SURESH RAMANATHAN and GEETA MENON*

Marketers and academics have long been interested in understanding what drives impulsive behavior and have focused on what causes a person to indulge. The three experiments reported in this article examine reasons that underlie urges that strengthen over time and cause people to overindulge from a goal-theoretic view of impulsiveness. The authors demonstrate that impulsivity is characterized by generalized reward sensitivity and by an activation of chronic goals to seek pleasure in various domains (Experiment 1). Furthermore, through a moment-to-moment tracking of desires, the authors demonstrate that such chronic goals, particularly in conjunction with temporarily primed goals, provide the momentum for impulsive people to override their self-control goals, leading to a strengthening of desires over time (Experiment 2). In turn, this causes impulsive people to behave even more impulsively when their activated hedonic goals are not satiated (Experiment 3). The findings suggest that contextual cues have powerful influences on impulsive behavior over time when acting in conjunction with chronic hedonic goals. The results have public policy implications for behaviors such as binge drinking and unrestrained eating.

Time-Varying Effects of Chronic Hedonic Goals on Impulsive Behavior

Most people believe that they are capable of controlling their impulses and desires. Yet statistics, such as 44.4% of students in undergraduate colleges across the country indulge in binge drinking, often suggest otherwise (Weschler et al. 2002). Furthermore, the incidence of overeating and obesity is considerably high; among Americans 20–74 years of age, 30.9% are classified as obese (Flegal et al. 2002). Such phenomena challenge the belief that people always have control over their desires and testify to tendencies not only to indulge but also to overindulge. Such impulsive acts are often attributed to personality traits, specifically, the extent to which a person is impulsive (e.g., Puri 1996; Rook and Fisher 1995). However, such personality scales help categorize people only as "impulsive" or "prudent" and predict whether a person might act impulsively, but they do not help determine the reasons for such impulsivity or account for how impulsively a person may act. Therefore, the purpose of this article is to provide a framework based on goal theory (1) not only to explain how situational cues can activate needs for pleasure and lead to urges to act impulsively, both among impulsive and prudent people, (2) but also to study how such urges come into conflict with self-control over time, leading to a period of intense ambivalence, and (3) to examine how impulsive and prudent people react differently over time to this ambivalence, leading to overindulgence among impulsive people and significantly reduced urges among prudent people. In this article, our interest is not just to show the immediate effects of a tempting contextual cue but also to draw a map of how desires change among different people over time. In summary, we propose a dynamic model of impulsive behavior based on goal activation.

THEORETICAL BACKGROUND

Impulsive behavior has been studied in a variety of domains such as shopping, gambling, eating, drinking, and

*Suresh Ramanathan is Associate Professor of Marketing, Graduate School of Business, University of Chicago (e-mail: sramana1@gsb.uchicago.edu). Geeta Menon is Professor of Marketing and Harold MacDowell Faculty Fellow, Leonard N. Stern School of Business, New York University (e-mail: gmenon@stern.nyu.edu). This article is based on the first author's dissertation under the supervision of the second. It was partially funded by the 2001 SCP-Sheth Dissertation Proposal Award that the first author won, as well as by the Beatrice Foods Co. Faculty Research Fund and the Kilts Center for Marketing at the Graduate School of Business, University of Chicago. The authors gratefully acknowledge the detailed feedback from members of the dissertation committee: John Bargh (co-chair of the committee), Tom Meyvis, Vicki Morwitz, Sankar Sen, and Patti Williams. They also thank Nidhi Agrawal, Ayelet Fishbach, Chris Janiszewski, Aparna Labroo, Ann McGill, and Bob Wyer for their comments on previous drafts of this article. The authors are indebted to Suchi Chandran for her assistance at various stages of this project and to Manoj Thomas for his assistance in data collection. Special thanks are due to Kalpana Suresh for painstakingly helping with data entry. Finally, they acknowledge the invaluable input and guidance provided by the late *JMR* editor, Dick Wittink, and the three anonymous *JMR* reviewers for their constructive comments. Baba Shiv served as guest editor for this article.

ISSN: 0022-2437 (print), 1547-7193 (electronic)

Journal of Marketing Research
Vol. XLIII (November 2006), 628–641

sex (for a review, see Baumeister, Heatherton, and Tice 1994), and several views have emerged from the literature on the mental processes underlying such behavior. Proponents of the cognitive view suggest that impulsive behavior arises from a tendency to overvalue benefits and undervalue long-term consequences (e.g., Ainslie and Haslam 1992; Puri 1996). According to this argument, people try to maximize the immediate utility of consumption, even as they come into conflict with the goal of maximizing a higher-order, long-term utility. Failures occur because people do not consider long-term costs unless they are certain and salient (Puri 1996).

An alternative view of impulsive behavior stresses the interplay between the affective and the cognitive systems (Hoch and Loewenstein 1991; Metcalfe and Mischel 1999; Shiv and Fedorikhin 2002). This body of work suggests that acts of indulgence are influenced by two separate processes: activation of spontaneous lower-order affective reactions in response to tempting stimuli and more deliberative affective and cognitive reactions. Thus, impulses have also been defined as "desires" that compete with a person's "willpower" (Hoch and Loewenstein 1991). Metcalfe and Mischel (1999) posit that impulses are guided by "hot" or affect-laden cognitions and often proceed to completion when "cold" or rational cognitions are underdeveloped. Shiv and Fedorikhin (2002) find evidence for the activation of appetitive or approach goals when lower-order affective reactions arose after exposure to a temptation.

All these accounts have largely focused on single-indulgence instances, but they do not address why some people overindulge over time by going on shopping splurges or eating excessively. In other words, what might be the qualitative differences in the mental processes for a person who succumbs to the occasional temptation and the person who cannot resist piling up multiple scoops of ice cream from the tub in the refrigerator? How soon do people succumb to such temptations? What happens to self-control in the process? To understand this, we draw from recent evidence on how desires are created (see Kavanagh, Andrade, and May 2005) and propose a dynamic model of impulsiveness based on hedonic or pleasure-seeking goals.

Central to our argument is Kavanagh, Andrade, and May's (2005) idea that desires are wishes or urges to gain pleasure, satisfy a want, or engage in consummatory behavior. Implicit in this definition is the notion that desires link into the motivational system through the activation of wants. Thus, the spontaneous affect, or "hot cognitions," we described previously not only represent immediate reactions but also map onto pleasure-seeking goals (Shiv and Fedorikhin 2002). Recent neurobiological evidence suggests that such desires are linked directly to the activation of a particular neuromodulator, namely, dopamine (Berridge 2003; Robinson and Berridge 2003). Furthermore, dopamine has been shown to be strongly associated with reward seeking and impulsiveness (Depue and Collins 1999).

On the basis of this evidence, we propose that impulsive behavior is driven by hedonic, or pleasure-seeking, goals that may cause a person to experience desires for related objects or products. Consistent with goal theory, such goals may also strengthen over time (Atkinson and Birch 1970). Importantly, such goals may conflict with other goals, such as to be frugal or to stay healthy, and cause intense ambivalence. Such conflicting goals are part of control processes that may ordinarily override temporary urges (Hoch and Loewenstein 1991). We argue that differences in behavior are borne out of the relative chronicity of the two goals. Impulsive people have stronger and chronic hedonic goals and weaker self-control goals, whereas prudent people are likely to have stronger self-control goals and weaker hedonic goals. Ultimately, therefore, behavior over time is determined by the relative strengths of an activated hedonic goal that rises in surgency and the goal to remain in control or be prudent. Our key point of departure from the previous literature on impulsive behavior is in the *dynamics* of the underlying processes. Specifically, we are concerned about what happens immediately after someone sees something tempting and about what happens when a desire has been activated and continues to linger on within the person. None of the extant literature on impulsive behavior makes this distinction. We now turn to a discussion of individual differences in these hedonic goals.

Impulsivity and the Chronicity of Hedonic Goals

Researchers who are interested in studying individual differences in behavior have examined impulsivity as a personality variable (e.g., Gray 1987; Puri 1996). For example, Gray (1987) defines impulsivity in terms of an overactive tendency to approach rewards and an underactive tendency to inhibit or avoid such behavior. However, there is an emerging body of literature that focuses on the motivational aspects of traits (e.g., Read and Miller 2002) and conceptualizes traits along two dimensions: the general level of activation of this "approach–avoidance" system and the specific chronicity of individual goals associated with the trait. Along the same lines, we conceptualize impulsivity both as a generalized higher sensitivity to rewards, as shown by the neurobiological studies we referred to previously, and as a specific bias toward different types of hedonic goals that manifest in the form of desires for specific stimuli related to these goals. We account for the notion that people seek and derive pleasure from multiple sources, as the literature also supports (e.g., Duncker [1941] differentiates among sensory, aesthetic, and accomplishment pleasure, and Dubé and Le Bel [2003] examine pleasure as a hierarchical concept). We define "hedonic goals" as the need to seek pleasure in any of these domains and "hedonic products" as those that are purchased and/or consumed primarily for their ability to provide feeling or pleasure rather than for their utilitarian value (Dhar and Wertenbroch 2000). These sources of pleasure are idiosyncratic paths to the realization of the overarching reward motivation. Frequent pursuit of the same paths is a source of chronic activation of specific hedonic goals related to those paths.[1] Thus, apart from a generalized reward-seeking tendency, impulsive people are also more likely to have specific hedonic goals and associated subgoals within idiosyncratic domains. Thus, people who derive a lot of pleasure from music are likely to be

[1]We recognize that another source of chronic activation is "hardwired" responses. Although some sources of pleasure are indeed likely to be hardwired (e.g., sweet tastes), others (e.g., appreciating fine wine or art) are likely to be acquired over time. We do not distinguish between hardwired and learned responses, as long as both processes lead to chronic accessibility of hedonic goals. We thank an anonymous reviewer for pointing this out.

especially responsive to cues in the environment that trigger this goal and thus frequently engage in impulse purchases of music CDs. Conversely, others may have subgoals that are related to sweetness and thus indulge themselves with a decadent dessert.

Based on the foregoing discussion, our first proposition is that impulsivity is characterized by chronic activation of both generalized and domain-specific hedonic goals. To test this proposition, we have three specific hypotheses related to the accessibility of hedonic goals, its effect on task performance, and the spillover effects on product evaluations when a hedonic subgoal is suppressed.

Fazio (1995) argues that reaction times (i.e., response latencies) associated with reporting attitudes are reflective of their accessibility in memory. An important source of such accessibility in memory is frequent instantiation of the same or similar behaviors in response to underlying goals (Bargh et al. 1986). The more frequently a person has engaged in a set of behaviors, the more likely they are to be associated with his or her self-identity and be easily retrieved in response to measures of this identity. Menon and Raghubir (2003) suggest that such ease of retrieval could be experienced outside of awareness and effortlessly. On the basis of this underlying logic, Higgins, Shah, and Friedman (1997) examine differences in chronic regulatory focus by examining the accessibility of associated traits and descriptors. We use this paradigm to hypothesize about the chronic accessibility of reward-seeking tendencies among impulsive people:

H_1: (a) Impulsive people will respond faster than prudent people to measures of reward-seeking tendencies, but (b) there is no difference between impulsive and prudent people on measures that are unrelated to reward seeking.

Although the response latency measure yields useful insights into prior behavior, it does not indicate whether impulsive people have generalized hedonic goals that might direct future behavior. Previous research on reward responsiveness has shown that monetary rewards are linked directly to dopaminergic activity, which leads to greater motivation to respond (Montague, Hyman, and Cohen 2004). Furthermore, Depue and Collins (1999) find greater dopamine activity among people who score high on extraversion and impulsiveness. On the basis of this evidence, we hypothesize the following:

H_2: Impulsivity interacts with the type of task such that (a) impulsive people will perform better on tasks that carry monetary rewards as opposed to those that are unrewarded, but (b) there will be no difference in performance across type of task for prudent people.

In addition to the generalized responsiveness to reward that characterizes impulsive people, we hypothesize that there is an increased sensitivity to specific sources of pleasure that becomes activated only in the presence of relevant situational cues. Thus, we examine domain-specific goals related to pleasure to establish that situational cues interact with traits in influencing desire. We use a paradigm of goal incompleteness and persistence to demonstrate this point. For example, Zeigarnik's (1938) classic study shows that people tend to recall more goal-relevant cues when they are interrupted in their pursuit of a goal. Moskowitz and colleagues (1999) show that failure to achieve a goal strengthens the tension to attain the goal and causes people to use subsequent behavior to compensate. If, as we hypothesize, impulsivity is associated with chronic subgoals to seek pleasure in various domains, we should observe a similar effect among impulsive people. Specifically, forcing impulsive people to give prudent responses to a set of tempting situations within a particular domain of pleasure should cause them to overcompensate on a subsequent product evaluation task but only for products related to the violated subgoal. We should not observe this effect for products that are not related to the violated subgoal. In contrast, if people do not possess such chronic goals, their evaluations should be consistent with the constructs or goals being activated by the prudence manipulation and, thus, become lower over time.

H_3: Impulsivity interacts with subgoal condition and time such that (a) when the goal is violated (i.e., after a prudent response), (i) impulsive people will evaluate products related to the subgoal higher than their baseline—this effect will not manifest for products, regardless of whether they are hedonic or neutral, that are unrelated to the subgoal—and (ii) prudent people will evaluate products related to the subgoal lower than their baseline—this effect will not manifest for products, regardless of whether they are hedonic or neutral, that are unrelated to the subgoal. (b) When the goal is not violated, impulsive and prudent people will not differ in their evaluations of any product over time, mimicking the control condition.

Dynamics of Chronic Hedonic Goals and Conflict with Self-Control Goals

Although the previous theorizing implies that impulsive people may possess strong reward-seeking goals, such goals are not the only ones in operation. Research suggests that people also possess goals to be frugal or healthy or to exercise control (Fishbach, Friedman, and Kruglanski 2003). Although most accounts of impulsive behavior agree that people experience a conflict between desire and willpower (e.g., Hoch and Loewenstein 1991), relatively little is known about the interplay of two countervailing forces over time. Hoch and Loewenstein (1991) provide a flavor of the dynamics involved when they suggest that unmet desires increase over time because of shifts in the reference point that cause a greater sensitivity to deprivation. Consumers have also reported the feeling of desires gnawing away at them until they acted on them (Rook 1987). Conversely, self-conscious emotions, such as guilt or regret for prior behaviors, may also become increasingly accessible (Giner-Sorolla 1999), thus activating goals to maintain self-control or exercise willpower. Ultimately, behavior is determined by what wins out in the race between the rising surgency of an activated hedonic goal and the inhibitory effects of the alternative prudence goal.

According to goal systems theory (Kruglanski et al. 2002), goals are represented in the mind in the form of cognitive structures. Furthermore, goals that are often activated together may form automatic associations that are either facilitative or inhibitory (Shah, Friedman, and Kruglanski 2002). Successful self-regulators (or those whom we label as prudent) with a relatively low commitment to hedonic goals have been shown to activate automatically the higher-order self-control goals that help them override a momen-

tary temptation (Fishbach, Friedman, and Kruglanski 2003). Thus, when such people are presented with a temptation, they should automatically experience an avoidance reaction, consistent with the activation of the higher-order control goal. Having successfully shielded their goal of self-control from the temptation, such people should feel no sense of violation and thus display a stable, conflict-free pattern of evaluation over time. What might happen if prudent people are primed with a hedonic goal and then presented with a temptation? Shah and Kruglanski (2002) note that such people may be strongly committed to being in control and therefore able to shield this goal from unconscious primes of social or other temptations. However, it is not known whether such goal shielding comes into play immediately or emerges over time. Bargh and Chartrand (1999) suggest that opposing goals can be contextually primed, leading them to compete for processing resources. Similarly, Shah and Kruglanski (2002) show that participants' focus on a current goal was disturbed when they were primed with an alternative goal. Thus, we expect prudent people to experience a temporary desire for a temptation when they are primed with a hedonic goal; however, we do not expect the effects of such hedonic goal activation to last long, and chronic goals to stay in control may reassert themselves. In the process, prudent people are also likely to feel strong ambivalence or conflict and a sense of goal violation as a result of having temporarily "succumbed" to the momentary allurement. This should lead to a renewed attempt to shield their goal of staying in control from the temptation (Shah, Friedman, and Kruglanski 2002), thus causing a devaluation of the temptation and a reduction in felt ambivalence.

Conversely, impulsive people may be more motivated to seek pleasure. Giner-Sorolla (1999) finds that low self-control is associated with faster activation of positive hedonic emotions, such as pleasure and joy. Shiv and Fedorikhin (1999, 2002) find that impulsive actions are characterized by the experience of spontaneous low-road affect that leads to the activation of appetitive goals. Thus, the immediate reaction to something tempting among people who are impulsive is likely to be one of strong desire. This effect is likely to be stronger when such people are primed with a hedonic goal related to the same domain. That is, if hedonic goals related to sweetness are contextually primed, we expect a facilitative effect among impulsive people because the intergoal connections for chronic and temporary goals strengthen each other (Shah, Friedman, and Kruglanski 2002); this may also be due to additivity of chronic and temporary sources of activation (Bargh et al. 1986). With the passage of time, however, we expect that the spontaneous approach motivation comes into conflict with the goal to stay in control. Giner-Sorolla (1999) suggests that these self-conscious reactions are slower to emerge. Such conflict between desires and willpower is likely to lead to intense ambivalence. Vallacher, Novak, and Kaufman (1994) find that the experience of ambivalence is characterized by significant levels of volatility in moment-to-moment reactions. Thus, we expect that impulsive people will demonstrate a greater level of volatility in their reactions than prudent people, but this volatility will emerge only after some time has elapsed. However, it is maladaptive for people to continue experiencing such ambivalence. Two forces are at play: First, because a chronic subgoal related to sweetness has been activated and not satiated, it could continue to operate on the person; second, ambivalence may lead to depletion of conscious resources available to exercise control (Baumeister and Vohs 2003), which in turn could lead to a resurgence of the desire for something sweet. Regardless of which explanation holds true, we expect that delay will cause ambivalence to give way to increasing want and a decrease in volatility.

To examine these ideas formally, we hypothesize the following:

H_4: Impulsivity interacts with a primed goal and time in influencing approach toward tempting stimuli such that (a) impulsive people will show a quadratic trend, with stronger reactions in the beginning and the end; (b) this effect will be stronger when impulsive people are primed with a sweetness goal; (c) prudent people who are primed with a sweetness goal will show a linear trend, with the strongest reactions in the beginning and declining thereafter; and (d) prudent people who are not primed will not experience an approach reaction after exposure to the temptation.

H_5: Impulsivity interacts with time in influencing volatility such that (a) impulsive people will show a quadratic trend in volatility with peak ambivalence occurring in the middle and (b) prudent people will show a linear trend in volatility with peak ambivalence occurring in the beginning.

Effect on Behavior

We conjecture that impulsive people primed with situational hedonic cues related to a specific subgoal are likely to resolve their ambivalence from weakly active self-control goals and to experience an increasing desire with time. Consistent with this idea, we expect that these strengthening hedonic goals will lead to an increase in the tendency to act impulsively over time because the goal has not been satiated. In contrast, because prudent people are more likely to have stronger self-control goals, we expect that they will be only temporarily susceptible to the effects of situational cues that prime opposing goals (Shah and Kruglanski 2002). In other words, the effect of priming subgoals in a specific domain should be observed for a very short time, after which it should wear off such that these people revert to being nonimpulsive after a delay. Thus,

H_6: If an activated hedonic goal has not been satiated, (a) there will be a greater tendency toward impulsive behavior among impulsive people after a delay, and (b) there will be a decreased tendency toward impulsive behavior among prudent people after a delay.

We organize the rest of the article as follows: In Experiment 1, we test H_1–H_3 and provide evidence for our basic proposition that impulsive people have chronic pleasure-seeking goals, both generalized and domain specific. In Experiment 2, we prime one specific subgoal, a want for something sweet, and show that such primed goals create increased urges over time among impulsive people such that they are able to override self-control and ambivalence, whereas prudent people experience short-term urges that dissipate rapidly (H_4–H_5). Finally, in Experiment 3, we show that the primed goal leads to increased indulgence among impulsive people over time but causes prudent people to act impulsively temporarily and revert to being prudent over time (H_6).

EXPERIMENT 1: IMPULSIVITY AND CHRONIC HEDONIC GOALS

Method

Ninety-six undergraduate students in a large midwestern university participated in this study for a monetary compensation of $6. We conducted the study in two stages approximately three weeks apart. In the first stage, participants completed a task called the "card assortment reward responsiveness objective task" (Al-Adawi, Powell, and Greenwood 1998), which measured their generalized hedonic goals and response latencies. This task uses a set of cards imprinted with five-digit numbers, each of which uniquely has the digits 1, 2, or 3 appearing in any of the five positions just once. The respondent's task was to sort the cards into three piles on the basis of the presence of one of the three distinguishing digits. In the first trial, the respondent sorted 60 cards. In the next three trials, the respondent sorted 100 cards within the time he or she took to sort the 60 cards. Trials 2 and 4 were unrewarded, and Trial 3 offered the respondent a reward of $.20 for every five cards sorted. Participants then completed a series of unrelated filler tasks, including the Singelis scale for individualism–collectivism. Then, they indicated how impulsive they were on the 12-item consumer impulsiveness scale (CIS) (1 = "usually describes me," 7 = "seldom describes me"; Puri 1996) and the 20-item behavioral activation system/behavioral inhibition system scale (Carver and White 1994). The computer also recorded the time participants took to respond to each of these scale items.

In the second stage, participants were contacted approximately three weeks later for a goal-violation task, which we adapted from the work of Moskowitz and colleagues (1999). In groups of three to seven people, participants completed two additional sets of tasks. They first rated a set of 15 pictures (10 hedonic, 5 utilitarian) of various objects with respect to how much they liked the product featured in the picture on a nine-point semantic differential scale anchored by 1 ("dislike very much") and 9 ("like very much").[2] They then completed a distraction task that required them to find the names of various car models in a word puzzle. Following this task, participants completed one of two prudence-induction tasks that were meant to induce a feeling of goal violation in desires for sweet and savory foods. They read three situations that featured a common temptation (e.g., "You are standing in line at Starbucks and see those delicious muffins on display"). Participants were asked to click on the button that best described how they would feel in that situation. Each of the three options was designed to be a prudent response.[3] We also included a control group that completed only the rating task without any intervening prudence manipulation.[4]

Next, participants were again presented with the set of 15 pictures with the order rotated randomly and asked to indicate how much they liked or disliked each product. The cover story was that we were interested in knowing whether their gut responses were stable. After another distraction task, we again elicited participants' self-reports of impulsivity using Puri's (1996) CIS. Finally, participants indicated how health conscious and hungry they were on seven-point scales (1 = "not at all," 7 = "very much").

Results

Categorizing impulsive people and prudent people. Following the work of Puri (1996), we categorized participants who had a score below the median on the hedonic subscale and above the median on the prudence subscale as impulsive (n = 34) and those who scored above the median on the hedonic subscale and below the median on the prudence subscale as prudent (n = 36). We categorized the rest as moderates (n = 26) and discarded them from our analyses because the hypotheses pertain only to impulsive people and prudent people.[5]

H_1. We computed the average response latencies to the CIS (separately for the prudence and the hedonic subscales) and to the Singelis scale and logarithmically transformed them on 68 participants, after discarding two outliers that were more than three standard deviations from the mean. A multivariate analysis of variance with impulsivity as the independent variable and log latencies for the three scales as dependent variables was significant ($F(3, 64) = 5.15$, $p < .01$). Further univariate tests showed that there were significant differences between impulsive and prudent people on response latencies for the hedonic subscale ($M_{impulsive}$ = 2752 milliseconds, $M_{prudent}$ = 3230 milliseconds; $F(1, 66) = 4.53$, $p < .05$), thus confirming H_{1a}. Conversely, prudent people were directionally faster to respond to measures on the prudence subscale ($M_{impulsive}$ = 2973 milliseconds, $M_{prudent}$ = 2706 milliseconds; $F(1, 66) = 2.55$, $p = .12$). However, impulsive people were no different from prudent people on the neutral Singelis scale ($M_{impulsive}$ = 4322 milliseconds, $M_{prudent}$ = 4656 milliseconds; $F(1, 66) = 1.52$, $p = .23$), thus confirming H_{1b}. This suggests that faster response times were not just due to differences in motoric response between impulsive and prudent people. Together, these data provide evidence that the CIS impulsivity measures tap into chronic accessibility and pursuit of hedonic goals and show that impulsive people have higher reward

[2]Following the work of Dhar and Wertenbroch (2000), we defined hedonic products as those that are bought or consumed primarily for enjoyment or as those that gave the respondent pleasure, whether sensory, emotional, or mental, as a result of purchase or consumption. We conducted a pretest of 41 participants to establish the degree to which 50 products were determined to possess hedonic qualities. Respondents classified these products, pictures of which appeared on the screen, as "primarily functional," "primarily hedonic," "both hedonic and functional," and "neither hedonic nor functional." The 10 products chosen for their hedonic value were all rated by more than 50% of participants as "primarily hedonic," thus indicating a greater than chance perception of their hedonic nature (p values for all chi-squares < .05). The 5 neutral products were similarly rated as primarily functional. Of the 15 products, 5 could be classified as sweet foods (ice cream, assorted danishes, strawberry cake, chocolate truffles, and tarts); 5 could be classified as savory foods (chips, pizza, burger, steak, and nachos); and 5 could be classified as utilitarian items, both durable and nondurable (bathroom cleaner, pens, paper towels, lawn mower, and washing machine).

[3]For example, in the case of muffins, the three prudent responses were (1) "Muffins are high on sugar and you are concerned about your health," (2) "You consider muffins an unnecessary temptation," and (3) "You are concerned about adding extra pounds to your waist or hip line." Details of the procedure are available on request.

[4]We thank an anonymous reviewer for suggesting that we include a control condition on nonhedonic products to clarify our results.

[5]We ran a linear regression on the complete data set, using scores on the two impulsiveness subscales, goal condition, gender, and respective interaction terms as predictors of Time 2 ratings of each of the product categories (we used Time 1 ratings as covariates); the results were identical, and we do not present them here because of space constraints.

sensitivity and drive that are part of their chronically accessible selves.

H_2. To yield a measure of reward sensitivity, we computed the average number of cards sorted on the unrewarded trials and the number of cards sorted on the rewarded trials and ran a mixed analysis of covariance with impulsivity as a between-subjects factor and type of task (rewarded versus unrewarded) as a within-subjects factor. This analysis yielded a significant main effect of type of task ($M_{rewarded}$ = 75.6 versus $M_{unrewarded}$ = 73.5; $F(1, 68) = 40.6$, $p < .001$), qualified by a significant interaction between impulsivity and task ($F(1, 68) = 29.8$, $p < .01$), such that impulsive people showed reward sensitivity by sorting more cards on the rewarded trials than on the nonrewarded ones ($M_{rewarded}$ = 77.4 versus $M_{unrewarded}$ = 73.4; $F(1, 68) = 68.1$, $p < .001$), thus confirming H_{2a}. However, prudent people were indifferent to rewards ($M_{rewarded}$ = 73.9 versus $M_{unrewarded}$ = 73.6, $F < 1$), thus confirming H_{2b}. These data provide evidence that impulsive people have a higher generalized sensitivity to a reward that manifests in reward-seeking behavior.

H_3. We ran a mixed, multivariate analysis of covariance on evaluations of the three product types with the time of measurement as a within-subjects factor; goal condition, impulsivity, and gender as between-subjects factors; and state of hunger and health consciousness as covariates. This analysis revealed a significant main effect of gender (multivariate $F(3, 54) = 2.74$, $p = .05$); men had a higher evaluation of savory products than women (M_{male} = 6.77, M_{female} = 5.73; $F(1, 56) = 7.93$, $p < .01$). There was no difference in the evaluations of any of the other products across gender, and gender did not interact with any other variable.[6] Although hunger was significant as a covariate (multivariate $F(3, 54) = 3.48$, $p < .05$), it did not interact with any of the other independent variables. Health consciousness was not significant as a covariate. None of the other lower-order effects were significant. Cell means appear in Table 1.

Consistent with H_3, there was a significant three-way interaction among time, goal condition, and impulsiveness (multivariate Wilks' lambda: $F(6, 108) = 4.06$, $p < .01$). Univariate tests confirmed that these interactions were significant for both types of hedonic products (sweet foods: $F(2, 56) = 8.03$, $p < .01$; savory foods: $F(2, 56) = 3.17$, $p = .05$) but not for the neutral utilitarian products ($F(2, 56) = 1.57$, $p = .22$).

We made simple pairwise comparisons between impulsive people and prudent people using the Sidak adjustment for multiple comparisons between Time 1 and Time 2 evaluations. Impulsive people demonstrated compensatory behavior for each of the hedonic product types when they were forced to be prudent in the corresponding domains. Thus, suppressing the sweetness subgoal caused impulsive people to evaluate sweet foods higher at Time 2 (M_{time1} = 6.35, SE = .45; M_{time2} = 6.95, SE = .47; $p = .01$) but had no effect for the other products (for all comparisons, $p > .10$). Similarly, suppressing the savory subgoal led impulsive people to evaluate savory products higher at Time 2 (M_{time1} = 5.99, SE = .42; M_{time2} = 6.35, SE = .42; $p < .05$) but not any of the other products (for all comparisons, $p > .10$). These results support $H_{3a(i)}$. The sweetness subgoal task that caused prudent people to evaluate sweet foods lower at Time 2 (M_{time1} = 5.94, SE = .38; M_{time2} = 5.53, SE = .39; $p < .01$) had no effect on their evaluations for the other products. We obtained similar patterns for savory foods when the savory subgoal was suppressed (M_{time1} = 6.61, SE = .46; M_{time2} = 6.23, SE = .47; $p < .05$), thus confirming $H_{3a(ii)}$. Finally, in confirmation of H_{3b}, there were no significant differences in evaluations of utilitarian products, regardless of goal condition or impulsivity across all comparisons (for all comparisons, $p > .20$).

[6]We included gender because some of the products may be evaluated differently by men and women. The results indicate that the difference for savory products is driven by the lower liking for steaks and pizza by women, presumably because of concerns about diet.

Table 1

EXPERIMENT 1: EFFECTS OF GOAL SUPPRESSION ON CHANGE IN MEAN EVALUATIONS OF HEDONIC PRODUCTS

Dependent Measure = Nine-Point Semantic Differential Scale Anchored by "Dislike Very Much" and "Like Very Much"	*Sweet Foods*		*Savory Foods*		*Utilitarian*	
	Time 1	*Time 2*	*Time 1*	*Time 2*	*Time 1*	*Time 2*
Impulsive People						
Gustatory-sweet goal suppressed	6.34	**6.95****	6.53	6.66	4.75	4.54
	(.44)	(.46)	(.42)	(.41)	(.36)	(.40)
Gustatory-savory goal suppressed	6.27	6.28	6.00	**6.39***	4.62	4.63
	(.41)	(.42)	(.39)	(.39)	(.34)	(.38)
Control (no goal suppressed)	6.29	5.93	6.03	6.04	4.70	4.78
	(.52)	(.52)	(.48)	(.48)	(.42)	(.47)
Prudent People						
Gustatory-sweet goal suppressed	5.95	*5.53***	5.92	6.03	4.92	4.90
	(.37)	(.38)	(.34)	(.34)	(.30)	(.33)
Gustatory-savory goal suppressed	6.01	6.09	6.59	*6.17**	4.65	4.70
	(.45)	(.45)	(.36)	(.35)	(.37)	(.41)
Control (no goal suppressed)	5.86	5.93	6.21	6.21	4.98	4.77
	(.56)	(.56)	(.53)	(.52)	(.46)	(.51)

*$p < .05$.

**$p < .01$.

Notes: Numbers in parentheses are standard deviations. Bold numbers indicate hypothesized increases in evaluations, and italicized numbers indicate hypothesized decreases in evaluations.

Discussion

The results we obtained in this experiment indicate that there is a significant link between impulsiveness and pleasure seeking, both at a generalized level and in specific domains. Impulsive people are more likely to show sensitivity to extrinsic rewards, as we observe in the card-sorting task. They are faster to respond to measures of reward seeking, presumably because of chronic accessibility of such behavior in the past. They are also likely to be committed to specific hedonic goals in various domains and therefore experience a feeling of incompleteness when these goals are violated. Thus, the prudence task may have conflicted sharply with the chronic pleasure-seeking goal. This leads to compensatory behavior in terms of higher evaluations of hedonic products. Importantly, although both impulsive and prudent people expressed similar levels of liking for the products at Time 1, only impulsive people showed this compensatory behavior at Time 2, suggesting that the increased liking is due to differential activation of desires.

An alternative explanation for our findings for impulsive people could be that the prudence task created a contrast effect either by way of comparison to an exemplar or through correctional adjustment.[7] The comparison theory holds that primes may activate either moderate or extreme exemplars of a category, and if the target object is less extreme than the exemplar being primed, a contrast effect may ensue (Herr 1986). Given that the behaviors in our prudence task were commonplace examples of exercising self-control and also that they referred to the participant's own exercise of such self-control rather than that of someone else, it is not likely that the task activated any extreme exemplars. The correctional adjustment theory holds that people may perceive a prime as a biasing influence and thus correct their judgments by subtracting the bias (Martin 1986). Although the correctional adjustment argument cannot account for the finding that only impulsive people demonstrate a contrast effect, it is still a viable explanation. However, this process is effortful and requires cognitive resources (Moskowitz and Skurnik 1999). Thus, respondents must take a greater amount of time to make the second evaluation than they did to make the first one. However, we found no such evidence for any of the product categories.[8]

Together, the evidence suggests that impulsive people have chronic pleasure-seeking goals, both at a general level, as shown by our data on the card-sorting task, and at a domain-specific level, as shown by the data on situation-specific compensatory behavior. Importantly, unless these chronic subgoals in various domains are activated, they do not have an effect on evaluations or desires for indulgences. Thus, for example, unless the sweetness subgoal is activated, impulsive people do not report an increase in desire for sweet foods. In addition, although most impulsive people are likely to have generalized reward-seeking goals, not all of them are expected to have chronic sweetness or savory subgoals. Thus, a person who acts impulsively in a shopping situation may not undertake risky gambles at a casino. Although 31 of the 34 (91%) self-reported impulsive people exhibited reward sensitivity on the card-sorting task (whereas only 12 of 36 [33%] prudent people did), suggesting that this is a more generalized goal, we observed compensatory behavior among 6 of 11 (55%) impulsive people in the sweetness goal condition and 8 of 15 (53%) impulsive people in the savory goal condition. Thus, our data provide support for the idea that, in general, most impulsive people are more responsive to rewards but are not likely to show increased desires for all hedonic products unless their chronic subgoals are activated. Furthermore, only a subset of impulsive people shows this compensatory behavior, suggesting that these chronic subgoals are individual specific. Having established that impulsive people possess chronic pleasure-seeking goals at varying levels of specificity, we now examine how these goals may interact with goals to stay in control or exercise willpower over time.

EXPERIMENT 2: THE CONFLICT BETWEEN DESIRE AND SELF-CONTROL

We test H_4 and H_5 in Experiment 2 by exploring the dynamics of goal conflict among impulsive and prudent people through a novel moment-to-moment tracking of their approach and avoidance reactions to a temptation. We exposed people to a tray filled with cookies and elicited their spontaneous reactions with a joystick that sampled evaluations every second. Our goal in this experiment was to show that the differences in levels of chronicity of hedonic goals we demonstrated previously would have a material effect on how people react to temptations. We predicted that impulsive people would react by spontaneously activating their hedonic goals and thus show an immediate approach reaction toward the cookies (Shiv and Fedorikhin 2002), whereas prudent people would react by spontaneously activating their higher-order goals to stay in control or to be healthy and thus show an immediate avoidance reaction in the same situation (Fishbach, Friedman, and Kruglanski 2003). Furthermore, we expected that impulsive people would experience ambivalence as their relatively weaker control goals began to come into conflict with their immediate desire for the cookies. However, we expected this ambivalence to be overcome by the power of the unsatiated desires.

We also wanted to examine what would happen when people were primed with a hedonic goal before seeing the temptation. Whereas we expected impulsive people to show additive effects of the chronic and temporary sources of goal activation, we expected prudent people to react in accordance with the primed goal initially because the strong linkages between the primed goal and the means (cookies) would potentially inhibit the chronic goal of staying in control. However, we did not expect this effect to last long, because prudent people were likely to realize that their chronic goals were being violated by their reactions and thus would trigger goal-shielding mechanisms to protect their chronic goal from the debilitating influence of the temptation.

[7]We thank an anonymous reviewer for pointing this out.

[8]Most notably, Time 2 response times for impulsive people in both suppression conditions were no slower than in the control–no suppression condition (Sweet: $\bar{x}_{sweetness}$ = 1443 milliseconds versus $\bar{x}_{control}$ = 1375 milliseconds, $p > .10$; Savory: $\bar{x}_{savory}$ = 1456 milliseconds versus $\bar{x}_{control}$ = 1416 milliseconds, $p > .10$).

Method

Seventy-eight undergraduate students at a midwestern university participated in this study in return for a compensation of $5. Half of the participants were first primed with a sweetness-related subgoal using a scrambled-sentence task (Srull and Wyer 1979), and the other half completed a neutral version of the same task. Examples of sentences priming the sweetness subgoal include "is white will the ice-cream," "watching I enjoy television sweet," and "off some take dessert time." In the priming condition, 8 of the 20 sentences primed the sweetness subgoal, and the other 12 were neutral in content. In the neutral condition, all 20 sentences were neutral in content. Participants were then told that they were taking part in a task in which they needed to indicate their spontaneous feelings about a product. An assistant brought out a tray filled with cookies and replenished it every hour. Participants were instructed to focus for the next three minutes on the items on the tray and indicate how close they felt toward the items (or wanted them) at that very instant by pulling a joystick toward themselves or how distant they felt from the items (or felt like avoiding them) by pushing the joystick away. A slider on screen mapped these movements onto an 11-point vertical scale, anchored by 0 ("very distant") and 10 ("very close"), continuously over three minutes, with the joystick capturing movements every .1 seconds and averaging to 1 second. Thus, we have 180 data points per respondent. Next, respondents indicated their felt emotions and summary measures on felt urges. After a series of filler tasks that lasted half an hour, they completed the CIS. On the basis of the same criteria that Puri (1996) used (see the relevant discussion in Experiment 1), we classified 44 of the respondents as either impulsive (n = 20) or prudent (n = 24).

Results

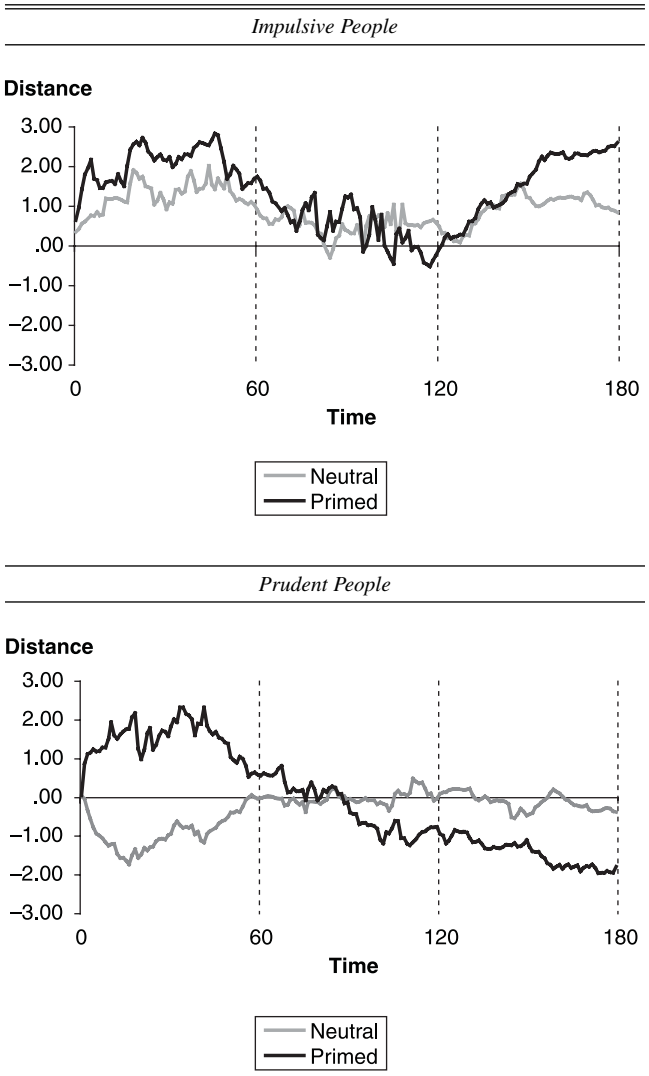
We averaged the distance data across all participants according to goal condition (primed versus neutral) and impulsivity (impulsive versus prudent). Figure 1 presents the trajectories for impulsive and prudent people in the two goal-prime conditions. We first provide a descriptive presentation of the results based on Figure 1, followed by a statistical one.

Description of the pattern of results. Four patterns emerge from the data in Figure 1. First, impulsive people who were primed with the sweetness goal showed a strong desire for the cookies after being exposed to the cookies (lasting approximately 50 seconds), followed by a period of ambivalence (lasting approximately 70 seconds) that gave way to another increase in desire. Second, prudent people who were primed with the sweetness goal showed a similar strong desire for the cookies, but it was only temporary (approximately 40 seconds) and gave way to an equally strong avoidance reaction that persisted subsequently. Third, prudent people in the neutral condition showed a strong avoidance reaction immediately after being exposed to the cookies (lasting approximately 25 seconds), but this gave way to a stable, low-variance pattern soon after. Fourth, impulsive people in the neutral condition had a dampened version of the same pattern as those in the primed condition.

Statistical tests of hypotheses. To test the intrinsic dynamics in the system statistically, we used two measures:

Figure 1

EXPERIMENT 2: APPROACH/AVOIDANCE OVER TIME



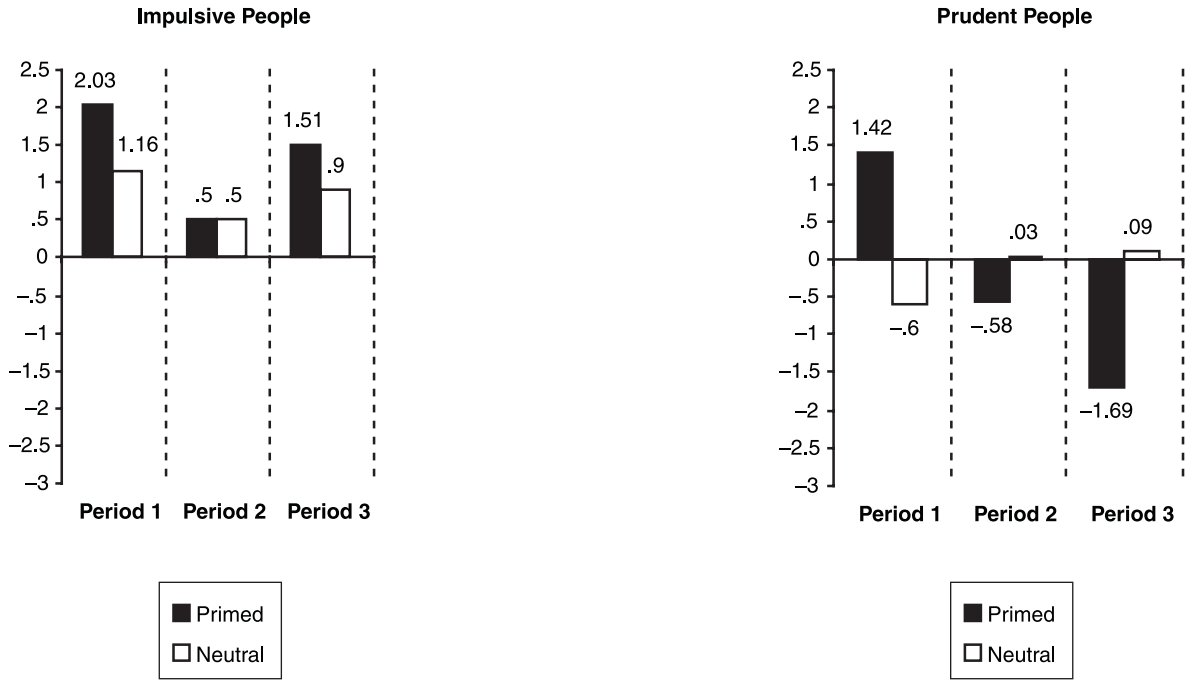
Notes: Positive distances from midpoint signify approach reactions, and negative distances signify avoidance reactions.

distance (for H_4) and absolute velocity (for H_5; see Vallacher, Nowak, and Kaufman 1994). Distance is simply the deviation of the joystick measure from the midpoint (i.e., 5) at which all participants began; it represents the moment-to-moment approach or avoidance reaction. The more positive the distance, the greater is the want for the cookies, and the more negative the distance, the greater is the need to avoid them. Absolute velocity is the absolute value of the change in distance per second; it represents the volatility in reactions to the stimuli. To examine whether participants' evaluations changed over time, we divided the total time into three equal intervals of 60 seconds (as indicated by the dashed gridlines in Figure 1) and derived the aforementioned measures of dynamics for each of these periods; these appear in Figure 2, Panels A and B.

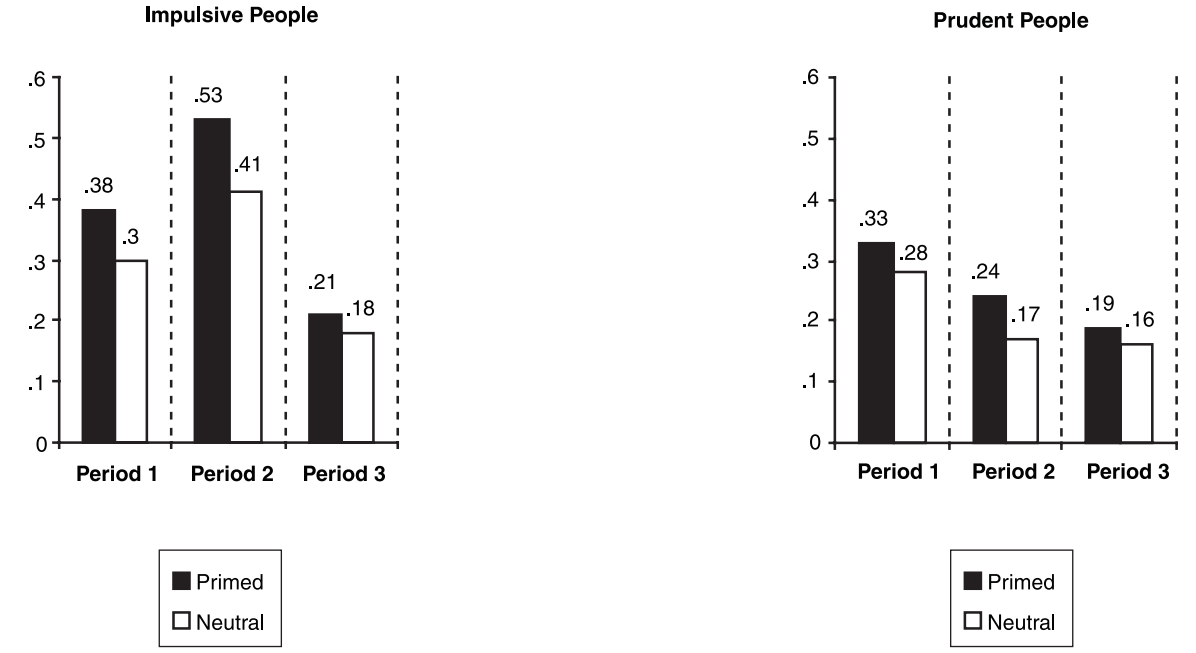
We entered distance and absolute velocity for each participant into a 2 (goal condition: sweetness versus neutral) × 2 (impulsivity: impulsive versus prudent) × 3 (period: first

Figure 2
EXPERIMENT 2: APPROACH/AVOID MOTIVATION (A) AND VOLATILITY (B) BY PERIOD

A: Distance from Midpoint



B: Absolute Velocity



Notes: In Panel A, positive distances signify approach reactions, and negative distances signify avoidance reactions. In Panel B, higher values of absolute velocity signify greater ambivalence and volatility.

versus second versus third) doubly multivariate analysis of variance with repeated measures on the last factor. We subsequently report the results of the omnibus multivariate tests followed by relevant contrasts for each of the measures. We report all multivariate statistics on the basis of Wilks' lambda.

Overall, there was a significant effect of period ($F(4, 37) = 9.80$, $p < .01$) for both measures. There was also a significant main effect for impulsivity ($F(2, 39) = 3.74$, $p < .05$). These effects were qualified by two-way interactions between impulsivity and time ($F(4, 37) = 5.34$, $p < .01$) and between goal condition and time ($F(4, 37) = 2.84$, $p < .05$). Finally, there was a significant three-way interaction among goal condition, impulsivity, and time ($F(4, 37) = 2.59$, $p = .05$).

For distance, contrasts showed that impulsive people reported a stronger desire for the cookies than did prudent people ($M_{impulsive} = 1.06$, $M_{prudent} = –.22$; $F(1, 40) = 3.92$, $p < .05$). Furthermore, impulsive people showed a quadratic trend in distance ($M_{period1} = 1.44$, $M_{period2} = .50$, $M_{period3} = 1.21$; quadratic trend: $F(1, 40) = 6.06$, $p < .01$), in support of H_{4a}, whereas prudent people showed a linear trend ($M_{period1} = .41$, $M_{period2} = –.27$, $M_{period3} = –.80$; linear trend: $F(1, 40) = 8.15$, $p < .01$). Among impulsive people, distances in the first period were more positive in the primed condition than in the neutral condition ($M_{sweet} = 2.03$, $M_{neutral} = 1.16$; $F(1, 40) = 3.39$, $p = .07$), but distances in the second and third periods were no different from each other across goal condition ($F < 1$). Thus, H_{4b} is only partially supported. Prudent people primed with the sweetness goal showed a strong linear trend in their reactions to the cookies ($M_{period1} = 1.42$, $M_{period2} = –.58$, $M_{period3} = –1.69$; linear trend: $F(1, 40) = 21.53$, $p < .01$), in support of H_{4c}. Furthermore, they showed a greater want for the cookies than those in the neutral condition in the first period ($M_{sweet} = 1.42$ versus $M_{neutral} = –.6$; $F(1, 40) = 11.34$, $p < .01$) and a directionally higher avoidance reaction in the third period ($M_{sweet} = –1.69$ versus $M_{neutral} = .09$; $F(1, 22) = 2.57$, $p = .12$). There were no significant differences across time for prudent people in the neutral condition ($F(2, 39) = 1.27$, not significant). Thus, H_{4d} was supported.

For absolute velocity, contrasts showed that impulsive people had greater volatility than did prudent people ($M_{impulsive} = .34$, $M_{prudent} = .22$; $F(1, 40) = 3.99$, $p = .05$). Furthermore, impulsive people showed a significant quadratic trend in their absolute velocity ($M_{period1} = .34$, $M_{period2} = .47$, $M_{period3} = .19$; quadratic trend: $F(1, 40) = 11.54$, $p < .01$), in support of H_{5a}, whereas prudent people showed a significant linear trend ($M_{period1} = .30$, $M_{period2} = .20$, $M_{period3} = .17$; linear trend: $F(1, 40) = 11.41$, $p < .01$), in support of H_{5b}. Impulsive people had a higher absolute velocity in Period 2 than did prudent people ($F(1, 42) = 9.1$, $p < .01$).

Discussion

Experiment 2 provides a map of the ongoing mental processes that underlie the conflict between desire and willpower. By examining the moment-to-moment trace of felt desire, we are able to show not just what happens immediately after a person sees something tempting but also the feelings and conflicts experienced as he or she continues to be in its presence. We show the extent to which impulsive people experience ambivalence and conflict when faced with a temptation and how such ambivalence gives way to increasing desire, because the strength of the desire outweighs the inhibitory force of self-control.

Conversely, prudent people who were primed with the hedonic goal showed a temporary increase in desire for the cookies. This is because the primed hedonic goal inhibited the self-control goal, consistent with the idea that opposing goals could temporarily override preexisting ones (Shah and Kruglanski 2002). We found that these effects lasted a little longer (40–50 seconds) than the effects of mere semantic activation of constructs that are relatively short lived. We also found that such people were also more likely to show a stronger avoidance reaction with time, presumably because they felt a violation of their chronic self-control goals and felt the need to shield these goals from any further influence of desires, much as the impulsive participants did in Experiment 1 when they tried to shield their hedonic goals from the imposition of prudence. In contrast, prudent people who were not primed automatically activated their self-control goals, consistent with the pattern that Fishbach, Friedman, and Kruglanski (2003) obtained. Over time, because there was no sense of goal violation, such people did not feel any attraction toward the cookies, and their reactions were relatively neutral.

Our findings on volatility show that impulsive people experience significantly more conflict than do prudent people, particularly after the initial desire comes into conflict with subsequently activated self-conscious emotions or control goal. However, we observe a reduced volatility as the unsatiated desire among impulsive people strengthens, indicating an ability to cope with this ambivalence, potentially explaining the overpowering influence of desires on behavior among this group. We explore the effects of such unsatiated desires on actual behavior in Experiment 3.

EXPERIMENT 3: EFFECTS OF UNSATIATED HEDONIC GOALS ON IMPULSIVE BEHAVIOR

In Experiment 3, we test H_6 and examine how the effects of chronic and temporarily activated hedonic goals interact over time in driving not just whether a person acts impulsively but also how impulsively he or she does so. In other words, we examine not just the incidence but also the intensity of behavior. We use a different manipulation of subgoals related to sweetness—namely, a cereal-rating task in which the attributes are constructed to activate thoughts related to sweetness. We measure behavior by examining whether people pick up cookies from a tray when they are left alone in a room and, if so, how many cookies they pick up. We study such behavior over a time interval of five minutes, assuming that any ambivalence felt after the prime would have dissipated in favor of the primed goal in the case of impulsive people (as evidenced by the renewed desires in Experiment 2) and against the primed goal in the case of prudent people (as evidenced by the sharp decrease in desires in Experiment 2).

Method

Pretest for priming sweetness goal. Respondents were asked to evaluate and choose from among three brands of cereals rated on attributes that were either sweetness related or not (i.e., neutral). In the sweetness-primed condition, we used taste (described in terms of sweetness and the presence of raisins and nuts) and calories (described in terms of sugar

content) as the two attributes of interest, and we used crispiness and texture in the neutral condition.[9] Two additional attributes—namely, cost per ounce and sodium content—were held constant across the two conditions. We ran a pretest of the two conditions among 45 students. Respondents in the sweetness-primed condition reported a greater need for something sweet on a seven-point scale (M_{prime} = 5.14, $M_{neutral}$ = 3.71; F(1, 41) = 7.15, $p < .05$) than did those in the neutral condition. Therefore, we concluded that the priming manipulation would successfully activate the need for something sweet.

Procedure. Eighty-four undergraduate students at a large northeastern university participated individually in this experiment for partial course credit. All participants were primed with the sweetness goal using the cereal evaluation task described in the aforementioned pretest, after which they were assigned randomly to a delay or a no-delay condition. When participants in the delay condition completed the cereal evaluation task and the associated measures related to task difficulty and current mood states, they completed a second, unrelated task (embedded in the same questionnaire) that required them to find the names of eight cars in a word puzzle.[10] After the first task (and the second, in the delay condition), the participant immediately moved to an adjacent room. There was a tray of cookies placed on a table inside the room. As the experimenter ushered in the participant, he or she remarked that the cookies were from a departmental meeting that had just ended. The participant was left alone in the room for less than two minutes while the experimenter pretended to get the questionnaire. Unbeknownst to the participant, a Logitech Quickcam Pro video camera, with a motion detector that allows the recording of any motion that is beyond a set sensitivity limit, was attached to an IBM personal computer with its monitor turned off. It was focused on the tray of cookies so that it could record whether the participant picked up a cookie and how many. After an interval of approximately two minutes, the experimenter returned to the room with a questionnaire. We elicited confound check measures related to current moods, the CIS (Puri 1996), and the covariate measures on state of hunger as in Experiment 1.

Results

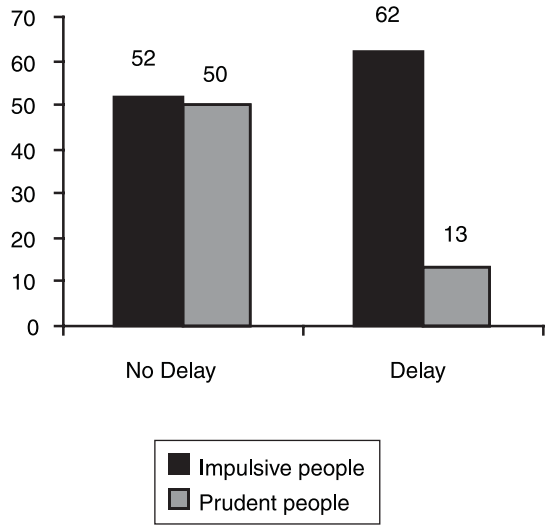
Impulsivity. On the basis of the same criteria as Puri (1996) uses, we classified 37 of the 84 participants as impulsive and 29 as prudent (the remaining were moderate, and we did not use them in the analysis). A test–retest procedure four weeks after the main experiment elicited self-ratings on the CIS from the same participants in a completely unrelated experiment. The correlation between the two measures was .88, indicating stability of the trait measures.

Choice. We used two objective measures of choice, determined from the motion video, for analyses in this experiment. We coded the first measure as a binary variable (1 = picked up cookie, and 0 = did not pick up a cookie). The second measure was the number of cookies picked up. Figure 3, Panels A and B, present the results.

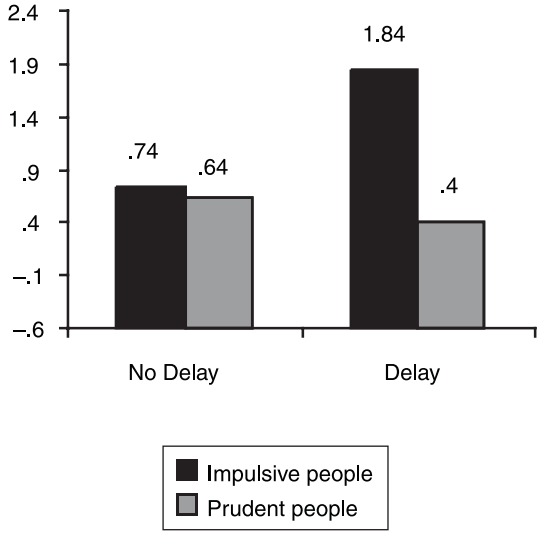
A binary logistic regression on choice incidence with state of hunger as a covariate revealed a significant main effect of impulsivity. Although 57% of the impulsive people picked up a cookie, only 31% of the prudent people did so (b = –1.87, odds ratio = .15, $p < .05$). Notably, there was an interaction between delay and impulsivity (b = 1.87, odds ratio = 6.50, $p < .05$); although the percentage of impulsive people who picked up cookies was not different in the delay

Figure 3
EXPERIMENT 3: INCIDENCE (A) AND INTENSITY (B) OF IMPULSIVE BEHAVIOR

A: Picking Up Cookies from Tray (%)



B: Number of Cookies Picked Up



[9]Note that though crispiness and texture may be considered hedonic attributes and may be relevant to activating desires for something crunchy (e.g., potato chips), we were interested in priming subgoals related to sweetness, which may not be related to these two attributes.

[10]A pretest among 25 participants indicated that this task took approximately ten minutes to complete and was rated moderately easy ($\bar{x}$ = 3.2 on a seven-point scale anchored by "very easy" and "very difficult").

versus no-delay conditions (62% versus 52%; $\chi^2(1) = .38$, $p = .54$), the introduction of a delay caused a sharp decrease for prudent people (13% versus 50%; $\chi^2(1) = 4.55$, $p < .05$). State of hunger was not significant.

Because there was skewness in the distribution of the number of cookies (greater number of zeroes than in a normal distribution), we ran a negative binomial regression on the number of cookies picked up, with impulsivity (through scores on the two subscales); delay condition; hunger; and interaction terms for delay, impulsivity, and hunger as independent variables. The model fit the data well (deviance $\chi^2(76) = 74.84$, $p = .48$) and had little or no overdispersion (deviance/d.f. = 1.01).[11] The analysis showed that there were significant main effects for delay (b = 4.78, $\chi^2(1) = 3.52$, $p = .06$) and for impulsivity, both on the hedonic subscale (b = .74, $\chi^2(1) = 12.27$, $p < .01$) and on the prudence subscale (b = –.71, $\chi^2(1) = 4.40$, $p < .05$), such that both delay and impulsivity were associated with increases in impulsive behavior. This was qualified by a significant interaction between delay and scores on the hedonic subscale (b = 1.08, $\chi^2(1) = 5.50$, $p < .05$). Further analysis using median splits on the impulsivity scales to determine impulsive people and prudent people supported H_4 such that delay caused a significant increase in the average number of cookies picked up by impulsive people ($M_{no\ delay} = .74$, $M_{delay} = 1.84$; $F(1, 61) = 6.79$, $p < .05$). However, delay did not cause a significant decrease in the number of cookies picked up by prudent people ($M_{no\ delay} = .64$, $M_{delay} = .40$, $F(1, 61) = .26$, $p > .10$). Note that hunger did not have a significant effect in any of the analyses.

Discussion

Experiment 3 shows that there is an increase in the intensity of the behavior for people with chronically accessible goals. Although there is no increase with delay in the percentage of impulsive people picking up cookies, there is an increase in the number of cookies picked up. This result is consistent with the finding in Experiment 1 that only a subset of impulsive people has chronic goals in a specific domain. The primed goal acts on this subset in strengthening the urge for something sweet over time, in line with the work of Atkinson and Birch (1970), who propose that cues in the environment could have a dynamic influence on the inertial tendency to engage in a given behavior. In addition, the scores on the hedonic subscale predict this behavior best, again suggesting that the reward-seeking aspect of impulsivity drives such impulses, particularly when they are not satisfied immediately. In the case of prudent people, there is no significant decrease in the number of cookies picked up. Rather, delay causes fewer people to act impulsively, presumably because being prudent implies not acting impulsively at all rather than merely reducing the intensity of indulgence. Thus, there are two different effects of delay on behavior, one in which the intensity of behavior is not affected and one in which the incidence of behavior is affected negatively.

[11]We also ran a Poisson regression on the same data and found that the model did not fit the data well (deviance $\chi^2(76) = 90.7$, $p = .09$) and was overdispersed (deviance/d.f. = 1.23).

An alternative explanation could be that these effects were induced by moods created by the delay manipulation, such that impulsive people tried to correct their negative moods by taking more cookies. However, confound checks on the mood ratings (both positive and negative) showed no significant differences across the conditions for both impulsive and prudent people.

Thus, Experiment 3 demonstrates the goal-driven properties of impulsive behavior. Activating subgoals related to the desire for something sweet led to temporary incidence of impulsive behavior among both impulsive and prudent people, but this activation wore off for prudent people, whereas it continued to strengthen over time for impulsive people, overcoming any conflict in the process.

GENERAL DISCUSSION

The results from the three experiments demonstrate that impulsive behavior is a function of the extent to which goals to seek pleasure in various domains are chronically accessible. We provide the first empirical model of impulsive behavior that systematically tests the motivational antecedents of impulsive behavior over time. Experiment 1 shows that trait impulsivity is associated with chronic hedonic goals that manifest both in generalized reward-seeking tendencies and in activation of situation-specific responses to sources of pleasure. Experiment 2 demonstrates that both impulsive and prudent people experience spontaneous desires after being primed with a hedonic goal immediately on perception of tempting stimuli. The differences between the two groups are most apparent when time elapses between the activation of the goals and the perception of the relevant stimuli. The chronic hedonic goals associated with impulsive people come into conflict with goals to stay in control, causing extreme ambivalence. However, this resolves in favor of the hedonic goal that continues to operate in the background and leads to a resurgence in desire. In contrast, among prudent people, the temporary activation of hedonic goals through priming causes a temporary increase in desire for the related product but a sharp compensatory avoidance reaction soon after. Experiment 3 examines the goal-driven properties of impulsive behavior, in which impulsive people display increased intensity of impulsive behavior over time after being primed with a hedonic goal, whereas prudent people display a decreasing tendency to act impulsively over time after being primed. Together, the three experiments support the argument that impulsive behaviors are primarily a function of the degree to which hedonic goals are chronically accessible. Impulsive people have chronic hedonic goals, the pursuit of which feeds back into the affective system and drives desires and resultant behavior. Such a model supports and builds on the affective–cognitive framework that Shiv and Fedorikhin (2002) propose. Although Shiv and Fedorikhin show that temptations could evoke lower-order affective reactions that lead to appetitive motivations, we argue that such lower-order affective reactions may stem from chronic hedonic goals that become spontaneously activated on perception of tempting stimuli in the environment.

Thus, our key proposition is that the overall reward motivation that underlies impulsivity is linked to multiple goals and subgoals of pleasure in various domains, each of which might be chronically accessible. Activating a goal to seek

pleasure in one domain through situational cues leads to an increasing desire for products or behaviors related to that goal that overrides willpower and a concomitant increase in the intensity of the behavioral tendency. Conversely, people who are less impulsive are not as likely to have such goals at a chronic level of activation. Thus, although situational cues may temporarily activate these goals, they are not likely to persist, either because of extinction or because of being overridden by naturally existing prudence goals. Notably, we find that this leads to a rebound effect in the opposite direction; prudent people who reacted positively to the cookies felt a sense of violation of their sense of self-control and thus compensated by reacting more negatively over time compared with the baseline. Furthermore, prudent people who were not primed showed an immediate avoidance reaction that is consistent with the findings of Fishbach, Friedman, and Kruglanski (2003), who show that temptations may prime willpower automatically among successful self-regulators. However, we did not find evidence for the persistence of this reaction.

Thus, our research contributes to the literature on impulsive behavior by demonstrating the dynamics of hedonic goals and associated want for products related to those goals. Current models of impulsive behavior describe it in a static sense and do not account for the motivational pull of the underlying reward-seeking tendencies of the impulsive person and associated desires. Thus, unlike Shiv and Fedorikhin (1999), who describe the experience of spontaneous affect in explaining choice of a cake over salad, we show, for example, that some people might actually end up taking more of the cake if the desire continues to linger in their minds. Current trait-based models also do not account for the notion that prudent people may sometimes succumb to temptations. Experiments 2 and 3 demonstrate that short-term activation of the need for something sweet can lead to impulsive behavior even among those who might otherwise be prudent.

A potential limitation of our findings lies in our use of the CIS (Puri 1996) to measure domain-specific impulsivity. The CIS is a generalized measure of impulsiveness in the consumer domain. Other, more specific measures, such as the behavioral activation system (BAS) scale, capture reward-seeking behavior, albeit not necessarily in the consumer domain. Our analyses show that there is a relatively small but significant correlation between the BAS scale and the hedonic subscale (overall, approximately .35). This suggests that not all reward seekers are impulsive. However, response times to the BAS scale were faster among impulsive people (3242 milliseconds, as measured by the CIS) than among prudent people (4194 milliseconds; $F(1, 65) = 11.28$, $p < .01$).

The three experiments we report in this research demonstrate consistently that impulsive behavior is driven by the activation of reward-seeking goals that then proceed to create a feeling of desire for objects related to those goals. It would be worthwhile to examine what happens when currently operating hedonic goals are frustrated. Prior work on goal frustration has shown that people are likely to ruminate extensively when they are prevented from attaining their goals (e.g., Martin and Tesser 1989). A question that arises, then, is whether people with chronic goals find alternate routes to goal attainment. Thus, would presenting impulsive people with alternative means of reaching a hedonic goal lead to a dampening of ruminations after frustrating the original goal?

Our findings have implications for marketers and public policy makers. Retailers often try to influence in-store behavior by using stimuli such as ambient scents, displays, coupons, and so forth. Our research suggests that there are dynamic effects of such activation on behavior, and it underscores the importance of delay as a strategic tool for manipulating behavior. If marketers could segment customers on the basis of their levels of impulsiveness, targeted cues aimed at activating specific hedonic goals could be given to such consumers before they enter the store. We expect such cues to have a powerful influence in driving impulsive behavior. We show that it is possible to activate chronic hedonic goals among impulsive consumers and that such activation manifests in a greater liking for products related to the goal in question and a greater intensity of impulsive behavior.

REFERENCES

Ainslie, George and Nick Haslam (1992), "Hyperbolic Discounting" in *Choice Over Time*, George F. Loewenstein and Jon Elster, eds. New York: Russell Sage, 57–92.

Al-Adawi, Samir, Jane Powell, and Richard Greenwood (1998), "Motivational Deficits After Brain Injury: A Neuropsychological Approach Using New Assessment Techniques," *Neuropsychology*, 12 (January), 115–24.

Atkinson, John W. and David Birch (1970), *A Dynamic Theory of Action*. New York: John Wiley & Sons.

Bargh, John A., Ronald Bond, Wendy Lombardi, and Mary Tota (1986), "The Additive Nature of Chronic and Temporary Sources of Construct Accessibility," *Journal of Personality and Social Psychology*, 50 (5), 869–78.

——— and Tanya L. Chartrand (1999), "The Unbearable Automaticity of Being," *American Psychologist*, 54 (7), 462–79.

Baumeister, Roy F., Todd Heatherton, and Dianne M. Tice (1994), *Losing Control: How and Why People Fail at Self-Regulation*. San Diego: Academic Press.

——— and Kathleen D. Vohs (2003), "Willpower, Choice, and Self-Control," in *Time and Decision: Economic and Psychological Perspectives on Intertemporal Choice*, George Loewenstein and Daniel Read, eds. New York: Russell Sage, 201–216.

Berridge, Kent C. (2003), "Pleasures of the Brain," *Brain and Cognition*, 52 (10), 106–128.

Carver, Charles S. and Teri L. White (1994), "Behavioral Inhibition, Behavioral Activation and Affective Responses to Impending Reward and Punishment: The BAS/BIS Scales," *Journal of Personality and Social Psychology*, 67 (2), 319–33.

Depue, Richard A. and Paul F. Collins (1999), "Neurobiology of the Structure of Personality: Dopamine Facilitation of Incentive Motivation and Extraversion," *Behavioral and Brain Sciences*, 22 (3), 491–569.

Dhar, Ravi and Klaus Wertenbroch (2000), "Consumer Choice Between Hedonic and Utilitarian Goods," *Journal of Marketing Research*, 37 (February), 60–71.

Dubé, Laurette and Jordan L. Le Bel (2003), "The Content and Structure of Laypeople's Concept of Pleasure," *Cognition and Emotion*, 17 (2), 263–95.

Duncker, Karl (1941), "On Pleasure, Emotion and Striving," *Philosophy and Phenomenological Research*, 1 (4), 391–430.

Fazio, Russell H. (1995), "Attitudes as Object-Evaluation Associations: Determinants, Consequences and Correlates of Attitude Accessibility," in *Attitude Strength: Antecedents and Consequences*, Richard E. Petty and Jon A. Krosnick, eds. Mahwah, NJ: Lawrence Erlbaum Associates, 247–82.

Fishbach, Ayelet, Ronald S. Friedman, and Arie W. Kruglanski (2003), "Leading Us Not into Temptation: Momentary Allurements Elicit Overriding Goal Activation," *Journal of Personality and Social Psychology*, 84 (2), 296–309.

Flegal, Katherine M., Margaret D. Carroll, Cynthia L. Ogden, and Clifford L. Johnson (2002), "Prevalence and Trends in Obesity Among US Adults, 1999-2000," *Journal of the American Medical Association*, 288 (14), 1723–27.

Giner-Sorolla, Roger (1999), "Guilty Pleasures and Grim Necessities: Affective Attitudes in Dilemmas of Self-Control," *Journal of Personality and Social Psychology*, 80 (2), 206–221.

Gray, Jeffrey A. (1987), "Perspectives on Anxiety and Impulsivity: A Commentary," *Journal of Research in Personality*, 21 (December), 493–509.

Herr, Paul (1986), "Consequences of Priming: Judgment and Behavior," *Journal of Personality and Social Psychology*, 51 (6), 1106–1115.

Higgins, E. Tory, James Shah, and Ronald S. Friedman (1997), "Emotional Responses to Goal Attainment: Strength of Regulatory Focus as Moderator," *Journal of Personality and Social Psychology*, 72 (3), 515–25.

Hoch, Stephen J. and George F. Loewenstein (1991), "Time-Inconsistent Preferences and Consumer Self-Control," *Journal of Consumer Research*, 17 (March), 492–507.

Kavanagh, David J., Jackie Andrade, and Jon May (2005), "Imaginary Relish and Exquisite Torture: The Elaborated Intrusion Theory of Desire," *Psychological Review*, 112 (June), 446–67.

Kruglanski, Arie W., James Y. Shah, Ayelet Fishbach, Ron Friedman, Woo Young Chun, and David Sleeth-Keppler (2002), "A Theory of Goal Systems," in *Advances in Experimental Social Psychology*, Vol. 34, Mark P. Zanna, ed. San Diego: Academic Press, 331–78.

Martin, Leonard L. (1986), "Set/Reset: Use and Disuse of Concepts in Impression Formation," *Journal of Personality and Social Psychology*, 51 (3), 493–504.

——— and Abraham Tesser (1989), "Toward a Motivation and Structural Theory of Ruminative Thought," in *Unintended Thought*, James S. Uleman and John A. Bargh, eds. New York: Guilford Press, 306–326.

Menon, Geeta and Priya Raghubir (2003), "Ease-of-Retrieval as an Automatic Input in Judgments: A Mere-Accessibility Framework?" *Journal of Consumer Research*, 30 (September), 230–43.

Metcalfe, Janet and Walter Mischel (1999), "A Hot/Cool-System Analysis of Delay of Gratification: Dynamics of Willpower," *Psychological Review*, 106 (1), 3–19.

Montague, P. Read, Steven E. Hyman, and Jonathan D. Cohen (2004), "Computational Roles for Dopamine in Behavioral Control," *Nature*, 431 (October), 760–67.

Moskowitz, Gordon B., Peter M. Gollwitzer, Wolfgang Wasel, and Bernd Schaal (1999), "Preconscious Control of Stereotype Activation Through Chronic Egalitarian Goals," *Journal of Personality and Social Psychology*, 77 (1), 167–84.

——— and Ian W. Skurnik (1999), "Contrast Effects as Determined by the Type of Prime: Trait Versus Exemplar Primes Initiate Processing Strategies that Differ in How Accessible Constructs Are Used," *Journal of Personality and Social Psychology*, 76 (6), 911–27.

Puri, Radhika (1996), "Measuring and Modifying Consumer Impulsiveness: A Cost-Benefit Accessibility Framework," *Journal of Consumer Psychology*, 5 (2), 87–113.

Read, Stephen J. and Lynn C. Miller (2002), "Virtual Personalities: A Neural Network Model of Personality," *Personality and Social Psychology Review*, 6 (4), 357–69.

Robinson, Terry E. and Kent C. Berridge (2003), "Addiction," *Annual Review of Psychology*, 54, 25–53.

Rook, Dennis W. (1987), "The Buying Impulse," *Journal of Consumer Research*, 14 (September), 189–99.

——— and Robert J. Fisher (1995), "Normative Influences on Impulsive Buying Behavior," *Journal of Consumer Research*, 22 (December), 305–313.

Shah, James Y., Ron Friedman, and Arie W. Kruglanski (2002), "Forgetting All Else: On the Antecedents and Consequences of Goal Shielding," *Journal of Personality and Social Psychology*, 83 (6), 1261–80.

——— and Arie W. Kruglanski (2002), "Priming Against Your Will: How Accessible Alternatives Affect Goal Pursuit," *Journal of Experimental Social Psychology*, 38 (4), 368–83.

Shiv, Baba and Alexander Fedorikhin (1999), "Heart and Mind in Conflict: The Interplay of Affect and Cognition in Consumer Decision Making," *Journal of Consumer Research*, 26 (September), 278–92.

——— and ——— (2002), "Spontaneous Versus Controlled Influences of Stimulus-Based Affect on Choice Behavior," *Organizational Behavior and Human Decision Processes*, 87 (2), 342–70.

Srull, Thomas K. and Robert S. Wyer Jr. (1979), "The Role of Category Accessibility in the Interpretation of Information About Persons: Some Determinants and Applications," *Journal of Personality and Social Psychology*, 37 (October), 1660–72.

Vallacher, Robin R., Andrzej Nowak, and J. Kaufman (1994), "Intrinsic Dynamics of Social Judgment," *Journal of Personality and Social Psychology*, 67 (1), 20–34.

Weschler, Henry, Jae Eun Lee, Meichun Kuo, Mark Seibring, Toben F. Nelson, and Hang Lee (2002), "Trends in College Binge Drinking During a Period of Increased Prevention Efforts: Findings from 4 Harvard School of Public Health College Alcohol Study Surveys: 1993-2001," *Journal of American College Health*, 50 (5), 203–217.

Zeigarnik, Bluma (1938), "On Finished and Unfinished Tasks," in *A Source Book of Gestalt Psychology*, W. Ellis, ed. New York: Harcourt, Brace and Company, 300–314.