

“Whether I Like It or Not, It’s Important”: Implicit Importance of Means Predicts Self-Regulatory Persistence and Success

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To effectively self-regulate, people must persevere on tasks that they deem important, regardless of whether those tasks are enjoyable. Building on past work that has noted the fundamental role of implicit cognition in guiding effective self-regulation, the present paper tests whether an implicit association between goal means and importance predicts self-regulatory persistence and success. Implicit importance predicted markers of effective self-regulation—better grades, more studying and exercise, and stronger standardized testing performance—over and above, and often better than, explicit beliefs about the importance of that self-regulation, as well as implicit evaluations of those means. In particular, those for whom tasks were fairly taxing to complete (i.e., those for whom this self-regulation required effortful self-control) were those who most benefitted from the implicit association between means and importance. Moreover, when participants were reminded of recent self-regulatory failure that they believed could be overcome through hard work, implicit importance toward the means increased as if to prepare them to achieve self-regulatory persistence. A final study sought to reconcile the present findings with previous work showing the key role that implicit evaluations play in effective self-regulation. We reasoned that means are important precisely because they are associated with valued end-states. Consistent with this account, implicit evaluations of end-states predicted the implicit importance of means, which in turn predicted effective self-regulation.

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In making progress toward goals, ambitious intentions do not always lead to impressive results. This is especially true when one hopes to accomplish outcomes that require effortful self-regulation (e.g., Rhodes, Courneya, & Jones, 2003)—difficult or resource-consuming actions that one must will oneself to do in order to effectively exert self-control and achieve future goals (Baumeister & Vohs, 2007; Shah & Kruglanski, 2000). For example, people hope to reap the benefits of formal education but cannot always maintain the necessary academic discipline, have ambitious plans for retirement but cannot exercise the financial restraint in the present, or vow to get in shape but cannot keep up the necessary exercise regimen (de Bruijn, 2011; Rhodes, de Bruijn, & Matheson, 2010; Rhodes, Plotnikoff, Courneya, 2008). Thus, in understanding who effectively achieves their goals, it is not enough to ask whether people state an explicit intention to do so.

Instead, research over the last decade has shown that people’s *implicit* (i.e., rapidly and spontaneously activated) goal-relevant cognitions are a critical part of the explanation for whether they

succeed (e.g., Aarts, Custers, & Marien, 2008; Custers & Aarts, 2010; Ferguson, 2007, 2008; Fishbach, Friedman, & Kruglanski, 2003; Fujita & Han, 2009; Kruglanski, Chernikova, Rosenzweig, & Kopetz, 2014; Myrseth, Fishbach, & Trope, 2009; Shah, 2005). Typically, this research has focused on how implicit evaluations—positive or negative associations—guide goal pursuit. By offering a common currency that permits comparisons between qualitatively different courses of action, implicit evaluations¹ can guide people toward their long-term goals and away from short-term temptations (Cabanac, 1992; Fishbach et al., 2003; Fujita & Han, 2009). And, indeed, positivity has a causal role in motivating behavior. By conditioning different activities with positivity, people then are more likely to try to engage in those activities (e.g., see Aarts, Custers, & Holland, 2007; Custers & Aarts, 2005; see also Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010). In one study, for instance, participants had to complete a mouse-clicking task quickly in order to be able to work on a puzzle. If they did not work quickly enough, time would run out, and they would miss this opportunity. Those for whom puzzle-related words were positively (vs. neutrally) conditioned worked significantly more quickly on the mouse-clicking task, presumably to maximize their chances of actually being able to work on the subsequent puzzle (Custers & Aarts, 2005; see also Custers & Aarts, 2007).

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¹ Such evaluations may be affective in nature (see Amodio & Devine, 2006; Gawronski & Ye, 2014).

Not only does implicit evaluation play a role in self-regulation, it appears to play a *special* role, one that goes above and beyond what explicit evaluations and intentions track. For example, Ferguson (2007) found that implicit evaluations toward thinness predicted participants' ability to resist a tempting but unhealthy food, even as participants' explicit evaluations toward thinness did not. Why would implicit evaluations have such special explanatory power? There may be multiple reasons (e.g., Gawronski, LeBel, & Peters, 2007), but efficiency may be a critical one in the domain of self-regulation. Much self-regulation and goal pursuit—especially the difficult, self-control conflicts of interest in the present work—occur over long time spans: each day affords a new opportunity to go (or not go) to the gym, to buy (or not buy) an alluring designer purse, or to study (or not study) for that looming final exam. In exerting the self-control to effectively self-regulate, it seems unlikely that people are constantly explicitly weighing the costs and benefits of continuing toward a goal or succumbing to temptation. Such constant, conscious decision-making would presumably be highly inefficient and render the person unable to function effectively at even simple tasks (e.g., Baddeley, 2007; Hassin, 2013; Kahneman, 1973). Instead, implicit cognition may be shaping and guiding one's self-regulatory efforts on a more general, daily basis (Custers & Aarts, 2005, 2010; Masicampo, & Baumeister, 2013; McClelland, Koestner, & Weinberger, 1989). Suggestive evidence for this idea comes from work showing the predictive validity of implicit associations for future behavior across domains (for reviews see Cameron, Brown-Iannuzzi, & Payne, 2012; Weingarten et al., 2016), such as prejudice (e.g., Greenwald, Banaji, & Nosek, 2015; Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Towles-Schwen & Fazio, 2006; cf., Oswald, Mitchell, Blanton, Jaccard, & Tetlock, 2013), interpersonal relationships (e.g., McNulty, Baker, & Olson, 2014; McNulty, Olson, Meltzer, & Shaffer, 2013), academic performance (Nosek & Smyth, 2011), and political behavior (Galdi, Arcuri, & Gawronski, 2008; Perugini, Richetin, & Zogmaister, 2010; cf. Friese, Smith, Plischke, Bluemke, & Nosek, 2012).

Although implicit evaluations may hold unique explanatory power in self-regulation, are they the full story? Do our assessments of the pleasure or displeasure of goal-relevant stimuli—perhaps especially when measured implicitly—represent the only ingredient of successful self-regulation? It seems unlikely. The voluminous literature on (explicit) goals and motivation argues that there is more to goals than simply what we like or dislike (see also Higgins, 1997). Classic definitions of goals identify a critical distinction between the reward that motivates us in the first place—usually associated with the outcome or end-state—and what exactly we have to do to *get* the reward—that is, the means (Aarts, Dijksterhuis, & de Vries, 2001; Atkinson, 1974; Austin & Vancouver, 1996; Bandura, 1997; Bargh & Gollwitzer, 1994; Carver & Scheier, 1998; Fishbach & Ferguson, 2007; Kruglanski et al., 2002; Pervin, 1989; Schank & Abelson, 1977; Vallacher & Wegner, 1989; Young, 1961). In contrast with the motivating pleasure of the end-state, the pathways that lead to those desired end-states are often difficult and relatively unpleasant. One reason why some self-regulation is difficult and vulnerable to failure is that the activities that the coveted end-states require are tedious, arduous, or even painful—leading to what Fujita (2011) identifies as a dual-motive self-control conflict. People may persist to

achieve subsequent rewards, or they can instead satisfy short-term desires—indulging in temptations or merely slacking off.

So how do people get over these burdensome behavioral hurdles to make progress toward a prized outcome? One might think that the answer would be that people who succeed (vs. do not) must simply evaluate those tedious activities as less negative. Such a claim would be consistent with an explanatory model of self-regulation that focuses exclusively on *evaluation* (positivity, negativity). In contrast, we argue a critical factor for whether people succeed in enacting difficult means is their assessment of the means' *importance* for reaching the end-state. That is, the more people see a difficult, goal-related activity as critical, necessary, and important, the more they should be willing to perform those activities, even though such means may be less exciting than other candidate behaviors.

Although self-regulation can sometimes be driven by an inherent love of the tasks one is engaging with, it also often requires persistence at frustratingly unenjoyable yet *important* activities (Burton, Lydon, D'Alessandro, & Koestner, 2006). For example, physically fit (vs. unfit) people may not feel that getting up at 6 a.m. to go running is inherently more enjoyable than sleeping in; however, they may have a stronger sense that doing so is an important activity to engage in. Although this notion of importance and necessity has been measured explicitly in various ways (e.g., Atkinson, 1974; Klein, Wesson, Hollenbeck, & Alge, 1999), its implicit operationalization has never been addressed. In light of our earlier arguments that implicit cognition may play a key role in self-regulation, our central research question is whether people's *implicit* characterization of the *means* to certain long-term rewards as important predicts whether they enact them effectively and successfully.

There are at least four hints in the literature that the implicit importance of means, rather than the evaluation of those means, may predict successful enactment of those means. First, goal pursuit is facilitated when people focus their evaluations on the end-states rather than the means. Menial laborers or struggling students complete their tasks more effectively when they focus on the ultimate benefit of those tasks (valued end-states), even though this does not make the tasks themselves more enjoyable (Hughes, 1958, 1962; Yeager et al., 2014). This implies that the evaluative nature of the means may not influence regulatory success. Second, previous demonstrations that implicit evaluations predict successful goal pursuit suggest it matters *what* people are implicitly evaluating. Whereas implicit evaluations of the end-states (e.g., thinness) predict success, implicit evaluations of the activities to get there (the means) do not (Ferguson, 2007; see also Moore, Ferguson, & Chartrand, 2011). This pattern may even be adaptive, given that positivity toward end-states encourages one to steadily pursue such rewards even as the means by which to get there can change (Marien, Aarts, & Custers, 2012).

Third, Burton et al. (2006) found that those who associated means with concepts like "important" and "worthwhile" (*identified self-regulators*) experienced satisfaction that was contingent on their self-regulatory success, whereas those who associated means with concepts like "enjoyable" and "exciting" (*intrinsic self-regulators*) did not experience success-contingent satisfaction. If a sense that what one is doing today is important reflects that satisfaction will be contingent upon self-regulatory success, this may serve to make certain self-regulation is sufficiently focused to

achieve successful outcomes—helping to make the tasks one must engage in bearable even if not enjoyable (Grant & Sonnentag, 2010). Fourth, and providing empirical support for this account, although athletes who were intrinsic self-regulators were happier during the season, those who were identified self-regulators scored more points (Paquin, 2005). Attaching importance versus mere positivity to one's current pursuits may encourage one to succeed on (as opposed to merely enjoy) them.

Although we have stressed that implicit importance should play a complementary role to implicit evaluation in goal pursuit, note we have not suggested that it plays an unrelated role. Instead, we have emphasized that certain means acquire importance because of their ability to lead to positive end-states. That is, a given end-state's value should imbue the corresponding means with importance. This is presumably why goal importance has been described as commitment to, perseverance on, or persistence at the means of goal pursuit (Austin & Vancouver, 1996; Hollenbeck & Klein, 1987; Locke, Latham, & Erez, 1988)—all of which may derive from the anticipated satisfaction or value to be achieved (Naylor et al., 1980). Custers and Aarts (2010) offered additional hints of our argument, writing "People . . . take into account the value . . . of the goal, because this tells them whether it is warranted to invest the effort or recruit the resources necessary for maintaining their behavior, overcoming obstacles, or deviating from routines to attain the goal" (p. 49). We draw on these ideas in predicting that people's implicit evaluation of a given end-state determines whether certain means are implicitly tagged as important to pursue. These means may not be the particularly enjoyable behaviors (e.g., homework, aerobics) or domains (e.g., academics, exercise) one can focus one's attention on in the present, but these means should draw one's attention and engagement because of the highly valued end-states they can lead to (e.g., graduation, fitness).

That said, although there are certain logical similarities between implicit importance of means and goal commitment (Locke & Latham, 1990), our approach to measuring implicit importance differs from how goal commitment is operationalized in at least one key way. Goal commitment typically focuses on the perceived necessity of completing a goal (e.g., "No matter what happens, I will not give up this goal"; Monzani et al., 2015). In contrast, we focus on whether the specific means to goal fulfillment are tagged as important. But given that one source of goal commitment is the expected value of goal attainment (Atkinson, 1964; Emmons, 1986), and that the perceived value of a goal influences actual goal progress through goal commitment (Monzani et al., 2015), it may be that goal commitment operates by strengthening the sense—even implicitly—that means are important.

Overview of Key Research Objectives and Empirical Strategy

Most centrally, we introduce the construct of implicit importance and test its role in predicting effective management of difficult self-regulation. We predicted that implicit associations between importance and means would predict effective engagement with those means, so as to reap the long-term rewards (i.e., end-states) that follow from successful self-regulation. Although we have repeatedly differentiated between means and end-states, one challenge is that there is not always such a clear differentiation (Austin & Vancouver, 1996). That is, there often exists a long

chain of means and end-states such that one link's end-state is the next link's means (Marien et al., 2012). Completing an exam could be the end-state of the specific muscle tensions involved in moving one's pen (see Powers, 1973), or the means by which one graduates. This is why it is necessary for us to create a dividing line to differentiate the near-term behaviors and activities that often require self-control to enact (means such as going to the library, investing effort in graded assignments, completing exams) and the rewarding, highly desirable outcomes that are what follow from effective enactment of those means (end-states such as graduation, achievement, and employment). We report a Pilot Study below that tests whether participants appreciate this distinction, and in so doing, validates the specific stimuli used in our studies as representing the behaviors and domains at which one must persist now (i.e., the means) or the long-term rewarding end-states that follow from effective engagement with those means (i.e., the end-states). Before reporting those tests, we outline the paper's four primary objectives.

First, we tested whether the implicit importance of means predicts self-regulatory persistence and ultimate success. In some studies, we predict performance outcomes that are achieved—in part—through effortful self-regulation. In other studies, we more directly measure the intensity or frequency with which participants engaged in self-regulatory efforts. Specifically, we tested whether the implicit importance of schoolwork predicts participants' course performance (Studies 1, 3a–3b, and 7) and study behaviors (Studies 2 and 7), whether the implicit importance of a standardized test predicts performance on that test (Study 5), and whether implicit importance of exercise predicts exercise behavior (Study 6). Notably, putting in hard work at school, maintaining focus on a standardized test, and keeping up a consistent gym regimen are all difficult acts of self-regulation that are done in the service of future rewards—for example, graduation or a career, admission to graduate school, and strength or wellness, respectively.

Second, we sought to establish the incremental validity of *implicit importance of means*. We wanted to test whether there is special predictive power that comes from all three components of this measure—that is, whether it matters that the measure is implicit (vs. explicit), that it measures importance (vs. mere evaluation), and that it assesses associations with the means (vs. the end-states). Thus, we tested whether implicit importance is predictive above and beyond several measures of the explicit evaluation of (Studies 2 and 3b) or explicit importance of means (Studies 3a–3b, 7), implicit evaluations of means (Studies 1–2, 3b, 5–7), as well as implicit importance of end-states (Studies 6–7). Some studies include other covariates, introduced to establish the unique predictive power of implicit importance and rule out alternative explanations.

Third, we wanted to understand how implicit importance is related to implicit evaluation. In particular, our final study tests whether implicit importance of the means is what *explains* the previously observed relationship (Ferguson, 2007) between implicit evaluation of end-states and successful goal pursuit (Study 7). This would support our larger argument that the implicit value of a given end-state determines whether the associated means are tagged as important, which in turn predicts the successful enactment of those difficult means.

Fourth, we asked for whom implicit importance is likely to predict effective self-regulation. We reasoned that those for whom

self-regulation is particularly difficult, taxing, or demanding—meaning the self-regulation will require more effortful self-control to navigate effectively—should benefit most from thinking that such means, although onerous, are important. Although “self-control” is typically invoked to describe the effortful overcoming of *temptations* (choosing papers over pizza), we note that those who struggle with self-regulation must exert self-control in inhibiting the desire to slack off or give up (completing a whole paper instead of a whole paragraph). [Kruglanski et al. \(2012\)](#) argue that goal progress requires that the driving force (which includes a sense that one’s tasks are important) be greater than the restraining force (which includes task demands). A student who finds it taxing to complete assignments, a test-taker who finds it difficult to muster the motivation to last through a dry reading comprehension passage, or an exerciser who could easily be dissuaded by the weather in deciding whether to go to the gym is precisely the kind of person who finds regulation to be most demanding, and thus has the biggest potential to benefit from a strong cognitive linkage between such means and importance (Studies 3a–3b, 5–6). For those for whom these means are performed with self-regulatory ease, the same benefit may not be conferred; for these individuals, any barrier to succeeding on self-regulatory tasks is likely found elsewhere. Regardless of the reason why self-regulation is difficult, the need to avoid acting on myopic evaluations, and instead focus on what present means are important for future rewards, is the same. This prediction is also reminiscent of [Custers and Aarts’ \(2005\)](#) finding that implicit positivity was important for goal pursuit only for those who needed a nudge to pursue the goal, not those who would do so naturally.

Across our studies, instead of prespecifying a sample size, we had research assistants run as many participants as they could in a certain amount of time (typically, until the end of an academic term). Although all conditions and exclusions are reported in the main text, we include those measures that were exploratory or rendered moot by the success of a prior experimental manipulation, as well as additional descriptive statistics for our primary measures, in the Supplemental Materials instead of the main text. We include an exploratory post hoc analysis, which is identified as such, in a footnote.

Pilot Study

We conducted a Pilot Study with two objectives. First, we wanted to make sure that people could easily differentiate target words that related to our definition of the means versus ends of goal pursuit. Second, and relatedly, we validated the means and end-state words used as stimuli in Studies 1–4 and 6–7. We explained to 193 undergraduates at the University of California, Berkeley, our conception of means and ends. We provided these instructions in the context of two goals that are markers of effective self-regulation: getting a high GPA (relevant to Studies 1–4 and 7) and engaging in a frequent exercise regimen (relevant to Study 6). As we explained, means—in these contexts—are “the difficult things that are important to work hard at or do now,” such that “by doing these things, you can reach the goal,” and that “relate to how you reach the goal.” In contrast, the ends were said to “describe the positive rewards that come from meeting your goal.” These descriptions were positioned on a timeline to show that the means represent what one persists on now when self-

regulating effectively, whereas the ends are what follow from the markers of effective self-regulation. Although our characterization of “means” and “ends” as “difficult” and “positive,” respectively, would not accurately apply to all examples of goal pursuit, they do apply to the self-control dilemmas that are the focus of the present research.

Participants saw 14 target words in a random order that relate to the goal of getting a good GPA, as well as 14 target words that relate to the goal of exercising frequently. For each target, participants indicated on a 7-point scale to what extent the word was a *means* (1) or an *end* (7) for that goal. We expected that half of the words would be categorized as what one must focus on and engage with now in order to achieve the goal—that is, the means (GPA: academics, classes, exams, grades, lectures, papers, school; Exercise: aerobics, athletics, cardio, exercise, gym, running, weights). We expected the other half would be categorized as what eventually follows from achieving the goal—that is, the end-states (GPA: accomplishment, achievement, career, employment, graduation, job, success; Exercise: appearance, energy, fitness, health, muscle, strength, wellness).

Participants classified all of the 28 target words as expected. The 7 GPA-means words were all rated significantly less than the midpoint of 4 ($1.59 < Ms < 2.94$; $ts > 7.93$, $ps < .001$), whereas the 7 GPA-ends words were all significantly greater than the midpoint ($5.83 < Ms < 6.45$; $ts > 20.54$, $ps < .001$). Similarly, the 7 exercise-means words were all significantly less than the midpoint of 4 ($1.69 < Ms < 3.03$; $ts > 7.76$; $ps < .001$), whereas the 7 exercise-ends words were all significantly greater than the midpoint of 4 ($5.31 < Ms < 6.49$; $ts > 10.58$, $ps < .001$). Analyzed differently, the means words were classified differently than the ends words for both the GPA, $Ms = 2.07$ versus 6.20, paired $t(192) = 42.31$, $p < .001$, as well as the exercise words, $Ms = 2.13$ versus 5.82, paired $t(192) = 33.81$, $p < .001$.

Note that we chose to measure perceptions of stimuli as means versus ends on a 7-point (instead of a dichotomous) scale because we expected there would be variability in how perfectly each target fit the conception of a means versus an end-state. For example, both lectures ($M = 1.49$) and papers ($M = 1.59$) were more obviously means to future rewards than were grades ($M = 2.79$) and academics ($M = 2.93$). But notably, all four were seen to be clear means—that which one must seriously engage with and work hard at now in order to get a high GPA and the positive rewards that follow. Similarly, although employment ($M = 6.46$) was a clearer end-state reward that can follow from a high GPA than the more abstract term accomplishment ($M = 5.83$), there was a clear consensus that both reflected the positive rewards that follow from a high GPA.

Study 1

Study 1 investigated whether implicit importance toward the means of goal pursuit would predict effective self-regulation. In particular, we examined whether implicit importance of school-work would predict participants’ college GPAs—what previous research has used as a marker of effective academic self-regulation ([Tangney, Baumeister, & Boone, 2004](#); [Yeager et al., 2014](#)). Success at school requires persevering on many means that are effortful, challenging, and unexciting, but nonetheless important to do if one wishes to receive the benefits accompanying academic

success (Burton et al., 2006; Gagné & Deci, 2005). But given there are vast differences in how much time different students—who vary in both ability and course schedule—need to spend on these means, we chose not to measure the means directly (e.g., hours of study) and instead leaned on an index of whether the effort invested was sufficient (i.e., one's GPA). For example, the self-regulatory work required in an English seminar takes a very different form from that required in organic chemistry.

All participants were current undergraduates who had completed at least two semesters of college. We assessed whether implicit importance of schoolwork predicted their effective engagement with their academic work as indexed by their GPA. To test whether it was implicit *importance* in particular that might offer this predictive power, we also measured participants' implicit evaluation (positivity or negativity) of schoolwork. Finally, we included one additional variable—optimistic denial (Thompson & Schlehofer, 2008)—that we thought could address a first alternative explanation for why implicit importance of schoolwork might predict GPA. Those high in optimistic denial seem to easily convince themselves that they are relatively immune from bad things happening to them. We speculated that this could be a third-variable influence on both GPA and implicit importance. That is, participants higher in optimistic denial might be self-deluded in how prepared they are for their schoolwork (low GPA), but preempt any negative feedback's ability to shatter their sense of self-security by having an implicit association between schoolwork and unimportance (low implicit importance).

Method

Participants. Three hundred twelve undergraduates at Cornell University participated in exchange for extra course credit. Participants were sophomores, juniors, and seniors who had completed at least two semesters at the university.

Procedure. Participants completed two implicit measures in the laboratory—single category IATs assessing implicit importance and implicit evaluations of schoolwork. The measures were completed in a random order, with 15 min of unrelated tasks completed in between the two. At least 24 hours before coming to the lab, participants completed the Optimistic Denial Scale (Thompson & Schlehofer, 2008). On that Web-based pretest, participants were asked to report their cumulative GPA across all classes they had taken at their university. A link was provided where participants could look up their GPA if they did not know it.

Implicit importance of schoolwork. Participants completed a single-category IAT (SC-IAT; Karpinski & Steinman, 2006) that measured the strength of their association between words related to schoolwork (i.e., the means to academic success) and the concept of importance (vs. unimportance). Relying on the template offered in Karpinski and Steinman (2006), the single-category IAT had two halves. Each half consisted of 24 practice trials followed by 72 experimental trials. We had all participants complete the two halves in the same order. Only experimental trials were included in analyses.

During the task, participants placed their left and right pointer fingers on keys labeled LEFT ('Z') and RIGHT ('.'), respectively. On each trial, a word related to schoolwork (*grades, academics, classes, lectures, exams, papers, school*), a synonym of the word

important (*important, crucial, informative, meaningful, vital*), or a synonym of the word unimportant (*trivial, meaningless, petty, unnecessary, trifling*) would appear on the screen. In the first half, participants were to press LEFT if the word related to schoolwork or was a synonym of the word important. They were to press RIGHT if the word was a synonym of the word unimportant. In the second half, participants were to press LEFT if the word was a synonym of the word important. They were to press RIGHT instead if the word related to schoolwork or was a synonym of the word unimportant. Following the recommendations of Karpinski and Steinman (2006), the ratio of target words related to schoolwork, importance, and unimportance was 7:7:10 in the first half and 7:10:7 in the second half.

For the IAT, participants were informed that both speed and accuracy were key. On each trial, if participants responded correctly, the target word would disappear and 300 ms later the next target word would appear. If participants responded incorrectly, the target word was replaced by the message "INCORRECT." This message would remain on the screen for 2,000 ms. Matching Karpinski and Steinman (2006), if participants failed to respond within 1,500 ms, the target word disappeared, and the message "TOO SLOW!!!" would follow on screen for 2,000 ms.

We should point out two decisions we made concerning our IATs, both in this and subsequent studies, that were substantiated by Nosek, Greenwald, and Banaji (2005). First, we used at least five target words for each category. Nosek et al. (2005) report that there is no benefit from having more than four distinct targets per category, so we felt five was sufficient. Second, participants always completed the two blocks in the same order. Nosek et al. (2005) found there is an order effect that makes the second pairing more difficult than the first pairing, presumably because there is interference as the participant attempts to learn a new pairing. But because we are interested in the IAT as a relative (individual differences) measure, not in the absolute meaning of the IAT scores, this is not problematic, and has in fact has been endorsed by previous researchers with these goals (Friese et al., 2008; Milyavskaya, Inzlicht, Hope, & Koestner, in press). Had we counterbalanced the order of the blocks across participants, this would have introduced an extra source of noise we would have had to control for. When we used the same IAT in different studies, we retained the same order of the blocks (to permit comparison of descriptive statistics regarding the IAT across samples).

To compute a measure of the implicit importance of schoolwork, we followed Greenwald, Nosek, and Banaji's (2003) *D*-score algorithm. To begin, responses that were less than 350 ms were eliminated, as were nonresponses (target words that were not responded to after 1,500 ms). Incorrect responses were replaced with the block mean plus a 400 ms "error penalty." We then subtracted the mean latency to trials in half 1 from the mean latency to trials in half 2. This value was divided by the standard deviation of all correct response latencies in both halves. The resulting *D*-score reflects the participant's implicit association between importance and schoolwork ($M = .51, SD = .41$). As discussed above, this is not an unbiased indicator of *absolute* associative strength (given known order effects we did not attempt to correct for), but variation on this measure should be a valid indicator of participants' *relative* associative strength between importance and schoolwork.

Implicit evaluation of schoolwork. The SC-IAT measuring participants' implicit evaluation of schoolwork had a similar structure but used different categories. The important and unimportant category labels and accompanying target words were replaced with a positive category label and positively valenced targets (*sunrise, kiss, angel, hug, cheer, pleasure, joy, smiling, friendly, freedom*) as well as a negative category label and negatively valenced targets (*hatred, lice, sickness, cancer, dreadful, tumor, rabies, nasty, humiliate, disgusting*). A *D*-score was calculated in a similar way ($M = .29, SD = .44$).

We chose to rely on the SC-IAT in this and every study because of a helpful property that may differentiate the IAT from implicit measures that merely gauge automatic reactions to specific exemplars. IATs are ideal for assessing the strength of associations between *categories*, but are less sensitive to specific associations with individual exemplars (De Houwer, 2001; Olson & Fazio, 2003). For the present purposes, we realized that there was likely variability in which means people rely on to achieve good grades. For example, only some classes assign papers (one of our means words). Furthermore, and relevant to our future studies that also measure implicit associations with end-states, people may be motivated by different future rewards in deciding how hard to self-regulate today: Some gym-goers may be seeking more energy, whereas others are hoping to build muscle. The IAT—as an implicit measure that is optimal for measuring relationships between categories—helps to sidestep such concerns.

Optimistic denial. When signing up for the study (at least 24 hours in advance of their lab appointment), participants completed the 10-item Optimistic Denial scale from Thompson and Schlehofer (2008). The scale consists of 10 items (e.g., “I find it easy to assure myself that bad things won’t happen to me”). Reliability was high ($M = 4.07, SD = .91, \alpha = .81$). Those higher in optimistic denial generally feel less at risk that bad things will happen to them.

Results and Discussion

The zero-order correlations between the variables are presented in Table 1. We regressed participants' cumulative GPA on our three measures: implicit importance of schoolwork, implicit positivity toward schoolwork, and optimistic denial. Only implicit importance of schoolwork predicted GPA, $\beta = .13, t(308) = 2.27, p = .02$. Neither implicit evaluation, $\beta = .01$, nor optimistic denial, $\beta = -.03$, showed a similar relationship, $ts < 1$. For exploratory purposes, we added to this model the interaction term between implicit importance and implicit positivity. No such interaction emerged, $\beta = .00, t < 1$.²

This provides initial evidence that implicit importance of means, but not implicit evaluations of those means, predicts a marker of

effective self-regulation. Furthermore, this relationship could not be accounted for by the students' optimistic denial score, which we speculated might (but did not) lead to both depressed GPA and an implicit denial of schoolwork's importance. Although these findings rule out one third-variable explanation, they leave open a reverse-causality argument. Perhaps students' previous academic successes caused them to strengthen their implicit associations between academics and importance. Study 2 is the first of several studies that address this alternative explanation.

Study 2

Study 2 extends on Study 1 in three ways. First, whereas Study 1 aimed to predict a marker of academic self-regulatory effort (i.e., GPA), Study 2 tried to measure academic self-regulatory efforts more directly (e.g., contributing more than one's share to group assignments, checking over one's work instead of rushing through it). One worry is that between-class variability in the workload that is required might obscure any true relationship between implicit importance and self-regulatory persistence. Study 2 sidesteps this concern by recruiting participants from a single large class and measuring study behaviors for that class.

Second, instead of testing whether implicit importance predicts previous successes, Study 2 tested whether implicit importance prospectively predicts self-regulatory effort. Participants completed the implicit measures early in the term. After their final exam, participants reported on their self-regulatory study behaviors related to the course. We predicted that implicit importance of the course would predict participants' subsequent self-regulatory study behaviors, but that the other measures used in Study 1 (implicit positivity and optimistic denial) would not.

Third, we wanted to determine whether implicit importance could predict self-regulatory efforts above and beyond an explicit measure that has been shown to predict goal-relevant behaviors. According to the theory of reasoned action (TRA) as well as the theory of planned behavior (TPB), people engage in behaviors toward which they have an especially positive attitude—defined as those behaviors that are seen as highly likely to produce outcomes that are highly valued (Ajzen, 1991, 2011). Note that we have argued that means may acquire perceived importance because of their associations with valued endstates. As such, it would be useful to know whether the implicit importance measure relates to or offers incremental validity over and above an explicitly measured attitude from the TRA tradition.

² Was this nonsignificant interaction anomalous, or is this a robust null effect? To address this question, we meta-analyzed the 6 studies for which we measured both implicit importance of the means and implicit evaluation of the means to determine whether their interaction predicted effective self-regulation. We found no significant effect in any study: $\beta = .00, t < 1$ (Study 1); $\beta = -.04, t < 1$ (Study 2); $\beta = .12, t(185) = 1.58, p = .12$ (Study 3b); $\beta = -.04, t < 1$ (Study 5); $\beta = -.15, t(138) = -1.89, p = .06$ (Study 6); $\beta = -.03, t < 1$ (Study 7). Furthermore, the meta-analytic effect was nonsignificant: $\beta = -.01, Z = -0.30, p = .77$. In light of our argument that affect may influence what people pursue, future research should test whether implicit importance toward the means is a more important predictor of effective self-regulation when implicit evaluations of temptations are especially positive.

Table 1
Correlations Between Measures (Study 1)

Measure	Implicit importance	Implicit positivity	Optimistic Denial
Implicit positivity	.28***	XXX	XXX
Optimistic denial	-.07	.01	XXX
GPA	.14*	.04	-.04

* $p < .05$. *** $p < .001$.

Method

Participants and design. Participants were undergraduates in an introductory marketing class at University of California, Berkeley. Data collection took part at three points in time: a Web-based pretest completed when making an appointment to come into the lab ($N = 110$), an in-lab session that occurred early in the term ($N = 109$), and a Web-based posttest that was completed after the final exam ($N = 97$). The 90 participants who completed all three sessions are included in the analyses reported below.

Procedure. Participants completed similar measures to those in Study 1: the Optimistic Denial Scale (on the Web-based pretest; $\alpha = .77$), and a modified implicit importance and implicit positivity SC-IAT (in the lab). The IATs were completed approximately 30 min apart, in a counterbalanced order, and with unrelated study materials in between. Participants also completed measures that permitted us to calculate their attitude toward academic self-regulatory means. Finally, on the Web-based posttest, participants completed measures that assessed their self-regulatory efforts in the class. The new and modified measures are described below:

Implicit importance and positivity. Whereas Study 1 measured participants' associations with academics more generally, Study 2 used modified IATs that assessed implicit associations with UGBA106, the course from which all participants were recruited. After consulting with the class's professor and syllabus, we replaced the academics-related terms "academics," "classes," "papers," and "school" with the words "assignments," "marketing," "midterm," and "participation" for both the implicit importance ($M = 0.42$, $SD = 0.47$) and implicit positivity ($M = 0.24$, $SD = 0.43$) SC-IATs.

Explicit attitude toward the means. As used in the theory of reasoned action (Ajzen & Fishbein, 1980; Ajzen, 2011), an expectancy value-based attitude toward a behavior is the product of (a) the perceived likelihood that engaging in the means will lead to different end-states, and (b) the perceived value of those end-states. First, we asked participants to consider 7 outcomes they may ultimately realize. For each, they indicated from 1 (*extremely negative*) to 7 (*extremely positive*) how they felt about each. The 7 outcomes were those validated by the pretest as endstates that follow from doing well in classes: academic accomplishment, academic achievement, a career, employment, graduation from college, a job, academic success ($M = 5.71$, $SD = 0.97$, $\alpha = .88$).

Then, participants considered the 7 means used in the IATs. Participants were asked to indicate "how likely it is that doing each of these things will help you realize the 7 outcomes mentioned above": class assignments, performing well on exams, getting good grades on the different graded components of the class, attending lectures, doing well in marketing, performing well on the midterm, participation in class. Participants responded to each on a 7-point scale from 1 (*extremely unlikely*) to 7 (*extremely likely*). Responses indicated that although there was between-participants variability, there was a general sense that these means would allow one to achieve the valued endstates ($M = 5.47$, $SD = 1.03$, $\alpha = .92$). We multiplied each participant's valuation of the outcomes by the perceived likelihood that the relevant means would help one achieve those outcomes to create a single measure of *explicit attitude toward the means* ($M = 31.72$, $SD = 9.51$).

Study behaviors. After participants had taken the final exam, we contacted them by e-mail to remind them that they had agreed

to complete a brief posttest about their study behaviors relating to their marketing class. We continued to contact participants over the next week either until they completed the posttest or they had been contacted four times. We used 9 items that would capture how much self-regulatory effort participants put into the class. Four items were modeled on items in a study we had run previously (Study 7 in the current manuscript), and five additional items were created after consulting with the course's professor and syllabus.

Participants were asked to "Please answer the following questions by focusing on your work habits and study behaviors for your summer marketing class." Participants responded to all 9 items on 7-point Likert-type scales: "I was diligent about getting my schoolwork complete for my summer marketing class" (1 = *complete disagree*; 7 = *completely agree*); "How many of the summer marketing classes/lectures did you skip or NOT attend?" (0, 1, 2, 3, 4, 5, 6 or more); "When I had the opportunity to go out with other people, I tended to do that instead of study for my summer marketing class" (1 = *completely disagree*; 7 = *completely agree*); "What was the largest number of consecutive hours you were able to spend working on your summer marketing class without taking a break?" (1, 2, 3, 4, 5, 6, 7 or more); "Do you feel you worked harder or less hard than the average student in your summer marketing class?" (1 = *definitely less hard*; 4 = *about the same as*; 7 = *definitely harder*); "Think about times when you were working on or studying for your summer marketing class. When you would encounter something that was difficult, how likely were you to take a break vs. continue working?" (1 = *keep working*; 4 = *both equally*; 7 = *take a break*); "Going into your final exam, did you feel that you had spent sufficient amount of time studying, or that you did not study a sufficient amount to do your best?" (1 = *did not spend sufficient time studying*; 7 = *spent sufficient time*); "In working on assignments for your summer marketing class, did you complete assignments quickly without checking over your work; or did you spend a lot of time on your assignments, checking over them thoroughly before submitting them?" (1 = *checked over work*; 7 = *completed assignments without checking over work*); "On your group assignments, did you put in more or less work than the average member of your group?" (1 = *much less*; 4 = *about the same as*; 7 = *much more*).

We reverse-scored items that captured lower effort (the second, third, sixth, and eighth) to create a *self-regulatory effort* composite ($M = 4.67$, $SD = 0.59$; $\alpha = .45$). Note that the reliability was relatively low. By our interpretation, this reflects that different people engage more or less intensely with their coursework in different ways. In other words, some students engage in effortful self-regulation by working harder than their groupmates (item #9), whereas others toil long hours without a break (item #4). These are not necessarily the same people ($r = .09$). Despite such variability in how people engage in more intense self-regulation, summing the items into a single composite provides a straightforward index of who engages with the means more versus less intensely.

Results and Discussion

The correlations between our five variables are presented in Table 2. We proceeded to test whether participants' implicit importance toward their marketing class predicted their subsequent self-regulatory effort for the class. We began by testing a model

that was nearly equivalent to that tested in Study 1. We regressed self-regulatory effort on implicit importance, implicit positivity, and optimistic denial. Only implicit importance predicted participants' self-regulatory effort, $\beta = .27, t(86) = 2.52, p = .01$. Neither implicit positivity ($\beta = .02$) nor optimistic denial ($\beta = -.10$) did, $t_s < 1$.

But would implicit importance still demonstrate this unique predictive power even once we controlled for participants' evaluation of the means? We conducted the regression again with this new term. Although those with a highly positive attitude toward the behavior (i.e., those who saw means as likely to lead to highly valued endstates) did engage in more self-regulatory effort, $\beta = .25, t(85) = 2.39, p = .02$, implicit importance continued to predict more persistent self-regulatory study behaviors, $\beta = .27, t(85) = 2.55, p = .01$. As can be seen in Table 2, both implicit importance and the explicit attitude correlate with the self-regulatory effort, but the two predictors do not correlate with each other. As this pattern in the correlations foreshadowed, implicit importance and explicit evaluations of means are distinct predictors of self-regulatory effort.

Study 3a and 3b

Studies 3a and 3b return to the IATs and marker of effective self-regulation used in Study 1 (GPA). But the studies build on our previous findings in two ways. First, if implicit importance toward schoolwork encourages better academic performance, we can ask for whom this implicit nudge should prove most helpful. By our logic, implicit importance is useful because it serves as a key motivator as people persevere at a task. That is, one may redouble one's efforts when cued that what one now has to do is important. But by this account, those who find academic self-regulation to be particularly difficult are those who may benefit most from the implicit association. Both Studies 3a and 3b test in independent samples whether academic self-regulatory ease moderates the implicit importance-GPA link.

Second, Study 2 showed that implicit importance predicted effective self-regulation, over and above what an explicit measure of participants' evaluations of the means accounted for. Was this because the *implicit* nature of our importance measure allowed it to achieve unique predictive power, or instead did the expectancy-value attitude simply not capture the crucial perception that schoolwork is *important*? Although Studies 3a and 3b include several additional covariates to test the unique predictive power of implicit importance, crucial among these are our measures of *explicit importance*, a belief that schoolwork is important. In this way, we have complementary measures that differ in whether they

are implicit or explicit in nature, but that both capture the importance of schoolwork. An explicit measure of importance should reflect how people report feeling about a task when consciously reflecting on it, but implicit importance may instead reflect what cognitions are spontaneously activated when actually encountering or considering goal-relevant means in a context ("Should I set my alarm early to make it to *class*?", "Can I blow off participation *grades*?"). If implicit importance continued to predict GPA even once explicit importance was accounted for, it would speak to the special role of *implicit* cognition—at least as indexed by the implicit measure—in goal pursuit.

Studies 3a and 3b were conducted at different universities and differed most clearly in three additional ways. First, we measured explicit importance in each study, but with different measures. Study 3a relied on straightforward and face valid measures of the perceived importance of performing well (e.g., "Would you say that excelling in classes at Cornell is important?"). Study 3b's measure more closely paralleled the implicit measure (i.e., it asked about the importance of each schoolwork target word from the implicit importance IAT). Second, only Study 3b included the implicit evaluation IAT, as well as an explicit evaluation measure that paralleled the explicit importance measure. Third, Study 3a was limited to those who had taken the SAT, but Study 3b did not limit recruitment in this way. This is because almost all students in the population from which Study 3a were recruited had taken the same college entrance exam (SAT), whereas the population from which Study 3b's sample was drawn was less uniform in which college entrance exam they took.

Method

Participants and design. Participants in both Studies 3a and 3b participated in exchange for academic credit. One hundred twenty-four undergraduates at Cornell University completed all three parts of Study 3a: a lab session, a Web-based pretest completed at least 24 hours before coming to the lab, and a Web-based posttest completed 1 to 2 weeks after coming into the lab. One hundred ninety-seven undergraduates at the University of California, Berkeley, participated in Study 3b, entirely in the lab.

Procedure. During the lab session, all participants completed the same single-category IAT that assessed their implicit importance of schoolwork. Only participants in Study 3b completed the implicit evaluation of schoolwork single-category IAT (either 30 min before or 30 min after the implicit importance IAT). Participants always reported their GPA in the lab, and last. For Study 3a, participants reported their SAT score on the Web-based posttest. The following additional measures were collected:

Explicit importance of schoolwork. In Study 3a, participants completed four Likert-type items asking about schoolwork's importance. On the posttest, participants expressed their agreement with four statements about schoolwork's importance on scales anchored at 1 (*completely disagree*) and 7 (*completely agree*): "Excelling in classes at Cornell is important," "It does not really matter whether I am good at academics or not" (reverse-scored), "It is beneficial to be good at academics," and "What I learn at Cornell is not that important for my success at life" (reverse-scored). We averaged the four items ($M = 5.64, SD = 0.86, \alpha = .73$).

Table 2
Correlations Between Measures (Study 2)

Measure	Implicit importance	Implicit positivity	Optimistic denial	Explicit attitude
Implicit positivity	.04	XXX	XXX	XXX
Optimistic denial	.24*	.11	XXX	XXX
Explicit attitude	.04	.13	.10	XXX
Self-regulatory effort	.25*	.02	-.03	.24*

* $p < .05$.

In Study 3b, participants completed seven Likert-type items that asked about the importance of the schoolwork-related target words used on the IAT—that is, the means. Participants responded to the prompt “How important do you think each of the following things related to academics is?” They responded to each word on a 1 (*not at all*) to 7 (*very much so*) scale: academics, classes, exams, grades, lectures, papers, school ($M = 5.57$, $SD = 1.05$, $\alpha = .86$). The target words appeared in a random order.

Explicit evaluation of schoolwork (Study 3b). Because only participants in Study 3b completed the implicit evaluation IAT, we had participants in only that study complete an explicit evaluation measure that matched the explicit importance one. Participants responded to the prompt “How positively do you feel about each of the following things related to academics?” They saw the seven schoolwork-related target words used in the IAT and responded on 7-point scales anchored at 1 (*very negative*) and 7 (*very positive*). These 7 items showed high internal reliability ($M = 4.49$, $SD = 1.19$; $\alpha = .89$).

Academic self-regulatory ease. We aimed to measure individual differences in the extent to which academics was a domain for which participants found onerous the self-regulatory steps required to succeed. For Study 3a, we used 10 items—modified from the Self-efficacy for self-regulated learning scale (Bandura, 2006)—that assessed the (self-perceived) ease with which students can self-regulate academically (e.g., “I can easily finish homework assignments by deadlines”). Participants completed the 10 items on the Web-based pretest ($M = 4.25$, $SD = 0.93$, $\alpha = .79$). For Study 3b, we used six items—constructed from six core self-regulatory skills for academic success identified by Wood and Locke (1987)—as a convergent measure of the same construct (e.g., “I have difficulty maintaining focus while taking exams, often feeling the need to take breaks in my concentration” [reverse-scored]). This scale too had good internal reliability ($M = 4.88$, $SD = 1.16$, $\alpha = .70$).

Defensive attribution style. In the lab, participants were asked to, “Imagine that on the next important assignment in your major (or most likely academic major), you end up not doing as well as you would have hoped. Assess how likely it would be that each of the following explanations would explain your personal failure.” The 10 items reflect a tendency to take personal responsibility (e.g., “I did not effectively manage my time in preparing for the assignment or test”) or to blame external circumstance for disappointing performance (e.g., “My evaluator was unfair in his or her assessment of my work”). Agreement was expressed on 9-point scales anchored at 1 (*not at all*) and 9 (*extremely*). Higher scores reflect a tendency to blame others as opposed to taking personal responsibility (Study 3a: $M = 4.35$, $SD = 1.04$, $\alpha = .74$; Study 3b: $M = 4.45$, $SD = 1.02$; $\alpha = .70$).

Results

Study 3a. We regressed GPA on implicit importance, academic self-regulatory ease, and the Implicit Importance \times Academic Self-Regulatory Ease interaction. We also included the following predictors, as well as their interactions with implicit importance: explicit importance, defensive attribution style, and SAT score. The complete output is provided in Table 3. The main effect of implicit importance was significant, $\beta = .21$, $t(114) = 2.68$, $p = .01$. But as expected, implicit importance was not an

unconditional marker of academic success. Instead, the Implicit Importance \times Academic Self-Regulatory Ease interaction achieved significance as well, $\beta = -.23$, $t(114) = 2.75$, $p = .01$ (see Figure 1a). For students for whom it was difficult to complete the self-regulatory steps needed for academic success (-1 SD : academic self-regulatory ease), there was a strong relationship between their implicit association between schoolwork and importance and their GPA, $\beta = .45$, $t(114) = 4.27$, $p < .001$. In contrast, for students for whom schoolwork was not particularly taxing ($+1$ SD : academic self-regulatory ease), there was no relationship between implicit importance of schoolwork and their GPA, $\beta = -.03$, $t < 1$. Explicit importance did not predict GPA, $t < 1$.

Study 3b. We conducted similar analyses for Study 3b, except in this case we had measures of implicit and explicit evaluation of schoolwork, but did not have college entrance exam scores (see Table 3). In this case, the overall main effect of implicit importance did not reach significance, $\beta = .09$, $t(185) = 1.26$, $p > .21$, but the Implicit Importance \times Academic Self-Regulatory Ease interaction emerged once again, $\beta = -.16$, $t(185) = 2.24$, $p = .03$ (See Figure 1b). Just as in Study 3a, implicit importance predicted the GPA of those who had more difficulty with academic self-regulation, $\beta = .24$, $t(185) = 2.33$, $p = .02$. Also, implicit importance was unrelated to GPA for those who found academic self-regulation easy to accomplish, $\beta = -.06$, $t < 1$. Neither explicit importance, explicit positivity, nor implicit positivity predicted GPA (either as main effects or interacted with academic self-regulatory ease), $|\beta| < .05$, $t < 1$.

Note there is one small difference between the results of Study 3a and 3b. Although in both studies implicit importance predicted GPA for those high ($+1$ SD) but not those low (-1 SD) in academic self-regulatory ease, the studies differed in whether those average in academic self-regulatory ease show a significant relationship between implicit importance and GPA. This small inconsistency could be reconciled if there were reason to believe that those in Study 3b tended to find academic self-regulation to be easier than did those in

Table 3
Regression Analyses Predicting GPA (Studies 3a and 3b)

Variable	Study 3a		Study 3b	
	β	t	β	t
Implicit importance	.21	2.68**	.09	1.26
Academic self-regulatory ease	.41	4.64***	.27	3.71***
Implicit importance \times Academic self-regulatory ease	-.23	2.75**	-.16	2.24*
Explicit importance	-.07	<1	-.04	<1
Implicit importance \times Explicit importance	.08	<1	.02	<1
Defensive attribution style	.12	1.57	.10	1.37
Implicit importance \times Defensive attribution style	-.17	2.08*	.00	<1
SAT score	.36	4.55***	XX	XX
Implicit importance \times SAT score	-.13	1.39	XX	XX
Implicit positivity	XX	XX	.02	<1
Implicit importance \times Implicit positivity	XX	XX	.12	1.58
Explicit positivity	XX	XX	-.04	<1
Implicit importance \times Explicit positivity	XX	XX	.12	1.35

* $p < .05$. ** $p < .01$. *** $p < .001$.

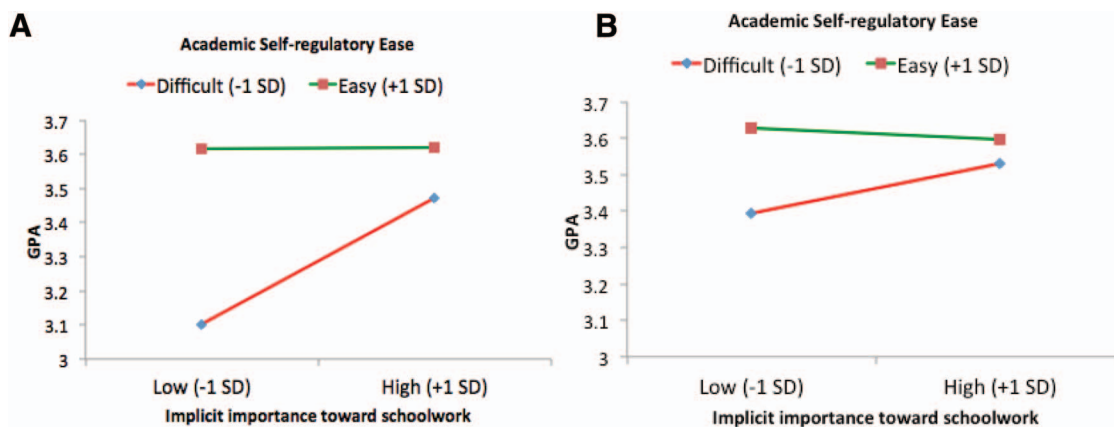


Figure 1. Predicted GPA for participants who are one standard deviation above (high implicit importance) and one standard deviation below (low implicit importance) the sample mean for the implicit importance toward schoolwork, and for participants who are one standard deviation above (self-regulatory ease) and one standard deviation below (self-regulatory difficulty) the sample mean for the academic self-regulatory ease composite (A: Study 3a; B: Study 3b). See the online article for the color version of this figure.

Study 3a. This assumption seems plausible for two reasons: Study 3b participants had higher grades and were drawn from a more elite subsample of their university.³ Although the presence of an overall main effect of implicit importance on GPA should depend on the academic self-regulatory skill of the sample, we do note that meta-analytically combining across the nearly identical Studies 3a and 3b uncovered a clear overall main effect of implicit importance (even with all of the covariates controlled), $\beta = .14$, $z = 2.77$, $p = .01$.

Discussion

Studies 3a and 3b again found that implicit importance toward means predicted a marker of effective self-regulation, at least for those for whom academic self-regulation is a challenge. Over the long course of a semester, there are many times in which a student must choose to work on schoolwork instead of succumb to non-academic temptation. If implicit importance operates by providing people with a reminder that schoolwork is important, then those who find it especially onerous to persevere on their schoolwork should be those who most benefit from this implicit nudge. Indeed, this is what we found.

Implicit importance predicted academic success above and beyond explicit importance (Studies 3a and 3b). We certainly are not arguing that implicit importance toward the goal is always the sole, much less the better, predictor. Clearly explicit importance will sometimes matter; after all, if a person explicitly decides that academics is so unimportant to them that it is not worth staying at a school, we do not propose that implicit importance pulls them into the library outside of their volition. But our interest is in who does versus does not persist and succeed at tasks in which they have some basic engagement. For our purposes, what is key is that implicit importance was able to predict successful outcomes above and beyond the explicit measures. Implicit importance predicted academic success even with explicit positivity, implicit importance, baseline ability (as indexed by SAT), and defensive attribution style statistically controlled.

We included the defensive attribution style measure to assess the plausibility of a reverse-causality account. That is, if implicit impor-

tance tracks instead of predicts academic success, then those who have a defensive attribution style might be those whose implicit associations between schoolwork and importance shift in response to having succeeded or failed. We observed an Implicit Importance \times Defensive Attribution Style interaction in Study 3a, but note that it was in the opposite direction of the artifactual account. Furthermore, there was no hint of this interaction in Study 3b.

Study 4

We have argued that implicit importance may serve as an important motivator when pursuing goals that require effortful self-regulation. But if implicit importance tracks or operates as part of a motivational system, then it should display certain properties that characterize people's response to goal setbacks and successes. For example, when people recall goal progress or goal failure, the implicit positivity toward those end-states may decrease or increase, respectively (Ferguson & Bargh, 2004; Fishbach, Eyal, & Finkelstein, 2010; Goschke & Kuhl, 1993). This is because when goal progress is stunted, one must increase one's efforts in order to later succeed; successful goal progress, at least temporarily, removes the urgency associated with the goal (Ferguson & Bargh, 2004; Seibt et al., 2007).

We applied similar logic to our study of implicit importance. We asked participants to recall two recent episodes of academic failure or academic success. On a Web-based pretest, we measured whether participants believed that through hard work, they actually could improve their intellectual abilities—that is, whether they had an *incremental theory of intelligence* (Dweck, 1999). Incremental theorists are those who adaptively redouble their efforts following

³ The average GPA of students in Study 3a ($M = 3.45$ out of 4.33, $SD = 0.42$) was lower than the GPA of those in Study 3b ($M = 3.54$ out of 4.00, $SD = 0.28$), $t(319) = 2.22$, $p = .03$. Note this underestimates the "true" gap because the maximum GPA at Study 3a's university was higher than the maximum at Study 3b's university. Although both samples were drawn from students at highly selective universities, the Study 3b sample came from students accepted to a highly competitive, elite major within an already-elite university.

failure (Dweck & Leggett, 1988; see El-Alayli, 2006) because they believe that improvement is possible with effort (Dweck, 1999; Molden & Dweck, 2006).

If implicit importance functions to increase one's commitment to effortful goal pursuit, then an implicit characterization of schoolwork as important should be heightened when reminded of recent setbacks—at least to the extent that hard work in this domain would be assumed to pay off (i.e., as incremental theorists believe). For those who are not incremental theorists, there would be no reason to show a sign of enhanced motivation following a reminder of failure. In addition to more firmly connecting implicit importance to people's motivational, self-regulatory system, the present predictions are notable because they are not consistent with (even if they do not conclusively prohibit) a reverse-causality argument. That is, if people's implicit characterization of schoolwork as important is merely in response to a sense that they are doing well or poorly, then reminders of academic failure should decrease, not increase, their implicit importance. Also, there would not be clear reason to believe why one's incremental theory should matter.

Method

Participants and design. Seventy-five undergraduates at Cornell University participated in exchange for extra credit in their psychology and human development classes. Participants were randomly assigned to one of two recall conditions: *success* or *failure*.

Procedure. At least 24 hours before their scheduled laboratory session, participants completed Dweck's (1999) Incremental Theory subscale of her Implicit Theories of Intelligence scale. People who have a strong incremental theory of intelligence are those who believe that with hard work they can train and grow their intellectual ability. Such individuals endorse items like "Good preparation before performing a task is a way to develop your intelligence," "You can develop your intelligence successfully if you really try," and "The effort you exert improves your intelligence." Participants responded to 7 items on 1 (*completely disagree*) to 9 (*completely agree*) scales ($M = 6.04$, $SD = 1.30$, $\alpha = .80$).

Once in the lab, participants were led through the remaining tasks in a private room by computer instruction. First, participants completed a recall task. In the failure condition, participants were asked to, "Think of two times in which you failed at an academic pursuit, failing to achieve at a level that would be consistent with your personal standards of accomplishment." In the success condition, participants were instead asked to, "Think of two times in which you succeeded at an academic pursuit, achieving at a level that would be at least consistent with your personal standards of accomplishment." Only once participants had thought of both examples were they to press a key indicating that they were ready to describe the two experiences.

For each memory, participants were to respond to three prompts: "Write a short description of the [first, second] [failure, success] experience"; "How did your own actions contribute to the [failure, success]?"; and "Describe your emotions immediately following the [failure, success] experience." Immediately after completing this recall task, participants completed the single-category IAT

used in Studies 1 and 3 that measured their implicit importance of schoolwork.

Participants also completed four Likert-type items asking about schoolwork's importance. These items were anchored at 1 (*completely disagree*) and 7 (*completely agree*): "Exceling in classes at [this university] is important," "It does not really matter whether I am good at academics or not" (reverse-scored), "It is beneficial to be good at academics," and "What I learn at [this university] is not that important for my success at life" (reverse-scored). We averaged the four items ($M = 5.67$, $SD = .99$; $\alpha = .70$).

Results and Discussion

We regressed implicit importance of schoolwork on participants' recall condition (+1 = failure, -1 = success), participants' (standardized) incremental theory of intelligence, as well as the Recall Condition \times Incremental Theory interaction. As predicted, the impact of the recall condition on participants' implicit importance toward schoolwork depended on whether participants were incremental theorists, $\beta = .23$, $t(71) = 1.98$, $p = .05$ (see Figure 2). This interaction was right at the threshold of significance, making it all the more important that the specific pattern of simple effects conform to what was hypothesized.

We used simple slopes analyses (Aiken & West, 1991) to predict the influence of the manipulation for those who were one standard deviation above and below the mean on the incremental theorist scale. For incremental theorists, their implicit importance toward schoolwork was higher after contemplating failure ($M = 0.775$) than after contemplating success ($M = 0.501$), $\beta = .37$, $t(71) = 2.23$, $p = .03$. In contrast, for those who did not have an incremental theory of intelligence, their implicit importance toward schoolwork was similar following failure ($M = 0.481$) and success ($M = 0.555$), $t < 1$. Examined a different way, among those contemplating failure, incremental theorists had greater implicit importance toward schoolwork than did entity theorists, $t(71) = 2.09$, $p = .04$. But among those contemplating success,

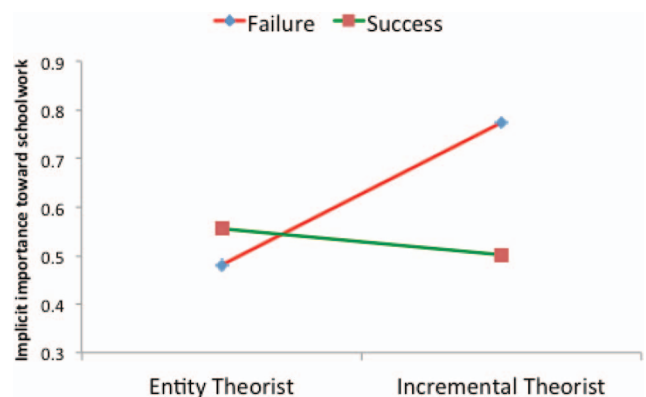


Figure 2. Predicted implicit importance toward schoolwork by condition for a participant whose endorsement of an incremental theory of intelligence placed him or her one standard deviation below (entity theorist) or above (incremental theorist) the sample mean (Study 4). See the online article for the color version of this figure.

whether one was an incremental theorist did not predict one's implicit importance, $t < 1$.⁴

Neither the recall manipulation, the incremental theory of intelligence measure, nor the Recall \times Incremental Theory interaction term predicted explicit importance of intelligence, $\beta_s < .15$, $t_s < 1.21$, $p_s > .23$. We did not have predictions for whether the explicit measures would be affected, though we note these null effects to reinforce the distinct nature of implicit and explicit importance toward schoolwork, which were uncorrelated, $r = -.01$.

Study 4 provides evidence linking implicit importance of means with one's motivational system. When recalling recent academic failures, people showed an enhanced implicit association between importance and schoolwork, at least when they had a belief that intellectual ability could be improved through hard work. Previous research has shown that when people encounter obstacles that they believe are surmountable (as opposed to beyond their reach), they show commitment to their goal by redoubling their efforts (Kernan & Lord, 1989; Lee, Keil, & Wong, 2015). The present results show that people respond to surmountable failure by showing a stronger association between means and importance, as if to ready their commitment to enacting the goal. Note that these results are inconsistent with a reverse-causality argument that implicit importance toward schoolwork rises and falls with the mental accessibility of successes and failures, respectively.

Study 5

Study 5 aimed to extend our investigation in four ways. First, we moved away from our studies of classroom performance to examine performance on an in-lab task. Namely, we tested whether participants' implicit importance toward an exam—one that would require self-regulatory persistence to maintain focus on and successfully complete—would predict their subsequent performance on that exam. Participants learned about the Verbal portion of the Graduate Record Exam (GRE), the standard graduate school entrance exam. Before participants knew they would actually take the exam, participants completed single category IATs that measured their implicit importance toward the GRE: Verbal test as well as their implicit evaluation of the test. We predicted that implicit importance, but not implicit evaluations, of this difficult, demanding task would predict successful performance on it.

Second, we wanted to further support our argument that people's implicit importance prospectively predicts, as opposed to merely retrospectively tracks, their performance success. This is why participants completed the implicit measures *before* taking the test. Furthermore, we asked participants to report their SAT score, so we could test whether implicit importance toward the GRE: Verbal predicted test performance above and beyond their prior history of success with standardized testing. Thus, if a relationship between implicit importance and GRE: Verbal performance emerged, even when controlling for SAT score, it would be unlikely that a general skill at standardized test taking is what led one to perform well on both the SAT and the in-lab exam.

Third, we found in both Studies 3a and 3b that implicit importance toward schoolwork predicted the GPA of those who found academic self-regulation to be difficult, but not those who found such self-regulation simple. We tested whether this

effect would replicate in this new context. That is, we predicted that implicit importance toward the GRE: Verbal test would best predict test performance for those who find it difficult to exert the self-control necessary to maintain self-regulatory persistence while taking a standardized test.

Fourth, we sought to further test our argument that implicit importance toward the means of goal pursuit (i.e., the task on which one must self-regulate now) encourages more self-regulatory *effort*, which is what leads to superior performance. Although we made initial progress toward that aim in Study 2 (in which we showed that implicit importance of a course predicted how hard one subsequently worked in that class), Study 5 reflected a first attempt to show that implicit importance encourages self-regulatory effort, which produces stronger performance outcomes. In short, we predicted that the effect of implicit importance on test performance would be mediated through self-reported expended effort.

Method

Participants. Fifty-nine undergraduates at the University of California, Berkeley, participated as partial fulfillment of a class requirement. We limited recruitment to those who said it was "somewhat likely" or "very likely" that they would pursue graduate studies, not permitting those who said it was "not at all likely" to sign up. In this way, even though the practice exam that people took would not directly factor into their future success, at least their performance on the task would serve as a signal to themselves of their likelihood of future success.

Procedure. When participants signed up for the study, they were taken to a Web-based pretest where they completed two measures. First, they provided their SAT: Verbal score ($M = 696.27$, $SD = 67.67$). Second, they completed a 6-item measure of standardized testing self-regulatory ease. This measure was similar to the measure of academic self-regulatory ease used in Study 3b, except the instructions asked people to report on, "the extent to which these statements reflect your general experience with *standardized tests of your verbal ability*." The items were modified to refer to standardized tests instead of more general academic experience ($M = 4.99$, $SD = 1.11$).

⁴ For exploratory purposes, we ran an additional model in which we included a third factor—the time it took for participants to recall two instances of success or two instances of failure. We reasoned that recalling success or failure may have been most impactful if people could think of two such instances quickly. If people spent considerable effort trying to generate two examples, this metacognitive difficulty could have reduced the power of the manipulation. When we included the (log-transformed) time it took to recall both memories, as well as the Recall Condition \times Time to Recall interaction terms, the impact of the recall condition on participants' implicit importance toward schoolwork still depended on whether participants were incremental theorists, $\beta = .28$, $t(69) = 2.43$, $p = .02$. But there was also now a Recall Condition \times Time interaction, $\beta = -.24$, $t(69) = 2.11$, $p = .04$. Simple-slopes analyses at one standard deviation above and below the mean recall time showed that for those who were able to quickly recall the specified academic experiences, those focusing on failure showed greater implicit importance toward schoolwork than those focusing on success, $\beta = .37$, $t(69) = 2.37$, $p = .02$. In contrast, for those who struggled to recall such instances, the nature of what was recalled did not affect subsequent implicit importance toward schoolwork, $\beta = -.11$, $t < 1$.

Once in the lab, participants were told that they would be learning about the GRE:Verbal test and then would look over a sample version of the test. As the experimenter explained:

This test is the GRE:Verbal test, which is a lot like the SAT:Verbal test. Whereas the SAT is used for undergraduate admissions, the GRE is the standardized test used for graduate school admissions. You will learn about the different types of questions on the GRE:Verbal, complete a few computer-based tasks, and then will have a chance to read over a practice GRE:Verbal test so you can see what it would be like to actually take it. We won't actually have you take that test.

Participants then received a page that included descriptions of the types of questions used on the GRE:Verbal test. This page permitted us to introduce key terms that would then be used for the single-category IATs assessing the implicit importance toward and implicit evaluation of the GRE:Verbal.

Next, participants completed the implicit importance ($M = .46$, $SD = .37$) and implicit positivity ($M = .30$, $SD = .39$) SC-IATs in a counterbalanced order. We used seven target words related to the GRE: Verbal test—*analogy*, *antonym*, *comprehension*, *language*, *reading*, *verbal*, and *vocabulary*—the difficult task one would have to engage with effectively in the present to reap the future rewards of a good GRE:Verbal score. The synonyms of important and unimportant, as well as the positive and negative words, were the same as in earlier studies.

After completing the IATs, the experimenter said that, “In the interest of time, we’re not going to have you look over this test, but we are going to have you take a different test.” The test that had been sitting by participants had an official-looking blue cover page. The experimenter exchanged it for a test with a similar-looking green cover page. We took this step so that participants who might have flipped through the original test book would not be advantaged when taking the actual test. Also, we did not want to lie to participants when we told them earlier that they would not take “that test.”

Participants were also provided with a bubble page on which they could mark their answers. The test was a 30-item version of the GRE:Verbal test. Participants had 30 min to work on the test. The experimenter gave participants a 5-min warning before collecting their answer pages. Participants’ test performance—that is, the number of questions answered correctly—served as our marker of performance on a task that required self-regulation.

Before debriefing, participants answered two final questions. One assessed the strength of their self-regulatory effort (“I tried my hardest and took the test very seriously.”). If implicit importance predicts how much self-regulatory effort people will exert (as opposed to how much raw skill they possess), then this measure may mediate any effect of implicit importance on test performance. The second measure was one of self-regulatory ease (“I had difficulty maintaining focus while taking the exam, frequently feeling the need to take breaks.”). The purpose of this measure was to help validate participants’ standardized testing self-regulatory ease they reported on the Web-based pretest. That is, even though we worried that the self-regulatory ease measure might be contaminated by one’s perceived performance on the test, observing a significant correlation between the pretest’s scale and this measure would lend confidence to the pretest measure’s applicability to this in-lab experience. Participants responded to both items on 7-point scales anchored at 1 (*completely false*) and 7 (*completely true*).

Results

We first tested whether implicit importance toward the GRE: Verbal test would predict performance above and beyond baseline skill (SAT:Verbal score) and implicit positivity toward the GRE: Verbal test. To this end, we regressed performance on the test on those three variables. As predicted, implicit importance toward the GRE:Verbal test predicted performance on the test, $\beta = .24$, $t(55) = 2.12$, $p = .04$. There was no impact of implicit positivity toward the GRE:Verbal on performance, $\beta = -.07$, $t < 1$. Participants’ SAT:Verbal scores also predicted performance, $\beta = .59$, $t(55) = 5.52$, $p < .001$.

Of course, we have not argued that implicit importance is an unconditional predictor of self-regulatory success, but that it should be for those who find the means particularly difficult. Before conducting this more nuanced test, we assessed whether those who reported on the pretest that standardized testing self-regulation was more difficult also had more difficulty self-regulating on the current test. This correlation was significant, $r(57) = .35$, $p = .01$, suggesting that the dispositional measure characterized participants’ experience during the lab. To assess whether standardized testing self-regulatory ease moderated our effect of implicit importance toward the GRE:Verbal test, we added additional terms to our regression model: standardized testing self-regulatory ease, as well as the two-way interaction terms involving self-regulatory ease, implicit importance, and implicit evaluation. The only significant predictor of test performance was the Implicit Importance \times Standardized Testing Self-regulatory Ease interaction, $\beta = -.29$, $t(51) = 2.28$, $p = .03$ (see Figure 3). Simple-slopes analyses (Aiken & West, 1991) showed a similar pattern to that observed in Studies 3a and 3b. More specifically, for participants for whom standardized testing self-regulation was difficult, implicit importance was a strong predictor of standardized test performance, $\beta = .50$, $t(51) = 3.21$, $p = .002$. In contrast,

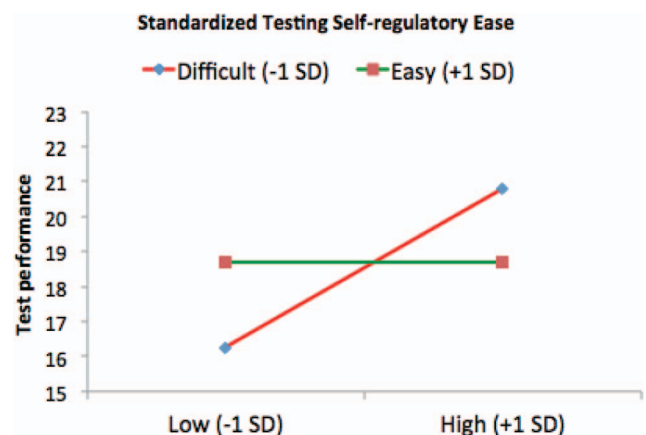


Figure 3. Predicted test performance on the GRE: Verbal test for participants who are one standard deviation above (high implicit importance) and one standard deviation below (low implicit importance) the sample mean for the implicit importance toward the GRE:Verbal, and for participants who are one standard deviation above (self-regulatory ease) and one standard deviation below (self-regulatory difficulty) the sample mean for the standardized testing self-regulatory ease composite (Study 5). See the online article for the color version of this figure.

for those for whom standardized testing was not a demanding task, there was no such relationship, $\beta = -.04$, $t < 1$.

We then tested whether self-regulatory effort mediated these effects on GRE performance. First, we conducted a regression analysis similar to the one just reported, but we predicted self-reported self-regulatory effort instead of the test score. In this case, the Self-Regulatory Ease \times Implicit Importance interaction was marginally significant, $\beta = -.30$, $t(50) = 1.82$, $p = .07$. When self-regulatory effort was added as a predictor to the original model predicting test performance, self-regulatory effort was a significant predictor, $\beta = .28$, $t(50) = 2.56$, $p = .01$. The Implicit Importance \times Self-regulatory Ease interaction term dropped to marginal significance, $\beta = -.21$, $t(50) = 1.70$, $p = .10$. We used Hayes's (2013) PROCESS Model 8 to test the mediated moderation model—that self-regulatory ease might moderate the link between the IV (implicit importance) and DV (test performance) as well as between the IV (implicit importance) and mediator (self-regulatory effort). The conventional threshold of significance was just missed; that is, the 95% confidence interval narrowly included 0, $[-1.1246, 0.0463]$. In combination, this provides evidence that is suggestive, but not definitive, that self-regulatory effort explains the effect of implicit importance on the successful performance.

Discussion

Study 5 thus extended our implicit importance findings to a new marker of self-regulatory effort—performance on a standardized test. An implicit association between importance and the GRE: Verbal test predicted subsequent performance on the test, whereas implicit positivity toward the test did not. Furthermore, those who found standardized test taking to be particularly taxing were those who benefitted most from the implicit association of that task with importance—both in terms of their self-reported effort (marginally) and their ultimate performance success. These findings buttress those first suggested in Study 2, that implicit importance does not merely track skill or success, but instead prospectively predicts who will most vigorously self-regulate.

Study 6

Study 6 built on the previous studies in three ways. First, we moved to a new domain—exercise—in which people must self-regulate to enact means today in order to achieve valued end-states in the future. Although Study 2 showed a connection between implicit importance and self-regulatory effort, the present study has the opportunity to replicate this finding in a new domain. Thus, we predicted that implicit importance toward exercise would predict behavioral persistence with exercise.

Second, we offered our first test of whether it is implicit importance toward regulatory *means*, in particular, that predicts successful self-regulation. We included an additional IAT in which we measured implicit importance toward the end-states of exercise success—the rewards that follow from adhering to an exercise program (e.g., strength, health). Of course, one can find these abstract end-states to be important without necessarily connecting them to the importance of exercise. That is, the means are more directly tied to what we aim to measure: exercise behavior. This is why we had a more specific predic-

tion, that implicitly connecting importance to the means in particular—that is, the difficult behaviors that are deemed important because of the future rewarding end-states they may offer—should predict the successful enactment of those specific means.

Third, to connect these findings to our previous demonstrations, we again hypothesized that implicit importance toward exercise would be most useful for those who have the most trouble actually getting themselves to exercise. That is, we expected that those for whom exerting the self-control to exercise was more difficult would be those who would most benefit from the implicit association between exercise and importance.

Method

Participants. One hundred forty-five undergraduates at the University of California, Berkeley, participated as partial fulfillment toward a class requirement.

Procedure. Participants first completed three single-category IATs in a random order. Two of the IATs were analogous to ones used in our earlier studies, in that they assessed implicit importance and implicit positivity toward means (exercise). The third IAT assessed implicit importance toward the ends that would follow from a steady exercise regimen.

After completing an unrelated experiment for 15 min, participants completed two final measures. One measure was the short form of the International Physical Activity Questionnaire (IPAQ), a measure of exercise frequency and intensity that has been validated in multiple international samples (Craig et al., 2003). The second measure was our measure of self-regulatory ease, which included 15 of 16 items from a scale developed and validated by Davis, Figueredo, Fahy, and Rawiworrakul (2007). One item, for use with people who have chronic obstructive pulmonary disease (COPD), was not included.

Single category IATs about exercise. In the lab, participants completed three single-category IATs about exercise: importance-means ($M = .40$, $SD = .35$), positivity-means ($M = .33$, $SD = .37$), and importance-ends ($M = .50$, $SD = .47$). Seven targets referred to the means connected to exercise: *aerobics, athletics, cardio, exercise, gym, running, weights*. A different seven terms referred to the positive end-states that follow from a steady exercise regimen: *appearance, energy, fitness, health, muscle, strength, wellness*. Recall that these classifications were validated in the Pilot Study. We used the same synonyms for importance, unimportance, positivity, and negativity as in the earlier studies.

International Physical Activity Questionnaire—Short Form. Participants were asked to consider their exercise behavior over the past year. They then were prompted to consider four classes of behavior: vigorous physical activity, moderate physical activity, walking, and sitting. The IPAQ provides a clear explanation of each category. For example, physical activity includes “physical activities like heavy lifting, digging, aerobics, or fast bicycling.” Moderate physical activity includes episodes of at least 10 min like “carrying light loads, bicycling at a regular pace, or doubles tennis.” Walking is defined as episodes of at least 10 min that involved walking “for recreation, sport, exercise, or leisure.” For each category, participants indicated how many times in the average week they did each of the behaviors. They then indicated, “For each day I engaged in [vigorous exercise, moderate exercise,

walking], the average number of minutes spent doing this was: ____.” Finally, they indicated how many hours and minutes in the average week they spent merely sitting. We followed the guidelines for scoring the IPAQ—Short Form:

$$\begin{aligned} \text{IPAQ—Short Form score} = & 8 * (\text{Days : Vigorous exercise}) \\ & * (\text{Avg. Minutes : Vigorous exercise}) \\ & + 4 * (\text{Days : Moderate exercise}) \\ & * (\text{Avg. Minutes : Moderate exercise}) \\ & + 3.3 * (\text{Days : Walking}) \\ & * (\text{Avg. Minutes : Walking}) \end{aligned}$$

These scores exhibited considerable positive skew, $z = 34.74$, $p < .001$, which was eliminated through a log-transformation ($M = 7.60$, $SD = .93$).

Exercise self-regulatory ease. We wanted to differentiate those participants for whom carrying out an exercise regimen remains simple versus turns difficult when confronted with potential obstacles. Participants completed 15 of the 16 items from Davis et al.’s (2007) Exercise Self-regulatory Efficacy Scale. Participants were asked to imagine that they were exercising regularly—3 times a week for 20 min each. They then considered different obstacles and indicated how confident they were (from 0% to 100%, to the nearest 10%) that they would maintain their exercise regimen in light of that obstacle. For example, participants considered whether they would still likely exercise if they had difficulty getting to the exercise location, felt tired or fatigued, or had to exercise with no support from others. Participants who gave higher numbers on these items reported that it would be relatively simple to effectively self-regulate even in light of objective obstacles that would require self-control to overcome ($M = 49.43\%$, $SD = 22.51\%$, $\alpha = .95$). It is those for whom such self-regulatory persistence would prove more challenging who may most benefit from the implicit association between exercise and importance.

Results and Discussion

We first tested whether implicit importance toward the exercise means (importance-means) predicted exercise behavior as measured by the IPAQ-Short Form. As expected, this relationship was positive and significant, $\beta = .21$, $t(143) = 2.58$, $p = .01$. We then regressed exercise behavior on all three SC-IATs. Implicit importance of the means of exercise continued to predict exercise behavior, $\beta = .19$, $t(139) = 2.14$, $p = .03$. Showing that not any measure of implicit importance had predictive validity, implicit importance of the ends of exercise showed no relationship to exercise behavior, $\beta = -.02$, $t < 1$. In this study, implicit evaluations of the means of exercise showed a marginal relationship to exercise behavior, $\beta = .15$, $t(139) = 1.76$, $p = .08$.

In Studies 3a, 3b, and 5, we found that the implicit importance toward the means to goal success was a stronger predictor for those who found exercise self-regulation difficult. Thus, we expanded on our model by including four additional terms. We added the main effect of exercise self-regulatory ease, as well as the three two-way interaction terms that tested whether self-regulatory ease moderated the effect of each implicit measure. In this model, the main effect of self-regulatory ease was significant, $\beta = .28$, $t(134) = 3.28$, $p = .001$. But consistent with hypotheses, Self-regulatory Ease \times Importance-Means IAT interaction was significant as well,

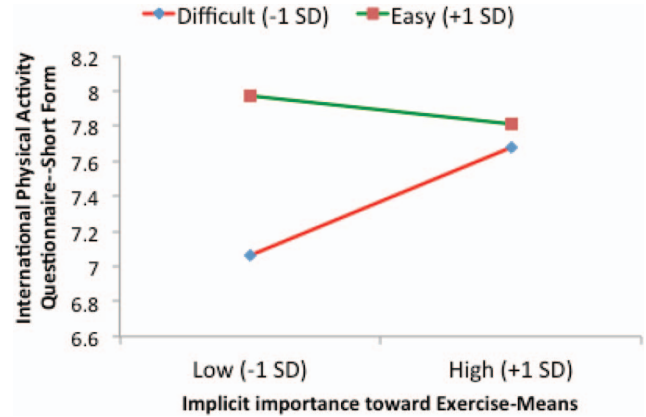


Figure 4. Predicted exercise activity as measured by the International Physical Activity Questionnaire—Short Form (Study 6), for participants who have high implicit importance toward the means of exercise (+1 *SD*) or low implicit importance toward the means of exercise (−1 *SD*), and for participants for whom exercise self-regulation is easy (+1 *SD*) and those for whom exercise self-regulation is difficult (−1 *SD*). See the online article for the color version of this figure.

$\beta = -.18$, $t(134) = 2.17$, $p = .03$ (see Figure 4). Self-regulatory ease did not moderate the effect of the other two implicit measures, $|\beta| < .04$, $t < 1$. To probe the nature of the interaction, we conducted simple slopes analyses to examine the impact of implicit importance-means on exercise behavior for those who find exercise self-regulation easy (+1 *SD*) or difficult (−1 *SD*). Consistent with our previous findings, those who were not sure that they would be able to self-regulate through obstacles showed a strong relationship between their exercise behaviors and implicit importance toward the means to exercise, $\beta = .33$, $t(134) = 2.56$, $p = .01$. Instead, among those for whom adherence to an exercise regimen felt insensitive to potential obstacles, they showed no benefit from having a strong implicit connection between importance and exercise-related regulatory means, $\beta = -.09$, $t < 1$.

Study 6 showed that implicit importance toward exercise predicted participants’ exercise behavior. Those who persisted at exercise were those for whom the specific exercise-related means, not merely the end-states toward which those means may ultimately lead, were tagged as important. As with classroom and standardized testing performance, it was those individuals who found exercise-related self-regulation to be particularly difficult who seemed to most benefit from the implicit association between exercise and importance.

Study 7

Although previous researchers have examined the role of implicit cognition in the study of self-regulation, the present paper is unique in its examination of implicit importance as opposed to implicit evaluations. Study 7 attempted to test our argument about how both implicit evaluation as well as implicit importance may combine to encourage effective self-regulation. We maintain that the means toward goal success derive their importance from the value of the end-states that they can bring about. That is, people may (implicitly) look to the positivity of an end-state to know whether it is important to pursue the means. Our argument then is

that implicit positivity toward end-states predicts implicit importance of means, which then predicts effective self-regulation. Second, Study 7 more precisely examined how implicit importance toward means may produce better performance. Study 2 showed that implicit importance prospectively predicted self-regulatory effort in the form of study behaviors. We predicted that a greater incidence of self-regulatory study behaviors would explain why those with a strong implicit association between schoolwork and importance have better grades.

Method

Participants. Participants were 161 undergraduates at a university in the western United States who completed the study in exchange for extra course credit.

Procedure. Once in the lab, participants first completed four single-category IATs in a random order. An unrelated 5- to 7-min. physical task separated each pair of SC-IATs. A week before coming to the lab, participants completed a Web-based pretest that measured their: GPA ($M = 3.49$, $SD = .32$), explicit importance of academics, and specific self-regulatory study behaviors. The explicit importance composite comprised the four items used in Study 3a ($M = 5.50$, $SD = .98$, $\alpha = .66$).

Single-category IATs. Participants completed four single-category IATs related to academics: importance-means ($M = .51$, $SD = .31$), evaluation-means ($M = .36$, $SD = .34$), importance-ends ($M = .73$, $SD = .33$), evaluation-ends ($M = .67$, $SD = .31$). The importance, positivity, and means to academic success words were used in previous studies. As reported and validated in the Pilot Study, seven words related to the positive end-states that follow from working hard enough at academics to get a high GPA: *accomplishment*, *achievement*, *career*, *employment*, *graduation*, *job*, *success*.

Study behaviors. Participants completed four measures that asked about their self-regulatory study behaviors. Participants responded to each on 7-point scales anchored at 1 (*completely disagree*) and 7 (*completely agree*): “I am diligent about organizing my schedule to get my schoolwork done,” “I very rarely, if ever, skip class,” “If my friends invite me out, I am likely to go out instead of continuing my schoolwork” (reverse-scored), and “Spending an entire day at a campus library is too painful to do” (reverse-scored).⁵ We averaged the items to create a self-regulatory study behaviors composite ($M = 4.03$, $SD = 1.21$, $\alpha = .58$).

Results

We first tested whether implicit importance of the means for academic success would predict GPA. Replicating earlier findings, the importance-means IAT was a significant predictor of GPA, $\beta = .21$, $t(157) = 2.70$, $p = .01$. Conceptually replicating Study 5, neither the importance-ends ($\beta = .04$, $t < 1$), nor the evaluation-means IAT ($\beta = .02$, $t < 1$) predicted GPA. But as predicted and replicating previous findings (Ferguson, 2007), implicit evaluations of the end-states of academic success also predicted GPA, $\beta = .17$, $t(157) = 2.14$, $p = .03$. As before, explicit importance neither related to the implicit measures, $|r| < .13$, $ps > .12$, nor did controlling for it affect the level of significance of any reported finding.

We proceeded to test a mediation model by which implicit evaluations of the ends of academic success leads to implicit importance toward the means, which then predicts GPA. First, we found that the evaluation-ends IAT predicted the importance-means IAT, $\beta = .26$, $t(159) = 3.38$, $p = .001$. Next we regressed GPA on both the evaluation-ends and the importance-means IATs simultaneously. Whereas the importance-means IAT remained a significant predictor of GPA, $\beta = .18$, $t(156) = 2.21$, $p = .03$, the evaluation-ends IAT no longer predicted GPA, $\beta = .12$, $t(156) = 1.49$, $p > .13$. That is, those who had high implicit evaluations of the ends of academic success displayed heightened implicit importance toward the means to such success; it was this implicit importance that was the proximal predictor of academic success.⁶

Although these findings help to clarify the relationship between implicit importance and implicit evaluation as they relate to actual academic achievement (GPA), these findings do not show exactly how implicit importance toward the means of academic success was connected with good grades. We tested whether self-regulatory study behaviors mediated the relationship between implicit importance and high grades. First, we observed that the implicit-importance IAT predicted self-regulatory study behaviors, $\beta = .17$, $t(159) = 2.13$, $p = .04$. Second, we found that these self-regulatory study behaviors were related to higher GPAs, $\beta = .18$, $t(157) = 2.32$, $p = .02$. Because implicit importance continued to predict GPA, $\beta = .19$, $t(156) = 2.41$, $p = .02$, even when controlling for the predictive power of self-regulatory study behaviors, $\beta = .15$, $t(156) = 1.98$, $p = .05$, these findings are consistent with partial mediation.

Finally, we used Hayes’s (2013) PROCESS Model 6 to test the sequential mediation model implied by the two sets of analyses just reported. More specifically, we tested whether implicit evaluation of the ends predicted GPA through implicit importance of the means and study behaviors. We tested for three indirect effects simultaneously—through each mediator individually as well as the two in sequence. Two of the three pathways were significant. We found a significant indirect effect through implicit importance alone, consistent with our first set of analyses tested above, 95% CI: [0.0013, 0.0350]. But also, we found a significant indirect effect through the entire sequence: implicit evaluation of ends \rightarrow implicit importance of means \rightarrow study behaviors \rightarrow GPA, 95% CI: [0.003, 0.0091]. We did not find evidence of a positive indirect effect through study behaviors alone, 95% CI: [−0.0191, 0.0020]. This shows that implicit evaluation of the ends did not increase GPA by having a direct effect on study behaviors, one that did not operate through implicit importance of the means. We summarize these results in Figure 5.

⁵ These four items are modified versions of the first four items used in Study 2. Note that Study 2 was actually run after Study 7. As such, we modified the wording of the items for Study 2 based on participant feedback. Also, we created the other five items for Study 2 after consulting with the professor and the syllabus for the class from which we recruited.

⁶ Note that our findings are not inconsistent with the transfer of affect principle (Kruglanski et al., 2002), which would predict that positivity toward the endstates should elevate positivity toward the means. As can be seen in the Supplemental Materials, the two measures significantly correlate, $r(161) = .25$, $p = .001$. Our point is that it is the implicit importance of these means, not their implicit positivity, that predicts the performance outcome (GPA).

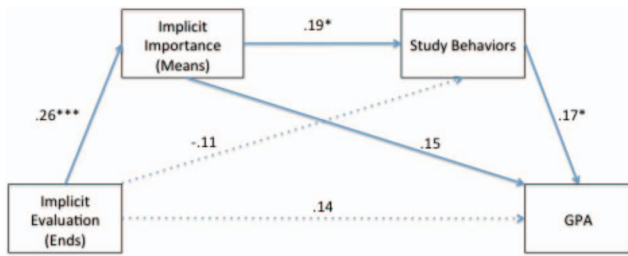


Figure 5. The effect of implicit evaluation of the ends of academic success on GPA is fully mediated by two indirect effects (Study 7): implicit importance of the means (alone) and implicit importance of the means and study behaviors (in that sequence). All numbers are standardized betas from regression analyses in which the variable(s) earlier in the chain were entered as simultaneous predictors of the relevant dependent variable. The solid arrows trace significant indirect effects identified by Hayes's (2013) sequential mediation model (PROCESS Model 6). * $p < .05$. *** $p < .001$. See the online article for the color version of this figure.

Discussion

Study 7 accomplished two objectives. First, it clarified the relationship between implicit importance and implicit evaluation. In particular, implicit importance toward means mediated the previously reported relationship between implicit positivity toward end-states and evidence of effective self-regulation (Ferguson, 2007). To the extent participants displayed a high implicit evaluation of the benefits of academic success (e.g., graduation, accomplishment, job), they showed an implicit association between importance and the means by which one reaches those valued end-states (e.g., exams, classes, school). This implicit importance toward the means predicted the effective enactment of those means, as measured by grades. This larger model of how implicit evaluation and implicit importance combine to influence self-regulation provides the larger explanatory context by which to understand implicit cognition and effective self-regulation. Not only do these findings suggest the route by which means become implicitly classified as important, but they help to address an alternative explanation for why implicit evaluation of the means and implicit importance of the end-states did not predict our behavioral outcomes of interest. More specifically, the positive predictive power of implicit evaluation of the end-states on GPA shows that it is not that the IATs' target stimuli for positivity or end-states were poorly chosen and thus unlikely to predict much of anything.

Second, additional analyses showed that implicit importance toward means explained superior grades because the importance-means IAT predicted self-regulatory persistence on the study behaviors that are important for performing well. It may seem peculiar that these study behaviors only partially mediated the relationship between implicit importance of the means to academic success and actual academic success indexed by grades. One possibility is that future research will uncover another mechanism connecting implicit importance and performance success. A second possibility is that our measure of study behaviors was not all-encompassing. If so, a measure that assessed an even fuller range of possible self-regulatory study behaviors (like the 9-item measure used in Study 2) might achieve full mediation. A third possibility is that those with strong implicit importance toward the means to academic success may make decisions to engage more

with means as needed, but not unconditionally. How much studying is needed to perform well will vary by student. If so, self-regulatory study behaviors will be an imperfect (and thus partial) mediator.

General Discussion

The current studies sought to better understand the role of implicit cognition in effortful self-regulation. In particular, we introduced and tested the construct of implicit importance. We found that implicit importance toward the means of goal pursuit offered unique or incremental predictive power in accounting for more effortful, and thus effective, self-regulation. Although people may value certain end-states or avoid others because of the positive or negative implicit evaluations people have of those outcomes, it seems that people remain committed to means when they implicitly associate importance with the domains and tasks that define these immediate pursuits.

We outlined four objectives of the current set of studies, and our findings made progress toward each one. First, we found that implicit importance toward means predicted effective pursuit of those means across a variety of self-regulatory domains: schoolwork, standardized test performance, and exercise behavior. High grades produce academic achievement and good job prospects; good performance on standardized tests improves one's graduate school admissions prospects; consistent exercise can produce benefits for health, strength, and appearance. In each case, successful enactment of these difficult means can lead to downstream rewards. Of course, our means are themselves complex behaviors that involve a series of more micro means and ends. For example, registering for classes, finding a sharpened #2 pencil, or preparing one's gym bag temporally precede submitting graded assignments, solving standardized test items, and spending an hour on the treadmill. Our operationalization of the means-ends distinction, substantiated by the classifications of our Pilot Study subjects, separates the stimuli that all relate to the complex immediate tasks for which one must self-regulate (what we call the means) and the downstream rewards that follow from the successful enactment of those means (what we call the end-states).

Second, we showed that implicit importance predicts markers of effective self-regulation—both more intense engagement with means and superior performance outcomes—over and above the predictive power of other relevant constructs. Some of these other covariates helped support that the *implicit* nature of implicit importance toward means was crucial (i.e., explicit importance); others spoke to the fact that the *importance* aspect of the measure was critical (i.e., implicit evaluation); and others established that it was importance of the *means* that was key (i.e., implicit importance toward end-states). We used other covariates that further established the incremental validity of the implicit importance toward means: optimistic denial, expectancy-value attitudes toward the means, baseline ability (e.g., SAT score), self-esteem and defensive attribution style. In combination, these findings speak to the robustness of the relationship between the implicit importance of means and markers of effective self-regulation.

These covariates frequently served a second purpose—to address many third-variable alternative models of our results. For example, it seemed possible that those with high baseline ability (SAT score) would both perform well in school and develop an

implicit association between schoolwork and importance. Establishing the link between implicit importance and GPA while controlling for SAT score (and all other covariates) addresses this and similar concerns. Nonetheless, the use of many covariates does not conclusively address a reverse-causality argument—that self-regulatory success may not be caused by, but may instead cause implicit importance. Three features of the data diminish the plausibility of such an account. First, implicit importance was able to prospectively predict study behaviors (Study 2) and performance on a standardized test (Study 5). Second, the reverse-causality argument would have more trouble accounting for the moderation by self-regulatory ease (Studies 3a–3b, 5–6). Third, reminders of failure did not depress, and for some (i.e., incremental theorists) even elevated, implicit importance (Study 4).

As for our third objective of this research, we connected our efforts to past research that has established that implicit evaluations of end-states predict effective self-regulation. We see implicit importance as a measure of conditional evaluation: means are important because they lead to valued end-states. Thus, we predicted and found that implicit importance toward means mediates the relationship between implicit positivity toward end-states and effective self-regulation. Note that this does not imply that implicit evaluations of end-states are the *only* predictor of implicit importance toward means. Future research may find other such sources—for example, the perceived likelihood that certain means will produce an end-state (i.e., the means' instrumentality), or even the presence of other means that will produce the same end-state, or even the number of other end-states that the means can fulfill (Zhang, Fishbach, & Kruglanski, 2007).

Although our studies show that implicit evaluations of end-states (vs. means) predict performance, we think this account underplays the role of implicit evaluations in immediate self-regulatory pursuits. In addition to implicit positivity guiding selection of valued end-states, implicit negativity may help us to steer clear of certain impediments to goal pursuit (Fishbach & Shah, 2006; Fujita & Han, 2009). For example, Milyavskaya et al. (in press) found that those with “want-to goals” (essentially those who are intrinsically motivated) show fewer automatic positive associations with temptations (e.g., “cake”), but not more automatic positive associations with means (e.g., “fruit”). Why might implicit evaluations predict what we avoid, whereas implicit importance predicts what we persist on? The most parsimonious reconciliation may be that evaluations guide our selections of what to pursue (e.g., valued end-states) or not (e.g., temptations), whereas importance is how we tag activities that have conditional value because of their ties to the future outcomes we are ultimately pursuing. People pursue things that are important not necessarily for immediately realizable affective benefits, but because of the value of what can ultimately be achieved. In this way, implicit importance may reflect another resource, beyond the effortful inhibition of impulses, that people leverage when self-regulation requires effective self-control (Fujita, 2011).

Fourth, we showed that implicit importance predicted self-regulatory success to the extent that the self-regulation was difficult. We reasoned that implicit importance may help one to remain committed to a task, especially when such commitment is challenging, burdensome, and thus requiring of self-control. Consistent with this reasoning, in each domain we tested—grades, standardized test performance, and exercise—participants who said that

persisting with the task required more effortful self-regulation were those who benefited from the implicit association between means and importance. In the language of Kruglanski et al. (2012), implicit importance may offer a driving force that is most likely to be the determinative factor encouraging self-regulation when the restraining force is high. Fujita (2011) argued that people effectively exert self-control not merely when they effortfully inhibit the impulse to pursue temptation, but when they limit exposure to, change their construal of, and modify their cognitive associations with temptations. The present studies show that cognitive associations with means may be another cognitive mechanism that should be added to this list.

One key question is whether implicit importance actually predicts self-regulatory effort, or whether it merely reveals who is naturally talented in certain domains. Two features of our data suggest it is the former. First, although there can be ambiguity about whether people successfully complete means because they worked hard (e.g., by spending long hours in the library) or because it was simple for them (e.g., because math comes easy), Studies 3 and 5 through 7 measured self-regulatory effort instead of just evidence that the self-regulation was effective. Second, the natural talent hypothesis would see self-regulatory ease as a mediator, not a moderator of our effects. Instead of finding that implicit importance reveals who finds the completion of self-regulation simple, we found that implicit importance appeared to benefit those who found self-regulation difficult.

Questions for Future Research

Although the present studies showed that implicit importance plays a unique role in predicting self-regulatory effort and ultimate success, it remains an open question how exactly the implicit association guides behavior. We consider two distinct possibilities. Implicit cognition—the associations captured by the SC-IATs—may reflect the extent to which content is spontaneously and rapidly activated. Thus, a first possibility is that strong implicit associations between means and importance lead the notion of importance to be spontaneously activated while in the midst of a difficult mean or when contemplating commencing one. Such a rapidly and unintentionally activated reminder of importance may be precisely the nudge that gets people to invest a bit more effort. This would be consistent with the idea that efficient goal pursuit involves goal-relevant concerns shuttling in and out of working memory as required (Wyer & Srull, 1989). Future research could use sequential priming paradigms to determine whether means prime importance (see Wittenbrink, 2007), perhaps in a unidirectional way, such that importance would not prime means (see Fishbach et al., 2003, for evidence of similar unidirectional priming).

A second possibility is that the means–importance IAT simply reflects a better measure (than a comparable explicit one) of people's chronic sense that a particular means is important—one that reflects the typical degree to which such means are characterized by importance, instead of the ideas that are called to mind only upon conscious reflection. This potential superiority of implicit measures is foreshadowed even by a research tradition that has relied on explicit measures. The theory of planned behavior posits that behavioral intentions are a function of attitudes toward a behavior (the perceived likelihood that a behavior will lead to

highly valued end-states), perceived behavioral control (the perceived likelihood that a behavior can be enacted, which is somewhat analogous to self-regulatory ease), and the normative expectations of important others (Ajzen, 1991, 2011). But crucially, it is the momentary accessibility of these beliefs that is assumed to guide intentions, and in turn, behavior. If different inputs are accessible when consciously reflecting on one's intentions and when actually behaving, then behavior may not be predicted by the measured precursors to intentions (Ajzen, 2011; Ajzen & Sexton, 1999). This account may describe explicit measures' shortcomings and the superiority of implicit measures in the contexts studied.

Regardless of precisely why implicit importance translates into self-regulatory effort, it remains an open question when and on what this influence occurs. Does implicit importance encourage people to make firmer plans to engage with means, to persevere on such means for longer, or to engage with means with greater intensity? We returned to Study 6 in search of preliminary evidence regarding this question. We were able to decompose three aspects of people's exercise behavior: the number of exercise events they engaged in each week, the average number of minutes in each exercise episode (log-transformed), and the proportion of exercise that was vigorous. Implicit importance of regulatory means correlated with the number of exercise episodes, $r(144) = .24$, $p = .003$, the length of the exercise episodes, $r(144) = .19$, $p = .02$, but not with the proportion of that exercise that was vigorous, $r(143) = .08$, *ns*. This might suggest that implicit importance is more crucial for planning and perseverance than intensity. That said, Study 5—which showed a connection between implicit importance of the GRE and performance on a surprise, time-limited GRE—did not offer participants a chance to plan or persevere for longer. Instead, implicit importance most likely encouraged, or at least predicted, more intense efforts. Future research will be necessary to determine whether implicit importance predicts all or only some steps involved in effective self-regulation.

We presented multiple lines of evidence consistent with the idea that implicit importance leads to more intense and effective self-regulatory efforts. The reverse-causality argument was made implausible, as were a number of potential third-variable arguments. Nonetheless, a challenge for future research—one that could more definitively speak to the causal question, as well as to how the present results could be implemented to bring about behavior change—is how to produce long-lasting changes in participants' implicit associations in a way that could affect self-regulatory outcomes. Although previous researchers have used evaluative conditioning to change implicit evaluations (Baccus, Baldwin, & Packer, 2004; De Houwer, Thomas, & Baeyens, 2001; Rydell et al., 2006), even over the course of several days (Olson & Fazio, 2004), these procedures require technologically sophisticated delivery methods, and reasonable worries may persist that some interventions may train people to temporarily "beat" a measure without having sizable, long-term effects on the underlying implicit associations. Are there more straightforward ways to alter these associative connections? One possibility is that the formation of implementation intentions (Gollwitzer, 1999) or action plans (Sniehotka, Scholz, & Schwarzer, 2006; Sniehotka, Schwarzer, Scholz, & Schuz, 2005) may be useful because they alter people's beliefs—even their implicit associations—concerning the importance of means.

Regardless of whether participants' implicit importance toward regulatory means can be changed in a lasting manner, identifying who is high or low in this implicit association may itself be particularly valuable. That is, those who are both low in this implicit association and find the self-regulation difficult are those most at risk of self-regulatory failures. If implicit importance functions by nudging one to persist on these *important* tasks, then these individuals may benefit from getting these reminders externally. That is, those who find self-regulation easy or those who have a strong implicit association between schoolwork and importance may be those who can be purely intrinsically motivated, and reap the accompanying rewards (Ryan & Deci, 2000). Those who lack both may need external intervention. For large groups (e.g., a workforce, a student body), it may be impractical for them to all complete a single category IAT. Future research may find that other more easily administered measures can assess the same implicit associations (see Jordan, Whitfield, & Zeigler-Hill, 2007, for this approach with implicit evaluations).

Conclusion

In summary, our findings show that an implicit association between means and importance predicts self-regulatory persistence and ultimate success. Much research—on self-regulation, prejudice, and other domains—has benefited from considering implicit evaluations in predicting judgments and behavior. The present research demonstrates the value in considering not merely automatic evaluative reactions to stimuli, but also automatic conceptual associations (e.g., Glaser & Knowles, 2008; Nosek & Smyth, 2011) in self-regulation and motivation research. We are optimistic that future research will refine our understanding of when and how these types of implicit cognition relate to meaningful behavioral outcomes.

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