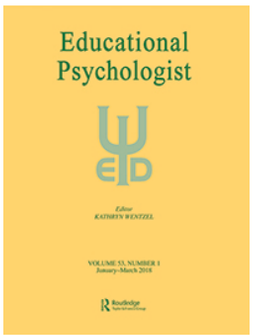

Routledge
Taylor & Francis Group

Educational Psychologist

ISSN: 0046-1520 (Print) 1532-6985 (Online) Journal homepage: https://www.tandfonline.com/loi/hedp20

The Role of Metamotivational Monitoring in Motivation Regulation

David B. Miele & Abigail A. Scholer

To cite this article: David B. Miele & Abigail A. Scholer (2018) The Role of Metamotivational Monitoring in Motivation Regulation, Educational Psychologist, 53:1, 1-21, DOI: 10.1080/00461520.2017.1371601

To link to this article: https://doi.org/10.1080/00461520.2017.1371601

EDUCATIONAL PSYCHOLOGIST, *53*(1), 1–21, 2018

ISSN: 0046-1520 print / 1532-6985 online
DOI: 10.1080/00461520.2017.1371601

Routledge
Taylor & Francis Group

The Role of Metamotivational Monitoring in Motivation Regulation

David B. Miele[1] and Abigail A. Scholer[2]

[1]*Department of Counseling, Developmental, and Educational Psychology, Boston College*
[2]*Department of Psychology, University of Waterloo, Ontario, Canada*

This article builds on existing models of motivation regulation in order to examine how students identify and address motivational deficits (e.g., not enough motivation or not the right type of motivation). Integrating perspectives from the achievement motivation, metacognition, and emotion regulation literatures, we propose that metamotivational processes play an essential role in students' monitoring of their motivational states. By emphasizing the ways in which students monitor not only the quantity but also the quality of their motivation, our model extends existing perspectives. We identify different components of motivation that are likely to be the target of monitoring (e.g., self-efficacy, intrinsic value), specify the metamotivational feelings (e.g., hopelessness, boredom) that signal problems with each component, and discuss how strategies are selected to address these problems. Our framework generates new questions about how students monitor (and control) their task-specific motivation.

Over the past several decades, there has been a great deal of research within educational psychology investigating motivational factors that influence student engagement (see Wentzel & Miele, 2016). Much of this research has focused on exploring the ways in which educators can structure learning environments to make academic tasks and domains more enticing, such as changing students' motivational beliefs, making the material seem more interesting, and increasing the perceived relevance of the task or domain. Although research in this area has made great strides in understanding these factors, relatively little is known about how students monitor and address their own motivational problems. This gap in knowledge is not trivial. Even if educators are successful in stimulating a general desire to learn and to engage in academic tasks, there are numerous obstacles that students may experience during task performance that are likely to reduce or impede their motivation. Students cannot necessarily rely on their parents or teachers to help them overcome these obstacles, especially when the task is unsupervised.

Considering how often students are faced with motivational obstacles, and the obvious impact that these obstacles can have on their learning and achievement (see Corno, 1993), it is important that we develop a better understanding of the processes by which students regulate their motivational states when pursuing their academic goals, particularly the process of monitoring task motivation and detecting potential obstacles. Despite researchers' acknowledgment that such monitoring is an essential component of motivation regulation (e.g., Kuhl, 2000; Sansone & Thoman, 2005; Schwinger & Stiensmeier-Pelster, 2012; Wolters, 2003, 2011), no one has offered a thorough description of the monitoring processes on which students rely to initiate strategic control of their task-specific motivational states. Thus, the purpose of this review is to extend existing models of motivation regulation in ways that better account for how students monitor their task motivation. Answering questions about students' monitoring is important because it can help us to better understand the different challenges students face when learning how to regulate their task motivation. Although some students may struggle because they lack knowledge of what strategies they can use to bolster their motivation, other students may possess this knowledge but still struggle because they are unable to accurately detect when such strategies are needed or because they are bad at selecting effective strategies.

Correspondence should be addressed to David B. Miele, Department of Counseling, Developmental, and Educational Psychology, Boston College, 140 Commonwealth Ave., Chestnut Hill, MA 02467. E-mail: d.miele@bc.edu

Color versions of one or more of the figures in the article can be found online at www.tandfonline.com/hedp.

The updated model we are proposing (depicted in Figure 1) builds on what is already known about different types of motivation regulation strategies (see Miele & Scholer, 2016; Wolters, 2003) by (a) identifying different components of motivation that are likely to be the target of regulation, (b) specifying the phenomenological experiences that indicate the status of different components (i.e., "metamotivational" feelings), and (c) emphasizing ways in which students monitor both the quantity and quality of their motivation. The model therefore provides a framework for asking important questions and guiding future research about students' monitoring of their task motivation, such as: Is monitoring a top-down process that is executed as part of a strategic plan, or a bottom-up process that is triggered by experiential cues? Once a problem with motivation has been detected, how do students identify which components of their motivation (e.g., low intrinsic value or self-efficacy) are the source of the problem? In addition, how do they decide which strategy will be most effective at bolstering the component they think is undermining their desire to engage in the task? Although much of our proposal currently lacks empirical support, the proposed model integrates perspectives from the motivation, metacognition, and emotion regulation literatures and, thus, has a strong theoretical grounding. When possible, we draw from empirical work to support our contentions.

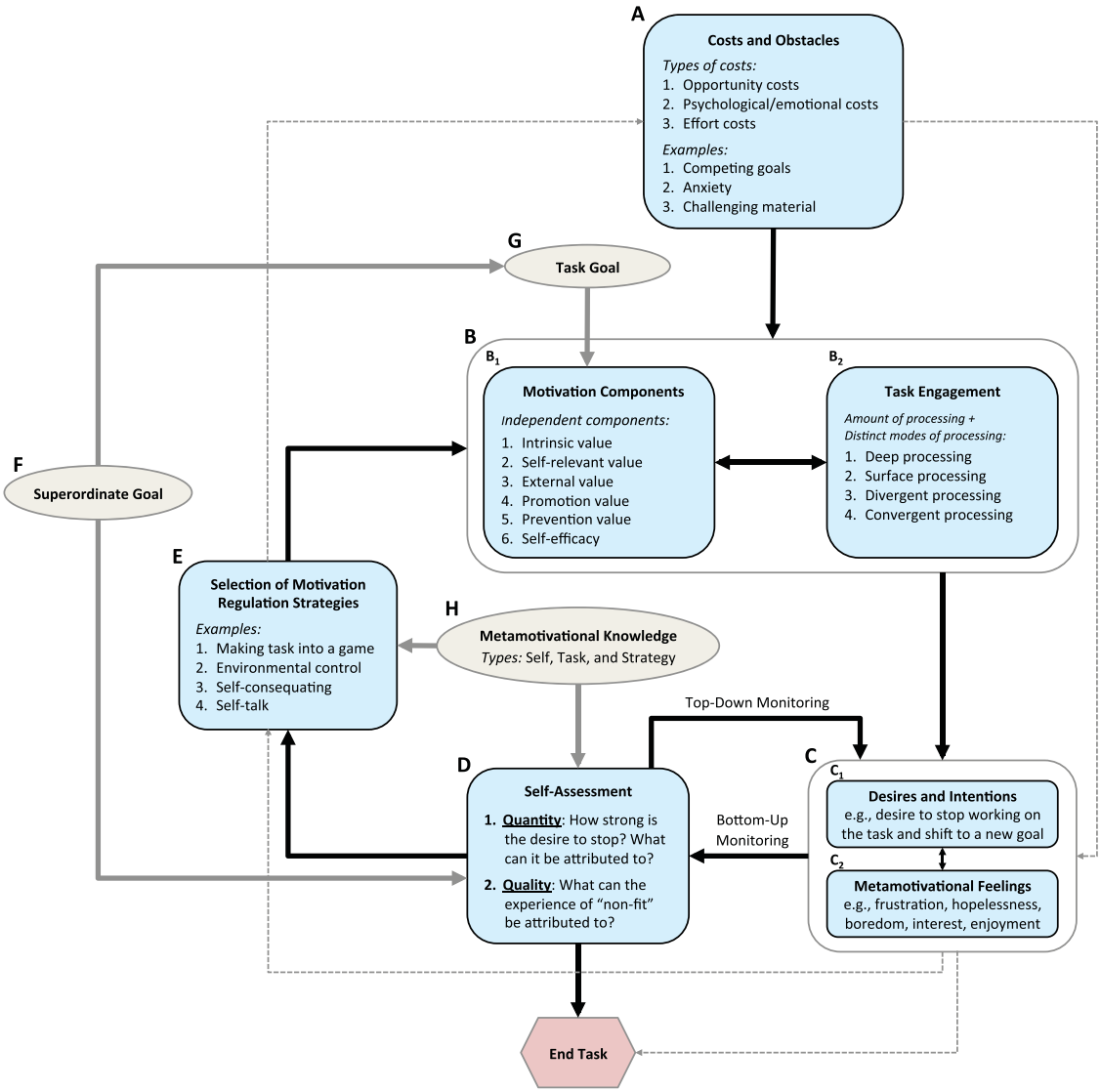

FIGURE 1 A metamotivational model of motivation regulation. *Note*. Blue boxes represent dynamic processes and states that are updated each time the individual cycles through the feedback loop. Beige ovals represent more stable constructs that are not necessarily updated with each cycle. Solid black arrows represent the standard pathway through each loop. Dashed gray arrows represent possible, but less standard pathways. Solid gray bars represent the connections between stable factors that exist outside of the feedback loop and dynamic factors within the loop. In general, boxes and arrows depicted in the bottom half of the figure correspond to metamotivational monitoring, whereas those depicted in the top half correspond to metamotivational control. Note that there may be additional metamotivational processes that are not addressed by the model and, thus, not depicted in the figure.

WHAT IS MOTIVATION REGULATION?

We define motivation regulation as the process by which one attempts to maintain the level and type of motivation needed to optimally pursue some goal. We consider goals to be cognitive representations of specific tasks/outcomes (see Elliot & Fryer, 2008), in contrast to "goal orientations," which we consider to be broad motivational tendencies that influence engagement in academic activities more generally (Elliot, 2005). In keeping with past work on motivation regulation (e.g., Wolters, 1998, 2003; Wolters & Benzon, 2013), our model focuses on how students regulate their motivation to pursue specific task goals (e.g., the goal of studying for an important exam) and not how they regulate their higher level goals (e.g., the goal of maintaining a high grade point average [GPA]) or their goal orientations (e.g., the general desire to appear smart).

Drawing from the literatures on metacognition and self-regulated learning (e.g., Nelson & Narens, 1990; Winne & Hadwin, 1998), theorists have suggested that, at the broadest level, motivation regulation comprises two reciprocal metamotivational processes (Boekaerts, 1995; Corno, 1993; Kuhl, 2000; Pintrich, 2004; Sansone & Thoman, 2005, 2006; Schwinger & Stiensmeier-Pelster, 2012; Wolters, 2003, 2011). The first process, which we call *metamotivational monitoring* (Path C→D in Figure 1), involves assessing both the quantity and quality (e.g., intrinsic vs. extrinsic) of one's motivation to pursue a task goal; the second process, *metamotivational control* (Path $E \rightarrow B_1 \rightarrow B_2$ in Figure 1), involves selecting and executing strategies that bolster or change one's task motivation. These processes are reciprocal and form a feedback loop, such that the control function takes the output of monitoring as its input and monitoring takes the output of control as its input.

The effectiveness of students' monitoring and control processes depends in part on their *metamotivational knowledge*. Making accurate metamotivational assessments and decisions, like making accurate metacognitive assessments, requires self, task, and strategy knowledge (Oval H in Figure 1; see Flavell, 1979; Pintrich, 2002; Wolters, 2003). For example, a student working on a challenging task needs to know both the level and type of motivation (e.g., promotion vs. prevention; Higgins, 1997) required in order to perform her best (*task knowledge*), the strategies she can employ to enhance her level of motivation or shift into a different orientation (*strategy knowledge*), and which of these strategies she can implement most effectively (*self-knowledge*). It is important to note that this knowledge may affect monitoring and control either explicitly or implicitly (e.g., a student may intuitively be aware that relying solely on intrinsic motivation can lead to inefficient behavior when studying for an important exam). That is, despite sometimes using language that implies that these metamotivational processes are consciously controlled, we believe that (similar to what some theorists claim about metacognitive processes; Butler & Winne, 1995; Reder, 1996; Reder & Schunn, 1996) they can occur implicitly and/or automatically.

HISTORICAL BACKGROUND

Our definition of motivation regulation is in line with modern conceptions of volition. Theorizing about volition dates back hundreds of years (see Hilgard, 1980). For instance, Alexander Bain (1859) posited that volition serves as the arbiter between conflicting motives: "Wherever two present sensations dictate opposite courses, there is an experiment upon the relative strength of the two. The resulting volition decides the stronger, and is the ultimate canon of appeal" (p. 408). In contrast to this "associationist" conception of volition, other theorists, such as Narziss Ach (1910/2006), posited that the function of volition is not necessarily to decide between conflicting tendencies or motives but to ensure that implementation of a specific goal or intention (which serves a particular motive) is not abandoned in favor of a competing motive or impulse (see Kuhl & Beckmann, 1985). In other words, volition is about the enactment of intentions rather than their formation.

At the end of the last century, this distinction was reintroduced to the psychological literature by Heinz Heckhausen (1991) and Julius Kuhl (1984). Kuhl's theory of action control differentiates between two separate aspects of conation: motivation and volition. Motivation, in his view, refers specifically to the process by which values and expectancies guide an individual's decision to engage in a particular action (i.e., goal selection). In contrast, volition comes into play once a decision has been made and an intention has been formed; it serves to ensure that the person acts on the intention in the face of competing impulses or tendencies and sees this action through to completion (Kuhl, 1984). Kuhl originally posited six types of volitional strategies that individuals use to ensure that their intentions are enacted. Lynn Corno, who introduced action control theory to educational psychology (e.g., Corno, 1986), added several strategy types and organized the full list into a hierarchical taxonomy (Corno, 1989, 2001). At the most general level of the taxonomy, she distinguished between covert volitional strategies, which involve efforts to regulate internal mental processes, and overt volitional strategies, which involve efforts to restructure features of the task or social context in order to shield one's intentions from competing demands.

These two sets of volitional processes have been explored by separate but overlapping literatures. On one hand, recent models of motivation regulation (Sansone & Thoman, 2005, 2006; Schwinger & Stiensmeier-Pelster, 2012; Wolters, 2003, 2011) have focused specifically on

the processes by "which individuals purposefully act to initiate, maintain, or supplement their willingness to start, to provide work toward, or to complete a particular activity or goal (i.e., their level of motivation)" (Wolters, 2003, p. 190). In contrast, social psychological models of self-control have typically focused on deliberate or automatic strategies (e.g., attentional deployment, implementation intentions, goal shielding, etc.; Achtziger, Gollwitzer, & Sheeran, 2008; Duckworth, White, Matteucci, Shearer, & Gross, 2016) used to regulate the impulses and temptations that automatically override intentional behavior without necessarily altering one's underlying motivation to achieve the intended goal (see Duckworth, Gendler, & Gross, 2014; Hoffman, Friese, & Strack, 2009; note that the term "self-control," as used in the social and developmental psychology literatures, is not synonymous with what we mean by "metamotivational control"). This is not to say that self-control and motivation regulation are entirely separate. Indeed, self-control can certainly be in service of motivation regulation, and motivation regulation may also operate in service of self-control. However, we argue that people often work to regulate their motivation even when there is not a salient self-control conflict.

In addition to focusing on how students bolster their motivation, rather than how they protect against competing impulses or temptations, most models of motivation regulation also posit different types of motivational problems and aim to identify the strategies students use to overcome these problems. In the present article we extend these models by attempting to explain both how and when students are likely to become aware of a particular motivational problem and how they go about figuring out which regulation strategies are best suited for addressing this problem. The processes we describe are not limited to addressing problems involving deficits in the quantity of one's task motivation; they also apply to problems involving a mismatch between the quality of one's motivation and the processing demands of a given task.

WHAT ASPECTS OF TASK MOTIVATION DO STUDENTS MONITOR?

Before discussing how students monitor their motivation, it is important to identify the specific aspects of motivation that students self-assess. We begin by drawing a distinction between the monitoring of quantitative and qualitative aspects of motivation. We then go on to identify the underlying components of motivation that students monitor, which account for both quantitative and qualitative variation in task engagement. We also identify various costs and obstacles that interfere with these components and cause motivational problems, as well as the metamotivational feelings that signal the presence or resolution of such problems.

Regulating Quality *and* Quantity of Task Motivation

For the most part, research on motivation regulation has focused on the steps that students take to increase the amount of motivation they have for pursuing a task goal. Our model builds on this research by attempting to explain how it is that students become aware of the need to increase their motivation. However, an additional feature of our model is that it attempts to account for how students monitor whether they are "motivated in the right way," in addition to whether they are "motivated enough" (D2 vs. D1 in Figure 1). In doing so, it draws on research in motivation science—particularly self-determination theory (Deci & Ryan, 2000) and regulatory focus theory (Higgins, 1997; Molden & Rosenzweig, 2016)—to make explicit the idea that students can experience different types or qualities of motivation (e.g., intrinsic vs. extrinsic, promotion vs. prevention; see Miele & Wigfield, 2014; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). Because certain qualities of task motivation are associated with modes of processing that are well suited for engaging in certain kinds of tasks (Box B_2 in Figure 1; e.g., deep vs. surface, divergent vs. convergent), we propose that motivation regulation involves creating a "fit" between the quality of one's motivation and the processing demands of the task at hand (in addition to bolstering or maintaining the quantity of one's motivation).

For instance, although a student who is driven by extrinsic performance incentives may be just as strongly motivated to engage in a task as a peer who is inspired by interest or curiosity, the extrinsically motivated student is likely to find the experience less enjoyable compared to her intrinsically motivated peer and to engage in processing that is less complex, creative, and flexible (particularly if the incentives undermine her sense of autonomy or self-determination; Cerasoli, Nicklin, & Ford, 2014; de Jesus, Rus, Lens, & Imaginário, 2013; Grolnick & Ryan, 1987; McGraw & McCullers, 1979; but see Byron & Khazanchi, 2012, for a partial discussion of the debate surrounding this matter and possible exceptions). Thus, if optimal performance on the task requires complex or flexible processing, the extrinsically motivated student is likely to perform worse than her peer. However, because extrinsic incentives may sometimes lead individuals to narrowly focus on exactly what they need to do in order to achieve a desired outcome, the extrinsically motivated student may, in certain contexts, perform better than her intrinsically motivated peer, especially if the task has a very concrete set of requirements (Cerasoli et al., 2014).

Differentiating Between Motivation Components

Another important feature of our model is that it identifies the specific components of task motivation that students attempt to monitor and control. When students feel like

quitting a task, they try to determine which components of their motivation (e.g., low self-efficacy, low intrinsic value) are causing this feeling and need to be bolstered (i.e., they monitor the quantity of various motivation components). In addition, when students feel as if they are going about the task with the wrong mindset or orientation, they try to identify which components (e.g., high intrinsic value rather than high extrinsic value) may be a better fit with the demands of the task (i.e., they monitor the quality of the motivation associated with each component).

Evidence that students differentiate between motivation components comes from research by Wolters, Sansone, and others (Engelschalk, Steuer, & Dresel, 2016; Sansone, Weir, Harpster, & Morgan, 1992; Wolters, 1998). For example, in a study by Wolters (1998), college students were presented with a number of scenarios describing common school-related tasks (such as attending a lecture or studying for an exam). For each scenario, the students were tasked with imagining three motivational problems (the task/material seemed unimportant, boring, or difficult). They were then asked to describe the kinds of behaviors they would engage in order to maintain their motivation in each situation (i.e., for each task–problem combination). The results showed that the strategies described by the students tended to vary in accordance with the type of motivational problem depicted in the scenario, which supports the proposal that students do not rely on a set of general strategies that they broadly implement in any circumstance that requires them to bolster their task engagement. Instead, they use more focused strategies that specifically target the component of motivation that appears to account for their lack of engagement.

Existing Categories of Motivation Components

In the study by Wolters (1998), students' self-reported strategies were coded on the basis of theoretic distinctions made in the volitional and motivational literatures. The categories used by Wolters generally corresponded to the components of motivation that these strategies appeared to target (e.g., task value, interest, self-efficacy). Based on this initial research, Wolters and Schwinger (Schwinger, Steinmayr, & Spinath, 2009; Wolters, 1999; Wolters & Benzon, 2013; see also McCann & Garcia, 1999) developed questionnaires that ask students to rate the likelihood that they would engage in a number of regulatory behaviors. Factor analyses of participants' responses have identified up to eight strategy types, which have been labeled in terms of either the motivational construct targeted by the strategy (e.g., "mastery goals," "value") or the specific actions that constitute the strategy (e.g., "self-consequating," "environmental structuring"). Studies using these questionnaires have shown that the subscales have good reliability and predictive validity (Grunschel, Schwinger, Steinmayr, & Fries, 2016; Schwinger & Otterpohl, 2017; Schwinger et al., 2009; Schwinger & Stiensmeier-Pelster, 2012).

These studies provide us with a good sense of the strategies that students employ to regulate their motivation. They answer the question of how strategies tend to hang together and provide some insight into the types of motivational components that students target. However, the questionnaires used in these studies were not designed to directly ask students about which components they attempt to target. Thus, in factor analyses of their responses, much of the variance accounted for by the factor structure seems to correspond to the different behaviors that constitute each strategy (i.e., the kinds of actions that are involved) rather than the component of motivation that the strategy targets. To examine which motivational components students attempt to regulate, we next outline a taxonomy of components based, in part, on a theory-driven approach to identifying components.

A Taxonomy of Motivation Components

In the process of identifying components, we developed three conceptual criteria. Our aim in developing these criteria was to create a taxonomy that can generate novel and testable predictions. The *first* criterion is that high levels of each of these components are associated with a unique set of feelings or phenomenological experiences. As we discuss in more detail below, these metamotivational feelings serve multiple functions in our model. Our *second* criterion is that for each component that contributes to students' regulation, there exists a set of strategies that can be used to directly enhance or diminish this component but does not fully overlap with the set of strategies used to enhance or diminish some other component. This is not to say that there do not also exist strategies that can simultaneously influence two components of motivation. We are simply arguing that any particular component can be targeted independent of any other component. As our *third* and final criterion, we propose that each component has a direct positive influence on the desire or intention to pursue a particular task goal. That is, the positive effect of the component on one's desire or intention is not mediated by other prominent motivational constructs. For the purposes of this article, we define "desire" as the experience of being motivated to engage in a task and "intention" as a cognitive representation of one's commitment to engage in it.[1]

[1]We do not mean to suggest that students do not use strategies that influence more distal constructs (such as implicit theories of intelligence). Instead, we propose that by using these strategies, they are indirectly targeting more proximal determinants of task motivation *via* the distal constructs (e.g., attempting to feel more confident about the task by activating a growth mindset).

The three criteria just described can be used to distinguish a set of six motivation components from other motivational constructs. These components are based on a number of influential motivational models, including Eccles and Wigfield's expectancy-value theory (Wigfield, Tonks, & Lauda, 2016), which posits that expectations for success and subjective task values (including perceived costs) are the most direct or proximal determinants of achievement motivation, as well as self-determination theory (Deci & Ryan, 2000) and regulatory focus theory (Higgins, 1997), which differentiate between types of value.

In the remainder of this section, we discuss each of the six components we identified. Although we see this list as containing core components, we are not arguing that it is definitive; that is, future research may identify other components. Furthermore, because this discussion does not, in all cases, detail how we applied our criteria, we refer the reader to Table 1 for a full list of the feelings that we believe may correspond to each component, as well as a list of sample strategies that students potentially use to target each component. In addition, we provide a more detailed discussion of metamotivational feelings in a separate section below.

Self-Efficacy

Perceived *self-efficacy* refers to students' confidence in their ability to successfully execute task-relevant behaviors (Bandura, 1977). With respect to our criteria, we propose that self-efficacy is associated with feelings of frustration or hopelessness (Pekrun, 2006) when it is low and feelings of confidence when it is high (Criterion 1). In addition, it is likely that self-efficacy (as a type of expectancy) can directly affect students' motivation (Criterion 3) and that it can be targeted with a unique set of regulation strategies (e.g., proximal goal setting; Bandura & Schunk, 1981; Criterion 2).

TABLE 1
Motivationally Relevant Feelings and Motivation Regulation Strategies Corresponding to Motivation Components and Costs/Obstacles

	Feelings Signaling <u>High</u> Level	*Feelings Signaling <u>Low</u> Level*	*Strategies That Directly Target Component/Cost/Obstacle*
Motivation components			
Self-efficacy	Confidence	Frustration Hopelessness	• Efficacy self-talk (e.g., "You can do this!") • Proximal goal setting (i.e., breaking task down into substeps)
Intrinsic value	Interest Enjoyment	Boredom Understimulation Discontent	• Vary means or increase challenge to make task more fun/enjoyable • Approach task "like a game"
Self-relevant value	Importance Meaningfulness Autonomy		• Connect the current task to other personally important goals (e.g., "Not only will studying hard help me get into med school, it will make me a knowledgeable person")
External value	Compulsion Coercion		• Self-consequating (e.g., promising to reward yourself for finishing the task)
Promotion value	Hope Excitement Anticipated joy	*When all types of outcome value are low*: Purposelessness Indifference Boredom	• Self-talk focused on ideals and aspirations (e.g., "Getting an A on this exam would just be the best") • Gain-oriented task framing (e.g., thinking that you will *gain* 2 points for each correct answer)
Prevention value	Obligation/Duty Anxious concern Anticipated relief		• Self-talk focused on duties and responsibilities ("I absolutely have to get an A on this exam; failure is not an option") • Loss-framed incentives (e.g., thinking that you will *lose* 2 points for each incorrect answer)
Costs/Obstacles			
Temptations and opportunity costs	Temptation Conflict Distraction Regret	*When there are no costs interfering with motivation*: Flow Focus Fluency	• Environmental control (e.g., studying in a quiet location) • Multifinal means (e.g., studying with friends so that you can simultaneously fulfill your academic and social goals)
Emotional costs/ obstacles	Aversion Distraction		• Cognitive reappraisal (e.g., interpreting a bad grade as an opportunity for future growth, rather than as sign of low ability) • Response modulation (e.g., engaging in deep breathing in order to reduce arousal)
Effort costs	Mental effort Fatigue Exhaustion		• Proximal goal setting (i.e., breaking task down into substeps) • Spacing out performance (e.g., spending a little time working on the task each day for several days, rather than a lot of time on one day)

Subjective Task Value

Our perspective on value is shaped by expectancy-value theory (Eccles, 2005), self-determination theory (Deci & Ryan, 2000), and regulatory focus theory (Higgins, 1997). We propose five components of value that students may regulate. One component, which Eccles and colleagues identified as *intrinsic value*, pertains to the interest and enjoyment students derive from engaging in a task. It roughly corresponds to what self-determination theory refers to as "intrinsic motivation" (Deci & Ryan, 2000). The other four components (which collectively can be referred to as "outcome value"; Pekrun, 2006) correspond to the value of the potential outcomes of the activity, rather than the activity itself. Two of the outcome value components correspond to the autonomy-control distinction specified by self-determination theory and the other two correspond to the growth-security distinction specified by regulatory focus theory.

Autonomy-control components. The outcome value associated with a task can be distinguished in terms of where it falls on the autonomy-control continuum. *Self-relevant value* pertains to "the value an activity has because engaging in it is consistent with one's self-image" (Eccles, 2005, p. 109). It corresponds to what expectancy-value theory refers to as "attainment value" and to the two autonomous forms of extrinsic regulation specified by self-determination theory (i.e., identified and integrated regulation). In contrast, *external value* pertains to the value derived from a goal or demand imposed by some external force, such as tangible rewards/punishments (e.g., pizza for reading books) or the expectations of parents, peers, or society that have not been internalized. It is roughly equivalent to the two forms of controlled regulation posited by self-determination theory (i.e., external and introjected regulation). According to self-determination theory, external value leads students to engage in tasks in a qualitatively different manner than self-relevant or intrinsic value. For instance, consider a student who perceives studying for an exam as useful for maintaining her high GPA. She will experience this task to be high in external value (as opposed to self-relevant value) to the extent that she considers maintaining a high GPA to be important for satisfying her parents' expectations of her (which she does not share), as opposed to preserving her self-image as a "good student." This external value may lead her to experience a lack of autonomy and to process the material she is studying in a less complex, creative, and flexible manner than if she found the task to be intrinsically valuable or personally meaningful (Byron & Khazanchi, 2012; Cerasoli et al., 2014; de Jesus et al., 2013; Grolnick & Ryan, 1987; McGraw & McCullers, 1979). In addition to being experienced differently from self-relevant value (which is likely associated with feelings of importance and meaningfulness) and intrinsic value (which, by definition, encompasses feelings of interest and enjoyment; Criterion 1) and to directly affecting students' motivation (Criterion 3), external value can be increased with a unique set of regulation strategies (e.g., self-consequating; see Table 1; Criterion 2). For these reasons, we posit external value as a distinct component of value that students target in order to regulate their motivation.[2]

Growth-security components. Another relevant distinction for understanding outcome value, originally posited by Higgins as part of his regulatory focus theory (Higgins, 1997, 2012), is the extent to which value is associated with growth (the promotion regulatory system) or safety (the prevention regulatory system). Given that growth and safety are critical survival needs, these systems are fundamental for understanding how people regulate motivation.

According to regulatory focus theory, when people are primarily concerned with fulfilling their fundamental need for growth and advancement, they tend to value the outcomes of tasks/goals as ideals that they want to attain. The "promotion" motivation that is associated with this type of value causes them to experience feelings of hope and excitement (Criterion 1) and increases the likelihood of pursuing goals (Criterion 3) using eager strategies. Consequently, promotion-focused individuals may consistently perform well on tasks that reward associative, divergent, and flexible processing (such as brainstorming; e.g., Baas, De Dreu, & Nijstad, 2011). In contrast, when people are primarily concerned with maintaining a sense of safety and security, they tend to value the outcomes of tasks as responsibilities that they ought to attain. The "prevention" motivation that is associated with this type of value causes them to experience feelings of obligation and anxious concern (Criterion 1) and increases the likelihood of pursuing goals (Criterion 3) using vigilant strategies. As a result, prevention-focused individuals may, in some cases, perform better on tasks that reward analytic, convergent, and careful processing (such as an untimed math test; e.g., Rosenzweig & Miele, 2016). There is a large body of work showing several distinct ways in which promotion and prevention value can be induced in college participants (e.g., having students reflect on their ideals or responsibilities; see Molden & Rosenzweig, 2016; Scholer & Higgins, 2012); thus, there appear to be unique sets of regulatory strategies (Criterion 2) that students could use to enhance the promotion or prevention value of tasks.

Important to note, promotion and prevention value are not mutually exclusive from the previously described value

[2]It is worth noting that our model does not include a value component corresponding to what expectancy-value theory refers to as "utility value." This is because we believe that, within a hierarchical system of goals, perceived utility is the mechanism by which value is transmitted from a superordinate goal to a subordinate/task goal. For instance, reconsider the student who perceives studying for an exam as useful for maintaining her high GPA. The fact that the external value originates from the student's higher order goal (i.e., satisfying her parents' expectations regarding her GPA), and not from the task itself, should not dramatically alter the way in which this value is experienced or the effect it has on the student's engagement in the task.

components (see Molden & Miele, 2008; Molden & Rosenzweig, 2016). In fact, it may not be possible to experience self-relevant or external value without also experiencing promotion or prevention value. When a task is high in self-relevant value (i.e., when "consistent with one's self-image"; Eccles, 2005), this value will be represented either as an ideal or a responsibility (i.e., as an aspect of one's self-image that describes the kind of person one hopes to be or ought to be). Similarly, when a task is high in external value (i.e., when one feels compelled to engage in it), this value will also be represented as an ideal or responsibility (i.e., an externally imposed outcome that one hopes to gain or that one is worried about losing). However, we maintain that the concerns leading a student to target either the self-relevant or external component of outcome value can be independent of the concerns leading her to simultaneously target either the promotion or prevention component.

It is also important to note that we consider promotion and prevention value to be components of outcome value because they have to do with the way in which the outcomes of tasks are represented (as ideals or responsibilities). However, it is possible that because engagement in tasks that are intrinsically valuable promote growth (Deci & Ryan, 2000), intrinsic value may more frequently be accompanied by promotion value (which stems from our fundamental need for growth) but not prevention value (which stems from our need for safety; see Smith, Wagaman, & Handley, 2009; Vaughn, 2017).

Constructs not Included as Components

Readers who are familiar with the achievement motivation literature may wonder why we have not posited mastery and performance goals as components that students attempt to regulate, especially considering that existing questionnaires include subscales assessing students' use of strategies targeting these constructs (Schwinger et al., 2009; Wolters & Benzon, 2013). One reason for excluding mastery and performance goals is that we consider goals to be cognitive representations of tasks/outcomes (see Elliot & Fryer, 2008) that derive their motivational force from values and expectancies (i.e., motivation components). The purpose of our model is to explain how students regulate their motivation to achieve these outcomes (e.g., how a student increases her current motivation to outperform her peers on an academic task). If we were to designate task-level mastery and performance goals as both motivation components and outcomes, we would find ourselves making a somewhat circular and uninformative argument (i.e., students attempt to increase or strengthen their performance goals in order to achieve their performance goals).

Costs and Obstacles

In addition to the motivation components just described, our model includes factors that undermine these components and disrupt task engagement (Path A→B in Figure 1), which we refer to as *costs*. In some cases, costs are perceived as being endogenous to the task (as stemming from engagement in the task, some task requirement, or the nature of the material). In other cases, costs are perceived as being exogenous to the task (as stemming from the context or environment, as opposed to the task itself). In such cases we describe the costs as being generated by *obstacles*. Because both costs and obstacles explain why students who are sufficiently motivated to begin engaging in a task sometimes experience a desire to quit prematurely, one of the primary functions of motivation regulation in our model is to remove, reduce, or overcome these disruptive factors.

Types of Costs and Obstacles

Another reason that costs and obstacles are distinct from motivation components in the current version of our model (cf. Miele & Scholer, 2016) is that they are generally negatively associated with the desire to engage in a task, whereas components such as self-efficacy, intrinsic value, and self-relevant value are positively associated with this desire (in line with our third criterion for identifying components). However, costs and obstacles are also similar to motivation components in many respects. In fact, two of the criteria that we used to distinguish between the components of motivation that students regulate can be adapted in order to distinguish between types of costs and obstacles. For instance, consider the three types of cost that were initially proposed by Eccles-Parsons et al. (1983) and that have generally been supported by recent empirical studies (Perez, Cromley, & Kaplan, 2014; cf. Flake et al., 2015): *opportunity cost*, or valued alternative actions that one forgoes by engaging in the task; *psychological/emotional cost*, or the psychological discomfort that one experiences or associates with engaging in the task; and *effort cost*, or the level of effort that the task requires (see Table 1).

With respect to our first criterion, it seems clear that each type of cost is associated with a unique set of feelings or phenomenological experiences (though these feelings are not always metamotivational in nature; see below). For example, a student who is studying for an exam on a Friday night but would rather be hanging out with friends (opportunity cost) is likely to experience feelings of temptation or motivational conflict (see Hofer & Fries, 2016). If the student is instead concerned about how stressed and anxious she feels about the upcoming exam (psychological cost), she is by definition experiencing feelings of stress and anxiety. And if the student considers the task of studying to be overly demanding and time intensive (effort cost), she is likely to experience feelings of fatigue or exhaustion. With respect to the second criteria, we believe that there exist sets of regulation strategies that uniquely target each cost type. For instance, the strategy of restructuring a task so that it simultaneously targets two goals (i.e., multifinality) can be used to reduce

opportunity costs but is relatively unlikely to be used to directly target psychological or effort costs.

Metamotivational Feelings

As previously discussed, motivation components are associated with unique sets of feelings and phenomenological experiences, which we refer to as metamotivational feelings. Similar to metacognitive feelings, which "inform the student about specific aspects of cognitive processing" (e.g., feelings of familiarity and knowing; Boekaerts & Rozendaal, 2010, p. 373; see also Clore, 1992; Efklides, 2006), metamotivational feelings (Box C_2 in Figure 1) directly signal low or high levels of motivation components and can initiate or terminate further monitoring of motivational states. Like metacognitive feelings, metamotivational feelings can be thought of as occurring at what William James (1892) referred to as the "fringe" of consciousness, in part because they are peripheral to focal attention and because they result from nonanalytic, implicit processing (Efklides, 2006; Koriat, 2000, p. 158). An important function of fringe consciousness is that "it represents large amounts of information in a condensed format, to avoid exceeding the limited capacity of consciousness" (Norman, Price, & Duff, 2010, p. 68). Thus, one potential benefit of students relying on metamotivational feelings to monitor their motivation is that it allows them to engage in monitoring without substantially disrupting their processing of the material they are attempting to learn. That is, as opposed to having to regularly interrupt their task performance in order to ask whether they are sufficiently motivated, students can wait until the metamotivational feelings operating in the background become strong enough to automatically trigger the use of certain regulation strategies (Path $C_2 \rightarrow E$ in Figure 1) or to capture their attention and prompt conscious metamotivational processing (such as more deliberate selection of a regulation strategy; Path $C_2 \rightarrow D \rightarrow E$ in Figure 1; see below).

Our choice to use the term metamotivational "feelings" rather than "beliefs" is based on prior research suggesting that metacognitive feelings are distinct from metacognitive beliefs and judgments. For instance, the subjective feeling of being on the verge of recalling some answer can be distinguished from the belief that one will eventually be able to remember it (Koriat, Nussinson, Bless, & Shaked, 2008). We argue that a similar distinction can be made between metamotivational feelings (e.g., feelings of importance) and metamotivational beliefs/judgments (e.g., judgments of task relevance), and that this distinction is necessary to account for how students "transition" (see Koriat, 2000) from implicit to explicit metamotivational processing.

Feelings Associated With Decreases *in Motivation*

We propose that there exist metamotivational feelings corresponding to each component of motivation (or cluster of components) specified by our model (see Table 1). Importantly, we maintain that all metamotivational feelings that result in low levels of a component are deactivating such that they involve a reduction in physiological arousal (see Pekrun, 2016). Furthermore, we speculate that this deactivation is associated with the desire to disengage from an activity and, thus, may be an aspect of metamotivational feelings that (either directly or indirectly) signals the need for additional meta-level processing.

Our mapping of feelings to components is influenced by Pekrun's (2006) control-value theory of achievement emotions (although we do not believe that all metamotivational feelings count as full-blown emotions). For instance, consistent with Pekrun's theorizing about perceptions of control, we propose that low self-efficacy for managing an ongoing activity or attaining desired outcomes can lead to feelings of frustration and hopelessness. In addition, consistent with his theorizing about perceptions of an activity's value, as well as with research examining students' affective reactions to tedious or unchallenging tasks (see Daschmann, Goetz, & Stupnisky, 2011, for a review), we propose that lack of intrinsic value typically results in boredom. However, whereas control-value theory does not posit an affective response to low levels of what Pekrun refers to as "outcome value" (Pekrun, 2006; Pekrun, Frenzel, Goetz, & Perry, 2007, p. 22), our model proposes that students who are simultaneously low in self-relevant and external value, as well as promotion and prevention value (all of which can be considered types of outcome value), will experience feelings of purposelessness, indifference, and potentially boredom.

We propose that low outcome value, and not just low intrinsic value, may be related to boredom because some studies suggest that boredom is associated with a perceived lack of meaning or purpose (e.g., van Tilburg & Igou, 2012). It is possible, then, that there are two distinct types of boredom—one that is typically experienced as a lack of stimulation and another that is experienced as a lack of purpose or relevance (cf. Goetz et al., 2014). For instance, certain activities may be experienced as boring because they are unchallenging or tedious while being perceived as personally relevant or even self-transcendent (e.g., the "completion of boring math problems as [preparation] for a future career"; Yeager et al., 2014, p. 563). However, it seems unlikely that an interesting and enjoyable task would be experienced as boring even if it was perceived to be meaningless (e.g., playing a silly game in class with no discernable link to learning). This suggests that lack of intrinsic value (but not outcome value) may be a necessary condition for experiencing boredom. Perhaps the experience of boredom due to low intrinsic value can be expanded to incorporate feelings of purposelessness or indifference when the task is also perceived as low in outcome value. Consistent with the idea of a single, multidimensional experience of boredom, items from a boredom scale assessing the experiences of both dullness and unimportance in an academically unchallenging situation loaded onto a single factor (e.g., Acee et al., 2010;

but see Daschmann et al., 2011). It will be interesting to explore this possibility in future research.

It is also important to note that feelings such as hopelessness, boredom, and purposelessness are not the only experiences associated with declines in motivation. Feelings such as sadness, tiredness, and even temptation can stem from costs and thus may also be associated with a desire to disengage from a task. The difference is that feelings like boredom result from decreases in motivation components and so signal something to students about which component (or cluster of components) may be causing a change in their motivation. In contrast, feelings like sadness lead to these decreases and thus signal something about which costs may be undermining a particular component or increasing the student's desire to disengage. Because these feelings are not experienced as being about motivational states, we do not consider them to be "metamotivational"; instead, we refer to them as "motivationally relevant." Our distinction between these two types of feelings is consistent with Winne and Hadwin's (1998) COPES model of self-regulated learning, which posits that emotions can both influence and be the product of task engagement (Webster & Hadwin, 2015, p. 796).

Feelings Associated With Increases *in Motivation*

Although metamotivational feelings associated with low levels of motivation components play a very important role in our model, there also exist feelings that, in the context of metamotivational monitoring, may indicate high levels of different motivation components (see Table 1). We propose that these include feelings of confidence about task performance, which signal high self-efficacy; feelings of interest and enjoyment, which signal intrinsic value; feelings of importance and autonomy, which signal high self-relevant value; feelings of being compelled to do something, which signal external value; feelings of hope and excitement, which signal promotion value; and feelings of obligation and anxious concern, which signal prevention value (Higgins, Shah, & Friedman, 1997).[3]

At this point, it should be clear that we are proposing an asymmetry between feelings that signal low and high levels of outcome value, such that there is a single set of feelings (i.e., purposelessness, meaninglessness, boredom) that signal that all types of outcome value (self-relevant and external, as well as promotion and prevention) are simultaneously low but separate sets of feelings that indicate that each of these four types is high. As long as at least one value component is relatively high, the individual's affective experience is driven by that component. It is only when all of the outcome value components are low (i.e., when there is no component at a high level driving the affective experience) that the individual experiences a more general sense of purposelessness. We also propose that there is an asymmetry between feelings associated with low and high levels of costs, such that there is a single set of feelings (i.e., flow, focus, and fluency) that indicates low or manageable levels of all costs, but separate sets of feelings that indicate high levels of opportunity, emotional, and effort costs (see Table 1).

Metamotivational feelings indicating high levels of a particular component (such as interest or confidence) likely play multiple roles in monitoring. One may be to signal that attempts to bolster a particular motivation component have been successful, and thus no further attempts are needed. Another role may be to simply indicate to the student what type of motivation she is currently experiencing (e.g., intrinsic vs. extrinsic, promotion vs. prevention). As we explain in more detail in the sections to come, the student may use this information to determine whether this type of motivation "fits" with the processing demands of the present task (i.e., whether the type of motivation she is experiencing is likely to promote a mode of self-regulation and processing that will lead to optimal performance on the task).

Evidence for the Role of Metamotivational Feelings in Monitoring

Although we know of no studies directly examining the role that metamotivational feelings play in initiating efforts to regulate specific motivation components, a study by Webster and Hadwin (2015) suggests that boredom sometimes precedes students' attempts to regulate their learning. Specifically, the study showed that college students in a course on self-regulated learning retrospectively reported using motivation regulation strategies, such as self-consequating, to change emotions that "they perceived as interfering with [goal] progress," such as boredom and anxiety (p. 799). Because students were asked about regulating their emotions and not which strategies they used to bolster their motivation (cf. Wolters, 1998), these results suggest that they interpreted their experiences of boredom as an indication of low motivation and something that needed to be regulated (see also Nett, Goetz, & Hall, 2011). The fact that students reported using motivation regulation strategies in response to an emotion regulation prompt led Webster and Hadwin to suggest that:

[3]The reader may notice that, in our model, feelings of anxiety can serve both as costs that undermine motivation components (such as intrinsic value) and as metamotivational feelings that indicate high levels of prevention value. One way to reconcile this apparent discrepancy is to think in terms of the curvilinear relation between anxiety and performance. At low and moderate levels, anxiety may signal one's prevention concerns and be associated with the useful maintenance of vigilant motivational strategies that are associated with the prevention system (e.g., Scholer, Ozaki, & Higgins, 2014). This is similar to arguments that have been made with regards to defensive pessimism (e.g., Norem & Cantor, 1986). However, at high levels and for certain individuals (e.g., those who are predominantly promotion focused), anxiety may be detrimental for engagement and performance.

> [I]t may be worthwhile to further explore the distinction between regulating emotions and regulating motivation during goal-directed, independent studying. Perhaps an integrated framework could be developed from this research, or perhaps it will be discovered that there are indeed differences between these two areas that call for separate frameworks. (p. 813)

Although boredom may sometimes prompt the use of effective regulation strategies that increase motivation (Nett, Goetz, & Daniels, 2010), boredom frequently leads to negative outcomes (see Tze, Daniels, & Klassen, 2016). This suggests that not all students successfully regulate their motivation in response to metamotivational feelings. Our model is useful in trying to understand this problem because it suggests several mechanisms that can be investigated: (a) faulty interpretation of metamotivational feelings, (b) lack of sufficient superordinate motivation for regulating task motivation, or (c) lack of knowledge about effective strategies. Additional studies that examine the relations between experiences of particular metamotivational feelings and the use of certain strategies will be generative and informative in examining our model.

The Benefit of Distinguishing Between Components, Costs, and Feelings

The clear distinction our model makes between motivation components, costs/obstacles, and metamotivational feelings stands in contrast to existing theories, which often do not differentiate these three aspects of motivation regulation. For instance, in a study by Wolters (2001; as cited in Wolters, 2011), "Qualitative analyses of students' responses suggested eight types of problems that included distractions in the immediate environment, lack of personal interest or value for the material, task difficulty, and boredom" (p. 272; see also Engelschalk, Steuer, & Dresel, 2016; Schwinger & Stiensmeier-Pelster, 2012). In our model, lack of personal interest or value corresponds to the motivation components of intrinsic and self-referential value, distractions and task difficulty represent costs/obstacles that can interfere with these components, and boredom is a metamotivational feeling that signals interference.

Separating out motivational problems into components, costs, and feelings allows us to make a number of interesting predictions. The same cost could undermine different components depending on how it is experienced by the student and could even undermine multiple components simultaneously. For instance, consider a student who experiences a high level of math anxiety working on a calculus assignment. The student's anxiety is likely to undermine her self-efficacy if it makes her unable to concentrate on the math problems, but it may also undermine the intrinsic value of the task if it causes her experience of completing the math problems to become aversive. This suggests that a single strategy (e.g., mindful breathing) aimed at eliminating or reducing a particular cost (e.g., anxiety) can be used by students to bolster more than one component (e.g., self-efficacy and/or intrinsic value) within or across situations. It also suggests that the decision to use this strategy can be elicited by more than one metamotivational feeling (e.g., feelings of frustration and/or feelings of discontent).

Distinguishing between different aspects of motivational problems may also help in making sense of empirical findings from existing studies of motivation regulation, such as the fact that "the motivational problems reported by students [in Wolters's, 2001, study] varied as a function of the context or academic task" (Wolters, 2011, p. 272). For instance, students may have been more likely to report "lack of situational interest" as a motivational problem in regard to "listening to a lecture" than in regard to "studying for a test" because of the costs associated with a "controlling mode of instruction in which the teacher dominates the classroom" (see Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003, p. 172).

Separating components, costs, and feelings may also help to explain why students in a different study by Wolters (1998) were just as likely to use strategies targeting performance goals as they were to use strategies targeting interest in order to overcome the costs associated with having to process boring material. Perhaps the students who used strategies targeting performance goals perceived the boring material as interfering with the external or self-relevant value of the task (i.e., they found the task to be pointless), whereas the students who used strategies targeting interest perceived the material as interfering with the intrinsic value of the task (i.e., they found the task to be unpleasant or aversive). Ultimately, by understanding which costs are most likely to undermine particular motivation components in a given academic context, we may be better able to predict the strategies that students are likely to use in that context (compared to if we only define motivational problems in terms of either components or costs).

HOW DO STUDENTS MONITOR THE *QUANTITY* OF THEIR TASK MOTIVATION?

In examining the process by which students monitor the quantity of their own task motivation, we begin with what may seem like a puzzle: How can a student take steps to monitor or control her motivation to achieve a particular goal without being sufficiently motivated to achieve that goal to begin with? In answering this question, we begin from an assumption made by many models of self-regulation: Goals are organized hierarchically (see Carver & Scheier, 1998; Duckworth & Gross, 2014; Kruglanski et al., 2002; Schwinger & Stiensmeier-Pelster, 2012). A superordinate goal in this hierarchy does not lead directly to action or behavior but instead results in the adoption of

more concrete subordinate goals (such as task goals) that are acted upon in order to achieve the superordinate goal. In our model, the initial motivation to pursue a task goal (Oval G in Figure 1), as well as the desire to regulate this motivation over time, stems from its superordinate goal (Oval F in Figure 1). For instance, a student may initially feel strongly motivated to study for an exam because she really wants to do well in the course (see Davis, Kelly, Kim, Tang, & Hicks, 2016). However, over time she may have to deal with interference from competing goals or other perceived obstacles/costs (see Perez, Cromley, & Kaplan, 2014) that reduce her current motivation to pursue the subordinate goal of preparing for the test (Path A→B in Figure 1). Our model predicts that the likelihood of the student taking steps to overcome these obstacles depends partly on whether she is still strongly motivated to achieve the superordinate goal of getting a good grade in the course (Path F→D→E in Figure 1; for support, see Sansone, Weir, Harpster, & Morgan; 1992; Sansone, Wiebe, & Morgan, 1999; Smit et al., 2017; Wolters & Benzon, 2013; Wolters & Hussain, 2015; Wolters & Rosenthal, 2000).

Top-Down Versus Bottom-Up Monitoring of Motivation Quantity

A student who is sufficiently motivated to regulate her task motivation will initiate metamotivational monitoring in either a bottom-up or top-down manner. To understand the difference between these processes, it is helpful to consider the distinction made by theories of metacognitive self-regulation (Nelson & Narens, 1990; Winne & Hadwin, 1998) between "object-level" processes that represent goal-relevant mental activity and "meta-level" processes responsible for both evaluating the effectiveness of object-level processing and, when necessary, implementing corrective steps that can be taken to get the object level back on track. Consistent with these theories, we posit a bidirectional flow of information between the two levels. Information about the current state of one's motivation flows from the object level to the meta level (as part of metamotivational monitoring), and information about how to bring this state more in line with what is necessary to achieve one's goal, flows from the meta level back to the object level (as part of metamotivational control).

A key question is what triggers the flow of information from the object level to the meta level. One possibility is that monitoring occurs in a *top-down* manner (Path D→C in Figure 1), such that some executive process at the meta level (e.g., a "program of self-instructions"; Veenman, 2011) leads one to periodically check the object level to see whether one's motivation is sufficient for completing the task. For instance, a student who is studying a textbook for an upcoming exam may ask herself after every paragraph, page, or chapter (depending on the frequency of her monitoring) whether she still feels like completing the task, or whether she is in danger of quitting. If the student determines that quitting is a real possibility, she may consider why she is not motivated and whether it is worth engaging in regulatory behavior aimed at enhancing a particular motivation component.

Another possibility is that monitoring occurs in a more of a *bottom-up* fashion (Path C→D in Figure 1), such that the student does not initiate any meta-level processes until she encounters a cost at the object level (e.g., boring material) that disrupts task engagement and generates a metamotivational feeling signaling that she is in danger of quitting and switching to another goal (see Efklides, 2006, 2011, for the metacognitive equivalent of this mechanism). Understanding the threshold at which this feeling or the desire to quit leads to additional metamotivational processing is an important direction for future research. Presumably this threshold is based on some combination of self and task knowledge that the student has derived from her past experiences of boredom. The meta-level processes that are activated once the threshold is crossed represent the point at which bottom-up and top-down monitoring converge.[4]

Identifying the Source of a Motivational Deficit

When a student's initial monitoring of her motivation strongly signals that she is in danger of switching to another goal, she must decide whether to take steps to increase her task motivation or reduce task costs. According to our model, the student will make this decision by implicitly determining whether her desire to stop (which stems from the emerging costs of the task) outweighs her motivation to fulfill the superordinate goal of the task (Path F→D in Figure 1). If it does not, one step the student can take is to identify the component(s) responsible for undermining her task motivation. If the student's desire to stop was accompanied by a metacognitive feeling, such as hopelessness or purposelessness, this process is likely to be straightforward. For instance, a feeling of hopelessness would signal to the student that she is low in self-efficacy (see Table 1).

However, there may frequently be occasions when the desire to stop engaging in the task is not accompanied by a clear metamotivational feeling or when the student also wants to know why a particular component is low. In such cases, the student must search for or select other, more ambiguous cues (including feelings, thoughts, or behaviors) that provide some indication of the component(s) undermining her motivation, as well as the costs/obstacles interfering with this component. For instance, feelings of temptation may be viewed by a student as an indication that

[4]A third possibility is that, although monitoring another aspect of their learning goal (e.g., their comprehension of the material), students realize that their failure to make adequate progress toward this goal is due to motivational problems. In this case, monitoring would begin with what Carver and Scheier (1990, 1998) described as a "meta loop."

the opportunity costs associated with a task are interfering with her ability to concentrate and, thus, lowering her self-efficacy. Because these feelings are not inherently about particular components of motivation, they are more open to interpretation than metamotivational feelings.

Although it is possible that, in some cases, the search for motivationally relevant cues is a conscious and deliberately executed process, we contend that it is more likely to occur in an implicit or automatic manner. This contention is based in part on findings from the judgment and decision making literature examining how people form assessments based on metacognitive feelings. For instance, Menon and Reghubir (2003) showed that participants judged themselves less likely to recommend a product after being asked to recall a large number of positive features described in an advertisement for the product than after being asked to recall a small number. This suggests that participants attributed the mental effort associated with trying to recall a large number of features to the product not being very good (i.e., to there not being many good features to recall in the first place). In a later study, information designed to undermine this attribution was effective only in eliminating the effects of these cues on participants' judgments when they had the mental resources necessary to process this added information. However, when participants were placed under cognitive load, they continued to use mental effort as a cue for making judgments. In a review paper on metacognitive experiences, Schwarz (2004) concluded that the results of this study support "the assumption that the use of [metacognitive] accessibility experiences is relatively automatic and effortless, whereas their disuse is deliberate" (p. 343).

It is important to note that the way in which particular cues are interpreted during metamotivational monitoring may vary considerably from one student to the next, or even from one situation to the next for the same student. This is because students' interpretations are likely based on a variety of contextual and individual difference factors, such as their implicit beliefs about how specific cues relate to different components (e.g., the belief that, in general, the feeling of sadness is unacceptable and to be avoided vs. the belief that sadness is distracting and interferes with performance). Evidence for this claim comes from studies demonstrating that the effects of feeling-based cues (such as metacognitive feelings) on judgments can be manipulated by supplying students with different theories about what these cues mean in the present context (see Schwarz, 2004, for a review).

Selecting a Strategy for Regulating Motivation Quantity

Once a student has identified the component(s) that explains her reduced task motivation, and possibly the cost (s) that explains why this component is deficient, she must select (explicitly or implicitly) which regulation strategy she will use to bolster her motivation (Box E in Figure 1). This selection, which represents the transition from metamotivational monitoring to control, can be made in several ways. First, the student can attempt to enhance the component in question by removing or diminishing the cost/obstacle she thinks is interfering with it. For instance, if the student believes that the task has low intrinsic value for her because of how tired she is feeling, she may decide to get a cup of coffee before continuing. Second, the student can select a strategy that directly enhances the component irrespective of the cost that led to it being deficient. The student may be more likely to take this approach when she is unable to identify a cost, or when the cost is not easily diminished. For instance, if the student believes that the dryness of the material she is studying explains why the task is so tedious (i.e., why it has low intrinsic value), but she sees no easy way of making the material interesting (i.e., of eliminating the cost), she may try to increase her enjoyment of the task by turning it into a game.

Occasionally, the student may fail to identify an effective strategy for directly enhancing a particular component, either because she lacks knowledge of this strategy type or because she tried the strategies she does know but they were unsuccessful. In this case, she may try to bolster her motivation (or reduce her desire to disengage) by implementing a strategy that targets an alternate component. Evidence that students can successfully compensate for a low level of one component by increasing the level of a different component comes from an intervention study (Hulleman & Harackiewicz, 2009) in which high school students in the experimental condition were instructed to write about the value and usefulness of what they were learning in their science courses to their personal lives. Among students with low performance expectations, the intervention led them to express more interest in science and receive higher grades at the end of the semester (cf. Durik, Schechter, Noh, Rozek, & Harackiewicz, 2015). Although the participants were instructed to complete the relevance-building activity, students in other studies have reported choosing to engage in this type of behavior to regulate their motivation (e.g., "I try to make myself see how knowing the material is personally relevant"; Wolters & Benzon, 2013).

Once a student selects a motivation regulation strategy and implements it, she may monitor the effectiveness of this strategy as part of the same feedback loop that she used to monitor her motivation to begin with (Path C→D in Figure 1). After implementing a particular strategy, the student may notice (a) a reduction in her desire to disengage from the task, (b) a metamotivational feeling (e.g., interest) indicating a high level of the component targeted by the strategy, or (c) a feeling (e.g., flow) indicating the absence of any costs that were undermining her motivation. In such cases, she may decide that no additional attempts at enhancing her motivation are required and continue trying to complete the task (Carver & Scheier, 1998).

Evidence that certain feelings may, at times, signal the successful resolution of a motivation problem comes from a study by Bosch and D'Mello (2017) that used an affect annotation methodology to identify the various emotions novice students experienced while learning the fundamentals of computer programming in a computer environment that gave them some control over the learning activity. An analysis of affect transitions demonstrated that students' feelings of boredom were followed by feelings of engagement and flow at a rate that was above chance. Bosch and D'Mello suggested that students may have responded to the experience of boredom by changing the way in which they engaged with the learning environment, implying that this strategy may have bolstered the value of the task or removed some cost and, thus, increased their feelings of engagement and flow (though the transition from boredom to engagement could also have been due to the way in which events in the environment were sequenced; cf. D'Mello & Graesser, 2012). In addition, the authors found that the transition from boredom to engagement during the learning phase of the study was positively associated with performance during the assessment phase, which suggests that students' "ability to re-engage from boredom" was predictive of learning (Bosch & D'Mello, 2017, p. 200).

However, the strategies used to bolster motivation are not always successful. Thus, if after implementing a particular strategy, a student notices that her desire to disengage has persisted or even grown stronger, she may search for an alternate strategy for enhancing her motivation. Ultimately, if additional attempts to regulate her motivation are not successful, and if the strength of her desire to disengage now outweighs her motivation to fulfill the superordinate goal of the task, she may decide to quit and move on to pursue some other goal.

HOW DO STUDENTS MONITOR THE *QUALITY* OF THEIR TASK MOTIVATION?

As previously discussed, our model attempts to explain two functions of motivation regulation: The first aims to maintain a sufficiently high level of motivation, such that one still desires to complete the task in the face of motivational costs and obstacles, whereas the second aims to ensure that the quality or kind of motivation one is experiencing fits with the processing demands of the task and leads to optimal performance. Although these functions involve similar monitoring processes, there are some key differences, which we detail in the present section.

Top-Down Versus Bottom-Up Monitoring of Motivation Quality

Monitoring the quality of motivation, like monitoring the quantity, can occur in a top-down or bottom-up manner. In both cases, students make a determination about whether the quality of their current motivation (e.g., autonomous vs. controlled, promotion vs. prevention) matches their preferred motivation for engaging in the task. Our own research (Scholer & Miele, 2016) suggests that this preference may stem from students' implicit beliefs about the kinds of orientations that will lead to optimal performance on different tasks. For instance, it appears that some college students believe that a prevention orientation may lead them to perform better on tasks requiring convergent and analytic processing (such as a proofreading activity) compared to tasks requiring divergent or associative processing (such as a brainstorming activity).

Although it is possible that in some instances of top-down monitoring, students explicitly compare their current and preferred motivational orientations, we believe that they typically make this comparison implicitly and automatically. When an implicit monitoring process determines that the quality of the student's current motivation deviates from the quality of her preferred motivation, it may automatically generate a feeling of "nonfit" (i.e., a feeling that one is going about things in the wrong way; Appelt, Zou, & Higgins, 2010; Higgins, 2000). If this aversive feeling is strong enough (i.e., if it surpasses a certain threshold), it may activate (in a bottom-up manner) meta-level processes responsible for identifying the source of the nonfit and determining what the student can do to shift into a more task-appropriate orientation.

Evidence that students can become aware of a nonfit between their current motivational orientation and their beliefs about the kind of motivational orientation demanded by a task comes from a study by Spiegel, Grant-Pillow, and Higgins (2004) in which participants were asked to imagine completing a writing task in either an eager manner (i.e., "capturing as many details as they could and making their reports vivid and interesting") or a vigilant manner (i.e., "not forgetting to leave any details out and being careful not to make their reports bland or boring"). Participants who were dispositionally promotion focused (i.e., who were likely to have begun the task with a promotion focus) were less likely to complete the task when it was framed in terms of vigilance as opposed to eagerness, whereas the opposite was true for participants who were dispositionally prevention focused. That is, when participants began the task with an orientation that was qualitatively distinct from the orientation that seemed to best suit the task (given its framing), their overall level of motivation was relatively low. This lack of motivation suggests that students can be sensitive to the mismatch between their current and expected motivational orientation (i.e., to being in a state of nonfit). We propose that any feelings of nonfit associated with this sensitivity can (like other metamotivational feelings, such as boredom) signal a problem with motivation and, if not dealt with, can lead to an increasing desire to disengage from the task.

Identifying the Source of Nonfit

When a student experiences a strong feeling of nonfit, the meta-level processes that are automatically activated will search for cues that can be used to identify the source of the motivational problem (Box D2 in Figure 1). One particularly salient set of cues includes metamotivational feelings that indicate high levels of a particular component (see Table 1). We are not suggesting that students can formally articulate their experience of each component when monitoring their motivation. Rather, we believe that students have an intuitive understanding of what it feels like to be prevention focused (or to be intrinsically motivated) and to approach a task in this manner. It is this understanding (however it happens to be represented in students' minds) that guides their thinking when they are monitoring the quality of their own motivation.

In addition to identifying the motivation component causing her to experience feelings of nonfit, the student must also identify a component(s) that can produce a motivational orientation better suited to the processing demands of the task. One possibility is for the student to infer a better fitting component from her knowledge of the incompatible component. For instance, if the student's experience of nonfit leads her to believe that her prevention orientation is not a good match for the current brainstorming task, she may infer that she should shift into a promotion orientation because she understands that promotion/eagerness is the opposite of prevention/vigilance. Another possibility is for her to infer this component from her implicit beliefs about the nature of the task. We have conducted a number of studies using a paradigm adapted from the emotion regulation literature (see Tamir & Ford, 2009) that suggests that students are capable of doing this (Scholer & Miele, 2016).

In one of these studies, the participants were told about a task that demanded either eager or vigilant processing (e.g., "Your goal is to be as accurate as possible by making sure to avoid lurking errors and pitfalls"), as well as a recall activity that has been shown to shift people into a promotion or prevention focus (e.g., "Please write about a time in the past when you felt you made progress toward being successful in life"). The participants were then asked to report their preference for completing the recall activity before engaging in the task and to indicate their expectations concerning how successful they would be at the task after completing the recall activity. The results showed that participants preferred to engage in a promotion-inducing recall activity more when anticipating an eagerness-demanding task than when anticipating a vigilance-demanding task. In contrast, participants preferred to complete a prevention-inducing recall activity more when anticipating a vigilance-demanding task that than when anticipating an eagerness-demanding task. Furthermore, these differences in preference were partly mediated by how well participants expected to perform on the various tasks. The findings from this and other studies suggest that, on average, college students have metamotivational task knowledge about the motivational demands of different types of tasks (e.g., they realize, either implicitly or explicitly, that some tasks may require vigilance rather than eagerness) and that they have metamotivational strategy knowledge about how certain actions (e.g., writing about their responsibilities) might help them in addressing these demands.

In addition to monitoring how particular task demands fit with promotion and prevention orientations, students may also monitor how these demands fit with extrinsic and intrinsic motivations. Although there is no direct evidence of such monitoring, there is research suggesting that intrinsic and extrinsic motivations involve performance trade-offs similar to those observed with promotion and prevention orientations. According to a recent meta-analysis (Cerasoli et al., 2014), intrinsic motivation appears to be a better predictor of performance on tasks that "require a higher degree of complexity and engagement of more skill" (p. 982), whereas extrinsic incentives (particularly those that undermine one's sense of autonomy or self-determination; see Byron & Khazanchi, 2012) are better predictors when the performance criteria for a task are "noncomplex, repetitive, and require chiefly focus and drive for their completion" (Cerasoli et al., 2014, p. 984). Evidence for the relevance of this trade-off to research on motivation regulation in academic settings comes from a study that Sansone and colleagues conducted with undergraduates enrolled in either an on-campus or online section of a cognitive psychology course (Sansone et al., 2012). After the first exam, participants filled out a questionnaire that assessed their use of different motivation regulation strategies while preparing for the exam, as well as their level of interest in the class up to that point. For students in the online section, one self-reported strategy (i.e., exploring links posted on the class web page to make studying feel more enjoyable) was found to be positively correlated with their self-reported interest but inversely correlated with their performance on the exam.

Selecting a Strategy for Regulating Motivation Quality

Having identified a component that can produce a motivational orientation well suited to the demands of the task, the student must select a regulation strategy that she can use to enhance this component. In making her selection, the student may consider whether there are any costs or obstacles that are actively inhibiting the component she seeks to enhance or whether there are any features of the task or environment that may be promoting an incompatible component of motivation and, consequently, undermining a more compatible component. Once the student selects a

strategy and implements it, she will monitor the effectiveness of this strategy as part of the same feedback loop that led her to detect a problem to begin with. She will be particularly attuned to additional feelings of nonfit that may signal to her that the strategy she selected is not as effective as she hoped. If these feelings persist and grow stronger, she may choose to implement an alternate strategy. However, if the feelings recede or are replaced by a feeling of fit, she may instead decide that no additional attempts at regulating her motivation are necessary.

CONTRIBUTIONS, UNANSWERED QUESTIONS, AND FUTURE DIRECTIONS

To begin this section, we briefly summarize what we view as the major contributions of the current article to the motivation literature. First, although other researchers have acknowledged that metamotivational monitoring is an essential aspect of motivation regulation (e.g., Kuhl, 2000; Sansone & Thoman, 2005; Schwinger & Stiensmeier-Pelster, 2012; Wolters, 2003, 2011), we are the first to propose a thorough account of the monitoring processes that students rely on to initiate the strategic control of their task-specific motivational states. Second, in addition to explaining how students assess whether they are motivated enough to continue working on a task (i.e., monitor the quantity of their motivation), we attempt to explain how they assess whether the type of motivation they are experiencing fits with the processing demands of the task (i.e., monitor the quality of their motivation). Third, to better capture the complexity of what some researchers have referred to as "motivational problems," we distinguish between the underlying components of motivation that students target during regulation, the costs/obstacles that lead to changes in these components, and the metamotivational feelings that signal that these changes have occurred. Fourth, we propose a set of three criteria that can be used to distinguish six motivation components from other motivational constructs. Finally, we specify the metamotivational feelings that we think correspond to low and high levels of each component.

It is our hope that these contributions provide a starting point for more deeply exploring the ways in which the process of motivation regulation unfolds. In particular, our model raises several sets of questions that should be addressed by future research. *First*, what are the various motivation components that students monitor and target with regulation strategies? We have distinguished six components from other motivational constructs in terms of the three criteria in our model, but empirical studies assessing students' reasons for using different regulation strategies, as well as the effects of these strategies on different aspects of students' motivation, are needed to validate this taxonomy and to identify additional components. For example, our theory-driven approach could be complemented by an empirical approach similar in design to earlier studies that examined the types of strategies that students use (Schwinger et al., 2009; Wolters, 1998; 1999; Wolters & Benzon, 2013). To directly assess which components students attempt to regulate in this way, a survey could be developed that not only instructs students to rate their use of different regulation strategies but also asks them to report their reasons for using these strategies. For instance, students could be asked whether they would engage in environmental structuring in a particular context in order increase their efficacy for the task or to make their experience of completing it more enjoyable. So long as students are able to accurately report on their reasons for using various strategies (which they may not be; Nisbett & Wilson, 1977), a factor analysis of their responses would yield a structure that is more representative of the components they attempt to regulate (compared to factor analyses of existing motivation regulation questionnaires). Future research guided by this convergent top-down and bottom-up approach may provide significant insights into motivation regulation.

In addition to identifying a set of motivation components, our model identifies several types of costs that can undermine these components and reduce students' desire to engage in tasks. Thus, a *second* set of questions pertains to the possible relations between each type of cost and each component. Are certain costs especially likely to interfere with particular components? Do students' perceptions of these relations vary based on contextual or personal factors, such as naive theories about how a specific cost affects task engagement? Do costs influence a student's desire to engage in (or disengage from) a task only via reductions in components (i.e., Path A→B→C in Figure 1), or can they also influence a student's desire directly (i.e., Path A→C)? Regarding this last question, although some studies show an inverse correlation between perceived costs and perceptions of competence and value (Flake et al., 2015; Perez et al., 2014), there is also evidence that a direct or unmediated effect of costs on student choice emerges when controlling for these components (Perez et al., 2014). In certain cases, both pathways appear to be plausible explanations for the decrease a student experiences in her motivation. For instance, imagine a student who is studying by herself in the library for an important exam when she receives a text inviting her to a party. At this point, the student perceives the cost of continuing to study to be the fun she is sacrificing. One possibility is that this cost reduces her desire to study because it actually makes the task less enjoyable (i.e., because thinking about what she is missing reduces the task's intrinsic value). Another possibility is that the cost reduces her desire to study because the enjoyment that she has been deriving from the task (along with its importance) is simply outweighed by the enjoyment she thinks she would get from going to the party (or perhaps by

the importance of bonding with friends). Distinguishing between these possibilities is important because it may help in understanding which regulation strategies students are likely to use in particular situations (i.e., strategies directly targeting motivation components versus strategies targeting costs).

A *third* set of questions pertains to the metamotivational feelings that play a role in students' monitoring of their motivational states. Are certain feelings (e.g., helplessness, boredom, interest, etc.) associated with particular components? When these feelings surpass a certain threshold, do they sometimes trigger assessments of motivation in a bottom-up manner? If so, what determines the magnitude of this threshold? In addition, do metamotivational feelings serve as cues that students use to identify the motivation components undermining their desire to continue engaging in the task? These are difficult questions to answer using empirical methods that are standard within educational psychology. Students may have limited retrospective access to the transient feelings they experience during task performance. In addition, the sequence of feelings, attributions, and assessments involved in metamotivational monitoring cannot easily be inferred from questionnaires that assess task engagement at a single time point. Therefore, we call for more studies using fine-grained methods such as experience sampling (e.g., Nett et al., 2011), affect annotation of facial expressions captured during task engagement (e.g., D'Mello & Graesser, 2012), and even automated assessments based on "machine-readable behavioral and physiological signals" (D'Mello, Dieterle, & Duckworth, 2017, p. 104).

Fourth, questions can be asked about how and when students develop the capacity to monitor their motivation. For instance, at what age do students begin to spontaneously assess their motivational states? Are younger students less accurate in their assessments than older students? Is the development of metamotivational monitoring tied to the development of other psychological constructs, such as executive function, metacognition, and theory of mind? With apparently few exceptions (e.g., Cooper & Corpus, 2009; Gurland & Glowacky, 2011; Kuhl & Kraska, 1989; Xu & Corno, 2003), research on motivation regulation has focused on the strategies used by high school and college students to bolster their motivation. However, the relatively little developmental research on this topic that does exist suggests that early elementary school may be an important period for the acquisition of metamotivational knowledge (Cooper & Corpus, 2009). Thus, future research on motivation regulation should be conducted across a broad range of groups, starting early in development.

Understanding how metamotivation develops will help in answering a related set of questions about points in the monitoring process where regulation can go awry. In particular, do some students struggle to effectively monitor their motivation because they are insensitive to the feelings signaling problems with their motivation? Even when they are aware that they are in danger of quitting, do students have trouble identifying the factors undermining their motivation? Is this difficulty due, in part, to a lack of metamotivational knowledge about the relations among different components (see Murayama, Kitagami, Tanaka, & Raw, 2016) or between certain components and costs? Are there other students who, despite being able to correctly identify the source of their motivational deficit, fail to regulate because they (a) lack knowledge of which strategies could be used to target a particular component, (b) lack efficacy for being able to execute these strategies (see Murayama, Kuratomi, Johnsen, Kitagami, & Hatano, 2017), or (c) lack the desire to regulate their task motivation? This last possibility raises an additional set of questions pertaining to the source of students' motivation for engaging in motivation regulation. Earlier, we argued that the likelihood of a student taking steps to overcome a motivational obstacle depends partly on whether she is still strongly motivated to achieve the task's superordinate goal (e.g., maintaining a high GPA). But how do these superordinate goals develop in the first place? Existing research from the motivation literature suggests that they may derive from the student's basic needs for competence, autonomy, and relatedness (Deci & Ryan, 2000), in conjunction with family and cultural socialization processes that partly determine which activities and accomplishments she perceives as fulfilling these needs (see Wenztel & Miele, 2016).

Our *final* set of questions pertains to the ways in which students regulate the quality of their motivation. At this point, we have empirical evidence (Scholer & Miele, 2016) that students are, on average, at least aware of the fit between particular types of motivation (i.e., promotion and prevention) and the processing demands of certain tasks. One important question is whether this awareness extends to other motivations. For instance, are students aware of potential performance trade-offs between intrinsic and extrinsic motivation? Another important question is about whether this awareness translates into behavior. That is, when students realize that their motivation may lead to modes of processing that are suboptimal for the task, do they implement regulation strategies that can shift them into a different orientation? Finally, it will also be important to explore the ways in which students coordinate their regulation of motivation quality and quantity. For instance, when students realize that they are in danger of quitting because they perceive the task as having little outcome value, do they strategically choose to bolster the type of outcome value that best fits with the demands of the task? That is, does students' monitoring of motivation quantity sometimes trigger concerns about motivation quality?

Research examining these questions will help us to develop a better understanding of how students regulate their motivation and, in turn, design interventions aimed at improving students' regulatory effectiveness. These are important goals because, as we explained in the introduction, students often encounter obstacles during

task performance that undermine their motivation, and they cannot always rely on their parents and teachers to overcome them.

ACKNOWLEDGMENTS

We thank the three anonymous reviewers who provided detailed feedback on earlier manuscript drafts, as well as the editor; their insightful comments helped us to substantially improve the paper.

FUNDING

This research was supported in part by funding from the Buehler Sesquicentennial Assistant Professorship and from Collaborative Activity Award No. 220020483 from the James S. McDonnell Foundation.

REFERENCES

Acee, T. W., Kim, H., Kim, H. J., Kim, J.-I., Chu, H.-N. R., Kim, M., … The Boredom Research Group. (2010). Academic boredom in under- and over-challenging situations. *Contemporary Educational Psychology*, *35*(1), 17–27. https://doi.org/10.1016/j.cedpsych.2009.08.002

Ach, N. (2006). *On volition* (T. Herz, Trans.). Retrieved from https://cms.uni-konstanz.de/psychologie/forschung/kognitive-psychologie/various/narziss-ach. (Original work published 1910)

Achtziger, A., Gollwitzer, P. M., & Sheeran, P. (2008). Implementation intentions and shielding goal striving from unwanted thoughts and feelings. *Personality and Social Psychology Bulletin*, *34*, 381–393. https://doi.org/10.1177/0146167207311201

Appelt, K. C., Zou, X., & Higgins, E. T. (2010). Feeling right or being right: When strong assessment yields strong correction. *Motivation and Emotion*, *34*, 316–324. https://doi.org/10.1007/s11031-010-9171-z

Baas, M., De Dreu, C. K., & Nijstad, B. A. (2011). When prevention promotes creativity: The role of mood, regulatory focus, and regulatory closure. *Journal of Personality and Social Psychology*, *100*, 794–809. https://doi.org/10.1037/a0022981

Bain, A. (1859). *The emotions and the will*. London, UK: Parker and Son. https://doi.org/10.1037/10617-000

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology*, *41*, 586–598. https://doi.org/10.1037/0022-3514.41.3.586

Boekaerts, M. (1995). Self-regulated learning: Bridging the gap between metacognitive and metamotivation theories. *Educational Psychologist*, *30*, 195–200. https://doi.org/10.1207/s15326985ep3004_4

Boekaerts, M., & Rozendaal, J. S. (2010). Using multiple calibration indices in order to capture the complex picture of what affects students' accuracy of feeling of confidence. *Learning and Instruction*, *20*, 372–382. https://doi.org/10.1016/j.learninstruc.2009.03.002

Bosch, N., & D'Mello, S. (2017). The affective experience of novice computer programmers. *International Journal of Artificial Intelligence in Education*, *27*(1), 181–206. https://doi.org/10.1007/s40593-015-0069-5

Butler, D. L., & Winne, P. H. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research*, *65*, 245–281. https://doi.org/10.3102/00346543065003245

Byron, K., & Khazanchi, S. (2012). Rewards and creative performance: A meta-analytic test of theoretically derived hypotheses. *Psychological Bulletin*, *138*, 809–830. https://doi.org/10.1037/a0027652

Carver, C. S., & Scheier, M. F. (1990). Origins and functions of positive and negative affect: A control-process view. *Psychological Review*, *97* (1), 19–35. https://doi.org/10.1037/0033-295X.97.1.19

Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior*. New York, NY: Cambridge University Press. https://doi.org/10.1017/cbo9781139174794

Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. *Psychological Bulletin*, *140*, 980–1008. https://doi.org/10.1037/a0035661

Clore, G. L. (1992). Cognitive phenomenology: Feelings and the construction of judgment. In L. L. Martin & A. Tesser (Eds.), *The construction of social judgments* (Vol. 10, pp. 133–163). Hillsdale, NJ: Erlbaum. https://doi.org/10.4324/9780203772874

Cooper, C. A. & Corpus, J. H. (2009). Learners' developing knowledge of strategies for regulating motivation. *Journal of Applied Developmental Psychology*, 30, 525–536. https://doi.org/https://doi.org/10.1016/j.appdev.2008.12.032

Corno, L. (1986). The metacognitive control components of self-regulated learning. *Contemporary Educational Psychology*, *11*, 333–346. https://doi.org/10.1016/0361-476X(86)90029-9

Corno, L. (1989). Self-regulated learning: A volitional analysis. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement* (pp. 111–141). New York, NY: Springer. https://doi.org/10.1007/978-1-4612-3618-4_5

Corno, L. (1993). The best-laid plans: Modern conceptions of volition and educational research. *Educational Researcher*, *22*(2), 14–22. https://doi.org/10.3102/0013189x022002014

Corno, L. (2001). Volitional aspects of self-regulated learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (2nd .ed., pp. 191–226). Mahwah, NJ: Erlbaum. https://doi.org/10.4324/9781410601032

Daschmann, E. C., Goetz, T., & Stupnisky, R. H. (2011). Testing the predictors of boredom at school: Development and validation of the precursors to boredom scales. *British Journal of Educational Psychology*, *81*, 421–440. https://doi.org/10.1348/000709910X526038

Davis, W. E., Kelley, N. J., Kim, J., Tang, D., & Hicks, J. A. (2016). Motivating the academic mind: High-level construal of academic goals enhances goal meaningfulness, motivation, and self-concordance. *Motivation and Emotion*, *40*, 193–202. https://doi.org/10.1007/s11031-015-9522-x

de Jesus, S. N., Rus, C. L., Lens, W., & Imaginário, S. (2013). Intrinsic motivation and creativity related to product: A meta-analysis of the studies published between 1990–2010. *Creativity Research Journal*, *25*(1), 80–84. https://doi.org/10.1080/10400419.2013.752235

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*, 227–268. https://doi.org/10.1207/s15327965pli1104_01

D'Mello, S., Dieterle, E., & Duckworth, A. (2017). Advanced, analytic, qutomated (AAA) measurement of engagement during learning. *Educational Psychologist*, *52*, 104–123. https://doi.org/10.1080/00461520.2017.1281747

D'Mello, S., & Graesser, A. (2012). Dynamics of affective states during complex learning. *Learning and Instruction*, *22*, 145–157. https://doi.org/10.1016/j.learninstruc.2011.10.001

Duckworth, A. L., Gendler, T. S., & Gross, J. J. (2014). Self-control in school-age children. *Educational Psychologist*, *49*(3), 199–217. https://doi.org/10.1080/00461520.2014.926225

Duckworth, A., & Gross, J. J. (2014). Self-control and grit related but separable determinants of success. *Current Directions in Psychological Science*, *23*, 319–325. https://doi.org/10.1177/0963721414541462

Duckworth, A. 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. https://doi.org/10.1037/edu0000062

Durik, A. M., Shechter, O. G., Noh, M., Rozek, C. S., & Harackiewicz, J. M. (2015). What if I can't? Success expectancies moderate the effects of utility value information on situational interest and performance. *Motivation and Emotion*, *39*(1), 104–118. https://doi.org/10.1007/s11031-014-9419-0

Eccles, J. S. (2005). Subjective task value and the Eccles et al. model of achievement-related choices. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 105–121). New York, NY: Guilford.

Eccles-Parsons, J. S., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motives: Psychological and sociological approaches* (pp. 75–146). San Francisco, CA: Freeman.

Efklides, A. (2006). Metacognition and affect: What can metacognitive experiences tell us about the learning process? *Educational Research Review*, *1*(1), 3–14. https://doi.org/10.1016/j.edurev.2005.11.001

Efklides, A. (2011). Interactions of metacognition with motivation and affect in self-regulated learning: The MASRL model. *Educational Psychologist*, *46*(1), 6–25. https://doi.org/10.1080/00461520.2011.538645

Elliot, A. J. (2005). A conceptual history of the achievement goal construct. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 52–72). New York, NY: Guilford Press.

Elliot, A. J., & Fryer, J. W. (2008). The goal construct in psychology. In J. Y. Shah & W. L. Gardner (Eds.), *Handbook of motivation science* (pp. 235–250). New York, NY: Guilford Press.

Engelschalk, T., Steuer, G., & Dresel, M. (2016). Effectiveness of motivational regulation: Dependence on specific motivational problems. *Learning and Individual Differences*, *52*, 72–78. https://doi.org/10.1016/j.lindif.2016.10.011

Flake, J. K., Barron, K. E., Hulleman, C., McCoach, B. D., & Welsh, M. E. (2015). Measuring cost: The forgotten component of expectancy-value theory. *Contemporary Educational Psychology*, *41*, 232–244. https://doi.org/10.1016/j.cedpsych.2015.03.002

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist*, *34*, 906–911. https://doi.org/10.1037/0003-066x.34.10.906

Goetz, T., Frenzel, A. C., Hall, N. C., Nett, U. E., Pekrun, R., & Lipnevich, A. A. (2014). Types of boredom: An experience sampling approach. *Motivation and Emotion*, *38*, 401–419. https://doi.org/10.1007/s11031-013-9385-y

Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: An experimental and individual difference investigation. *Journal of Personality and Social Psychology*, *52*, 890–898. https://doi.org/10.1037/0022-3514.52.5.890

Grunschel, C., Schwinger, M., Steinmayr, R., & Fries, S. (2016). Effects of using motivational regulation strategies on students' academic procrastination, academic performance, and well-being. *Learning and Individual Differences*, *49*, 162–170. https://doi.org/10.1016/j.lindif.2016.06.008

Gurland, S. T. & Glowacky, V. C. (2011). Children's theories of motivation. *Journal of Experimental Child Psychology*, *110*(1), 1–19. https://doi.org/10.1016/j.jecp.2011.03.013

Heckhausen, H. (1991). *Motivation and action* (P. K. Leppmann, Trans.). Berlin, Germany: Springer-Verlag. https://doi.org/10.1007/978-3-642-75961-1

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, *52*, 1280–1300. https://doi.org/10.1037/0003-066x.52.12.1280

Higgins, E. T. (2000). Making a good decision: Value from fit. *American Psychologist*, *55*, 1217–1230. https://doi.org/10.1037/0003-066x.55.11.1217

Higgins, E. T. (2012). *Beyond pleasure and pain: How motivation works*. New York, NY: Oxford University Press. https://doi.org/10.1093/acprof:oSo/9780199765829.001.0001

Higgins, E. T., Shah, J., & Friedman, R. (1997). Emotional responses to goal attainment: Strength of regulatory focus as moderator. *Journal of Personality and Social Psychology*, *72*, 515–525. https://doi.org/10.1037/0022-3514.72.3.515

Hilgard, E. R. (1980). The trilogy of mind: Cognition, affection, and conation. *Journal of the History of the Behavioral Sciences*, *16*, 107–117. https://doi.org/10.1002/1520-6696(198004)16:2<107::AID-JHBS2300160202>3.0.CO;2-Y

Hofer, M., & Fries, S. (2016). A multiple goals perspective on academic motivation. In K. R. Wentzel & D. B. Miele (Eds.), *Handbook of motivation at school* (2nd ed., pp. 440–458). New York, NY: Routledge.

Hofmann, W., Friese, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. *Perspectives on Psychological Science*, *4*, 162–176. https://doi.org/10.1111/j.1745-6924.2009.01116.x

Hulleman, C. S., & Harackiewicz, J. M. (2009). Promoting interest and performance in high school science classes. *Science*, *326*(5958), 1410–1412. https://doi.org/10.1126/science.1177067

James, W. (1892). The stream of consciousness. In *Psychology: Briefer course* (pp. 151–175). New York, NY: Holt. https://doi.org/10.1037/11630-011.

Koriat, A. (2000). The feeling of knowing: Some metatheoretical implications for consciousness and control. *Consciousness and Cognition*, *9*, 149–171. https://doi.org/10.1006/ccog.2000.0433

Koriat, A., Nussinson, R., Bless, H., & Shaked, N. (2008). Information-based and experience-based metacognitive judgments: Evidence from subjective confidence. In J. Dunlosky & R. A. Bjork (Eds.), *A handbook of memory and metamemory* (pp. 117–136). New York, NY: Taylor & Francis. https://doi.org/10.4324/9780203805503.ch7

Kruglanski, A. W., Shah, J. Y., Fishbach, A., Friedman, R., Chun, W. Y., & Sleeth-Keppler, D. (2002). A theory of goal systems. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (pp. 331–378). San Diego, CA: Academic Press. https://doi.org/10.1016/s0065-2601(02)80008-9

Kuhl, J. (1984). Volitional aspects of achievement motivation and learned helplessness: Toward a comprehensive theory of action control. In B. A. Maher & W. B. Maher (Eds.), *Progress in experimental personality research* (Vol. 13, pp. 99–171). New York, NY: Academic Press. https://doi.org/10.1016/B978-0-12-541413-5.50007-3

Kuhl, J. (2000). The volitional basis of personality systems interaction theory: Applications in learning and treatment contexts. *International Journal of Educational Research*, *33*, 665–703. https://doi.org/10.1016/S0883-0355(00)00045-8

Kuhl, J., & Beckmann, J. (1985). Historical perspectives in the study of action control. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 89–100). Berlin, Germany: Springer-Verlag. https://doi.org/10.1007/978-3-642-69746-3_5

Kuhl, J., & Kraska, K. (1989). Self-regulation and metamotivation: Computational mechanisms, development, and assessment. In R. Kanfer P. L. Ackerman & R. Cudeck (Eds.), *Abilities, motivation and methodology: The Minnesota Symposium on Learning and Individual Differences* (pp. 343–374). Hillside, NJ: Erlbaum. https://doi.org/10.4324/9780203762905

McCann, E. J., & Garcia, T. (1999). Maintaining motivation and regulating emotion: Measuring individual differences in academic volitional strategies. *Learning and Individual Differences*, *11*, 259–279. https://doi.org/10.1016/s1041-6080(99)80003-x

McGraw, K. O., & McCullers, J. C. (1979). Evidence of a detrimental effect of extrinsic incentives on breaking a mental set. *Journal of Experimental Social Psychology*, *15*, 285–294. https://doi.org/10.1016/0022-1031(79)90039-8

Menon, G., & Raghubir, P. (2003). Ease-of-retrieval as an automatic input in judgments: A mere-accessibility framework? *Journal of Consumer Research*, *30*, 230–243. https://doi.org/10.1086/376804

Miele, D. B., & Scholer, A. A. (2016). Self-Regulation of Motivation. In K. R. Wentzel & D. B. Miele (Eds.), *Handbook of motivation at school* (2nd ed., pp. 363–384). New York, NY: Routledge.

Miele, D. B., & Wigfield, A. (2014). Quantitative and qualitative relations between motivation and critical-analytic thinking. *Educational Psychology Review*, *26*, 519–541. https://doi.org/10.1007/s10648-014-9282-2

Molden, D. C., & Miele, D. B. (2008). The origins and influences of promotion-focused and prevention-focused achievement motivations. In M. L. Maehr, S. A. Karabenick, & T. C. Urdan (Eds.), *Advances in motivation and achievement: Social psychological perspectives* (Vol. 15, pp. 81–118). Bingley, UK: Emerald. https://doi.org/10.1016/s0749-7423(08)15003-8

Molden, D. C., & Rosenzweig, E. Q. (2016). The origins and educational implications of promotion-focused and prevention-focused achievement motivations. In K. R. Wentzel & D. B. Miele (Eds.), *Handbook of motivation at school* (2nd ed., pp. 477–503). New York, NY: Routledge.

Murayama, K., Kitagami, S., Tanaka, A., & Raw, J. A. (2016). People's naiveté about how extrinsic rewards influence intrinsic motivation. *Motivation Science*, *2*, 138–142. https://doi.org/10.1037/mot0000040

Murayama, K., Kuratomi, K., Johnsen, L., Kitagami, S., & Hatano, A. (2017). *People underestimate our capability to motivate ourselves without extrinsic incentives*. Manuscript submitted for publication.

Nelson, T. O., & Narens, L. (1990). Metamemory: A theoretical framework and new findings. In G. H. Bower (Ed.), *The psychology of learning and motivation* (Vol. 26, pp. 125–173). New York, NY: Academic Press. https://doi.org/10.1016/s0079-7421(08)60053-5

Nett, U. E., Goetz, T., & Daniels, L. M. (2010). What to do when feeling bored?: Students' strategies for coping with boredom. *Learning and Individual Differences*, *20*, 626–638. https://doi.org/10.1016/j.lindif.2010.09.004

Nett, U. E., Goetz, T., & Hall, N. C. (2011). Coping with boredom in school: An experience sampling perspective. *Contemporary Educational Psychology*, *36*(1), 49–59. https://doi.org/10.1016/j.cedpsych.2010.10.0003

Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, *84*, 231–259. https://doi.org/10.1037/0033-295X.84.3.231

Norem, J. K., & Cantor, N. (1986). Defensive pessimism: Harnessing anxiety as motivation. *Journal of Personality and Social Psychology*, *51*, 1208–1217. https://doi.org/10.1037/0022-3514.51.6.1208

Norman, E., Price, M. C., & Duff, S. C. (2010). Fringe consciousness: A useful framework for clarifying the nature of experience-based metacognitive feelings. In A. Efklides & P. Misailidi (Eds.), *Trends and prospects in metacognition research* (pp. 63–80). New York, NY: Springer. https://doi.org/10.1007/978-1-4419-6546-2_4

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, *18*, 315–341. https://doi.org/10.1007/s10648-006-9029-9

Pekrun, R. (2016). Academic emotions. In K. R. Wentzel & D. B. Miele (Eds.), *Handbook of motivation at school* (2nd ed., pp. 120–144). New York, NY: Routledge.

Pekrun, R., Frenzel, A. C., Goetz, T., & Perry, R. P. (2007). The control-value theory of achievement emotions: An integrative approach to emotions in education. In P. A. Schutz & R. Pekrun (Eds.), *Emotion in education* (pp. 13–36). Burlington, MA: Academic Press.

Perez, T., Cromley, J. G., & Kaplan, A. (2014). The role of identity development, values, and costs in college STEM retention. *Journal of Educational Psychology*, *106*(1), 315–329. https://doi.org/10.1037/a0034027

Pintrich, P. R. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory into Practice*, *41*, 219–225. https://doi.org/10.1207/s15430421tip4104_3

Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review*, *16*, 385–407. https://doi.org/10.1007/s10648-004-0006-x

Reder, L. M. (1996). Different research programs on metacognition: Are the boundaries imaginary? *Learning and Individual Differences*, *8*, 383–390. https://doi.org/10.1016/S1041-6080(96)90024-2

Reder, L. M., & Schunn, C. D. (1996). Metacognition does not imply awareness: Strategy choice is governed by implicit learning and memory. In L. M. Reder (Ed.), *Implicit memory and metacognition* (pp. 45–78). Mahwah, NJ: Erlbaum. https://doi.org/10.4324/9781315806136

Rosenzweig, E. Q., & Miele, D. B. (2016). Do you have an opportunity or an obligation to score well? The influence of regulatory focus on academic test performance. *Learning and Individual Differences*, *45*, 114–127. https://doi.org/10.1016/j.lindif.2015.12.005

Sansone, C., Smith, J. L., Thoman, D. B., & MacNamara, A. (2012). Regulating interest when learning online: Potential motivation and performance trade-offs. *The Internet and Higher Education*, *15*, 141–149. https://doi.org/10.1016/j.iheduc.2011.10.004

Sansone, C., & Thoman, D. B. (2005). Interest as the missing motivator in self-regulation. *European Psychologist*, *10*, 175–186. https://doi.org/10.1027/1016-9040.10.3.175

Sansone, C., & Thoman, D. B. (2006). Maintaining activity engagement: Individual differences in the process of self-regulating motivation. *Journal of Personality*, *74*, 1697–1720. https://doi.org/10.1111/j.1467-6494.2006.00425.x

Sansone, C., Weir, C., Harpster, L., & Morgan, C. (1992). Once a boring task always a boring task? Interest as a self-regulatory mechanism. *Journal of Personality and Social Psychology*, *63*, 379–390. https://doi.org/10.1037/0022-3514.63.3.379

Sansone, C., Wiebe, D. J., & Morgan, C. (1999). Self-regulating interest: The moderating role of hardiness and conscientiousness. *Journal of Personality*, *67*, 701–733. https://doi.org/10.1111/1467-6494.00070

Scholer, A. A., & Higgins, E. T. (2012). Too much of a good thing? Trade-offs in promotion and prevention focus. In R. M. Ryan (Ed.), *Oxford handbook of motivation* (pp. 64–85). Oxford, UK: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195399820.013.0005

Scholer, A. A., & Miele, D. B. (2016). The role of metamotivation in creating task-motivation fit. *Motivation Science*, *2*, 171–197. http://dx.doi.org/10.1037/mot0000043

Scholer, A. A., Ozaki, Y., & Higgins, E. T. (2014). Inflating and deflating the self: Sustaining motivational concerns through self-evaluation. *Journal of Experimental Social Psychology*, *51*, 60–73. https://doi.org/10.1016/j.jesp.2013.11.008

Schwarz, N. (2004). Metacognitive experiences in consumer judgment and decision making. *Journal of Consumer Psychology*, *14*, 332–348. https://doi.org/10.1207/s15327663jcp1404_2

Schwinger, M., & Otterpohl, N. (2017). Which one works best? Considering the relative importance of motivational regulation strategies. *Learning and Individual Differences*, *53*, 122–132. https://doi.org/10.1016/j.lindif.2016.12.003

Schwinger, M., Steinmayr, R., & Spinath, B. (2009). How do motivational regulation strategies affect achievement: Mediated by effort management and moderated by intelligence. *Learning and Individual Differences*, *19*, 621–627. https://doi.org/10.1016/j.lindif.2009.08.006

Schwinger, M., Steinmayr, R., & Spinath, B. (2012). Not all roads lead to Rome—Comparing different types of motivational regulation profiles. *Learning and Individual Differences*, *22*, 269–279. https://doi.org/10.1016/j.lindif.2011.12.006

Schwinger, M., & Stiensmeier-Pelster, J. (2012). Effects of motivational regulation on effort and achievement: A mediation model. *International Journal of Educational Research*, *56*, 35–47. https://doi.org/10.1016/j.ijer.2012.07.005

Shernoff, D. J., Csikszentmihalyi, M., Shneider, B., & Shernoff, E. S. (2003). Student engagement in high school classrooms from the perspective of flow theory. *School Psychology Quarterly*, *18*, 158–176. https://doi.org/10.1521/scpq.18.2.158.21860

Smit, K., de Brabander, C. J., Boekaerts, M., & Martens, R. L. (2017). The self-regulation of motivation: Motivational strategies as mediator between motivational beliefs and engagement for learning. *International Journal of Educational Research*, *82*, 124–134. https://doi.org/10.1016/j.ijer.2017.01.006

Smith, J. L., Wagaman, J., & Handley, I. M. (2009). Keeping it dull or making it fun: Task variation as a function of promotion versus prevention focus. *Motivation and Emotion*, *33*, 150–160. https://doi.org/10.1007/s11031-008-9118-9

Spiegel, S., Grant-Pillow, H., & Higgins, E. T. (2004). How regulatory fit enhances motivational strength during goal pursuit. *European Journal of Social Psychology*, *34*(1), 39–54. https://doi.org/10.1002/ejsp.180

Tamir, M., & Ford, B. Q. (2009). Choosing to be afraid: Preferences for fear as a function of goal pursuit. *Emotion*, *9*, 488–497. https://doi.org/10.1037/a0015882

Tze, V. M. C., Daniels, L. M., & Klassen, R. M. (2016). Evaluating the relationship between boredom and academic outcomes: A meta-analysis. *Educational Psychology Review*, *28*(1), 119–144. https://doi.org/10.1007/s10648-015-9301-y

van Tilburg, W. A., & Igou, E. R. (2012). On boredom: Lack of challenge and meaning as distinct boredom experiences. *Motivation and Emotion*, *36*, 181–194. https://doi.org/10.1007/s11031-011-9234-9

Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology*, *101*, 671–688. https://doi.org/10.1037/a0015083

Vaughn, L. A. (2017). Foundational tests of the need-support model: A framework for bridging regulatory focus theory and self-determination theory. *Personality and Social Psychology Bulletin*, *43*, 313–328. https://doi.org/10.1177/0146167216684132

Veenman, M. V. (2011). Learning to self-monitor and self-regulate. In R. E. Mayer & P. A. Alexander (Eds.), *Handbook of research on learning and instruction* (pp. 197–218). New York, NY: Routledge. https://doi.org/10.4324/9780203839089.ch10

Webster, E. A., & Hadwin, A. F. (2015). Emotions and emotion regulation in undergraduate studying: Examining students' reports from a self-regulated learning perspective. *Educational Psychology*, *35*, 794–818. https://doi.org/10.1080/01443410.2014.895292

Wentzel, K. R., & Miele, D. B. (Eds.). (2016). *Handbook of motivation at school* (2nd .ed.). New York, NY: Routledge.

Wigfield, A., Tonks, S. M., & Klauda, S. L. (2016). Expectancy-value theory. In K. R. Wentzel & D. B. Miele (Eds.), *Handbook of motivation at school* (2nd .ed., pp. 55–74). New York, NY: Routledge.

Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 277–304). Mahwah, NJ: Erlbaum. https://doi.org/10.4324/9781410602350

Wolters, C. A. (1998). Self-regulated learning and college students' regulation of motivation. *Journal of Educational Psychology*, *90*, 224–235. https://doi.org/10.1037/0022-0663.90.2.224

Wolters, C. A. (1999). The relation between high school students' motivational regulation and their use of learning strategies, effort, and classroom performance. *Learning and Individual Differences*, *11*, 281–299. https://doi.org/10.1016/s1041-6080(99)80004-1

Wolters, C. (2001, August). *Motivational problems experienced by college students.* Paper presented at the annual meeting of the American Psychological Association, San Francisco, CA.

Wolters, C. A. (2003). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. *Educational Psychologist*, *38*, 189–205. https://doi.org/10.1207/s15326985ep3804_1

Wolters, C. A. (2011). Regulation of motivation: Contextual and social aspects. *Teachers College Record*, *113*, 265–283.

Wolters, C. A., & Benzon, M. B. (2013). Assessing and predicting college students' use of strategies for the self-regulation of motivation. *The Journal of Experimental Education*, *81*, 199–221. https://doi.org/10.1080/00220973.2012.699901

Wolters, C. A., & Hussain, M. (2015). Investigating grit and its relations with college students' self-regulated learning and academic achievement. *Metacognition and Learning*, *10*, 293–311. https://doi.org/10.1007/s11409-014-9128-9

Wolters, C. A., & Rosenthal, H. (2000). The relation between students' motivational beliefs and their use of motivational regulation strategies. *International Journal of Educational Research*, *33*, 801–820. https://doi.org/10.1016/s0883-0355(00)00051-3

Xu, J., & Corno, L. (2003). Family help and homework management reported by middle school students. *The Elementary School Journal*, *103*(1), 503–517. https://doi.org/10.1086/499737

Yeager, D. S., Henderson, M. D., Paunesku, D., Walton, G. M., D'Mello, S., Spitzer, B. J., & Duckworth, A. L. (2014). Boring but important: A self-transcendent purpose for learning fosters academic self-regulation. *Journal of Personality and Social Psychology*, *107*, 559–580. https://doi.org/10.1037/a0037637