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Using expectancy-value theory to understand academic self-control

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ABSTRACT

We applied expectancy-value theory to understand academic self-control. In three studies of middle and high school students (N_{total} = 2620), subjective values, but not expectancy beliefs, predicted motivation and behavior toward academic activities over alternative activities. Moreover, results showed that intrinsic value was a stronger incremental predictor of academic self-control compared to utility value. Study 1 used experience sampling and showed that momentary perceptions of intrinsic value were more strongly associated with motivational conflict during engagement in academic activities compared to perceptions of utility value. Study 2 used daily diaries and demonstrated that intrinsic value predicted greater self-control for homework over 14 days. Study 3 was a longitudinal study that showed the proposed framework generalized across math and science: Compared to utility value, intrinsic value of math and science were more strongly associated with academic self-control in each subject. Collectively, results suggest that enhancing enjoyment of academics may encourage greater self-control.

1. Using expectancy-value theory to understand academic self-control

Why do students sometimes feel conflicted between academic tasks and the desire to engage in less beneficial, leisurely activities, whereas other times they do not? Moreover, why do students sometimes exercise self-control to resist these momentary desires, but not other times? For example, how can we explain why a student will choose to complete a science assignment rather than watch television, and then on the very next day decide to spend time with friends rather than study for a math test? Apart from intelligence, measures of self-control are among the most reliable predictors of academic performance (Duckworth & Carlson, 2013; Hofer, Kuhnle, Kilian, & Fries, 2012). It is not surprising then, that boosting self-control is seen by researchers and policymakers as an effective strategy for promoting academic success (Blair & Diamond, 2008; Schunk, 2005; U.S. Department of Education Office of Educational Technology, 2013). Yet, the psychological mechanisms describing how self-control works in academic contexts and how it can be directly targeted for improvement have not received as much study. Across three studies, we tested the hypothesis that expectancy and subjective value beliefs underlie academic self-control.

1.1. What is self-control?

Self-control is defined as the set of processes by which individuals regulate attention, motivation, and behavior to pursue higher-order goals despite momentary impulses and desires to do otherwise (Duckworth, Gendler, & Gross, 2014). The need for self-control starts with the onset of motivational conflict (Kotabe & Hofmann, 2015), the subjective experience of feeling torn between two opposing response tendencies: one that, if enacted, is expected to bring immediate pleasure, and another that is expected to bring long-term benefit (Duckworth, Gendler, & Gross, 2016; Hofmann, Friese, & Strack, 2009). Consider, for example, a student who knows she should be studying for tomorrow's calculus test, but at the same time is torn by a desire to go out with friends. The immediate desire to spend the evening with friends conflicts with the higher-order goal of doing well on tomorrow's math test. In such instances, the student must exercise volitional control over these conflicting motivations to choose to study rather than engage in more immediately gratifying activities that do not advance long-term academic goals. Though self-control is often required in many domains of higher-order goal pursuit (e.g., dieting, exercise, saving money) (Tsukayama, Duckworth, & Kim, 2012), the focus of the current investigation was specifically on the regulation of motivation and behavior for advancing academic goals (Duckworth et al., 2014; Tsukayama, Duckworth, & Kim, 2013).

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What explains whether a student will exercise self-control in academic contexts? Most research on self-control with youth has focused on the importance of executive functioning (Diamond, 2013). This body of literature suggests that self-control depends on a suite of interrelated cognitive processes, especially inhibitory control, that enables top-down, goal-directed control over lower-level impulses. The idea here is that youth with greater executive functioning capacity are better able to inhibit maladaptive impulses in favor of more adaptive responses. Though better executive function does play a role in the control of behavioral impulses (Kieras, Tobin, Graziano, & Rothbart, 2005; Simonds, Kieras, Rueda, & Rothbart, 2007), the literature on executive functioning has not explained whether different subjective evaluations might also underlie how students regulate their motivation and behavior for academic goals over alternative goals. Because self-control involves a multitude of strategies that are not reducible to inhibition (Duckworth et al., 2014; Fujita, 2011; Galla & Duckworth, 2015), it is important to understand factors beyond executive function that might contribute to successful self-control.

1.2. An expectancy-value based account of academic self-control

The current research advanced the idea that academic self-control is a value-based decision (Berkman, Hutcherson, Livingston, Kahn, & Inzlicht, 2017; Berkman, Kahn, & Livingston, 2016; Hofer et al., 2010; Rangel, Camerer, & Montague, 2008). Value-based decision-making has been extensively studied in the fields of behavioral economics and neuroscience, and involves understanding how individuals select a course of action in a world full of alternatives (Berkman et al., 2016; Rangel et al., 2008). According to this view, individuals evaluate different attributes of a given choice option and then weigh those different valuations to make a decision (Fehr & Rangel, 2011; Kurzban, Duckworth, Kable, & Myers, 2013). Any given choice option will have an arbitrary number of value inputs that all contribute to its overall decision value. For example, deciding whether to buy an apple (or not) might depend on in-the-moment evaluations of tangible attributes, including its taste and cost, or more abstract attributes, including its healthiness and whether buying it confers social status. Numerous studies and literature reviews now document that decisions depend on the valuations given to the various attributes under consideration (Berkman, 2018; Berkman et al., 2016, 2017; Fehr & Rangel, 2011; Rangel et al., 2008). In one study, for example, non-dieting adults were shown images of food one-at-a-time and had to decide (yes, no) whether they wanted to eat that food at the end of the experiment (Hare, Malmaud, & Rangel, 2011). They then rated these different foods for perceived taste and healthiness. Results showed that, under natural conditions, taste ratings exerted a stronger effect on choice than health ratings. But, when researchers asked individuals to attend to the health attributes of different foods, they were more likely to base their choices on perceived healthiness. By contrast, when the same people attended to the taste attributes, they were less likely to base their choices on perceived healthiness. Overall, these findings suggest that individuals simultaneously evaluate a given choice option on multiple different attributes, and further, that evaluations of these different attributes can have starkly different effects on their actual decisions.

This idea is highly consistent with expectancy-value theory (Atkinson, 1964; Eccles & Wigfield, 2002), which posits a causal relationship between specific subjective evaluations and achievement decisions, but which has been mostly silent on the problem of self-control. The benefit of using expectancy-value theory is that, compared to more general models of value-based decision-making, it has precisely characterized several different attributes of academic tasks that students evaluate to inform their achievement-related decisions. In addition to *expectations* about being able to successfully accomplish goals, perceptions of *utility value* and *intrinsic value* are especially critical for students' motivation to engage in academic tasks (Wang, 2012). Utility value refers to how useful or important a task is for advancing long-term academic goals beyond the immediate situation. By contrast, intrinsic value refers to how enjoyable or interesting an academic task is in the moment it is being completed. Studies show that individuals are more likely to participate in learning activities and persist in the face of challenges when they have a high perception of their chance of being successful and view the task itself as interesting and useful (Galla et al., 2014; Wang & Degol, 2013; Wang & Eccles, 2013).

Here, we applied expectancy-value theory to the problem of academic self-control to suggest that expectancy beliefs and subjective values about academic tasks serve as inputs that predict motivation and behavior toward academic activities over alternative activities. Recall the example above where a student feels torn between studying for a test and going out with friends. We suggest that her motivation, and ultimately her decision, to stay home and forgo the opportunity to spend time with friends—thus demonstrating successful self-control—will depend on whether she believes she is capable of succeeding on the test and whether she perceives studying as being enjoyable in the moment and useful in the long-run.

Beyond testing main effects, we also examined whether distinct expectancy-value beliefs have differential predictive validity for self-control processes. More specifically, we tested whether the magnitude of the association with academic self-control was equivalent across utility value, intrinsic value, and success expectancies. We suspected it may not be. Recall from the experiment cited previously that different value inputs (i.e., health, taste) can have differential effects on choices made in the laboratory (Hare et al., 2011). In naturalistic settings, like those studied here, we expected that the valuations students make for different academic attributes would also have differential predictive validity for their self-control. Generally speaking, subjective value beliefs are stronger predictors of academic choices (e.g., course selection) than are expectancy beliefs (Eccles & Wigfield, 2002). This suggests that being good at a particular activity does not necessarily mean that a student will want to pursue the activity further, or even that they enjoy doing it. Because academic self-control represents another type of achievement-related decision, we hypothesized that utility value and intrinsic value would be stronger predictors of self-control processes than expectancy beliefs.

Apart from expectancy beliefs, we also hypothesized differences in the magnitude of the association with self-control between utility value and intrinsic value. Insofar as the conflicting motivations students experience during academic tasks incline them toward more immediately rewarding activities (Grund, Brassler, & Fries, 2014; Hofmann & Van Dillen, 2012), then self-control could hinge largely on students' perceptions of the short-term (e.g., enjoyment) relative to long-term (e.g., importance) attributes of academic tasks (Milkman, Rogers, & Bazerman, 2008). Recall previously that, all else being equal, individuals tend to base their food choices more on taste than healthiness (Hare et al., 2011). Likewise, individuals tend to care more about experiencing immediate rewards while they engage in different activities (relative to when they are not engaging in them), and they persist longer in the presence of immediate rewards, even though they (incorrectly) assume that long-term rewards will matter more (Woolley & Fishbach, 2015). The tendency of individuals to strongly consider immediate rewards during the moment of choice suggests that intrinsic value of academic tasks may also be more predictive of academic self-control compared to its utility value (Woolley & Fishbach, 2016, 2017). In other words, because intrinsic value signals the *immediate* rewards to be gained from academic tasks, then students' regulation of motivation and behavior toward academic goals over alternative goals may depend more powerfully on whether they find academic tasks more or less immediately rewarding.

Of course, perceived utility value of academic tasks may also foster self-control by helping students keep an important long-term goal in mind (Eskreis-Winkler et al., 2016; Yeager et al., 2014). But, utility value primarily signals the *delayed* rewards to be gained from academic tasks, not immediate, in-the-moment rewards of such work. Because