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In good time: A longitudinal investigation of trait self-control in determining changes in motivation quality

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ABSTRACT

The positive role of autonomous motivation in personal goal pursuit has been robustly established in Self-Determination Theory research. Recent work has linked individual differences in trait self-control to motivation quality, showing that higher self-control is associated with greater autonomous motivation (Converse, Juarez & Hennecke, 2018). The present investigation built on this research to test the association longitudinally in the context of long-term personal goal pursuit. In a prospective longitudinal study with college students, we tested whether trait self-control predicts increased autonomous goal motivation and decreased controlled motivation over time. Participants set three personal goals they planned to pursue for the duration of the academic year and reported on their goal motivation, self-control and Big Five personality traits. Results showed that trait self-control predicted increased autonomous motivation and decreased controlled motivation over the academic year, even after controlling for the Big Five. These findings contribute to the emerging understanding of the role of personality factors in determining motivation.

Decades of self-regulation research inextricably links autonomous motivation for goal pursuit with positive goal outcomes and adaptation such as increased goal perseverance, progress, attainment, and well-being (Holding, Hope, Harvey, Marion Jetten, & Koestner, 2017; Koestner, Otis, Powers, Pelletier, & Gagnon, 2008; Sheldon & Elliot, 1998). Conversely, pursuing a goal for controlled reasons, such as seeking reward, evading punishment, or appeasing feelings of guilt and shame, has shown absent associations with goal outcomes (Koestner et al., 2008), and has been linked to symptoms of depression (Holding et al., 2017). As such, the quality of motivation underlying goal pursuit is an important predictor of the progression, stagnation, or failure of a goal. However, the determinants of autonomous and controlled motivation have only recently been the focus of self-regulation research. Converse, Juarez, and Hennecke (2018) have linked trait self-control to autonomous motivation using experimental, experience sampling, and cross-sectional studies, thereby identifying self-control as a determinant of motivation quality. In a prospective longitudinal study, we seek to build upon this finding by examining the role of trait self-control in predicting change of motivation quality for personal goals over time, while controlling for the Big Five traits.

1. Organismic integration theory and motivation for goals

An important aspect of motivation concerns people's perceived reasons for goal pursuit. The Organismic Integration Theory (OIT) of goal striving developed as mini theory of SDT (Ryan & Deci, 2017), focuses on the quality of motivation that underlies personal goals. OIT proposes that motivation lies on a continuum of internalization from intrinsic motivation to external regulation, with researchers distinguishing between autonomous motivation and controlled motivation (Ryan & Deci, 2017). Autonomous motivation describes fully or partially internalized reasons for goal pursuit, such as choosing a goal for interest and enjoyment (*intrinsic motivation*), because the goal encompasses one's values and reflects one's identity (*integrated motivation*), or because one believes the goal to be meaningful and important (*identified motivation*). Conversely, controlled motivation subsumes the two least internalized forms of motivation on the continuum: pursuing goals out of internal feelings of guilt and pressure (*introjected motivation*) or in response to external contingencies, such as the expectation of reward or punishment (*external motivation*). These distinct forms of regulation tend to co-occur to different degrees in most complex behaviors, but have been associated with vastly different outcomes (Ryan & Deci, 2017).

Given that autonomous motivation predicts desirable goal

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outcomes, understanding the determinant(s) of this energizing force is a worthwhile question. Within the SDT literature, certain social-contextual factors, such as receiving autonomy support from others, have been found to promote autonomous functioning (Ryan & Deci, 2017). Goals high in autonomous motivation are also thought to arise when they relate to a domain that the individual finds need-satisfying (Milyavskaya, Nadolny, & Koestner, 2014). Finally, individual differences in the propensity to enact autonomous behaviour have also been established (i.e., dispositional autonomy, Weinstein, Przybylski, & Ryan, 2012). However, individual differences in self-regulation capacity have only recently received attention as potential determinants of autonomous motivation (Converse et al., 2018).

2. Self-control as a determinant of motivation quality

Self-control describes the exertion of control over the self in thought, feeling, or behavior, to help one prioritize long-term over short-term pursuits (Fujita, 2011; Muraven & Baumeister, 2000). Specifically, self-control is called for when abstract, distant goals or intentions (e.g. finishing a marathon) conflict with concrete, proximal wishes or desires (e.g. forgoing training to relax inside on a rainy day) (Fujita, 2011). Dispositional self-control is the general tendency, to control impulses, urges, temptations or habits that interfere with the pursuit of salient goals or intentions (Muraven & Baumeister, 2000). As such, self-control an important predictor of well-being and life satisfaction (Hofmann, Luhmann, Fisher, Vohs, & Baumeister, 2014).

There are indirect suggestions in the SDT literature outlining the idea that self-control may influence goal internalization. For example, Deci and Ryan (2000, p. 63) note that “the types of behaviors and values that can be assimilated to the self increase with growing cognitive and ego capacities”. Trait self-control is a good candidate for capturing “ego capacity”, suggesting that higher levels in self-control may facilitate the internalization process of personal goals. While people’s general regulatory styles tend to become more “internal” over time, in accord with the general organismic tendencies towards autonomy (Ryan & Deci, 2017), individual differences in self-control may influence people’s capacity or ease of assimilating reasons for goal pursuit.

Converse et al. (2018) were the first group of researchers to examine whether high self-control was associated with increases in autonomous motivation. They reasoned that self-control and autonomous motivation had mutual links to ease of goal pursuit and task construal, and conducted six studies to demonstrate this link via cross-sectional, experience sampling and experimental methods. However, prospective longitudinal evidence of this association remains to be explored. Self-regulation research in SDT has centered around the study of personal goals, with a specific focus on ideographic goals (i.e. spontaneously generated by the person; Sheldon, 2014). Given the unique and important role of personal goals, we wanted to test whether trait self-control predicted changes in motivation quality of long-term personal goals.

Converse et al. (2018) also included measures of controlled motivation in some of their studies to examine whether trait self-control related to controlled motivation. Interestingly, Converse et al. (2018) showed in Study 1 that trait self-control was significantly negatively related to controlled motivation. As such, we also sought to test the relationship between trait self-control and controlled motivation over time, predicting that self-control will lead to decreases in controlled motivation.

3. Association of Big Five personality traits with motivation quality

If dispositional self-control is implicated in determining motivation quality, this begs the question whether other personality traits are also determinants of motivation quality. The Big Five personality trait structure of neuroticism, extraversion, openness to experience,

agreeableness, and conscientiousness is a widely-accepted model of personality trait structure (John & Srivastava, 1999). Importantly, Big Five traits have shown associations with aspects of people’s tendency to function autonomously (Olesen, 2011; Weinstein et al., 2012). For example, Olesen (2011) found that openness was positively related to an orientation towards autonomy, whereas agreeableness was negatively related to an orientation towards control. Weinstein et al. (2012) found that extraversion and openness were positively related to autonomous functioning while neuroticism was negatively related to autonomous functioning. Neither study showed a link between individual’s orientation towards autonomous functioning and conscientiousness, which comes closest to trait self-control. Indeed, conscientiousness is composed of numerous characteristics that overlap with self-control (Roberts, Chernyshenko, Stark, & Goldberg, 2005). Given the links between relative autonomous functioning and Big Five traits, we wanted to test the specificity of trait self-control in determining motivation quality beyond the Big Five.

4. Current research

We conducted a prospective longitudinal study with college students that spanned the length of the academic year (34 weeks) to examine (1) whether trait self-control predicts changes in the motivation quality of personal goals over time and (2) whether other Big Five traits are related to changes in motivation quality. Based on the findings of Converse et al. (2018), we hypothesized that trait self-control would be associated with increased autonomous goal motivation and decreased controlled motivation at the end of the academic year. Since both Olesen (2011) and Weinstein et al. (2012) found links between openness and increased autonomous functioning we also expected to see this association. However, the literature does not show other consistent associations between the other Big Five variables and motivation quality, so we did not have clearly formulated hypotheses regarding the role of extraversion, agreeableness, conscientiousness, or neuroticism in determining autonomous and controlled motivation in personal goals. Importantly, we wanted to test whether self-control still predicted changes in motivation quality after controlling for the Big Five.

5. Methods

To test whether trait self-control predicts increases in autonomous and decreases in controlled motivation over time, we recruited participants for a longitudinal study on personality and personal goals. Previous research has been published with this data on the relationship between perfectionism and an orientation towards extrinsic aspirations and perfectionism in goal pursuit (Hope, Koestner, Holding, & Harvey, 2016; Moore et al., 2018), but self-control has not been used in previously published research on this data and no previous study has explored the current set of hypotheses.

5.1. Participants and procedure

344 undergraduate students (74% female, 64% Caucasian, 26% Asian, 2% Black, 3% Hispanic) ages 17–29 ($M_{age} = 19.4$, $SD = 1.82$) were recruited to participate in an online study on daily life and personal goals at a Canadian University. At the beginning of the academic year (mid-September) participants indicated 3 personal goals they planned to pursue over the course of the academic year, and rated their motivation (autonomous and controlled) for each goal. Participants also completed the Big Five personality inventory. Trait self-control was included in a follow-up survey (five weeks post-baseline) that was administered in October to reduce participant burden. At the end of the academic year in early May (34 weeks post-baseline), participants re-rated their goal-specific motivation. 283 participants completed the end-of-year survey assessment, representing an 82% retention rate.¹ This study was approved by the university ethics board and participants

Table 1
Descriptive information of and correlations between key variables of the study.

	Mean (SD)	1.	2.	3.	4.	6.	7.	8.	9.	10.
1. Baseline autonomous motivation	5.44 (0.85)	–								
2. End-of-year autonomous motivation	5.34 (1.03)	0.38**	–							
3. Baseline controlled motivation	3.16 (1.10)	–0.07	–0.15**	–						
4. End-of-year controlled motivation	3.48 (1.37)	–0.03	–0.18**	0.49***	–					
5. Self-control	3.79 (0.99)	0.08	0.20***	–0.19**	–0.32***	–				
6. Extraversion	3.15 (0.85)	0.17**	0.06	–0.13*	–0.07	0.02	–			
7. Agreeableness	3.73 (0.60)	0.12*	0.08	–0.12*	–0.06	0.13*	0.10	–		
8. Conscientiousness	3.41 (0.67)	0.08	0.15*	–0.15**	–0.27***	0.62***	0.17**	0.15**	–	
9. Neuroticism	3.10 (0.81)	–0.04	–0.05	0.13*	0.12	–0.28***	–0.29***	–0.23***	–0.24***	–
10. Openness	3.59 (0.64)	0.17**	0.19**	–0.10	–0.01	–0.04	0.27***	0.03	0.03	–0.08

* $p < .05$.

** $p < .01$.

*** $p < .001$.

were financially compensated \$50 CAD for their participation.

5.2. Measures

5.2.1. Personal goals

At the beginning of the academic year, participants were asked to list three personal goals that they planned to pursue over the course of the academic year. Examples of goals generated by participants included “Complete my applications to Graduate and Medical Schools” and “Find and sustain a relationship with a boyfriend”. The majority of goals were achievement-related goals related (69%), followed by social/affiliation-related goals (19%).

5.2.2. Autonomous and controlled goal motivation

In mid-September and early May participants were asked to rate their motivation for pursuing each goal using five items that assessed external, introjected, identified, integrated, and intrinsic reasons for goal pursuit (Sheldon & Elliot, 1998). All responses were made on a 7-point scale of 1 (not at all for this reason) to 7 (completely for this reason). The motivation questions were asked for each of participants' goals separately. Items included “Because somebody else wants you to, or because you'll get something from somebody if you do.” (*external*), “Because you would feel ashamed, guilty, or anxious if you didn't-you feel that you ought to strive for this.” (*introjected*), “Because you really believe that it is an important goal to have-you endorse it freely and value it wholeheartedly.” (*identified*), “Because it represents who you are and reflects what you value most in life.” (*integrated*), and “Because of the fun and enjoyment which the goal will provide you-the primary reason is simply your interest in the experience itself.” (*intrinsic*). As in previous research, autonomous motivation was calculated as the mean of intrinsic, integrated, and identified ratings, whereas controlled motivation was calculated as the mean of external and introjected regulation (e.g. Koestner et al., 2008). We computed the autonomous and controlled motivation for each personal goal and then averaged the autonomous and controlled motivations across the three personal goals (Autonomous motivation $T1 \alpha = 0.64$; $T2 \alpha = 0.75$; Controlled motivation $T1 \alpha = 0.51$; $T2 \alpha = 0.63$).

5.2.3. Big five inventory

At the beginning of the academic year we administered the 44-item Big Five Inventory (BFI; John & Srivastava, 1999) which is a widely-used, reliable and valid measure of the Big Five. The BFI utilizes 44 short phrases based in the trait adjectives known to be prototypical of

¹ Participants that did not complete the end-of-year assessment appeared to be significantly lower in trait conscientiousness ($M = 3.21$, $SD = 0.62$) than participants who completed the end-of-year assessment ($M = 3.45$, $SD = 0.67$), $F(1, 337) = 5.86$, $p = .02$.

the Big Five to capture individual differences. Participants rated items on a 5-point Likert scale ranging from “strongly disagree” to “strongly agree”. Sample items included “Is talkative” (*extroversion*), “Is helpful and unselfish with others” (*agreeableness*). The alphas were acceptable with extroversion $\alpha = 0.86$, agreeableness $\alpha = 0.73$, conscientiousness $\alpha = 0.80$, neuroticism $\alpha = 0.84$, and openness $\alpha = 0.78$.

5.2.4. Self-control

Participants completed the 13-item Brief Self Control Survey (Tangney, Baumeister, & Boone, 2004) five weeks following the initial survey. Sample items include “I am good at resisting temptation” and “I wish I had more self-discipline (reverse coded)”. Participants rated items on a 7-point Likert scale anchored “Not at all like me” to “Very much like me. Nine items were reverse coded ($\alpha = 0.85$).

6. Results

6.1. Preliminary results

To screen for multivariate outliers, we computed Mahalanobis distance values for all participants. Two participants exceeded the critical chi-square value at $p = .001$ and were thus removed from the final sample ($N = 342$). Table 1 illustrates the descriptive statistics and correlations for all the key variables. Overall, participants reported significantly higher baseline autonomous motivation ($M = 5.44$, $SD = 0.85$) compared to their baseline controlled motivation across their three goals ($M = 3.16$, $SD = 1.10$), $t(341) = 27.98$, $p < .0001$, $d = -2.31$. Mean levels of autonomous motivation for goals remained stable across the academic year, with no significant differences between beginning and end-of-year autonomous motivation, $t(281) = 1.08$, $p = .28$, $d = -0.07$, whereas mean levels of controlled motivation for goals increased across the academic year, $t(281) = -4.11$, $p < .0001$, $d = 0.28$. As can be seen in Table 1, trait self-control related positively to autonomous goal motivation at the end of the academic year, while relating negatively to controlled goal motivation at both time points.

6.2. Main analyses

To examine how trait self-control predicted change in goal motivation across the academic year, we performed two hierarchical regressions (Table 2). In the first step of each regression we controlled for the baseline measure of mean goal motivation, in the second step of each regression we entered trait self-control. In our first model, we predicted levels of end-of-year autonomous goal motivation. Participants' baseline autonomous motivation was a strong predictor of end-of-year autonomous motivation ($\beta = 0.40$, $t = 7.10$, $p < .001$, 95% CI [0.34, 0.59]), accounting for 15.6% of the variance in end-of-year autonomous motivation, $F(1, 273) = 50.36$, $p < .001$. At the second step,

Table 2
Hierarchical regressions predicting change in end-of-year goal motivation with self-control.

	Variables	End-of-year autonomous motivation		End-of-year controlled motivation	
		R ²	β	R ²	β
Step 1	Baseline motivation [†]	0.16*	0.40***	0.24	0.49***
Step 2	Self-control	0.19	0.16**	0.28	−0.22***

* $p < .05$.

** $p < .01$.

*** $p < .001$.

[†] Symbol indicates baseline autonomous motivation for analyses predicting end-of-year autonomous motivation, and baseline controlled motivation for analyses predicting end-of-year controlled motivation.

self-control was also positively associated with end-of-year autonomous motivation ($\beta = 0.16, t = 2.87, p = .004, 95\% CI [0.05, 0.27]$), accounting for an additional 3% of the variance $F(1,272) = 8.25, p = .004$. That is, participants high in trait self-control experienced increases in their autonomous motivation for their personal goals across the academic year, controlling for their baseline autonomous motivation. In our second hierarchical regression, we predicted levels of end-of-year controlled motivation for goals (Table 2). Baseline controlled goal motivation was a strong predictor of end-of-year controlled goal motivation ($\beta = 0.49, t = 9.17, p < .001, 95\% CI [0.47, 0.73]$), accounting for 24% of the variance in end-of-year controlled motivation $F(1,273) = 84.02, p < .001$. At the second step, trait self-control was significantly negatively related to end-of-year controlled motivation ($\beta = -0.22, t = -4.21, p < .001, 95\% CI [-0.45, -0.16]$), accounting for an additional 5% of the variance $F(1,272) = 17.70, p < .001$. In other words, participants high in trait self-control experienced decreases in their controlled motivation for their personal goals over the academic year.

To answer our second question, we examined whether the Big Five also predicted changes in motivation over the course of the year (see Table 3). Importantly, we sought to test whether self-control still predicted changes in motivation above and beyond the effects of the Big Five. To this end we performed two additional hierarchical regressions with baseline motivation entered at step 1, Big Five traits entered at step 2, and self-control entered at step 3. In predicting end-of-year autonomous goal motivation, participants' baseline autonomous motivation was a strong predictor of end-of-year autonomous motivation ($\beta = 0.40, t = 7.10, p < .001, 95\% CI [0.34, 0.59]$), accounting for

Table 3
Hierarchical regression predicting change in end-of-year goal motivation with Big Five and self-control.

	Variables	End-of-year autonomous motivation		End-of-year controlled motivation	
		R ²	β	R ²	β
Step 1	Baseline motivation [†]	0.16	0.40***	0.24	0.49***
Step 2	Extraversion	0.17	−0.05	0.28	0.01
	Agreeableness		0.02**		0.04
	Conscientiousness		0.13***		−0.20***
	Neuroticism		0.00		0.02
	Openness		0.15*		0.04
Step 3	Self-control	0.18	0.16*	0.29	−0.16*

* $p < .05$.

** $p < .01$.

*** $p < .001$.

[†] Symbol indicates baseline autonomous motivation for analyses predicting end-of-year autonomous motivation, and baseline controlled motivation for analyses predicting end-of-year controlled motivation.

15.6% of variance of end-of-year autonomous motivation $F(1,273) = 50.36, p < .001$. At the second step, only the Big Five traits of openness ($\beta = 0.15, t = 2.56, p = .01, 95\% CI [0.05, 0.41]$) and conscientiousness ($\beta = 0.13, t = 2.17, p = .03, 95\% CI [0.02, 0.36]$) were associated with end-of-year autonomous motivation, accounting for an additional 3.4% of the variance $F(1,268) = 2.25, p = .05$. At the third step, trait self-control remained a positive predictor of end-of-year autonomous motivation ($\beta = 0.16, t = 2.22, p = .03, 95\% CI [0.02, 0.30]$), accounting for an additional 1.5% in the variance $F(1,267) = 4.93, p = .03$. We repeated the same analysis with controlled motivation (Table 3). Baseline controlled goal motivation was a strong predictor of end-of-year controlled goal motivation ($\beta = 0.49, t = 9.17, p < .001, 95\% CI [0.47, 0.73]$), accounting for 24% of the variance of end-of-year controlled motivation $F(1,273) = 84.02, p < .001$. As the second step, only conscientiousness was significantly negatively associated end-of-year controlled goal motivation ($\beta = -0.20, t = -3.65, p < .001, 95\% CI [-0.63, -0.19]$), accounting for an additional 4.2% in the variance $F(1,268) = 3.08, p = .01$. In the final step, trait self-control remained significantly negatively related to end-of-year controlled goal motivation ($\beta = -0.16, t = -2.31, p = .02, 95\% CI [-0.40, -0.03]$), accounting for an additional 1.5% of the variance $F(1,267) = 5.33, p = .02$.

7. General discussion

This study provides the first longitudinal evidence that trait self-control predicts increases in autonomous motivation and decreases in controlled motivation for personal goals over the span of an academic year. Additionally, these effects remained significant after controlling for the Big Five. Trait self-control appeared to influence participants' movement along the motivational continuum of internalization, such that individuals high in trait self-control moved away from external and introjected reasons for goal pursuit over time, and towards identified, integrated and intrinsic reasons for goal striving. This has important implications for SDT, as determinants of motivation quality have previously focused on environmental controls, environmental supports (Ryan & Deci, 2017), as well as domain-specific need-satisfaction (Milyavskaya et al., 2014).

It is noteworthy that trait self-control and baseline autonomous motivation for personal goals were not correlated, but that this relationship only became significant over time. This fits with Converse et al.'s (2018) aptly worded observation that “it [is not] the case that individuals higher in self-control go through life with autonomy-colored glasses on. Rather, they seem to put those glasses on as needed.” Indeed, the positive relationship between trait self-control and autonomous motivation only came into focus over the course of the academic year. Conversely, trait self-control was negatively related to controlled motivation at the beginning of the study. Consistent with Converse et al. (2018, Study 1), who found a negative association between trait self-control and controlled motivation, we replicated this finding longitudinally to show that trait self-control predicted decreases in controlled motivation over the course of an academic year.²

An outstanding question remains why self-control leads to decreased controlled motivation for personal goals over time. Sheldon and Elliot (1998, p. 554) suggest that controlled goals “are selected when the individual fails to create an accurate assessment of their deeper needs, values, and interests”. It is possible that accessing one's deeper

² Interestingly, Converse et al. (2018) did not replicate the negative association of self-control and controlled motivation in studies 1R-3. The reason for the failed replications may be that the researchers simplified their measurement of controlled motivation after Study 1. Instead of continuing to assess controlled motivation by measuring both facets of controlled motivation, the authors only measured the external regulation facet of controlled motivation in subsequent studies 1R-3.

needs, values, and interests requires self-control, thus disfavoring individuals low on trait self-control in the selection of autonomous goals. Moreover, Sheldon and Elliot (1998, p.554) discuss how an individual is likely to follow “momentary enticements” (i.e., temptations) and “lingering introjects” (i.e., urges aimed at reducing shame, guilt, or anxiety) if they do not access their deeper needs and values. For people low in trait self-control this may mean that over time, a goal becomes increasingly controlled because there is insufficient self-knowledge and reflection about their deeper, enduring needs. This may render the individual more susceptible to external controls in the environment, such as the promise of immediate rewards.

The finding that trait self-control promoted a shift in motivation quality along the continuum of integration has important implications for Organismic Integration Theory. A possible explanation may be that self-control is implicated in the internalization process whereby a goal is assimilated with one's core sense of self. There may be multiple pathways through which self-control facilitates goal internalization that should be explored in future research. Deci, Eghrari, Patrick, and Leone (1994) identified several factors that allow internalization to unfold including a) identification of a meaningful rationale for goal pursuit, b) acknowledging a potential mismatch between certain aspects of the goal and one's natural inclinations, thereby legitimizing feelings of frustration or discomfort at the prospect of goal engagement, and c) experiencing a sense of choice about engaging with the goal. Future research in this area may uncover how self-control facilitates goal internalization. For example, a) are people high in trait self-control more likely to perceive a meaningful rationale for goal engagement because they are better at identifying the long-term benefits of goal pursuit? This would fit with Fujita's (2011) dual-motive conceptualization of self-control, which describes self-control as the process of advancing distal rather than proximal goals when the two compete. Alternatively, b) are individuals high in self-control more attuned to the internal mismatch they experience when a long-term goal (e.g., losing weight) conflicts with their natural inclination (e.g., skipping work-outs)? This would fit with Fishbach and Converse's (2010) notion of “conflict identification” which suggests that successful self-control depends on the ability to identify a conflict between present behavior and long-term goals. Finally, c) are people higher in trait self-control more in-tune with the degree of choice they have, at any given moment, to enact a behavior that is in line with their long-term goal? The notion of perceiving one's own choices in relation to future choices is consistent with work on self-control and “choice bracketing” (Read, Loewenstein, Rabin, Keren, & Laibson, 1999). This research highlights how people can perceive a choice narrowly and in isolation (e.g. “One muffin won't kill me”), versus broadly and in the context of habits and patterns (e.g. “Having a daily muffin will affect my health”) - the broader cognitive “bracket” often leading to more adaptive behavior and potentially driving goal internalization.

Consistent with Olesen's (2011) and Weinstein et al.'s (2012) findings, trait openness was positively related to increases in end-of-year autonomous motivation. In other words, people who identified as being creative, aware of their feelings, and appreciative of art, adventure, and unusual ideas, tended to feel more volitional about their goals over time. Likewise, people who scored highly on conscientiousness tended to feel more volitional about their goals over time. Given the overlap between self-control and conscientiousness this was unsurprising (Roberts et al., 2005). As for end-of-year controlled motivation, we found that trait conscientiousness was negatively related to controlled motivation, indicating that those high in trait conscientiousness experienced decreased controlled motivation for their personal goals over the course of the academic year. Nevertheless, trait self-control predicted variance beyond openness and conscientiousness in determining end-of-year motivation quality, suggesting that self-control may be a more sensitive indicator of key motivational qualities.

While this longitudinal study provides evidence that trait self-control impacts motivation quality over time, we cannot exclude the

possibility that the relationship between self-control and motivation quality is reciprocal and dynamic. For example, frequently experiencing controlled reasons for goal pursuit, and consequently feeling conflicted about one's goals, may change an individual's self-perception over time to the point this person endorses items that reflect poor self-control, such as “I am lazy” (Tangney et al., 2004). Likewise, an individual that consistently feels volitional and wholehearted about goal pursuit is likely to experience more goal progress, and consequently may come to endorse items that reflect good self-control, such as “I am good at resisting temptation” (Tangney et al., 2004). Indeed, future studies should measure trait self-control at both the beginning and end of longitudinal studies to explore the possibility that change in motivation quality impacts self-control over time. Relatedly, another limitation of this study was that trait self-control was measured five weeks later than the initial assessment of the three goals, motivation quality, and the Big Five. Since trait self-control is thought to be a stable individual difference for most individuals (Hay, Widdowson, & Young, 2018; Ray, Jones, Loughran, & Jennings, 2013; Turner & Piquero, 2002), we did not expect the delayed measurement to alter our results. However, we cannot exclude the possibility that participants' baseline motivation for goals impacted their rating of the self-control scale in October. Since we recruited a sample of young students, the majority of goals set in the context of the study were achievement related goals. However, future studies may benefit from examining whether there is goal-specific effect for self-control on motivation quality. Future research may also benefit from considering whether effortful control, a temperament-based self-regulatory capacity (Eisenberg, Smith, & Spinrad, 2011), is associated with changes in motivation quality over time. Importantly, studying behavioural measures of effortful control, such as the ability to inhibit a dominant response to perform subdominant responses or to detect errors (Eisenberg et al., 2011; Rothbart, Sheese, & Posner, 2014), would strengthen claims of the relationship between dispositional self-regulation and motivation quality. A final limitation of this study was the low percentage of male participants which limited us in exploring sex differences with respect to our main effects.

In conclusion, the findings of this paper suggest that trait self-control impacts the quality of motivation that fuels (or frustrates) personal goal pursuit. In a study spanning the academic year, we found that trait self-control was associated with increases in autonomous goal motivation and decreases in controlled motivation. There is considerable evidence in SDT that becoming relatively more autonomous promotes growth and adaptation (Ryan & Deci, 2017). This suggests that young adults high in self-control are well poised to display optimal motivation. However, for individuals who struggle with self-control, the findings of this study suggest it is all the more important to carefully reflect upon and reconcile reasons for goal pursuit. If a goal is not fun or interesting, does not seem meaningful or important, or lacks authenticity in the context of one's history, culture, identity and values, it may be time to reconsider the reasons for goal pursuit.

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