Planning for success: Trait self-control predicts goal attainment through the use of implementation intentions

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The purpose of this research was to examine the relation between trait self-control, implementation intentions, the subjective experience of obstacles, and goal attainment. Across three studies ($N_{\text{total}}=3,152$), participants completed the brief self-control scale, set goals for the next week (Studies 2-3) or next year (Study 1), and then rated whether they had implementation intentions for each goal. In a follow-up survey, participants rated the amount of progress they made on each goal (Studies 2-3). Self-control was positively associated with having implementation intentions (Studies 1-3), which in turn was associated with better goal attainment (Studies 2-3). We also found that both self-control and implementation intentions was negatively associated with the experience of obstacles during goal pursuit (Study 2), but this pattern was not replicated (Study 3). These findings suggest that people with higher levels of self-control are more likely to attain their goals because they use more adaptive strategies, such as implementation intentions.

Data, analysis code, supplementary material: osf.io/xs9v7

Keywords: self-control, self-regulation, implementation intentions, planning, obstacles, goal attainment

**THIS MANUSCRIPT IS UNDER REVIEW – IT HAS NOT BEEN PEER-REVIEWED
AND IS SUBJECT TO CHANGE THROUGHOUT THE EDITORIAL PROCESS.**

Self-control (or more colloquially known as “willpower”) has long been touted as a critical component of successful goal pursuit. The more willpower you have, the more likely you are to experience a wide array of positive life outcomes, such as better physical and mental health, financial security, lower crime rates, higher quality relationships, and better academic and job performance (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012; Duckworth & Seligman, 2005; Hofmann, Luhmann, Fisher, Vohs, & Baumeister, 2014; Moffitt et al., 2011; Tangney, Baumeister, & Boone, 2004). But why is it that people with better self-control are more likely to achieve their goals? While the traditional view of self-control focuses on effortful inhibition and attempts to explain

why people often fail at self-control (e.g., Baumeister, 2002; Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister, Vohs, & Tice, 2007), recent theorizing suggests that self-control can also occur through more strategic processes that serve to enhance regulatory success (Duckworth, Gendler, & Gross, 2016; Fujita, 2011; Gillebaart & Ridder, 2015; Hofmann & Kotabe, 2012). In other words, people who are high in self-control may not always be in a state of restraint (and thus relying on “willpower”), and instead they may use other strategies that not only help them to reduce the negative impact of temptations, but actually thrive in the pursuit of their goals. To better understand the characteristics of people who are good at self-control, in the present research we focus on the use of implementation intentions, a self-regulatory strategy that has previously been implicated in the development of more automatic habits and behaviours (e.g., Adriaanse, Gollwitzer, De Ridder, de Wit, & Kroese,

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2011; Verplanken & Faes, 1999). Specifically, we examine whether people with higher levels of trait self-control are more likely to have implementation intentions for their personal goals, and how this in turn influences goal attainment over time.

The Predictive Power of Trait Self-Control

Self-control is traditionally defined as the effortful inhibition of an immediately gratifying behaviour, impulse, thought, or emotion that conflicts with an individual's important long-term goals (de Ridder et al., 2012; Milyavskaya & Inzlicht, 2018). In a classic self-control dilemma, a person is faced with making a choice between a proximal desirable option (e.g., chocolate cake, buying an expensive new outfit) and a more distal personal goal (e.g., losing weight, saving money). When exerting self-control in such a dilemma, the person is actively changing their responses so that they become better aligned with future ideals and aspirations. While self-control appears to be a state-dependent capacity to some extent (e.g., Garrison, Finley, & Schmeichel, 2019; but see Friese, Loschelder, Gieseler, Frankenbach, & Inzlicht, 2018 for a review), there are also individual differences in the domain-general capacity for effective self-regulation, known as trait self-control (Tangney et al., 2004). It is this latter form of dispositional self-control, and how it facilitates more strategic goal pursuit, that is of primary interest in the present research.

There is substantial evidence for the predictive power of trait self-control. Starting with the seminal work by Mischel and colleagues, children's ability to delay gratification was found to predict their future achievement and positive life outcomes as adolescents (Mischel et al., 1989; Shoda et al., 1990) and adults (Schlam et al., 2013). Similarly, other longitudinal studies have used a combination of self-report and multi-source observational ratings to show that early self-control is indeed a strong predictor for future achievement (Caspi et al., 2017; Moffitt et al., 2011), even when controlling for other well-established predictor variables, such as socio-economic status and cognitive ability. In adults, high levels of trait self-control predicts future achievement and positive outcomes across multiple life domains, including social relationships, health, happiness, (less) behavioral problems, educational attainment, and job performance (de Ridder et al., 2012; Hofmann et al., 2014; Tangney et al., 2004). Thus, ranging from large-scale longitudinal studies on children to cross-sectional

studies of adults, the general pattern is that trait self-control is a powerful predictor of successful goal attainment and positive life outcomes.

Beyond Inhibition: Planning as a More Strategic Approach to Self-Control

Although self-control research has traditionally focused on the effortful inhibition of undesirable behaviours, recent research suggests that people can engage in more strategic self-control that facilitates successful goal pursuit (Duckworth, Gendler, & Gross, 2016; Fujita, 2011; Gillebaart & Ridder, 2015; Hofmann & Kotabe, 2012). These strategies include the downregulation of response conflict, avoiding temptations all together (e.g., by changing one's environment), and figuring out ways to turn "good" behaviours into automatic habits (Gillebaart & Ridder, 2015). In other words, adaptive self-control seems to be less about resisting temptation and more about not experiencing temptation as strongly in the first place. This proposition is supported by existing research, which finds that people with higher levels of trait self-control report fewer temptations in their daily life (assessed via experience sampling; Hofmann, Baumeister, Förster, & Vohs, 2012). Similarly, Ent, Baumeister, and Tice (2015) found that people with higher levels of trait self-control sought to minimize temptation by choosing a less distracting (and less entertaining) work environment than people with low self-control. Sadoff, Samek, and Sprenger (2015) found that people who showed initial signs of good self-control (having dynamically consistent time preferences) were also more likely to pre-commit to a healthy food order than people with poor self-control, thus avoiding temptation by removing unhealthy food options from their future choice environment. Finally, an experience-sampling study conducted by Milyavskaya and Inzlicht (2018) found that high frequency and strength of goal-conflicting temptations negatively influenced goal progress three months later. Taken together, these findings attest to the self-regulatory benefits of experiencing fewer temptations rather than merely saying "no" when such temptations are present.

While there is a fast-emerging body of research that has started to explore a variety of alternative strategies that may help people attain their goals (Duckworth, Gendler, et al., 2016; Duckworth, Milkman, & Laibson, 2018; Hofmann & Kotabe, 2012), evidence regarding which of these strategies are most effective is mixed (de Vet et al., 2014; Duckworth, White, Matteucci,

Shearer, & Gross, 2016; Hennecke, Czikmanti, & Brandstätter, 2018; Nielsen, Gwozdz, & De Ridder, 2019; Stok, de Vet, de Ridder, & de Wit, 2012). However, one long-standing self-regulatory strategy that has a strong history of facilitating successful goal pursuit is the use of implementation intentions, or concrete action plans that specify when, where, and how a person will pursue their goal (Gollwitzer, 1993, 1999; Gollwitzer & Sheeran, 2006). Implementation intentions are especially relevant in the context of more effortless forms of self-control due to their ability to automatize the goal striving process. Often using an “if/then” structure, implementation intentions are tied to some cue in the environment that elicits a goal-relevant response, which is then defined by the action component (i.e., “If situation X occurs, then I will do behaviour Y”). Thus, in order to effectively set an implementation intention, you first need to identify both the goal-directed behaviour that you wish to pursue and the situational cue that will elicit the desired behaviour.

For example, a person who is trying to lose weight may say, “If it is noon, then I will eat the healthy salad that I brought from home” or “If I get a craving for sweet foods, then I will eat the strawberries I packed for a snack.” Because the person already has a prepared response, deciding what to eat for lunch or what to do when they get a sudden craving to satisfy their sweet tooth does not require conscious attention, and instead facilitates a more automatic or habitual response that is congruent with their goal (Gollwitzer, 1999). Research within the goal literature consistently finds that implementation intentions are a useful strategy during goal pursuit, a finding that has been replicated across a variety of important life domains (e.g., environmental behaviours; Holland, Aarts, & Langendam, 2006; New Year resolutions; Koestner, Lekes, Powers, & Chicoine, 2002; health behaviours; Orbell, Hodgkins, & Sheeran, 1997). Indeed, a meta-analysis conducted by Gollwitzer and Sheeran (2006) found that the use of implementation intentions has a medium-to-large effect ($d = .65$) on goal progress.

The use of implementation intentions may also be especially relevant in the context of self-control. Indeed, it has been proposed that trait self-control is associated with better and more automatic habits (de Ridder et al., 2012), which we suggest may be explained by having implementation intentions – a strategy that is designed specifically to automatize behaviour and build better habits. This idea is congruent with suggestions by Gillebaart and De Ridder (2015), who state that setting implementation

intentions might be a mechanism linking trait self-control with successful (and more effortless) self-regulation. Additionally, previous research suggests that people with higher levels of trait self-control are less likely to report experiencing temptations in their everyday life (Hofmann et al., 2012). However, we propose that this finding may also be due in part to the more strategic use of implementation intentions. In addition to automating goal-congruent behaviour, another important feature of implementation intentions is the ability to anticipate future obstacles and develop a specific plan in advance for how to avoid them, how to overcome them once they are experienced, or how to handle the setbacks associated with succumbing to the obstacle (Bieleke & Keller, 2019; Gollwitzer, 1993, 1999; Sheeran & Webb, 2016). By anticipating potential obstacles during goal pursuit, people are less likely to be disrupted by these obstacles because the person can develop an automatic response in advance (thus, when they actually encounter the obstacle, they do not need to deliberate on how to respond, they can just automatically refer to their default, pre-planned response). Indeed, past research indicates that having plans that focus on overcoming obstacles are important for maintaining progress and staying on track with one’s goals (e.g., Bieleke & Keller, 2019; Gollwitzer & Oettingen, 2011).

Following the previous example, the co-worker wanting to lose weight knows that they should eat the nutritious salad they packed for lunch (a behaviour that is congruent with their goal), but also knows that they simply cannot resist the delicious pizza (an obstacle to their goal to lose weight) on display at the cafeteria. By anticipating this obstacle in advance, the co-worker may say, “If my colleagues invite me to lunch with them in the cafeteria, then I will bring the salad that I packed with me and wait at the table while they order.” By making this decision in advance, the person does not have to waste their time or energy deciding between the healthy and unhealthy options they may face when actually in the cafeteria, thereby minimizing the experience of temptation and making self-control more “effortless.” For these reasons, we propose that people with higher levels of trait self-control are more successful in achieving their goals as a function of having implementation intentions.

The Present Research

The purpose of the present research was to examine the extent to which trait self-control is associated with the self-reported use of implementation intentions, and

how this in turn affects the subjective experience of obstacles and subsequent goal attainment. Across three studies ($N_{\text{total}} = 3,152$), we incorporate both cross-sectional and longitudinal designs, as well as examine the pursuit of single and multiple self-selected goals to gain a more comprehensive understanding of the dynamics between trait self-control, implementation intentions, and goal attainment (see Figure 1). In this regard, we hypothesized that higher levels of trait self-control would be positively associated with having implementation intentions for an individual's personal goals (Studies 1-3), which in turn would have a positive association with goal attainment (Studies 2 and 3). Additionally, because one of the beneficial aspects of implementation intentions is the ability to anticipate obstacles during goal pursuit (e.g., Gollwitzer & Sheeran, 2006), we further expected that both trait self-control and having implementation intentions would be negatively associated with the subjective experience of obstacles that would otherwise detract from goal attainment (Studies 2 and 3).

Statement of Transparency

The data used in the present studies were all initially collected as part of larger studies on goal pursuit (i.e., this entire manuscript is comprised of secondary data analysis), which included the relevant constructs as supplementary goal characteristics that we routinely assess using this paradigm. The data from Study 2 were initially used as part of a conference presentation on a similar topic, and although there was a specific hypothesis deriving from existing research (see Gillebaart & de Ridder, 2015), those analyses were not officially documented prior to the development of the current manuscript. In an attempt to replicate these findings, we then conducted the analyses for Study 1 and Study 3. However, to achieve a better sense of flow and clarity in the current paper, we re-ordered the presentation of this research so that the cross-sectional data appears first (Study 1), followed by the longitudinal data assessing a single goal (Study 2), and then the longitudinal data assessing multiple goals (Study 3). Any further details relevant to the individual studies are mentioned in their corresponding methods section. All study materials – including both the study-relevant measures and the full original surveys for all studies, analysis plans (when applicable), data (including the necessary variables to replicate all

analyses), and statistical code are available on the Open Science Framework (OSF). Project link: osf.io/xs9v7

Study 1

The purpose of this study was to examine the relation between trait self-control and having implementation intentions during the goal setting phase. Specifically, we hypothesized that having higher levels of trait self-control would be positively associated with having implementation intentions when setting personal goals to pursue over the following week.

Participants and Procedure

Participants were 1,554 undergraduate psychology students who received extra course credit for their participation in a larger online study on goal pursuit¹. Participants were asked to identify three goals that they planned to pursue over the next year, rate a variety of goal-specific characteristics (including one about implementation intentions), as well as complete a variety of personality and individual difference measures, including trait self-control. Of the total sample, 194 responses were excluded before analyses because they did not complete the study, did not complete the goal setting task (e.g., provided less than 3 goals), or provided nonsense responses to the goal setting task (e.g. putting an “x” in each response box), resulting in final sample size of 1,360 participants. Participants in this final sample were predominately female (66%) and were on average 20 years old ($M = 20.36$, $SD = 4.01$, ranging from 16 to 57).

Measures

Trait Self-Control. Trait self-control was assessed using the Brief Self-Control Scale (Tangney et al., 2004). Sample items include: “I am good at resisting temptation,” “I refuse things that are bad for me,” and “I often act without thinking through all alternatives” (reversed scored). Responses were made on a five-point Likert scale ranging from 1 (*not at all like me*) to 5 (*just like me*).

¹ This sample is comprised of participants from three different, but similar studies focusing on how relationships influence a person's values. The trait self-control and goal-related measures used in the present research were

included as extra measures but were not relevant to the main research questions of any of the original studies. See the Study 1 Study Materials folder on OSF for a copy of the original surveys.

Figure 1. Hypothetical models with trait self-control predicting the use of implementation intentions (Studies 1-3), subjective perceptions of obstacles, and goal attainment (Studies 2-3).

Table 1. *Descriptive statistics and correlations among all variables for Studies 1-3.*

	Study 1				Study 2						Study 3						
	<i>M</i>	<i>SD</i>	1	2	<i>M</i>	<i>SD</i>	1	2	3	4	<i>M</i>	<i>SD</i>	ICC	1	2	3	4
1. Trait Self-Control	4.44	0.60	--		3.35	0.81	--				3.01	0.67	--	--			
2. Implementation Intentions	3.65	0.76	.22	--	5.32	1.60	.29	--			5.08	1.28	.39	.25	--		
3. Obstacles	--	--	--	--	4.84	1.65	-.18	-.18	--		4.39	1.35	.45	-.04	-.02	--	
4. Goal Attainment	--	--	--	--	4.74	1.84	.21	.42	-.35	--	4.79	1.24	.19	.30	.27	-.17	--

Note. Correlations in bold are $p < .001$. The correlations for Study 3 are from the between-person level of analysis.

Table 2. *Standardized path coefficients, indirect effects, and 95% confidence intervals for trait self-control predicting the use of implementation intentions, subjective perception of obstacles during goal pursuit, and goal attainment for Studies 1-3.*

Path	Study 1					Study 2					Study 3				
	b	SE	Est/SE	<i>p</i>	95% CI	b	SE	Est/SE	<i>p</i>	95% CI	b	SE	Est/SE	<i>p</i>	95% CI
Between-Person															
tsc → imp intent	.22	.034	8.18	<.001	[0.21, 0.34]	.29	.05	6.40	<.001	[0.20, 0.37]	.29	.04	6.97	<.001	[0.21, 0.37]
tsc → obstacles	--	--	--	--	--	-.14	.05	-2.84	.004	[-0.24, -0.06]	-.04	.05	-0.80	.422	[-0.14, 0.06]
tsc → attain	--	--	--	--	--	.06	.05	1.34	.181	[-0.06, 0.34]	.36	.06	5.91	<.001	[0.30, 0.59]
imp intent → attain	--	--	--	--	--	.36	.04	8.32	<.001	[0.27, 0.43]	.29	.08	3.74	<.001	[0.14, 0.44]
imp intent → obstacles	--	--	--	--	--	-.14	.05	-2.69	.007	[-0.23, -0.05]	-.01	.06	-0.20	.844	[-0.14, 0.11]
obstacles → attain	--	--	--	--	--	-.27	.04	-6.42	<.001	[-0.36, -0.20]	-.08	.07	-1.20	.232	[-0.22, 0.05]
Within-Person															
imp intent → attain	--	--	--	--	--	--	--	--	--	--	.14	.03	5.32	<.001	[0.09, 0.18]
imp intent → obstacles	--	--	--	--	--	--	--	--	--	--	.00	.03	0.14	.892	[-0.05, 0.06]
obstacles → attain	--	--	--	--	--	--	--	--	--	--	-.29	.03	-11.21	<.001	[-0.34, -0.24]
Indirect Effects (Between-Person)															
Sum of Indirect Effects	--	--	--	--	--	.15	.03	5.94	<.001	[0.10, 0.21]	.11	.03	3.29	.001	[0.04, 0.14]
tsc → imp intent → attain	--	--	--	--	--	.10	.02	4.99	<.001	[0.14, 0.33]	.08	.03	3.30	.001	[0.03, 0.13]
tsc → obstacles → attain	--	--	--	--	--	.04	.02	2.58	.010	[0.02, 0.15]	.00	.01	0.67	.505	[-0.01, 0.01]
tsc → imp intent → obstacles	--	--	--	--	--	-.04	.02	-2.47	.014	[-0.15, -0.02]	-.00	.02	-0.20	.844	[-0.04, 0.03]
tsc → imp intent → obstacles → attain	--	--	--	--	--	.01	.01	2.32	.020	[0.00, 0.05]	.00	.00	0.20	.846	[-0.00, 0.00]

Notes. tsc = trait self-control; imp intent = implementation intentions; obstacles = subjective perception of obstacles; attain = goal attainment.

Goal Setting Task. Using the following instructions, participants were asked to list three personal goals that they planned to pursue over the following year (e.g., Koestner, Otis, Powers, Pelletier, & Gagnon, 2008): “Personal goals are projects and concerns that people think about, plan for, carry out, and sometimes (though not always) complete or succeed at. They may be more or less difficult to implement; require only a few or a complex sequence of steps; represent different areas of a person’s life; and be more or less time consuming, attractive, or urgent. Please think of your three most important personal goals that you plan to pursue over this coming year.” Examples of goals listed by participants include “finish a school assignment,” “go to the gym at least twice,” and “eat healthy.”

Implementation Intentions. Among a series of goal characteristics, participants were asked to indicate whether they had implementation intentions for pursuing each of their personal goals. Drawing from the definition of implementation intentions (e.g., “Implementation intentions...specify the when, where, and how of responses leading to goal attainment,” Gollwitzer, 1999, p. 494), participants were presented with the following item that has been used in previous research (M. Milyavskaya & Nadolny, 2017): “I have made specific plans for how, when, and where to reach this goal.” Responses were made on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). For this study, a composite implementation intentions score was calculated by averaging this item across all three goals. Thus, higher scores indicate that people were more likely to have implementation intentions across all of their goals in general.

Results and Brief Discussion

Table 1 presents the descriptive statistics and correlations for all study variables. To test our initial hypothesis, we conducted a linear regression analysis with trait self-control predicting whether people report having implementation intentions across all three goals (see Table 2). Consistent with our hypothesis, results indicate that trait-self-control was positively associated with having implementation intentions during the goal setting phase, $b = 0.22$, $p < .001$. Trait self-control explained approximately 5% of the variance in having implementation intentions, $R^2 = .047$, $F(1, 1351) = 66.86$, $p < .001$. In other words, people with higher levels of trait self-control were more likely to have implementation intentions for the personal goals that they set out to pursue. This finding provides initial

evidence of the potential underlying process explaining why people with higher levels of trait self-control are more successful in achieving their goals, as the use of implementation intentions may lead to more effortless goal pursuit (e.g., by automatizing goal-related behaviours, especially in the face of potential obstacles or setbacks). However, the primary limitation of this study is that it is cross-sectional in nature, and therefore we did not actually assess goal attainment over time. To further understand these dynamics, in the following studies we analyzed data from two longitudinal studies assessing a single (Study 2) and multiple (Study 3) week-long goals, including a follow-up assessment to track the amount of self-reported progress people made on their goals.

Study 2

Whereas the previous study looked at the relation between trait self-control and having implementation intentions during goal setting, in the current study we sought to replicate this finding, as well as extend it by assessing participants’ self-reported goal attainment over time. To achieve this objective, we used a longitudinal design asking people to set a goal for the upcoming week, and then a week later we assessed how much progress they made on that goal. As an additional variable, we also measured the extent to which people faced obstacles or setbacks while pursuing their goal. Drawing from the literature on implementation intentions, a core aspect of self-regulation is being able to generate plans that help you to either avoid or overcome obstacles during goal pursuit (Gollwitzer & Brandstätter, 1997; Gollwitzer, 1993, 1999; Gollwitzer & Sheeran, 2006, 2009). In this regard, we again hypothesized that higher levels of trait self-control would be positively associated with the use of implementation intentions, which in turn would predict goal attainment. Additionally, we hypothesized that higher levels of trait self-control would be negatively associated with the subjective experience of obstacles during goal pursuit, and that the experience of obstacles would negatively influence goal attainment over time. Finally, we expected that having implementation intentions would also be negatively associated with the subjective experience of obstacles during goal pursuit.

Participants and Procedure

Participants were 799 workers recruited from Amazon’s Mechanical Turk (MTurk) to complete a longitudinal study on goal pursuit. At the initial

session, participants identified a goal that they planned to pursue over the next week, rated a series of characteristics for this goal, and then completed several personality measures. Of these participants, 496 completed the follow-up survey at T2, resulting in a 62% retention rate. Although 496 participants submitted at T2 survey, 93 participants did not report the amount of progress they made on their goals and so the final sample consisted of 403 participants. Participants in this final sample were predominately female (63%), Caucasian (82%), and were on average 38 years old ($M = 37.97$, $SD = 12.29$, ranging from 18 to 76).

Measures

Trait Self-Control. Trait self-control was assessed using the 13-item Brief Self-Control Scale (Tangney et al., 2004). Sample items include: “I am good at resisting temptation,” “I refuse things that are bad for me,” and “I often act without thinking through all alternatives” (reversed scored). Responses were made on a five-point Likert scale ranging from 1 (*not at all like me*) to 5 (*just like me*).

Goal Setting Task. For the weekly goal setting task², all participants were presented with the following instructions: “Personal goals are projects and concerns that people think about, plan for, carry out, and sometimes (though not always) complete or succeed at. They may be more or less difficult; require only a few or many steps; represent different areas of a person’s life; and be more or less time consuming, attractive, or urgent. Please think of a goal that you plan to pursue over this coming week and write it below.” Examples of goals listed by participants include “finish the book I’m reading,” “run 5 miles,” and “keep my spending within my budget.”

Implementation Intentions. Consistent with the previous study, during the initial (T1) survey participants were asked to rate the following item indicating their plans for pursuing their goal over the coming week: “I have made specific plans for how, when, and where to reach this goal.” Responses were made on a seven-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Subjective Perception of Obstacles During Goal Pursuit. At the follow-up (T2) survey, participants were asked to indicate whether they experienced any obstacles (“During the past week, I encountered

obstacles to achieving this goal”). Responses to the experience of obstacles were made on a seven-point Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*).

Goal Attainment. Goal attainment was assessed one week later using three items for each goal: “I have made a lot of progress toward this goal”, “I feel like I am on track with my goal plan”, and “I feel like I have achieved this goal.” All ratings were made on a seven-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Results and Brief Discussion

Table 1 presents the descriptive statistics and correlations for all study variables. Using MPlus v8.2 (Muthén & Muthén, 2017), we conducted a serial mediation model examining the relation between trait self-control, implementation intentions, the subjective experience of obstacles, and goal attainment. As indicated in Table 2, we replicated the finding that higher levels of trait self-control were positively associated with having implementation intentions, $b = .29$, $p < .001$, which in turn is positively associated with better goal attainment, $b = .36$, $p < .001$. We also found that higher levels of trait self-control were indeed negatively associated with the subjective experience of obstacles during goal pursuit, $b = -.14$, $p = .004$, and that the experience of obstacles was negatively associated with goal attainment, $b = -.27$, $p < .001$. Finally, as expected, we also found that having implementation intentions was negatively associated with the subjective experience of obstacles during goal pursuit, $b = -.14$, $p = .007$. However, when taking into account all of the indirect effects, the residual direct effect between trait self-control and goal attainment was not significant, $b = .06$, $p = .181$.

These findings are congruent with the proposition put forth by Gillebaart and de Ridder (2015), which is that people with higher levels of trait self-control are more successful in pursuing their goals because they use more adaptive strategies (e.g., implementation intentions, habits) that can help them to avoid potential conflict. Thus, self-control does not always need to be effortful or require the down-regulation of response conflict as it emerges, as the use of implementation intentions may help a person avoid the temptation or obstacle in the first place (Gillebaart & Ridder, 2015).

² The original purpose of this study was to examine whether four brief goal-intervention strategies would enhance goal attainment compared to a control group. However, there were no significant differences across conditions and

so we collapsed across conditions to examine the questions outlined within the current exploratory study. Results of these analyses can be found in the supplementary materials on OSF.

Study 3

The purpose of this next study was to conceptually replicate the findings in the previous studies with the added component of examining the dynamics among multiple goals over time. That is, we combined the multiple goals aspect from Study 1 with the longitudinal aspect of Study 2 to gain a more precise estimate of how trait self-control influences the use implementation intentions, the experience of obstacles, and subsequent goal attainment over time. This allowed us to more properly assess our proposed model at both the between and within-person levels, which is especially important since there is overwhelming evidence suggesting that 80-95% of variance in goal attainment is at the within-person level (Holding, Hope, Harvey, Marion Jetten, & Koestner, 2017; Milyavskaya, Inzlicht, Hope, & Koestner, 2015; Werner, Milyavskaya, Foxen-Craft, & Koestner, 2016; Werner, Milyavskaya, & Koestner, 2017; see Milyavskaya & Werner, 2018 for a more comprehensive review of this topic).

Participants and Procedure

Participants were 799 undergraduate psychology students who received extra course credit for their participation in a larger study on goal pursuit. At the initial session (T1), participants completed an extensive battery of questionnaires, including trait self-control. Additionally, participants identified three goals that they planned to pursue over the coming week and rated a variety of characteristics, including their use of implementation intentions. At the end of the week (T2), participants were reminded of their goals and were subsequently asked to rate how much progress they made on each of them. Of the total sample, 639 participants completed the follow-up survey, passed our attention check threshold, and were successfully matched on T1 and T2 surveys, resulting in a useable retention rate of approximately 80%. Participants in the final sample were 71% female, 51% Caucasian, 20% Asian, and on average 21 years old. Because participants were asked to list three goals each, this translates to 1917 goals at the within-person level. The measures in this study were the exact same as those used in the previous studies.

Results and Brief Discussion

Since participants each provided multiple goals and thus goals were nested within-person, in the following

analyses we used multi-level structural equation modelling to test a serial mediation model accounting for both the between and within-person variability of the relation between trait self-control, implementation intentions, the subjective experience of obstacles, and goal attainment. Adapted from Preacher, Zyphur, and Zhang (2010), we conducted a 2-1-1-1 model with trait self-control at Level 2 (between-person) and implementation intentions, subjective perceptions of obstacles, and goal attainment at Level 1 (within-person). This method allows us to differentiate the between and within-person effects among our variables, therefore reducing the overall bias on the indirect effect in our mediation model that would otherwise come with simply grand-mean centering all of our constructs (Preacher et al., 2010; Zhang et al., 2009). In our case, trait self-control is strictly a between-person variable and so it can only predict between-person variability in the use of implementation intentions, subjective perceptions of obstacles, and goal attainment. In this regard, we are technically interested in examining the extent to which between-person variability in both the use of implementation intentions and the subjective experience of obstacles mediate the relation between trait self-control and the between-person variability in goal attainment.

Table 1 presents the descriptive statistics and correlations for all study variables. Results from the multi-level analyses are presented in Table 2. Consistent with previous research, the majority (81%) of the variance in goal attainment was at the within-person level. Once again replicating our initial hypothesis, results indicate that higher levels of trait self-control was positively associated with having implementation intentions, $b = .29, p < .001$, which in turn was positively associated with better goal attainment at both the between, $b = .29, p < .001$, and within-person, $b = .14, p < .001$, levels. Results at the between-person level further indicate that there was a significant indirect effect of trait self-control on goal attainment through implementation intentions (see Table 2). Contrary to our hypothesis, neither trait self-control, $b = -.04, p = .422$, or implementation intentions, $b_{\text{between}} = -.01, p = .844, b_{\text{within}} = .00, p = .892$, was negatively associated with the subjective experience of obstacles during goal pursuit. However, subjectively experiencing more obstacles was negatively associated with goal attainment, but only at the within-person level, $b_{\text{within}} = -.29, p < .001, b_{\text{between}} = -.08, p = .232$. In other words, it was not the case that people who perceived greater obstacles were less likely

to attain their goals, but rather that goals featuring greater obstacles were less likely to be attained compared to other goals. As a result, there were no significant indirect effects for any models with obstacles, including the full serial mediation model (see Table 2). Together, trait self-control, implementation intentions, and obstacles explained 29% of the between-person variance in goal attainment ($R^2 = .29$, $p < .001$), and implementation intentions and obstacles explained 10% of the within-person variance in goal attainment ($R^2 = .10$, $p < .001$).

General Discussion

The purpose of the present research was to examine whether using implementation intentions can serve as an underlying mechanism of successful self-control. Specifically, we examined whether trait self-control was associated with having implementation intentions during goal setting, and how this in turn influences the subjective experience of obstacles and goal attainment over time. Across three studies, we found consistent evidence indicating that people with higher levels of trait self-control were more likely to have implementation intentions when setting their goals (Studies 1-3), which was in turn associated with greater goal attainment over time (Studies 2-3). We also found that both higher levels of trait self-control and having implementation intentions was negatively associated with the subjective experience of obstacles during goal pursuit (Study 2). However, this pattern was not replicated in our final analyses (Study 3).

The main objective of the present research was to examine why people who are better at self-control are more successful in attaining their goals. Based on the current findings, one candidate reason may be that such individuals use better regulation strategies, such as implementation intentions, to help them pursue and ultimately attain their goals. The use of implementation intentions helps to facilitate the automaticity of goal pursuit by having the person decide on a desired outcome in advance, therefore reducing the need for effortful self-control. Implementation intentions can also facilitate the development of more automatic habits, which further enhance goal attainment. This is especially helpful in the context of obstacles, where self-control conflict is likely to exist. By anticipating obstacles in advance and creating a contingency plan, the person would not need to decide in-the-moment (e.g., when faced with the pizza) because they have already made their decision (e.g., bringing a salad from home). Thus, implementation intentions may be one

reason why people with higher levels of self-control report experiencing fewer obstacles in their everyday life (e.g., Hofmann et al., 2012).

However, the effectiveness of implementation intentions in buffering against obstacles rests upon the idea that we are able to anticipate potential obstacles during goal striving. However, as anyone who has ever faced a self-control dilemma may know, this may not always be possible (Gollwitzer & Sheeran, 2006). This may be one explanation for why the use of implementation intentions was not related to the subjective experience of obstacles in Study 3. Perhaps people experienced more unanticipated obstacles and so their implementation intentions did not help them in that regard (i.e., if you cannot anticipate what obstacles will come, then there is not much you can do to prevent them, no matter how much you plan). Future research could explore what makes people accurate in anticipating obstacles that stand in the way of their goals (e.g., is it that some people are better at anticipating obstacles than other people, and if so, what are the characteristics of these people?), as well as the extent to which this phenomenon may vary across domains (e.g., are people accurate in anticipating obstacles in some domains, but not others?). Additionally, it is also important to remember that implementation intentions can be used in different ways, including the anticipation of obstacles (e.g., avoiding cake) and/or planning out the behaviours that actively help a person to attain their goal (e.g., bring a salad for lunch) (see Bieleke & Keller, 2019). Thus, it may be the case that people in this sample focused more on goal-promoting implementation intentions (e.g., when it is 12pm, I will eat a salad for lunch) rather than using temptation / obstacle-avoidance implementation intentions (e.g., when I encounter cupcakes in the office kitchen, I will eat a piece of fruit instead), and therefore did not even focus on obstacles at all. In our view, such a pattern fits well with classic notions of bounded rationality in heuristic decision-making (Simon, 1956): When people don't know exactly what to expect in their future environment, having a good rule-of-thumb might be more effective in promoting goal-consistent behavior than attempting to predict each and every obstacle in advance. Future research on goal pursuit would benefit from exploring the boundary conditions of using implementation intentions, to what extent they are context-specific, and whether the idea of planning can generalize to adjacent behaviours as a broader heuristic.

While implementation intentions may be a strategy that people with better self-control naturally use when

planning and pursuing their goals, it would make sense that implementation intentions may be especially useful for those low in self-control since such individuals typically experience more conflict when faced with such dilemmas. This is especially the case when it comes to anticipating obstacles that would detract from one's goals – perhaps by taking small steps to develop specific goal-oriented plans and responses to anticipated obstacles in advance, people with poorer self-control can learn to strengthen their regulatory abilities over time. Thus, even though people with lower levels of trait self-control may not intuitively know how to develop such plans, using such a “simple” self-regulatory tool may be a good starting place to help people build more adaptive habits over time. In other words, implementation intentions may help turn more effortful self-control into more effortless self-control over time.

Limitations and Future Directions

One limitation of the present research is that we simply asked people whether or not they had implementation intentions, without asking them to provide their specific plans. As a result, we were unable to assess the actual quality of the implementation intentions that participants had. This is important to consider in future research, as there is evidence to suggest that implementation intentions are not effective when set incorrectly (e.g., too broad, not specific enough). For example, within the health domain, a randomized control trial found that implementation intentions had no effect on physical activity (de Vet et al., 2009). This was because a substantial portion of participants did not form specific enough implementation intentions and therefore did not actually have any viable plans to aid in the pursuit of their physical activity goal (de Vet et al., 2011). In this regard, not having the ability to thoroughly check the quality of participants' implementation intentions may have introduced additional noise that may have weakened our findings.

One of the benefits of the present research is that we took an idiographic approach by asking participants about their own personal goals, therefore allowing them to report on goals that are actually meaningful to them (e.g., rather than researcher-imposed goals that may not be as relevant, or completing arbitrary lab tasks). However, this design also comes at the cost of not being able to obtain objective measures of goal attainment because everyone is pursuing different goals. Nonetheless, future research would benefit from

replicating the present studies in specific domains in order to obtain more objective measures of goal progress (e.g., assessing weight loss over time in participants actively pursuing the goal to lose weight; assessing GPA in students who have specific GPA goals within a given semester).

An important avenue for future research is to also consider a wider range of potential strategies that people naturally high in self-control may use. For example, in the context of healthy eating, Nielsen et al. (2019) found that trait self-control was positively associated with the self-reported use of situation selection, attentional deployment, reappraisal, and inhibition. However, only attentional deployment and reappraisal were positively associated with subjective well-being, whereas inhibition was negatively related to subjective well-being. In the academic domain, Duckworth, White, and colleagues (2016) found that students who were randomly assigned to use situation modification made better progress on their studying goal and reported better quality in their studying compared to students who were instructed to simply use their willpower or those in the control condition. Thus, although implementation intentions may be one strategy to enhance goal attainment, it would be interesting for future research to test its effectiveness compared to other strategies (e.g., such as situation modification, willpower) in order to determine which strategy is most effective. This is especially interesting when considering implementation intentions because this strategy is rather flexible in how it can be used (e.g., developing contingency plans, anticipating obstacles) whereas some other strategies may be more rigid in their use.

Conclusion

While research of self-control has typically focused on self-control failure, the aim of the present research was to examine why people with better self-control are more likely to attain their goals. Consistent with our hypothesis, one such reason may be that people with better self-control are more likely to have implementation intentions, which in turn positively influence goal attainment over time. It may also be the case that implementation intentions help to buffer against potential obstacles that may otherwise detract an individual from successfully pursuing their goal, although additional research is needed to better understand specific mechanics of using implementation intentions. Broadly, this research further suggests that more strategic self-control (compared to the traditional

strategy of using willpower) may serve as a more efficient path to goal attainment and is therefore an important avenue for future research.

References

- Adriaanse, M. A., Gollwitzer, P. M., De Ridder, D. T. D., de Wit, J. B. F., & Kroese, F. M. (2011). Breaking habits with implementation intentions: A test of underlying processes. *Personality and Social Psychology Bulletin*, 37, 502–513.
- Baumeister, R. F. (2002). Ego depletion and self-control failure: An energy model of the self's executive function. *Self and Identity*, 1, 129–136.
- Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, 74, 1252–1265.
- Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science*, 16, 351–355.
- Bieleke, M., & Keller, L. (2019). *Individual Differences in If-Then Planning* [Preprint]. PsyArXiv.
- Caspi, A., Houts, R. M., Belsky, D. W., Harrington, H., Hogan, S., Ramrakha, S., Poulton, R., & Moffitt, T. E. (2017). Childhood forecasting of a small segment of the population with large economic burden. *Nature Human Behaviour*, 1, 0005.
- de Ridder, D. T. D., Lensvelt-Mulders, G., Finkenauer, C., Stok, F. M., & Baumeister, R. F. (2012). Taking stock of self-control: A meta-analysis of how trait self-control relates to a wide range of behaviors. *Personality and Social Psychology Review*, 16, 76–99.
- de Vet, E., de Ridder, D., Stok, M., Brunso, K., Baban, A., & Gaspar, T. (2014). Assessing self-regulation strategies: Development and validation of the tempest self-regulation questionnaire for eating (TESQ-E) in adolescents. *International Journal of Behavioral Nutrition and Physical Activity*, 11.
- de Vet, E., Oenema, A., & Brug, J. (2011). More or better: Do the number and specificity of implementation intentions matter in increasing physical activity? *Psychology of Sport and Exercise*, 12(4), 471–477.
- de Vet, E., Oenema, A., Sheeran, P., & Brug, J. (2009). Should implementation intentions interventions be implemented in obesity prevention: The impact of if-then plans on daily physical activity in Dutch adults. *International Journal of Behavioral Nutrition and Physical Activity*, 6(1), 11.
- Duckworth, A. L., & Seligman, M. E. P. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science*, 16, 939–944.
- Duckworth, Angela L., Gendler, T. S., & Gross, J. J. (2016). Situational strategies for self-control. *Perspectives on Psychological Science*, 11, 35–55.
- Duckworth, Angela L., Milkman, K. L., & Laibson, D. (2018). Beyond willpower: Strategies for reducing failures of self-control. *Psychological Science in the Public Interest*, 19, 102–129.
- Duckworth, Angela L., White, R. E., Matteucci, A. J., Shearer, A., & Gross, J. J. (2016). A stitch in time: Strategic self-control in high school and college students. *Journal of Educational Psychology*, 108, 329–341.
- Ent, M. R., Baumeister, R. F., & Tice, D. M. (2015). Trait self-control and the avoidance of temptation. *Personality and Individual Differences*, 74, 12–15.
- Frieze, M., Loschelder, D. D., Gieseler, K., Frankenbach, J., & Inzlicht, M. (2018). Is ego depletion real? An analysis of arguments. *Personality and Social Psychology Review*.
- Fujita, K. (2011). On conceptualizing self-control as more than the effortful inhibition of impulses. *Personality and Social Psychology Review*, 15, 352–366.
- Garrison, K. E., Finley, A. J., & Schmeichel, B. J. (2019). Ego depletion reduces attention control: Evidence from two high-powered preregistered experiments. *Personality and Social Psychology Bulletin*, 45, 728–739.
- Gillebaart, M., & Ridder, D. T. D. de. (2015). Effortless self-control: A novel perspective on response conflict strategies in trait self-control. *Social and Personality Psychology Compass*, 9, 88–99.
- Gollwitzer, P. M. (1993). Goal achievement: The role of intentions. *European Review of Social Psychology*, 4, 141–185.
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, 54, 493–503.
- Gollwitzer, P. M., & Brandstätter, V. (1997). Implementation intentions and effective goal pursuit. *Journal of Personality and Social Psychology*, 73, 186–199.
- Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. In *Advances in Experimental Social Psychology* (Vol. 38, pp. 69–119). Elsevier.
- Gollwitzer, P. M., & Sheeran, P. (2009). Self-regulation of consumer decision making and behavior: The role of implementation intentions. *Journal of Consumer Psychology*, 19, 593–607.
- Hennecke, M., Czikmanti, T., & Brandstätter, V. (2018). Doing despite disliking: Self-regulatory strategies in everyday aversive activities. *European Journal of Personality*.
- Hofmann, W., Baumeister, R. F., Förster, G., & Vohs, K. D. (2012). Everyday temptations: An experience sampling study of desire, conflict, and self-control. *Journal of Personality and Social Psychology*, 102, 1318–1335.
- Hofmann, W., Frieze, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. *Perspectives on Psychological Science*, 4, 162–176.
- Hofmann, W., & Kotabe, H. (2012). A general model of preventive and interventive self-control. *Social and Personality Psychology Compass*, 6, 707–722.
- Hofmann, W., Luhmann, M., Fisher, R. R., Vohs, K. D., & Baumeister, R. F. (2014). Yes, but are they happy? Effects of trait self-control on affective well-being and life satisfaction. *Journal of Personality*, 82, 265–277.
- Holding, A. C., Hope, N. H., Harvey, B., Marion Jetten, A. S., & Koestner, R. (2017). Stuck in limbo: Motivational antecedents and consequences of experiencing action crises in personal goal pursuit. *Journal of Personality*, 85, 893–905.
- Holland, R. W., Aarts, H., & Langendam, D. (2006). Breaking and creating habits on the working floor: A field-experiment on the power of implementation intentions. *Journal of Experimental Social Psychology*, 42, 776–783.
- Koestner, R., Lekes, N., Powers, T. A., & Chicoine, E. (2002). Attaining personal goals: Self-concordance plus implementation intentions equals success. *Journal of Personality and Social Psychology*, 83, 231–244.
- Koestner, R., Otis, N., Powers, T. A., Pelletier, L., & Gagnon, H. (2008). Autonomous motivation, controlled motivation, and goal progress. *Journal of Personality*, 76, 1201–1230. <https://doi.org/10.1111/j.1467-6494.2008.00519.x>

- Milyavskaya, M., & Nadolny, D. (2017). Health goals among American adults: Prevalence, characteristics, and barriers. *Journal of Health Psychology*.
- Milyavskaya, M., & Inzlicht, M. (2018). Attentional and motivational mechanisms of self-control. In D. T. D. de Ridder, M. Adiraanse, & K. Fujita (Eds.), *Routledge International Handbook of Self-Control in Health and Well-Being* (pp. 11–24). Routledge.
- Milyavskaya, M., Inzlicht, M., Hope, N., & Koestner, R. (2015). Saying “no” to temptation: Want-to motivation improves self-regulation by reducing temptation rather than by increasing self-control. *Journal of Personality and Social Psychology*, 109, 677–693.
- Milyavskaya, M., & Werner, K. M. (2018). Goal pursuit: Current state of affairs and directions for future research. *Canadian Psychology/Psychologie Canadienne*, 59, 163–175.
- Mischel, W., Shoda, Y., & Rodriguez, M. (1989). Delay of gratification in children. *Science*, 244, 933–938.
- Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., Houts, R., Poulton, R., Roberts, B. W., Ross, S., Sears, M. R., Thomson, W. M., & Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences*, 108, 2693–2698.
- Muthén, L. K., & Muthén, B. O. (2017). *MPlus user’s guide*. (Eighth). Muthén & Muthén.
- Nielsen, K. S., Gwozdz, W., & De Ridder, D. (2019). Unraveling the relationship between trait self-control and subjective well-being: The mediating role of four self-control strategies. *Frontiers in Psychology*, 10.
- Orbell, S., Hodgkins, S., & Sheeran, P. (1997). Implementation intentions and the theory of planned behavior. *Personality and Social Psychology Bulletin*, 23, 945–954.
- Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods*, 15, 209–233.
- Sadoff, S., Samek, A. S., & Sprenger, C. (2015). Dynamic inconsistency in food choice: Experimental evidence from a food desert. *SSRN Electronic Journal*.
- Schlam, T. R., Wilson, N. L., Shoda, Y., Mischel, W., & Ayduk, O. (2013). Preschoolers’ delay of gratification predicts their body mass 30 years later. *The Journal of Pediatrics*, 162, 90–93.
- Sheeran, P., & Webb, T. L. (2016). The Intention-Behavior Gap: The Intention-Behavior Gap. *Social and Personality Psychology Compass*, 10(9), 503–518. h
- Shoda, Y., Mischel, W., & Peake, P. K. (1990). Predicting adolescent cognitive and self-regulatory competencies from preschool delay of gratification: Identifying diagnostic conditions. *Developmental Psychology*, 26, 978–986.
- Simon, H. A. (1956). Rational choice and the structure of the environment. *Psychological Review*, 63, 129–138.
- Stok, F. M., de Vet, E., de Ridder, D. T. D., & de Wit, J. B. F. (2012). “I should remember I don’t want to become fat”: Adolescents’ views on self-regulatory strategies for healthy eating. *Journal of Adolescence*, 35, 67–75.
- Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, 72, 271–324.
- Verplanken, B., & Faes, S. (1999). Good intentions, bad habits, and effects of forming implementation intentions on healthy eating. *European Journal of Social Psychology*, 29, 591–604.
- Werner, K. M., Milyavskaya, M., Foxen-Craft, E., & Koestner, R. (2016). Some goals just feel easier: Self-concordance leads to goal progress through subjective ease, not effort. *Personality and Individual Differences*, 96, 237–242.
- Werner, K. M., Milyavskaya, M., & Koestner, R. (2017). A test of two theories: The role of approach-avoidance and autonomous-controlled motivation on goal progress over time. *Unpublished Manuscript*.
- Zhang, Z., Zyphur, M. J., & Preacher, K. J. (2009). Testing multilevel mediation using hierarchical linear models: Problems and solutions. *Organizational Research Methods*, 12, 695–719.

This pre-print was designed using the following template:
 Wiernik, B. M. (2019, October 11). Preprint templates.
<https://doi.org/10.17605/OSF.IO/HSV6A>