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# Saying "No" to Temptation: *Want-to* Motivation Improves Self-Regulation by Reducing Temptation Rather Than by Increasing Self-Control

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Self-regulation has been conceptualized as the interplay between controlled and impulsive processes; however, most research has focused on the controlled side (i.e., effortful self-control). The present studies focus on the effects of motivation on impulsive processes, including automatic preferences for goal-disruptive stimuli and subjective reports of temptations and obstacles, contrasting them with effects on controlled processes. This is done by examining people's implicit affective reactions in the face of goal-disruptive "temptations" (Studies 1 and 2), subjective reports of obstacles (Studies 2 and 3) and expended effort (Study 3), as well as experiences of desires and self-control in real-time using experience sampling (Study 4). Across these multiple methods, results show that *want-to* motivation results in decreased impulsive attraction to goal-disruptive temptations and is related to encountering fewer obstacles in the process of goal pursuit. This, in turn, explains why *want-to* goals are more likely to be attained. *Have-to* motivation, on the other hand, was unrelated to people's automatic reactions to temptation cues but related to greater subjective perceptions of obstacles and tempting desires. The discussion focuses on the implications of these findings for self-regulation and motivation.

*Keywords:* self-regulation, goal motivation, self-control, temptations, goal pursuit



Self-regulation plays a key role in many domains in our life, from maintaining a healthy diet to being productive at work to resisting getting angry at your spouse after a tiring day. Indeed, many of today's societal ills are attributed to poor self-regulation—eating too much junk food, smoking, drugs, corruption, and violence are only some of the problems that (at least according to popular thought) would disappear if only people were better at controlling their impulses. Attempts at self-regulation typically involve setting a specific goal to pursue: "Lose 10 lbs.," "write two hours per day," "spend more time with my kids," or "quit smoking." However, although such goals can help people in guiding their actions, they are by no means a guarantee of successful self-regulation.

Typically when people talk about self-regulation, they usually mean "self-control," which can be defined as the effortful inhibition of impulses or the overcoming of temptations (but see Fujita, 2011, for an alternate definition). Thus, self-regulation is often thought to rely exclusively on the application of effort. However, we prefer to use a broader definition of self-regulation that focuses on goal-directed behavior in general (Carver & Scheier, 1982, 2011). Specifically, we use "self-regulation" as a broad term referring to all manner of goal pursuit, which can include both effortful control of behavior, but also effortless, automatic, or habitual forms of goal directed behavior (de Ridder, Lensvelt-Mulders, Finkernauer, Stok, & Baumeister, 2012; Fujita, 2011). As such, self-regulation often consists of balancing self-control efforts against the presence and strength of temptations and impulses that can distract or impede one's goal pursuits and must be effortfully overcome. Although as important as self-control, this second "impulse modulation" component of self-regulation is frequently overlooked. How frequent and strong is the craving for the cigarette or for the chocolate cake? Furthermore, could the strength and frequency of these cravings depend on how people construe their self-regulatory goals? In this article we investigate this question, looking at the role of goal motivation on the impulsive and effortful components of self-regulation.

## Dual Models of Self-Regulation

The process of self-regulation can be thought of as a seesaw. On one side are the impulses and desires—reaching for a chocolate, craving a cigarette, sneaking a peak at Facebook. On the other side are all the reasons to resist these desires—wanting to lose weight, trying to quit smoking, trying to get work done; these are typically demarcated by the long-term goals that may be jeopardized by giving in to

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the desire. This inner conflict is perhaps best described by the dual-system perspective on self-regulation (Hofmann, Friese, & Strack, 2009), which views behavior as a result of impulsive and reflective processes.

Impulsive processes represent the immediate cognitive or affective associations with a stimulus and typically operate outside of conscious awareness, resulting in largely automatic behaviors (Gawronski & Bodenhausen, 2006; Strack & Deutsch, 2004). Experiencing temptation is an impulsive process because temptations are typically activated by stimuli present in our environment (e.g., walking by a cupcake shop) or by internal triggers (e.g., hunger), and are accompanied by strong motivational and hedonic impulses (i.e., feelings of desire). If they are not resisted, temptations are accompanied by behaviors aimed at satisfying the temptation, especially if these behaviors are simple to accomplish (Hofmann et al., 2009). Reflective processes, on the other hand, are deliberate and effortful, requiring people to use knowledge and reasoning to establish the best course of action (Strack & Deutsch, 2004). They are also resource-dependent (Metcalfe & Mischel, 1999). Self-control is a reflective process, requiring a person to consider their distal goals and to override dominant impulses to reach these goals.

This duality of impulses and self-control is also reflected in neuropsychological research (for a review, see Heatherton & Wagner, 2011). Indeed, self-regulation has been described as involving "a balance between brain regions representing the reward, salience and emotional value of a stimulus and prefrontal regions associated with self-control" (Heatherton & Wagner, 2011). Neuroimaging studies using functional magnetic resonance imaging (fMRI) have shown that exposure to cues associated with rewards (e.g., food, cigarettes in smokers, drug paraphernalia in addicts, money, or sex) activates regions of the brain where rewards are processed, leading people to seek out the rewards (Childress et al., 2008). Critically, when this impulsive system conflicts with other long-standing goals, a different set of neural systems comes on line to activate control in the prefrontal cortex (PFC; Botvinick et al., 2001). Highlighting this neuropsychological duality of self-regulation, a recent study combining neuroimaging and experience sampling showed that activity in the Nucleus Accumbens in response to food images predicted experiencing increased desire for food, whereas activity in the inferior frontal gyrus (a part of the prefrontal cortex) predicted a lower likelihood of succumbing to temptations as well as reduced food consumption when desires were strong (Lopez, Hofmann, Wagner, Kelley, & Heatherton, 2014).

## Understanding the Impulsive System

While research has frequently examined the interplay between the reflective and impulsive systems, the focus has typically been on how reflective strategies (including, but not limited to, effortful self-control) can be used to modulate impulsive responses, showing that impulsive responses predominate when not countered by reflective strategies (e.g., Vohs, 2006). Compared with the research on influences on effortful self-control, relatively few studies have looked at situational and dispositional factors affecting the impulsive system. In their description of the dual-system model of self-regulation, Hofmann and colleagues (2009) review literature on self-regulation and noted that "these studies usually lacked a measure of impulsive precursors to behavior, and hence yielded no direct evidence for the impulsive system part of the model" (p. 166).

There exists, however, another line of research examining how the impulsive system can be down-regulated automatically, without being overridden by the reflective system. For example, in the famous Stanford Marshmallow Study, children who were distracted were better able to self-regulate, presumably because they experienced the temptation less strongly (Mischel & Ebbesen, 1970). More recent work has also suggested that impulsive and reflective processes can operate more independently to promote successful self-regulation. For example, the creation of habits engages reflective processes earlier on to establish automatic routines that can then run without the need for further input from reflective processes, such that temptations are downregulated without the need for effortful self-control (Galla & Duckworth, 2015). Other research has focused on the presence of automatic associations favoring the long-term goals that are activated whenever a conflict between a temptation and the long-term goal is detected (Fishbach, Friedman, & Kruglanski, 2003; for a review see Fujita, 2011). Although many refer to these processes as "effortless self-control" (Fujita, 2011; Gillebaart & de Ridder, 2015), according to our definitions it would be better termed as "effortless self-regulation."

In examining the impulsive system, some research has also found individual differences in the sensitivity to temptation or the strength of impulses (particularly in the food domain; Lopez et al., 2014; van Dillen, Papies, & Hofmann, 2013). However, the reasons for these differences and whether or not they are domain-specific or general are only beginning to be explored. For example, Gillebaart and de Ridder (2015) suggest that people high in trait self-control do not experience a conflict or temptation to the same extent. We take this further, suggesting that experiences of temptation may be domain-specific, depending in large part on the self-regulatory goals that oppose the satisfaction of the immediate impulse.

The presence of a distal goal that conflicts with the immediate temptation is a necessary precursor to self-control. Indeed, it may be argued that a distal goal is required for a self-regulation conflict to arise in the first place—if there is no goal of eating healthy, or losing weight, then the piece of chocolate cake does not constitute a "temptation," and no self-control will be needed. Research has examined various characteristics of goals that predict effective self-regulation and successful goal pursuit (e.g., Inzlicht, Legault, & Teper, 2014): setting goals that are specific, measurable, and optimally challenging (Locke & Latham, 2006); goals that are promotion rather than prevention focused (Higgins, 1997); and goals that are autonomous rather than controlled (Sheldon & Elliot, 1999). Here, we propose that one potential influence of how strongly temptations are experienced is the nature of the competing distal goal and, more importantly, the motivation for goal pursuit. For example, will Mark perceive a piece of chocolate cake as more tempting if he has undertaken the goal of losing weight to appease his spouse? Or will he perceive that same chocolate cake as more tempting if his weight-loss goal was undertaken because of his inherent desire to live a healthy and long life? We examine such questions here, and also ask if the nature of the goals people set for themselves not only changes how people experience temptation, but also affects the use of effortful self-control and predicts goal attainment.

## Goal Motivation

One important distinction in the quality of the goals that people set for themselves is the kind of motivation these goals entail. That

is, do people see their goals as "*have-to*" or "*want-to*" (Inzlicht, Schmeichel, & Macrae, 2014; Milkman, Rogers, & Bazerman, 2008)? Often referred to with other names (autonomous vs. controlled, self-concordant vs. not; Deci & Ryan, 2000; Sheldon & Elliot, 1999; Milyavskaya, Nadolny, & Koestner, 2014), *want-to* goals are goals that reflect a person's genuine interest and values and are personally important and meaningful. Such goals are pursued because of interest or enjoyment (*intrinsic*), because of the inherent importance of the goal (*identified*), or because the goal has been assimilated into the person's core identity (*integrated*); these motivations are collectively termed by self-determination theory as autonomous motivation (Ryan & Deci, 2000).[1] Goals pursued for these reasons can be contrasted with *have-to* goals that are pursued either for external reasons (e.g., to please others or attain an external outcome) or are accompanied by introjects such as feelings of shame or obligation to oneself (*introjected* motivation). Prospective studies have consistently found that people make more progress on *want-to* (compared with *have-to*) goals in a variety of domains including health, academic, and work-related goals (e.g., Judge, Bono, Erez, & Locke, 2005; Koestner, Otis, Powers, Pelletier, & Gagnon, 2008).

This distinction between autonomous/*want-to* and controlled/*have-to* motivation has long been the focus of self-determination theory (SDT; Deci & Ryan, 2000), which has distinguished the locus of causality (i.e., *why* a goal is pursued) from the regulatory focus (i.e., *how* a goal is pursued; Higgins, 1998). While research on regulatory focus has examined the effects of promotion and prevention focus on experiences of temptation and self-control (e.g., Freitas, Liberman, & Higgins, 2002; Dholakia, Gopinath, Bagozzi, & Nataraajan, 2006), research has yet to look at the role of the motivation for goal pursuit on these experiences. Although Moller, Deci, and Ryan (2006) did find that *want-to* motivation prevents ego depletion, they focused on motivation in a choice task, rather than motivation for a goal, and were unable to look at temptations or the self-control required to overcome them.

Most researchers have treated *want-to*, or autonomous motivation as the opposite end of a continuum from *have-to* or controlled motivation, computing a combined index of motivation that is then used to predict outcomes (e.g., Sheldon & Elliot, 1999; Sheldon & Houser-Marko, 2001). However, some research suggests that the two are separate motivational dimensions, such that a goal can be pursued for both *want-to* and *have-to* reasons. For example, Julie's goal of attending medical school might be guided both by her interest in science and in helping people (*want-to* motivation), and by her parents' high expectations that she becomes a doctor (*have-to* motivation). In most studies where the correlations between these two dimensions are examined, they are found to either be uncorrelated or the correlation is very small ($r$ around $-.2$; see Koestner et al., 2008 for a review). Research has repeatedly shown that *want-to* motivation is related to successful goal attainment (Koestner et al., 2008; Sheldon & Elliot, 1998), whereas results for *have-to* motivation have been mixed, with a meta-analysis showing no effect for *have-to* motivation on goal progress (Koestner et al., 2008).

*Want-to*, then, is better than *have-to* in terms of self-regulation. However, does this occur because self-control is increased, or because impulsive desires are lower? As discussed above, both processes result in better self-regulation. However, experiencing fewer desires would actually require less effortful self-control or restraint to achieve self-regulation, thereby making goal-pursuit more viable in the long run. For example, if Jon's goal to eat healthy is motivated by feelings of shame or anxiety about his looks, and he does not view healthy eating as intrinsically important for its own sake (high *have-to* and low *want-to* motivation), he may force himself to resist his cravings for junk food. Such resistance, however, may break down when he is fatigued, or it may affect his ability to resist temptation in other domains, curtailing his progress on other important goals. Contrast this to Maya, who is also pursuing the goal of eating healthy, but is doing so because she considers healthy eating as personally important and enjoyable (high *want-to* motivation). It may be the case that Maya has fewer cravings for chips or cake, and instead automatically reaches for fruits and vegetables when she is hungry. In this scenario, Maya would not need to apply as much effort toward her goal as Jon, but she may ultimately be more likely to successfully accomplish it. In summary, given that impulses and temptations are automatic while resistance is effortful, and that constant effort is not tenable in the long-term (Baumeister & Alquist, 2009), a more efficient pathway to self-regulation would occur when temptations are lowered (rather than self-control increased). In the present studies, we explore the relationship between goal motivation and both the impulsive and reflective systems of self-regulation. Specifically, we predict that people will encounter fewer temptations and impulses that threaten goal pursuit for goals that are characterized by *want-to* motivation, and that this could be responsible for increased goal attainment of *want-to* goals.

There are a number of reasons why motivation may be expected to influence the impulsive system. Most importantly, a goal that fits with personal values, interests, and other goals should be chronic, and thus accessible much of the time (Higgins, 1996). Specifically, chronic accessibility stems from repeated use or activation of a construct. If a given goal is closely related to a person's values, interests, and other goals, it should be easily activated whenever these values, interests or other goals become salient, and consequentially be active much of the time. Active goals then influence automatic processes, including attention, evaluation, and behavior, both as related to goal pursuit and to competing temptations. For example, research has shown that when a goal is activated, people implicitly evaluate goal-related stimuli more positively (Ferguson & Bargh, 2004). Other research has found that active goals are "shielded" from competing goals, such that stimuli related to other goals (e.g., the goal of instant pleasure) become less salient (Shah, Friedman, & Kruglanski, 2002). Additionally, in a series of studies where approach and avoidance were measured by the speed of pulling and pushing a joystick, people were found to automatically approach goal-related stimuli and avoid temptation-related stimuli when goals were active (Fishbach & Shah, 2006). In all these laboratory studies, the activation of a focal goal was related to more automatic self-regulation. Although we do not know exactly how this operates outside the laboratory in our day-to-day lives, it stands to reason that if *want-to* goals are

[1] We chose to use the terms "*want-to*" and "*have-to*" for two reasons: First, we wanted to make this article accessible to a wider audience beyond self-determination theory (SDT) researchers, and so chose to use more common terms easily understood by everyone rather than the more specialized terms. Second, even among SDT researchers, there is a debate whether *want-to* goals should be called "autonomous" or "self-concordant"; we did not want to enter this debate in this article.

more likely to be chronic (because of more frequent coactivation with values, other goals, etc.), they then stand to benefit from these processes more often than nonchronic goals.

Another way in which goal motivation is likely to reduce the experiences of temptations is through habits. *Want-to* motivation has been linked to spontaneously setting more implementation intentions (Carraro & Gaudreau, 2011), which effectively establish automatic behavior and habits (Gollwitzer, 1999). This takes behavior out of the realm of the reflective system and makes it automatic—for example, reaching for a healthy instead of an unhealthy snack. This parallels recent research showing that people high on trait self-control are better at self-regulation because they have established better habits and routines, experience less problematic desires, and do not need to rely on effortful resistance of temptations (Adriaanse, Kroese, Gillebaart, & de Ridder, 2014; de Ridder et al., 2012; Galla & Duckworth, 2015)—that is, trait self-control is directly linked with reduced temptations (Hofmann, Baumeister, Förster, & Vohs, 2012). Given that the effectiveness of self-regulation differs across domains (de Ridder et al., 2012), it is likely that such an establishment of habits can occur on a goal-specific (rather than trait) level. Specifically, we expect that *want-to* goals could lead to a similar habit-like effect.

## Temptations and Obstacles

Although the impulsive system is thought to give rise to tempting desires automatically, people do experience such desires consciously and are able to recognize these desires as temptations that conflict with their goals (Hoffman et al., 2012). Such conscious experiences of frequent tempting desires are likely to be experienced as obstacles standing in the way of goal pursuit. Obstacles have been defined as "interfering forces that prevent people from reaching their goals" (Marguc, Förster, & Van Kleef, 2011, p. 883). A strong desire for something that interferes with one's long-term goals, such as wanting a piece of chocolate cake when one has a goal of losing weight or craving a cigarette when one's goal is to quit smoking, will likely be construed by the person as an obstacle, which then needs to be overcome by applying effort. Although there may be other reasons for experiencing obstacles (e.g., environmental constraints or lack of resources), frequent experiences of temptations that are viewed by the person as obstacles can be thought to originate in the impulsive system. Just as we expect motivation to play a role in people's experiences of temptation and people's implicit reactions to tempting stimuli, so we would expect subjective perceptions of obstacles to be affected by motivation. Specifically, if *want-to* motivation leads to lower automatic attraction to goal-disruptive stimuli, this should result in experiences of fewer desires and fewer obstacles in people's day-to-day lives.

## Present Studies

In the present research, we investigate the effects of *want-to* and *have-to* motivation on both the impulsive (desires and obstacles) and reflective (effortful self-control) systems, including their effects on eventual goal attainment. This is done by examining people's implicit affective reactions in the face of goal-disruptive temptations (Studies 1 and 2), subjective reports of obstacles (Studies 2 and 3), and expended effort (Study 3), as well as experiences of desires and self-control in real-time using experience sampling (Study 4). We use a multimethod approach, including reaction time (RT), experience-sampling, and prospective (longitudinal) self-report studies. Throughout these studies, we explore whether *want-to* and *have-to* goals result in decreased impulsive attraction to goal-disruptive temptations and are related to encountering obstacles and expending effort in the process of goal pursuit, and whether this, in turn, explains why *want-to* goals are more likely to be attained. As described above, we expect *want-to* motivation to be related to reduced experiences of temptation and obstacles, translating into more effective self-regulation. Conversely, we do not have specific predictions for *have-to* motivation. The effects of *have-to* motivation on goal progress have been variable (Koestner et al., 2008), which could be either because this type of motivation is unrelated to self-regulation, or because it is differentially related to the impulsive and reflective system. For example, even if *have-to* motivation leads to greater effort, if it also leads to increased temptations then the net effect on goal pursuit might be nil. Because these possibilities could lead to multiple competing hypotheses, and in line with recommendations to avoid forming hypotheses after the results are known (a.k.a. HARKing; Kerr, 1998), we refrain from making any one specific prediction for *have-to* motivation and instead explore our results to see what they reveal about these processes, using results from each study to make predictions in subsequent studies.

## Study 1

The first study examines whether motivation for goal pursuit influences implicit reactions to goal-promoting and goal-thwarting stimuli by looking at people's implicit liking for foods that could help or hinder the goal of eating healthy. The affect misattribution procedure (AMP; Payne, Cheng, Govorun, & Stewart, 2005) was used to asses people's implicit attitudes toward both healthy (e.g., fruit, salad) and unhealthy (e.g., chips, cookies) foods. In the affect misattribution procedure, participants are asked to make rapid judgments about the pleasantness of neutral stimuli (Chinese pictographs), which are preceded by prime pictures that are flashed briefly but visibly on the screen. Although participants are explicitly told to ignore these primes, their responses to the pictographs are nevertheless influenced by their affective reactions to the primes, such that pictographs preceded by positive or liked stimuli are consistently rated as more pleasant because of the misattribution of the affect elicited by the primes onto the pictograph. The affect misattribution procedure has been shown to demonstrate good validity and reliability (Payne et al., 2005), and has, since its inception, become one of the most commonly used social–cognitive measures of implicit attitudes. In discussing avenues for testing the impulsive system of dual-process models, Hofmann and colleagues argue that the affect misattribution procedure "may be particularly suited to tap into the hedonic component of an impulse" (Hofmann et al., 2009, p. 167).

In the present study, we looked at people's motivation for the goal of eating healthy, distinguishing between *want-to* and *have-to* motivation. Specifically, we were interested in whether *want-to* and *have-to* motivation would have similar effects or be differentially related to implicit liking for healthy and unhealthy foods. The goal of eating healthy was used because it is a goal that is endorsed by a large majority of students (Milyavskaya, 2015b) and because people endorse pursuing this goal for both *want-to* and

*have-to* reasons (Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004). We expected that *want-to* motivation will be related to a decreased implicit liking for unhealthy foods and increased implicit liking for healthy foods. We did not have specific predictions for *have-to* motivation.

## Method

**Participants and procedure.** Sixty-nine undergraduate students ($M$ age = 20.5, $SD$ = 1.85, 91% female) were recruited for this study through the subject pool at a large Canadian university. All interested participants completed a prescreening questionnaire assessing their literacy in Chinese and whether or not they had the goal of eating healthy; only those who had the specific goal of eating healthy and reported no knowledge of the Chinese language were invited to participate in this study. Eligible participants completed an online questionnaire assessing their motivation for eating healthy (as well as some other measures unrelated to this study). Participants then came to the lab ~7 days later (range: 0–22) to complete the affect misattribution procedure.

**Materials.**

***Motivation for eating healthy.*** The Regulation of Eating Behavior Scale (REBS; Pelletier et al., 2004) was slightly adapted to assess participants' motivation for generally eating healthily (rather than only for restricting their food intake, as was done in the original scale).[2] The adaptation consisted of changing the stem of the scale from "Why are you regulating your eating behavior?" to "Why do you try to eat healthy?" The rest of the scale, including the actual items, remained unchanged. The scale consists of 24 items assessing six types of motivation ranging from intrinsic to amotivated. These were used to create two separate scales of *want-to* motivation (combining intrinsic, integrated, and identified regulation; e.g., "Eating healthy is part of the way I have chosen to live my life.") and *have-to* motivation (combining introjected and extrinsic regulation and amotivation;[3] e.g., "I feel I must absolutely be thin"). All items were rated on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale. Both subscales were reliable, $\alpha = .87$ for *want-to* motivation, $\alpha = .84$ for *have-to* motivation. Participants reported higher *want-to* motivation ($M$ = 5.28, $SD$ = .95) than *have-to* motivation ($M$ = 2.90, $SD$ = .96; paired $t(67) = 13.01$, $p < .001$), and there was a small negative correlation, $r = -.23$, $p = .055$ among the two types of motivation.

***Implicit liking of healthy and unhealthy foods.*** The affect misattribution procedure (Payne et al., 2005) was used to assess implicit liking of healthy and unhealthy foods. Stimuli were 12 images of healthy (e.g., fruits, vegetables) and 12 images of unhealthy (e.g., chocolate cake, ice cream) foods, as well as 200 images of Chinese pictographs used in the previous affect misattribution procedure designs. The images of healthy and unhealthy foods were selected from a larger pool of photographs found on the Internet and rated on appeal, health, and attraction by another group of raters who did not participate in this study; the two groups of images differed from each other on ratings of health ($M$ = 7.83, $SD$ = .61 for healthy vs. $M$ = 2.83, $SD$ = .70 for unhealthy), but not on ratings of appeal ($M$ = 7.05, $SD$ = .43 for healthy vs. $M$ = 7.00, $SD$ = .70 for unhealthy) or attraction ($M$ = 7.12, $SD$ = .42 for healthy vs. $M$ = 7.03, $SD$ = .69 for unhealthy; Milyavskaya, 2015a).

In each trial of the affect misattribution procedure, the prime is briefly presented, followed by a blank screen for 100ms, then the Chinese pictograph for 100 ms, and finally a mask that stays on screen while the participant provides their rating of the pleasantness of the pictograph. The affect misattribution procedure in the present study consisted of 2 blocks of 48 trials each preceded by 8 practice trials (with neutral nonfood primes). We modified the affect misattribution procedure task slightly in two ways: First, there were two sets of blocks where participants either rated the pictograph as pleasant or unpleasant (as in the original version of the affect misattribution procedure; Payne et al., 2005), or as *very pleasant* (coded as 2), *slightly pleasant* (coded as 1), *slightly unpleasant* (−1), or *very unpleasant* (−2) (as was previously done by Payne, Burkley, & Stokes, 2008, and Hofmann, van Koningsbruggen, Stroebe, Ramanathan, & Aarts, 2010); the order of these block was randomized across participants. Second, the prime was presented for either 100 ms or 200 ms;[4] this was randomized within each block. Preliminary analyses showed that although having four response categories did increase people's average positive ratings of the pictographs, this was equally the case for both healthy and unhealthy foods. The presentation time did not influence responses. The responses to all trials were thus separated for healthy versus unhealthy primes only, irrespectively of the number of response categories or the presentation time. The average response (ranging from −2 = *very unpleasant* to 2 = *very pleasant*) to healthy and unhealthy food was the measure of implicit liking for each food category. People on average found both types of food mildly pleasant ($M$ = .215, 95% confidence interval [CI; .104, .326] for healthy food, $M$ = .170, 95% CI [.059, .281] for unhealthy foods); these values were not significantly different from each other.

## Results

Two regression analyses were conducted looking at the effects of *want-to* and *have-to* motivation on implicit liking for healthy and unhealthy foods. In each regression, we also controlled for liking of the other type of food to ensure that the effects are not simply because of motivation generally influencing overall liking, as liking for healthy and unhealthy foods were positively correlated at $r$ = .37. Results (see Table 1) showed that *want-to* motivation was negatively related to implicit liking of unhealthy foods ($b$ = −.120, 95% CI [−.233, −.007]) and positively related

[2] We were interested in motivations for broader healthy-eating behaviors than the narrower food regulation behaviors originally assessed with this scale. As many of items themselves referred to eating healthy (e.g., "Eating healthy is an integral part of my life") we only changed the initial instructions to ask participants to think about their reasons for eating healthy (instead of thinking about reasons to regulate eating behavior). We believe that this improved the face validity of the scale, without actually changing any of the items. However, because the scale is repurposed, examining issues of construct validity would be important in the future.

[3] Amotivation was included because it formed part of the original scale and is thought to represent a resigned, nonself-determined motivation (e.g., "I don't know why I do it"; Pelletier et al., 2004). Results in Studies 1 and 2 are essentially the same when amotivation is excluded (using a subscale comprised of only introjected and extrinsic motivation).

[4] The prime duration was varied to explore another set of questions not directly related to the present article; because there was no effect of priming duration, we decided to combine both in analyzing our results.

Table 1
*Study 1 Results*

| | Unhealthy ($M$ = .170, $SD$ = .46) | | | Healthy ($M$ = .215, $SD$ = .46) | | |
|---|---|---|---|---|---|---|
| | b | 95% CI | β | b | 95% CI | β |
| Other food | **.448** | **[.223, .673]** | **.451** | **.443** | **[.221, .665]** | **.440** |
| *Want-to* | **−.120** | **[−.233, −.007]** | **−.247** | **.162** | **[.054, .271]** | **.332** |
| *Have-to* | *.093* | *[−.015, .200]* | *.193* | −.051 | [−.160, .057] | −.106 |

*Note.* Values in bold are significantly different from zero at $p < .05$; values in italics are significantly different from zero at $p < .10$. Other food refers to implicit liking of healthy food in analyses of unhealthy food, and implicit liking unhealthy food in analyses of healthy food.



to implicit liking of healthy foods ($b$ = .162, 95% CI [.054, .271]). That is, people with greater *want-to* motivation for eating healthy had a more positive automatic response to healthy foods and a less positive one to unhealthy foods. *Have-to* motivation, on the other hand, was marginally positively related to an implicit liking of unhealthy foods ($b$ = .093, 95% CI [−.015, 200]) and unrelated to implicit liking of healthy foods ($b$ = −.051, 95% CI [−.160, 057]). We also tested the interaction of *want-to* and *have-to* motivation; this interaction was not different from 0 for both unhealthy ($b$ = .083, 95% CI [−.061, .227]) and healthy ($b$ = −.012, 95% CI [−.158, .134]) foods.

## Discussion

The results of this study suggest that people who are pursuing the goal of eating healthy for *want-to* reasons have a more positive hedonic response to healthy food and a more negative response to unhealthy food. Because the affect misattribution procedure assesses implicit responses considered to be "automatic" or impulsive (Payne et al., 2005), these results provide preliminary evidence supporting our prediction that *want-to* motivation is associated with lower automatic attraction toward goal-disruptive stimuli, along with a greater draw toward things that can help with goal pursuit (i.e., healthy foods). The results for *have-to* motivation, while not significant, were in the opposite direction, suggesting a draw toward unhealthy foods that could threaten to disrupt the goal.

## Study 2

To ensure the robustness of our effect, we wanted to replicate the results of our first study with a different implicit measure and another set of stimuli. Perhaps the most used implicit measure is the Implicit Association Test (IAT), which assesses people's relative attitudes to two opposing categories (e.g., White vs. Black faces; Greenwald, McGhee, & Schwartz, 1998). Previous research has used the IAT to look at implicit preferences for healthy versus unhealthy foods (e.g., Friese, Hofmann, & Wänke, 2008; Karpinski & Hilton, 2001), showing that attitudes toward unhealthy foods on the IAT can predict eating behaviors when self-regulatory or cognitive resources are already low (Friese et al., 2008). In the present study, we used the categories of "snack" and "fruit," and used word stimuli rather than the images used in Study 1.

Although implicit attitudes have long been considered automatic, recent research has shown that it is possible to separate the sources of automatic responses into automatic and controlled components (see Payne & Bishara, 2009, for a review). For example, an implicit preference for unhealthy food might be because of an automatic draw toward this food (e.g., correctly pressing the button paired with "pleasant" when the word "chocolate" appears), or an inability to control oneself when this food is presented (e.g., making a mistake when chocolate is supposed to be paired with the same key as unpleasant). This separation can be made using the process dissociation procedure (PDP; Payne & Bishara, 2009), which consists of contrasting task demands such that both automatic and controlled processes lead to the same response in some cases, and opposite responses in others. For example, when participants are asked to pair chocolate cake with positive words they would do so both for automatic reasons (i.e., because they like it), and because this is what the task demands. Conversely, if they are told to pair chocolate cake with negative words, making an error would be a failure of task control, driven by automatic liking for the cake. The proportion of times when such errors are made can then be used to compute the likelihood of each of these processes and to determine whether people with a healthy eating goal would evaluate cake more positively because of an automatic positive association, or because they are unable to (automatically) control these positive responses. A similar paradigm has been used in the past to show that older adults (compared with younger adults) display greater antiblack prejudice because of lower control of automatic prejudice rather than greater automatic prejudice per se (Stewart, von Hippel, & Radvansky, 2009).

In addition to examining the effects of motivation on automatic responses, we were also interested in looking at people's subjective perception of obstacles. We expected that encountering temptations can be construed as subjective experiences of obstacles, which can serve as an index of the impulsive system. If this is the case, *want-to* motivation should play a role in the subjective experience of obstacles. Furthermore, if obstacles arise because of an increased draw toward goal-disrupting temptations, the link between motivation and obstacles is likely to be mediated by this automatic attraction. In the present study, we test these assumptions by examining whether people's subjective experiences of obstacles are more likely to arise in the presence of automatic attraction toward goal-disruptive temptations (in this case junk food). Furthermore, if automatic attraction does lead to obstacles, does that explain why *want-to* motivation is related to fewer obstacles? That is, do people with greater *want-to* motivation have

greater automatic preferences for unhealthy foods that then leads them to experience greater interference with their goal pursuit?

Based on the results of the first study, we hypothesized that *want-to* motivation for healthy eating would be associated with an increased preference for fruits over unhealthy snacks on the IAT. We were also interested in using the process dissociation procedure to determine whether this effect would be driven by less automatic liking for the snacks or by stronger controlled processes attenuating liking for snacks or increasing liking for fruit. Finally, we tested our prediction that *want-to* motivation for eating healthy was related to people's subjective perceptions of fewer obstacles to the goal of eating healthy, and that this effect was mediated by people's automatic preferences for snacks. We included *have-to* motivation as a control variable (because *want-to* and *have-to* motivation are typically correlated), and to see whether our previous results would replicate, but did not have specific predictions related to *have-to* motivation.

## Method

**Participants and procedure.** Participants were 159 undergraduate students recruited from the subject pool of a large Canadian university who, on a screening survey required to register for the subject pool, indicated that they were pursuing the goal of eating healthy. Because of computer malfunction, data from 15 participants was lost. A further five participants were removed because they indicated, during the debriefing, that they were not paying attention throughout the study. Two other participants who made more than 30% errors on either the compatible or incompatible blocks were also removed.[5] Data from the remainder 137 participants ($M$ age = 19.2, $SD$ = 2.1; 87% female) is presented below. Participants were seated at individual desktop computers and completed a number of RT tasks, including an IAT. After the completion of the IAT, participants completed a questionnaire that included a measure of their motivation to eat healthy and a measure of the obstacles they typically encounter in their pursuit of eating healthy.

**Materials.**

***Fruit versus snack IAT.*** A fruit versus snack variant of the IAT (Greenwald et al., 1998) was adapted from previous research on implicit liking for healthy and unhealthy foods (Friese et al., 2008; Fujita & Han, 2009). The target categories were fruit and snack and the attribute categories were "good" and "bad." We used the neutral word snack instead of a negatively valenced term such as "junk food" to avoid associations based on normative evaluations of the category (rather than participants' actual preferences; Olson & Fazio, 2004). Words were used to represent both the targets (e.g., "apple," "pear" for the fruit category; chocolate, cookie for the snack category) and the attributes (e.g., "joyful," "lovely" for the good category; "horrible," "nasty" for the bad category). After completing two blocks where they practiced sorting the targets and attributes separately, participants completed the first set of combined blocks (one practice and one regular) where snacks and pleasant adjectives were sorted on one key, while fruit and negative adjectives were sorted on another key. The practice block consisted of 20 trials, followed by the first combined block of 80 trials. The assignment of keys for snack and fruit was switched in the second set of combined blocks where fruit and pleasant adjectives were sorted on one key, whereas snacks and negative adjectives were sorted on another key. As we were interested in individual differences in the IAT effect, we followed Friese and colleagues' (2008) approach of presenting the blocks in the same order to all participants. The IAT effect was computed using Greenwald, Nosek, and Banaji's (2003) D-measure, with more positive values representing a more positive reaction toward snacks than toward fruits.

***Controlled and automatic estimates for fruits and snacks.*** To distinguish between automatic and controlled effects in the IAT, we computed separate automatic and controlled estimates for snacks and fruit separately from errors on the IAT using the Process Dissociation Procedure (Jacoby, 1991). For people who like snacks, categorizing snacks as good represents a congruent response, while categorizing snacks as bad can be considered "incongruent" (as it goes against one's natural tendency to like the snacks). The probability of correctly responding that a snack is good on a congruent trial is the probability of control (correctly identifying that the snack belongs in the good category in this portion of the task), plus the likelihood of making an automatic association when control fails (because the automatic association is that snack is good); this can be expressed as P(correct | congruent) = C + A (1 − C). In the incongruent trial (when snack is paired with bad), automatic (A) and controlled (C) processes should have different effects—controlled processes should lead to a correct response (that snack is bad), while automatic processes would lead to an incorrect response (i.e., that snack is good). Errors on incongruent trials are the results of a failure of control, expressed as P(error | incongruent) = A (1 − C). These two equations can then be used to algebraically compute the controlled and automatic components, such that C = P (correct | congruent) – P(error | incongruent) and A = P (error | incongruent)/(1 − C). Because we were interested in people's automatic reactions to both fruits and snacks, we computed the automatic and controlled components for snack and fruit separately. In this study, the average proportion of errors was 9%, which is similar to previously reported error rates on the IAT (e.g., Stewart et al., 2009).

***Motivation for eating healthy.*** As in Study 1, the Regulation of Eating Behavior Scale (Pelletier et al., 2004) was used to assess *want-to* and *have-to* motivation for healthy eating behaviors. Both subscales were reliable, $\alpha$ = .90 for *want-to* motivation, $\alpha$ = .85 for *have-to* motivation. Participants reported higher *want-to* motivation ($M$ = 5.73, $SD$ = .91) than *have-to* motivation ($M$ = 3.12, $SD$ = 1.02; paired $t(136)$ = 20.533, $p < .001$), and there was a small negative correlation, $r = -.18$, $p = .039$ among the two types of motivation.

***Obstacles.*** Participants were asked to report how frequently they encountered 11 situations that get in the way of their goal of eating healthy, on a 7-point scale ranging from *never* to *daily*. They then rated how much each situation gets in their way of goal pursuit on a scale of 1 (*not at all*) to 7 (*a lot*). These situations were drawn from common obstacles to personal goals reported by a different sample of students (e.g., "feeling hungry"; "not enough time to cook"; "someone else (parents, roommate) buys junk food"). The reliability across the 11 situations was good, $\alpha$ = .81 for frequency and $\alpha$ = .85 for disruptiveness. The average of the

[5] Results are essentially the same when these two participants are left in.

frequency of encountering the situations and the extent to which the situations was problematic was used as a measure of obstacles.

## Results

The effects of *want-to* and *have-to* motivation on the IAT effect were examined using a regression analysis (see results in Table 2). Results showed that while people generally had more positive automatic associations with fruit compared to snacks (mean D = −.25, *SD* = .41), this was exacerbated by *want-to* ($b = -.084$, 95% CI [−.159, −.009]) but not *have-to* ($b = -.036$, 95% CI [−103, .031]) motivation. As expected, increased *want-to* motivation for eating healthy was a negative predictor of implicit preference for snacks over fruit, whereas *have-to* motivation was unrelated.

We next conducted a series of regressions to determine the effects of *want-to* and *have-to* motivation on the automatic and controlled estimates for snacks and fruits. Results are presented in Table 2. Consistent with our hypothesis and the results of Study 1, *want-to* motivation was associated with lower automatic liking for snacks. It was not, however, associated with greater control (i.e., the C component in the process dissociation task). Somewhat surprisingly, *have-to* motivation was associated with lower control (rather than with higher automaticity). Counter to the results of Study 1 where *want-to* motivation was positively related to implicit liking for healthy foods, neither *want-to* nor *have-to* motivation was associated with automatic or controlled estimates for the fruits, suggesting that the IAT effect is driven by people's reactions to the snacks rather than to the fruits.

Next, we looked at the role of *want-to* and *have to* motivation in the obstacles to the goal of eating healthy. As expected, *want-to* motivation was related to experiencing fewer obstacles. *Have-to* motivation, on the other hand, was related to increased obstacles (see Table 2). We next examined whether perception of obstacles could be similarly predicted from the automatic and controlled processes responsible for identifying fruit and snacks as good. In a regression that included all four processes (automatic and controlled reactions to snacks and to fruit), only automatic reactions to snacks was a predictor, $b = .97$, 95% CI [.34, 1.61], $\beta = .26$. That is, more positive automatic reactions to snacks (the A component) was associated with reporting greater obstacles. Finally, we tested whether the influence of motivation on obstacles is mediated by people's automatic attraction toward goal-disruptive temptations. Using Hayes' (2013) PROCESS macro for SPSS, we examined the indirect effects of *want-to* motivation on obstacles through automatic and controlled reactions to snacks, controlling for *have-to* motivation. Results showed that an automatic liking for snacks was a significant mediator of the path between *want-to* motivation and obstacles, indirect effect = −.040, 95% CI [−.110, −.006] (see Table 2). That is, greater *want-to* motivation led to less automatic liking for the snacks, which in turn lead to fewer perceived obstacles. A second model was run to examine possible indirect effects of *have-to* motivation on obstacles; none of the indirect effects were significant.

## Discussion

This second study conceptually replicates the results of the first study, showing that *want-to* motivation is related to greater implicit preference for goal-promoting rather than goal-thwarting stimuli. Additionally, using the IAT allowed us to separate the automatic and controlled processes responsible for the IAT effect, showing that *want-to* motivation was especially related to a lower automatic attraction to snack foods (rather than better control when faced with snacks). Interestingly, although *have-to* motivation was unrelated to people's overall implicit preferences for fruits versus snacks, it was related to decreased control when faced with tempting goal-disruptive stimuli (i.e., snacks), suggesting that pursuing a goal for *have-to* reasons can actually undermine active self-control. Somewhat surprisingly, motivation was not associated with increased liking of fruit, which were generally preferred to snacks. Perhaps fruit, while certainly healthier than snacks, are not specifically closely associated with "healthy eating" and are inherently enjoyable whether one is eating healthy or not. It would be interesting to test whether motivation would be linked to increased liking of something that is more closely associated with eating healthy but that is not necessarily as universally enjoyable (e.g., broccoli).

In addition to examining people's implicit liking of snacks, this study also looked at people's explicit experiences of encountering obstacles to their goal. Results show that *want-to* motivation was

Table 2
*Study 2 Results*

| | | | *Want-to* | | | *Have-to* | | |
|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | b | 95% CI | β | b | 95% CI | β |
| D | −.25 | .41 | **−.084** | **[−.159, −.009]** | **−.190** | −.036 | [−.103, .031] | −.092 |
| A snack | .65 | .29 | ***−.048*** | ***[−.096, 000]*** | ***−.171*** | *−.012* | [−.055, .031] | −.047 |
| C snack | .80 | .14 | .002 | [−.023, .027] | .014 | **−.029** | **[−.051, −.007]** | **−.222** |
| A fruit | .51 | .34 | −.016 | [−.071, .038] | −.052 | −.004 | [−.053, .044] | −.016 |
| C fruit | .84 | .12 | .011 | [−.011, .034] | .088 | −.005 | [−.025, .014] | −.047 |
| Obstacles | 4.49 | .97 | **−.265** | **[−.434, −.096]** | **−.249** | **.267** | **[.116, .418]** | **.280** |
| | | | Indirect effects on obstacles | | | | | |
| Total | | | **−.040** | **[−.100, −.004]** | | −.007 | [−.064, .044] | |
| A snack | | | **−.040** | **[−.110, −.006]** | | −.010 | [−.059, .027] | |
| C snack | | | .000 | [−.018, .013] | | .003 | [−.029. .042] | |

*Note.* D = implicit preference for snacks relative to fruits; A = automatic component; C = controlled component. Values in bold are significantly different from zero at $p < .05$. Values in bold and italics are significantly different from zero at $p = .05$.

related to perceiving obstacles as less frequent and less problematic, while *have-to* motivation was related to increased obstacles. This was mediated by people's automatic attraction to snacks, as having an implicit automatic attraction to snacks was related to experiencing increased obstacles. This preliminary finding supports our proposition that obstacles are a manifestation of the impulsive system that people can consciously access and report. The mediation results also provide evidence that *want-to* goals are related to fewer obstacles indirectly through a change in implicit preference for goal-disruptive stimuli.

## Study 3

The first two studies demonstrated that *want-to* goals are related to lower automatic desire for potential temptations that conflict with the goal. Additionally, Study 2 showed that these lower automatic desires are translated into subjectively experiencing fewer obstacles standing in the way of goal pursuit. In the present study, we were interested in again testing whether *want-to* and *have-to* motivation influence people's subjective experiences of obstacles, as well as looking at subsequent goal progress. Additionally, we wanted to contrast the effects of motivation on the impulsive system (as indexed by obstacles) with effects on actual effort applied in the pursuit of the goal, which would represent the reflective system. Finally, we wanted to look beyond eating goals to see if our earlier studies would generalize to other domains. In the present study, participants described three goals they planned to pursue during the semester. Six weeks later, they reported on the obstacles they encountered and the effort they put into pursuing the goal. Finally, at the end of the semester, they reported on their goal progress. We explored whether *want-to* and *have-to* motivation played a role in the obstacles that participants encountered and the amount of effort invested into pursuing each goal. We expected that *want-to* motivation would be related to fewer obstacles, but not to increased effort. We were also interested in whether the impulsive (i.e., obstacles) and/or reflective (i.e., effort) systems were responsible for the effects of motivation on goal progress (that we expected to find based on previous studies of motivation and goal pursuit). Specifically, we hypothesized that *want-to* motivation would lead to more successful goal pursuit because of reduced obstacles (rather than because of increased effort). This study also allowed us to test the competing hypotheses that *have-to* motivation is unrelated to goal progress because of either (a) no effects of *have-to* motivation on both obstacles and effort; or (b) positive effects of *have-to* motivation on effort and negative effects on obstacles, resulting in a null total effect on goal progress.

### Method

**Participants and procedure.** Participants were 344 undergraduate students (74% female, *M* age = 19.38, *SD* = 1.82) recruited for a large prospective study of goal pursuit and well-being. At the start of the academic year (in September), participants indicated 3 goals that they intended to pursue that semester. Six weeks later (in early November), participants were reminded of their goals and reported on the obstacles they encountered and the effort expanded for each goal. Finally, in December, participants reported on their goal progress. Three hundred participants completed both follow-ups. All parts of the study were completed online.

**Measures.**

***Goal descriptions and motivation.*** At the initial assessment in September, participants were asked to think of three goals that they planned to pursue during the semester, using the following instructions:

> Personal goals are projects and concerns that people think about, plan for, carry out, and sometimes (though not always) complete or succeed at. They may be more or less difficult to implement; require only a few or a complex sequence of steps; represent different areas of a person's life; and be more or less time consuming, attractive, or urgent. Please think of three personal goals that you plan to carry out this semester.

Examples of goals listed by participants include "get a 4.0 GPA," "find a job," "lose 20 pounds," and "get over my ex-boyfriend."

After each goal, participants were asked to rate their motivation for pursuing that goal on a 7-point Likert scale from 1 (*not at all for this reason*) to 7 (*completely for this reason*) on five items that assessed external, introjected, identified, integrated, and intrinsic reasons for goal pursuit (Sheldon & Elliot, 1999). For each goal, *want-to* motivation was computed as the average of the intrinsic, identified, and integrated items, whereas *have-to* motivation was the average of the external and introjected items.

***Obstacles.*** For each goal, participants rated their agreement with the statement "Over the past 6 weeks I encountered obstacles to achieving this goal" on a 7-point scale from 1 (*completely disagree*) to 7 (*completely agree*). They also reported how frequently they encountered obstacles, choosing one of seven options ranging in frequency from "I did not encounter any obstacles to this goal" to "Multiple times a day." These two items were highly correlated ($r$ = .52 to .72 for the three goals), and were combined to form a measure of average obstacle experiences.

***Effort.*** Participants rated their agreement with one item for each goal representing effort: "I have tried really hard to achieve this goal" on a 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

***Goal progress.*** Goal progress was assessed at the final follow-up using three items for each goal: "I have made a lot of progress toward this goal," "I feel like I am on track with my goal plan," and "I feel like I have achieved this goal." All ratings were made on a 7 point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

***Analytic strategy.*** Because each person named three goals, multilevel analyses were conducted using the MIXED procedure in SPSS version 22 with goals nested within participants. To test for mediation, MPlus software was used to conduct multilevel structural equation modeling (MSEM) analyses (Preacher, Zyphur, & Zhang, 2010). In all analyses, a full information maximum likelihood (FIML) approach was used to deal with missing data (Enders & Bandalos, 2001).

### Results

Table 3 presents all the means, variances, and intraclass correlations (ICCs) of all study variables. Results suggest that ~75% of the variance in motivation was within-person (between goals).

Similarly, over 80% of the variance in obstacles, effort, and goal progress was within-person (between goals).

**Primary analyses.** We first examined whether *want-to* and *have-to* motivation have different effects on experiences of obstacles and effort. Both motivation variables were person-centered, and included in the model along with the mean person-level value. This analytic strategy permits us to examine both between-person (person-level) and within-person (goal-level) effects simultaneously, while precisely accounting for the source of the variance (Nezlak, 2012). Random effects were tested and found to be nonsignificant in all analyses; we thus report results from the fixed-effects model. We also tested the effects of motivation on goal progress to ensure that our data replicates previous studies.

Results (see Table 4) show differential effects of *want-to* and *have-to* motivation on obstacles: while *want-to* motivation was related to experiencing significantly fewer obstacles, *have-to* motivation was related to experiencing significantly greater obstacles. Interestingly, at the goal level, *want-to* goal motivation was unrelated to effort, although it was positively related to effort at the between-person level, suggesting that while people with generally high *want-to* motivation exerted more effort across all their goals, they did not exert more effort on goals that were higher in *want-to* motivation compared with their other goals. Results were opposite for *have-to* motivation, with people putting in more effort on goals higher in *have-to* motivation compared with their other goals but not generally across all their goals. Taken together, these results show that in pursuing *want-to* goals people encounter fewer obstacles but do not exert more or less effort, while for *have-to* goals people both experience more obstacles and exert more effort. As in previous research, *want-to* motivation (on both the goal and person levels) was positively related to goal progress, whereas *have-to* motivation was unrelated to progress.[6]

**Mediation.** To test whether obstacles and effort mediated the relationship between motivation and goal progress, we used MPlus software, which allowed us to test multiple mediators simultaneously while accounting for the multilevel nature of our data (Preacher et al., 2010). The model tested is illustrated in Figure 1 (along with estimates of all parameters), resulting in eight indirect effects; since none of the between-person effects were significant, we only report within-person (goal-level) effects (see Table 5). We also computed total indirect effects for both types of motivation (through both obstacles pursuit and effort). The within-person indirect effects of both *want-to* and *have-to* motivation through obstacles were significant (although going in different directions), whereas effort only mediated the effects of *have-to* goals. Specifically, *want-to* motivation was related to decreased obstacles whereas *have-to* motivation was related to increased obstacles, with greater obstacles then leading to decreased goal progress.

Table 3
*Descriptive Statistics of Study 3 Variables*

| | Mean | *SD* | ICC |
|---|---|---|---|
| Want-to motivation | 5.45 | 1.26 | .21 |
| Have-to motivation | 3.21 | 1.62 | .26 |
| Obstacles | 4.54 | 1.54 | .16 |
| Effort | 4.44 | 1.71 | .11 |
| Goal progress | 4.09 | 1.61 | .14 |

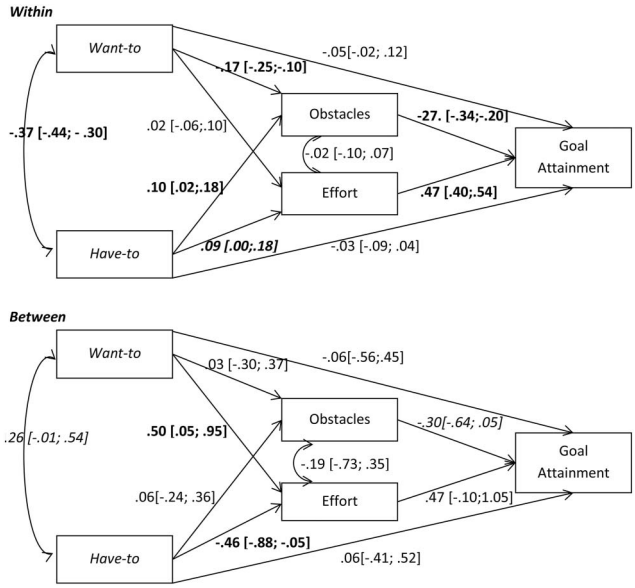


*Figure 1.* Complete MSEM model of within and between-person effects on goal attainment, including coefficients with their 95% confidence intervals. All results are standardized using the MPlus SDTXY procedure. Values in bold are significantly different from zero at $p < .05$; values in bold and italics are significantly different from zero at $p = .05$; values in italics are significantly different from zero at $p < .10$.

*Have-to* goals were also related to greater expended effort, which led to more goal progress. This means that people were more likely to accomplish those goals that were characterized by greater *want-to* motivation because they encountered fewer obstacles, and not because they exerted more effort in pursuing those goals. Conversely, *have-to* motivation was unrelated to goal progress because goals high on *have-to* motivation were related to both experiencing increased obstacles and putting in greater effort, with the two effects cancelling each other out.

## Discussion

This study complements the first two studies by examining participants' self-reported manifestations of the impulsive (i.e., obstacles) and reflective (i.e., effort) systems and by investigating actual goal progress. Results showed that when participants pursued *want-to* goals they experienced fewer obstacles and made more progress on these goals without exerting more effort. *Have-to* goals, on the other hand, led both to increased obstacles and increased effort, ultimately not affecting goal progress. Interestingly, there was no goal-specific relationship between obstacles and effort (as can be seen in Figure 1), so that people did not put in more effort into those goals on which they experienced more obstacles.

The use of self-reported obstacles and effort complements the implicit methodology used in the first two studies by showing that

[6] We also collected data on goal commitment to ensure that it was not responsible for our results. Additional analyses showed that commitment was a significant predictor of effort, but not obstacles at the within level only; the other results remained essentially unchanged when controlling for commitment.

Table 4
*Results From Study 3 Multilevel Analyses*

| | Obstacles | | Effort | | Goal progress | |
|---|---|---|---|---|---|---|
| | Estimate | [CI] | Estimate | [CI] | Estimate | [CI] |
| Goal *want-to* | **−.22** | **[−.322, −.117]** | .03 | [−.092, .148] | **.14** | **[.027, .253]** |
| Goal *have-to* | **.10** | **[.017, .185]** | **.10** | **[.006, .148]** | −.01 | [−.104, .077] |
| Mean *want-to* | *−.11* | *[−.243, .014]* | **.14** | **[.005, .281]** | **.14** | **[.003, .271]** |
| Mean *have-to* | **.10** | **[.005, .197]** | −.06 | [−.165, .040] | −.06 | [−.167, .041] |

*Note.* Goal measures are person-centered; mean measures represent a person's mean. Values in bold are significantly different from zero at $p < .05$; values in italics are significantly different from zero at $p < .10$.



motivation is related to people's actual perceptions of their own experiences. The longitudinal nature of the study provided evidence that motivation influences goal pursuit indirectly through the impulsive rather than the reflective system, such that obstacles were reduced rather than effort maximized. Additionally, the use of within-person analyses allowed us to rule out the effects of individual differences on these outcomes. However, some bias because of the necessity for recall may have tainted the results of the study. Specifically, asking participants to recall the obstacles and effort exerted over the course of the past 6 weeks might result in responses biased by the more proximal experiences (e.g., of the past week or past few days, rather than uniformly over the past 6 weeks). For this reason, we conducted another study that used experience sampling to examine people's in-the-moment experiences of temptation and self-control. Such studies are considered to be less tainted by recall (because participants report on events that happened in the few minutes leading up to the signal), and have previously been used in research on temptation and self-control (Hofmann et al., 2012).

## Study 4

So far, we have demonstrated that *want-to* goals are related to lower hedonic responses for potentially tempting desires that conflict with the goal, and that people report subjectively fewer obstacles (but do not put in more effort) when pursuing *want-to* goals. However, how does this translate into people's real-life, in-the-moment experiences? To answer this question, we used experience-sampling methodology, which examines people's experiences in real-time. Recent research has used this methodology to study desires, and has found that people experience many desires each day, ~35% of which conflict with important goals, constituting a temptation (Hofmann et al., 2012). In that study, conflict was assessed as whether the desire conflicts with one's general goals; this, however, could prove a skewed measure of conflict, as responses would depend on the goals that were currently salient. Additionally, such a methodology precludes the possibility of examining the effects of goals' motivational properties on these outcomes. In the present study, we examine whether people actually experience fewer desires that conflict with their *want-to* goals, and whether these desires are experienced as less tempting. We also examine whether people apply greater self-control when countering desires that conflict with *want-to* and *have-to* goals. Following the findings from Studies 1–3, we hypothesize that *want-to* motivation is related to decreased frequency and strength of temptations and unrelated to the amount of effortful resistance applied to counter tempting desires. *Have-to* motivation, on the other hand, was expected to be related to both increased temptations and increased resistance.

Table 5
*Study 3 Goal-Specific (Within-Person) Indirect Effects on Goal Progress*

| Effect | Estimate (SE) | 95%CI |
|---|---|---|
| *Want-to* through obstacles | **.063(.015)** | **[.033, .093]** |
| *Want-to* through effort | .012(.025) | [−.038, .062] |
| *Have-to* through obstacles | **−.029(.013)** | **[−.054, −.004]** |
| *Have-to* through effort | **.045(.022)** | **[.001, .089]** |
| Total *want-to* indirect | **.075(.029)** | **[.018, .131]** |
| Total *have-to* indirect | .016(.026) | [−.036, .067] |

*Note.* Values in bold are significantly different from zero at $p < .05$.

## Method

**Participants and procedure.** One hundred and fifty nine first-year university students who had smartphones were recruited for a study of goal pursuit and well-being that included an experience sampling component. Participants came into the lab at the start of the fall semester to complete baseline measures (including goal measures) and were introduced to the experience sampling protocol. Three weeks later, participants completed the week-long experience sampling component of the study: For 7 days, five times during the day at random intervals distributed over the course of 12 hr (from 10 am to 10 pm), participants received a text message with a link to a brief online survey regarding their present experience, which they were asked to complete immediately (Hofmann & Patel, 2015). There were 151 students who completed at least one of the daily signals, for a total of 3,615 experience sampling surveys (68% response rate).[7] Data from participants who responded to at least seven surveys (20% of the surveys sent out; $N = 140$) was used in this study.[8]

**Measures.**

***Goal descriptions and motivation.*** Participants were asked to list four personal goals that they planned to pursue during the

[7] Participants also completed a nightly survey, as well as longer surveys later in the semester; these were not directly relevant to the present study and will not be discussed further. Although we also collected data on goal progress, these results are presented elsewhere (Milyavskaya & Inzlicht, 2015).

[8] Because many of our variables of interest were based on the proportion of signals on which participants did or did not indicate a desire, a minimum number of reports were necessary for each participant to establish a baseline. We used 7 as an arbitrary number that allowed us to get a representative "snapshot" of each person's experiences, while maximizing the sample size.

Table 6
*Descriptive Statistics of Study 4 Variables*

| | Min | Max | Mean | *SD* | ICC |
|---|---|---|---|---|---|
| *Want-to* motivation | 1 | 7 | 5.59 | 1.28 | .22 |
| *Have-to* motivation | 1 | 7 | 3.31 | 1.73 | .39 |
| Proportion conflicting desires | 0 | 1 | .46 | .30 | .57 |
| Temptation | 0 | 38 | 8.89 | 7.05 | .46 |
| Resistance | −3 | 3 | .10 | 1.25 | .74 |

semester using the same instructions as in Study 3. After each goal, participants were asked to rate their motivation for pursuing that goal using the same scale as in Study 3. *Want-to* and *have-to* motivation were then computed for each goal.

***Experience sampling data.*** We used the methodology used by Hofmann and colleagues (2012) to collect data on desires and conflict. In the experience sampling survey, participants were first asked about whether they were currently experiencing a desire or had experienced one in the past 30 min. Only those surveys on which a current or recent desire was reported were analyzed (64.3% of occasions, $N = 2323$ observations). When participants indicated that they were or had recently experienced a desire, they were asked about how strong that desire was (on a scale of −3 = *very weak* to 3 = *very strong*) and whether they tried to resist the desire (on a scale of −3 = *did not try to resist at all* to 3 = *tried very hard to resist*). They were then asked about conflict with each of the four goals: "To what extent does this desire conflict with your goal of ___?" (on a scale of 0 = *not at all* to 6 = *very much*), where the blank was replaced by each of their goals that they had indicated at the initial assessment.

We were interested in the frequency and strength of temptations as two characteristics that we thought would be particularly relevant for their influence on subsequent goal pursuit. A temptation was operationalized as a "problematic" desire that conflicted with the goal (Hofmann et al., 2012). To determine the proportion of desires that constitute a temptation, we divided the number of desires that, for a given goal, were rated as at least 1 on the 0–6 conflict scale, by the total number of desires reported by the person. For example, if Julie reported a total of 25 desires, five of which conflicted with her health goal, her proportion of temptations for that goal would be 20% (5/25). Temptation strength was operationalized as the product of the strength of the desire (recoded as 1 = *very weak* to 7 = *very strong*) and conflict experienced with a given goals, such that nonconflicting desires (rated as 0 out of 6 on conflict) were considered nontempting (a score of 0), while conflicting desires could range in their level of temptation from 1 (for a weak desire that minimally conflicted with the goal) to 42 (for a very strong desire that also conflicted maximally with the goal). Goal-level temptation was computed by averaging the temptation experienced with a given goal across all desires. Finally, to look at effortful resistance, we computed a goal-specific measure of resistance by using the mean resistance for those desires that conflicted with each given goal, irrespective of nonconflicting desires. Therefore, if Julie reported five desires that conflicted with her health goal, her resistance for that goal would be the average of the resistance reported in response to those five desires only.

***Analytical procedure.*** Multilevel analyses were conducted using the MIXED procedure in SPSS version 22 using the maximum likelihood (ML) estimation procedure. Because we were primarily interested in the role of motivation on temptation and resistance, we conducted the analyses on goals nested within-person, with temptation and resistance aggregated across signals (for each goal) and goal motivation on Level-1 (the goal level).

## Results

Table 6 presents the means, *SE*s, and intraclass correlations (ICCs) for all our measures. It can be seen from the ICCs that there was nonnegligible variance between and within-person on all variables; however, the variability among goals was lower for resistance than for other variables. This suggests that people who generally exerted self-control for some goals were generally more likely to resist when facing conflicting desires (i.e., exert self-control to counter desires conflicting with all their goals); this is likely a results of our measurement, as resistance was assessed for each desire, not for each goal.

To test our hypotheses that people will experience less temptation for *want-to* goals but greater temptations for *have-to* goals, *want-to* and *have-to* motivation were used to predict temptation frequency and strength of temptation for each goal. *Want-to* and *have-to* motivation were person mean-centered, and both the goal-specific value and the mean across all four goals (i.e., person-level) were entered into the model; the results are presented in Table 7.[9] Results showed that goal-specific *want-to* and *have-to* motivation influenced the frequency of experiencing conflicting desires, as well as the strength of the temptation—people experienced weaker temptation and experienced temptation less frequently when pursuing goals high on *want-to* motivation, and more frequent and stronger temptation when the goal was high on *have-to* motivation (compared with the average motivation across their goals). Additionally, people who generally set more *have-to* goals experienced greater temptation. Contrary to our expectations, goal-specific *want-to* motivation also predicted resistance, with people applying more resistance (i.e., self-control) when faced with a tempting desire that conflicted with *want-to* goals (compared with their own average self-control across all goals); goal-specific *have-to* motivation was unrelated to resistance.[10]

[9] To determine whether the slopes of motivation should be fixed or random, we tested alternative models with neither, one, or both of the slopes of goal-centered motivation as random; results from fit indices showed that in all cases, the model with a random slope for *want-to* motivation and a fixed slope for *have-to* motivation provided the best fit. This means that for some people, *want-to* motivation was a stronger predictor of temptation and resistance than for others, while *have-to* motivation had similar effects across everyone. Table 7 presents results for the model with one random and one fixed slope.

[10] To ensure that goal content was not responsible for these findings, goal content was coded into seven categories (academic, interpersonal, self-growth, hobbies, exercise, work/financial, or other). While there were, as expected, differences in mean levels of motivation, conflict, temptation, and resistance, there were no interactions among domain and motivation on any of our three dependent variables. We also collected data on goal commitment to ensure that it was not responsible for our results. Additional analyses showed that commitment was not a significant predictor of any of the dependent variables, and that results remained essentially unchanged when controlling for commitment.

Table 7
*Results From Study 4 Multilevel Analyses*

| | % conflicting desires | | Temptation strength | | Resistance | |
|---|---|---|---|---|---|---|
| | b | CI | b | CI | b | CI |
| Fixed effects | | | | | | |
| Goal *want-to* motivation | **−.025** | **[−.047, −.003]** | **−1.128** | **[−1.73, −.52]** | **.077** | **[.006, .149]** |
| Goal *have-to* motivation | **.027** | **[.013, .040]** | **.869** | **[.52, 1.22]** | .022 | [−.029, .073] |
| Mean *want-to* motivation | .011 | [−.037, .058] | .597 | [−.47, 1.66] | −.095 | [−.333, .143] |
| Mean *have-to* motivation | **.066** | **[.036, .097]** | **1.297** | **[.61, 1.99]** | −.055 | [−.210, .098] |
| Random effects | | | | | | |
| Residual (sigma) | .028 | [.024, .033] | 18.01 | [15.39, 21.07] | .372 | [.317, .438] |
| Intercept ($\tau$) | .045 | [.035, .060] | 22.20 | [16.71, 29.48] | 1.205 | [.929, 1.563] |
| Goal *want-to* motivation ($t_{10}$) | **.006** | **[.003, .011]** | **5.05** | **[2.98, 8.55]** | *.028* | *[.009, .085]* |

*Note.* Goal measures are person-centered; mean measures represent a person's mean. Values in bold are significantly different from zero at $p < .05$; values in italics are significantly different from zero at $p < .10$.



## Discussion

This study extends the results of Studies 1–3 by examining in-the-moment experiences of temptation and self-control. Results showed again that motivation affects the likelihood of experiencing desires that conflict with a goal, the strength of the temptations, and the resistance applied to counter these temptations. Specifically, *want-to* goal motivation predicted experiencing fewer conflicting desires and weaker temptations accompanied by stronger resistance, whereas *have-to* goal motivation was related to more conflicting desires and stronger experiences of temptation. Although our methodology was similar to that used by Hofmann and colleagues, we made a number of changes that allowed us to investigate previously unexplored relationships. First, we assessed the resistance using a scale (rather than a yes vs. no response). More importantly, asking about conflict with specific goals (rather than with goals in general) allowed us to examine the effects of goal motivation on desires, resistance, and conflict. It is, to our knowledge, the first time that the effects of goal motivation on temptation and desire have been investigated.

# General Discussion

The present studies examined the influence of *want-to* and *have-to* motivation on the impulsive and reflective systems of self-regulation. Taken together, results from these studies show that *want-to,* or autonomous, motivation is consistently related to reduced temptations, including less automatic liking for unhealthy foods (Studies 1 and 2), fewer obstacles in the face of goal pursuit (Studies 2 and 3), and fewer and less tempting in-the-moment desires that conflict with important goals (Study 4). This suggests that *want-to* motivation can be protective against the influence of temptations, thereby boosting self-regulation by helping the seesaw tip in favor of self-control. As was shown in Studies 1 and 2, this happens automatically. This could be because pursuing *want-to* goals is intrinsically pleasurable and offers "natural incentives" (Cantor & Blanton, 1996)—an academic who writes because she enjoys it would be less likely to be tempted to check her Facebook page in the middle of writing a paper than someone for whom writing is a chore.

*Have-to* motivation, on the other hand, had a much more mixed influence: the effects on implicit liking of unhealthy foods were marginal (Study 1) or nonexistent (Study 2), although it was related to using less controlled processes when faced with snacks (Study 2). Furthermore, higher *have-to* motivation was related to perceiving more obstacles to goal pursuit (Studies 2 and 3), as well as encountering more conflicting and tempting desires. This suggests that while *have-to* motivation has no effect on people's automatic reactions to temptations, it does affect subjective interpretation of such cues, leading people to perceive greater obstacles and stronger temptations. This provides some evidence for why no consistent effects of *have-to* motivation on goal pursuit have been found (Koestner et al., 2008): although *have-to* motivation may lead people to feel like they are expending effort (as shown by the self-report in Study 3), it is accompanied by increased challenges and obstacles in the face of goal pursuit such that any expanded effort does not yield a net benefit. Additionally, it may be the case that people remember their efforts in the long run, especially when they succeed—because effort is typically considered (especially by laypeople) as necessary for success, people might make a reverse attribution when they experience success (i.e., "I was successful, so I must have tried hard"). However, this might not actually be true in the moment, where *have-to* motivation might have no effect on effortful resistance (as in Study 4).[11]

An important advantage of the present set of studies is the variety of methods utilized to examine the phenomena. Indeed, the convergence of implicit measures with longitudinal and experience sampling studies allow us to express greater confidence in the results of the studies. By not relying entirely on self-report (and including implicit measures), we are able to rule out self-report influences. Additionally, using experience sampling increases validity by allowing us to capture people's actual experiences. More importantly, looking at within-person effects (in Studies 3 and 4) allows us to rule out any effects of extraneous individual differences (e.g., neuroticism, optimism, positive response bias) on the results.

## Implications for Self-Regulation Theories and Research

The present studies extend research on dual-system models of self-regulation (Hofmann et al., 2009; Metcalfe & Mischel, 1999) by focusing primarily on the effects and fluctuations of the impul-

[11] We thank an anonymous reviewer for suggesting this interpretation.

sive system rather than on how reflective processes modulate the impulsive system. Specifically, instead of looking at how people can consciously regulate their desires and temptations (e.g., by distracting themselves, Mischel & Ebbesen, 1970), we directly examine whether impulses and desires are present and experienced as such. In particular, we find that the impulsive system is directly affected by the quality of motivation, and that this occurs at both the level of the individual and at the level of specific goals. In line with other recent research (Adriaanse et al., 2014; de Ridder et al., 2012) this suggests that effective self-regulation may not require active self-control and instead may be effortless rather than effortful.

While we have defined *self-control* as the effortful inhibition of impulses and *self-regulation* as a broader process of pursuing one's goals, other theories (using the terms interchangeably) have identified different stages at which self-control or self-regulation can occur. For example, in their model of emotional self-regulation, Gross and Thompson (2007) outline five different strategies for regulating emotions, including selecting one's context or situation in a way that will aid regulation, modifying the situation, directing attention to cues that promote regulation (and avoiding cues that may lead to undesirable emotions), changing one's thoughts or interpretations of these cues, and finally actually changing one's emotional response (see Gross & Thompson, 2007 for full details of the model). Similarly, Fujita (2011) considers that part of self-control is "regulating the availability and opportunity to indulge in temptation." Although in our definition this would be an example of self-regulation, rather than self-control per se, this difference is semantic, and it is useful to consider how the results from the present studies fit with such models.

Specifically, our data suggest that *want-to* goals affect self-regulation by affecting these earlier processes and reducing temptations before they are experienced. As such, *want-to* goals could result in fewer temptations and obstacles by acting on a number of these processes. For example, people may put themselves into situations where there are fewer temptations, such as taking a route to work that does not pass in front of an ice cream store. This parallels recent findings showing that people with high trait self-control experience less conflict but are not actually better at resistance, suggesting that people self-select into situations where they will not be faced with temptations (de Ridder et al., 2012; Hofmann et al., 2012). Alternatively, *want-to* motivation for a goal may directly affect how we notice and interpret stimuli in our environment, including where our attention is focused. Even if a person passes in front of an ice cream store, they may not notice it and their attention may be focused on the shoe store next door. Furthermore, even if the stimuli are noticed, they may not be perceived as tempting, such that seeing the ice cream store will not elicit a desire to consume ice cream (or the desire will be less strong). Our first two studies provide some evidence for this proposition, such that people are less implicitly drawn toward tempting goal-disruptive stimuli. Specifically, we showed that with increased *want-to* motivation, goal-disruptive stimuli are more negatively evaluated and less tempting. Although this provides preliminary evidence of the process by which *want-to* goals affect self-regulation, further research is needed to test other alternative explanations, which are not mutually exclusive but may combine to confer benefits of *want-to* motivation.

Our research adds to the growing literature on implicit self-control (Fishbach & Shah, 2006; also see review in Fujita, 2011; consistent with our definitions, this would be better termed implicit self-regulation). For example, in one series of studies, participants who were generally good at self-regulation were quicker to "approach" goals by pulling a lever toward themselves when goal-related words were presented and to "avoid" temptations by pushing the lever away for temptation-related words (Fishbach & Shah, 2006). Other research (Fishbach et al., 2003; Papies, Stroebe, & Aarts, 2008) has found that people develop cognitive associations such that temptations (e.g., chocolate) activate relevant goals (e.g., dieting); the reverse (i.e., goals activating temptation) was not found. Similarly, activating a goal led to more negative implicit evaluations of tempting stimuli and more positive evaluations of stimuli related to the goal itself (Fishbach, Zhang, & Trope, 2010). The present studies suggest that such automatic or implicit self-regulation takes place especially when the goals are characterized by *want-to* motivation.

## Implications for Self-Determination Theory

The present research also contributes to the literature on self-determination theory (Deci & Ryan, 2000) and the self-concordance model of goal pursuit (Sheldon & Elliot, 1999). Although previous research has repeatedly shown that setting and pursuing *want-to* (autonomous or self-concordant) goals leads to greater goal progress, the mechanism for this effect has received very limited attention. Indeed, the main explanation so far has been that people exert more sustained effort on pursuing *want-to* goals (Sheldon & Elliot, 1998). In the present studies, we propose an alternative mechanism, namely the experience of fewer temptations and obstacles. Although we only examined actual goal progress in one study (Study 3), the results from the other studies demonstrate the role of goal motivation on nonefortful goal pursuit. Additionally, because motivation exerts effects on implicit and momentary experiences of temptations, these may not be consciously accessible. For example, it may be the case that participants perceive that they are trying hard (perhaps because they see that they are making good progress toward their goals), when in fact they are simply experiencing fewer obstacles. Future research will need to further test whether fewer temptations are indeed the reason why *want-to* goals are more likely to be attained by further testing a complete model including motivation, temptation, self-control, and goal progress.

Together with our results, the finding that *have-to* goals seem to be ineffective (Koestner et al., 2008) suggests that *have-to* motivation does not have any utility, leading to questions about possible reason for its existence. However, *have-to* motivation is often a precursor to more internalized *want-to* motivation (Deci & Ryan, 2000). According to self-determination theory, most goals and activities begin as externally regulated (i.e., *have-to*) and are transformed into *want-to* by a process of internalization (Ryan & Deci, 2000). To the extent that internalization is a fluid process (Ryan & Deci, 2000), some of the *have-to* aspects of a goal might remain even as the goal is internalized. Although this is not helpful to goal pursuit, it does not seem to be harmful either, and may just be a byproduct of incomplete internalization. Conversely, it is also likely the case that some goals never get internalized and remain as *have-to* goals until they are abandoned.

## Limitations and Future Directions

Although the studies in this article use a variety of methods, they are all nevertheless correlational in nature, such that other interpretations of the data could be possible. For example, it may be the case that people who find unhealthy food especially tempting attempt to eat healthy only because they feel like they have to, and not because they actually want to. Similarly, in Studies 3 and 4, although participants set new goals for themselves, they may have recalled experiencing obstacles to similar goals in the past, which may have affected their motivation for these new goals. Previous research has shown that competence, autonomy, and relatedness experienced in a domain predict the motivation for goals associated with that domain (Milyavskaya et al., 2014, 2015). Experiencing (and giving in to) many competing temptations in a domain may lead to reduced competence, thereby resulting in increased *have-to* motivation for goals set in that domain. Future studies need to experimentally manipulate *want-to* and *have-to* motivation (e.g., Levesque & Pelletier, 2003) to definitively test the directionality of the effects. Perhaps even more likely, it may also be that the relationship between motivation and temptations is bidirectional, such that *want-to* motivation leads to experiencing fewer temptations, which then translates into enhanced *want-to* motivation.

One issue that we did not consider or address in the present study is the effect of goal conflict on the processes of temptations and self-control. Specifically, something that is helpful in achieving one goal can be construed as a temptation or obstacle in the pursuit of another, competing goal. For example, if Michael has the goal of finishing a manuscript and also of spending more time with his family, would his children knocking on his office door (while he is working at home) and asking him to go to the park constitute a temptation interfering with his work goal, something he can do to achieve his family goal, or both? Furthermore, what role does the motivation toward these two goals play in determining how he interprets the interruption and his choice of response? Although such questions were beyond the scope of the present article, they would be interesting to examine in the future.

A potential limitation of these studies was our definitions of obstacles and temptations. For example, although we described obstacles as resulting from frequent temptations and stemming from the impulsive system, there are many other potential reasons why obstacles may arise (Marguc et al., 2011). Specifically, environmental constraints such as other responsibilities or lack of resources (either internal or external) may be powerful forces that interfere with goal pursuit. For example, not having enough money to purchase healthy food might be a very real obstacle to eating healthy that is not a result of a desire, impulse or preference for unhealthy food. A better understanding of obstacles and the sources of these obstacles is needed in the future.

One alternative may be to move beyond dual process approaches altogether and to consider self-control as a decision that people make based on multiple inputs that contribute to the subjective value of control (Berkman, Kahn, & Livingston, 2014). According to this new approach, self-regulation is not seen as the result of some exclusive battle between process that contribute to control and those that contribute to impulsivity. Instead, self-regulation is seen as the product of multiple inputs that determine the subjective value of control and the decision about whether to apply effort or not. Thus, self-regulation here is not seen as the consequence of dual-processes, but instead as the consequence of a single-process that assigns value to the application of effort in any one domain (Berkman et al., 2014; Inzlicht, Berkman, & Elkins-Brown, in press). For example, whether a dieter sticks to his diet is less about how control processes interact with impulsive processes, and instead about how multiple inputs (e.g., positive value from looking skinny, from being healthy, from being part of a weight-loss group, and from pleasing his spouse; and negative value from foregoing temptation, from the aversiveness of effort, and from the higher monetary costs of a healthy food option) determine the subjective value of restraining food intake. When the subjective value is positive, our dieter will restrain himself, and when it is negative, he will overindulge. The research we presented here suggests that *want-to* goals have higher subjective value than *have-to* goals, and that one of the ways this value is determined is by devaluing the perceived benefits of temptations. Future work is needed to explore this new approach to self-regulation more fully.

## Conclusion

By examining the impulsive (temptations) and reflective (self-control) components of self-regulation, the present studies showed that *want-to* motivation reduces the prevalence and desirability of temptations, thereby promoting effective self-regulation. Unlike most studies that focus on the self-control component of self-regulation, we focused on the experience of temptation, showing through multiple methodologies that temptation is influenced by motivation. This enhances our understanding of self-regulatory processes, and is in line with recent calls in the literature (e.g., Fujita, 2011) to look beyond the effortful inhibition of impulses in our attempts at understanding successful self-regulation.

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