The Effect of Rationale Provision on Motivation and Performance Outcomes: A Meta-Analysis

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A meta-analysis of 23 experimental studies examined the effect of rationale provision on subjective task value, autonomous motivation, engagement, performance, perceived autonomy, perceived competence, perceived relatedness, and controlled motivation compared with a control condition. Results suggested that rationale provision enhanced subjective task value, engagement, performance, and perceived autonomy to a small to moderate extent ($d = .16$ to $d = .40$) under fixed- and random-effects models. Results also suggested that rationale provision diminished perceived competence under both fixed- and random-effects models ($d = -.19$), but did not impact autonomous motivation, controlled motivation, or perceived relatedness. Moderator analyses for subjective task value, autonomous value, motivation, engagement, and performance suggested that rationales were most effective (a) when they were prosocial or autonomous compared to controlling (for 3 outcomes), (b) for samples with a higher proportion of females (for 3 outcomes), and (c) for uninteresting tasks (for 3 outcomes). Implications for theory, future research, and practice are discussed.

Keywords: meta-analysis, motivation, rationale, self-determination theory, subjective task value

People are regularly faced with the challenge of motivating another individual. Parents, teachers, employers, and doctors regularly use one or more of the following strategies to motivate another individual to engage in a task: (a) external contingencies such as deadlines, rewards, punishment, (b) setting goals, or (c) an emphasis on autonomy in the form of providing choices. Indeed, comprehensive syntheses of research show the success and limitations of these strategies for motivating others (Deci, Koestner, & Ryan, 1999; Locke & Latham, 2002; Patall, Cooper, & Robinson, 2008). This meta-analysis adds to this body of research by synthesizing the effects of providing a rationale, another promising motivational strategy.

Rationale refers to the "verbal explanation of why putting forth effort during the activity might be a useful thing to do" (Reeve, Jang, Hardre, & Omura, 2002, p. 185). Examples of rationale provision include: a teacher discussing the way students may use information in the future, parents referring to rewards associated with a chore, or a doctor encouraging a patient to quit smoking by referring either to the increased risk of cancer or to associated changes in physical appearance. Across these different examples, rationale provision is social: the explanation for the task's value is provided by another individual. Though rationale is a motivational tool employed in educational, work, and health contexts, and a central component in several motivational theories, including Self-Determination Theory (SDT; Ryan & Deci, 2000b), there is little consensus regarding characteristics that may enhance or diminish its effects. The present analysis examines the overall effect of rationale on motivation and performance outcomes and moderators of that effect.

Theoretical Perspectives on Rationale Provision

Self-determination theory (SDT; Ryan & Deci, 2000b) proposes that satisfaction of the psychological needs for autonomy, competence,

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and relatedness underlie motivation, particularly powerful autonomous or intrinsic forms of motivation as opposed to controlling or extrinsic forms that may not sustain behavior as effectively across time or contexts. As such, SDT prioritizes an examination of the contextual factors that support satisfaction of these needs.

SDT has identified several practices that support the need for autonomy, a sense of volition or ownership over one's behavior (Deci, Eghrari, Patrick, & Leone, 1994; Reeve & Jang, 2006), including providing a rationale, which explains the value of the task and, therefore, gives the individual a reason to endorse it. In other words, hearing about the task's value is thought to encourage individuals to feel more ownership, or to feel that their work on the task is more closely aligned with their own personal goals. Even if the activity is not freely chosen, as is often the case with school assignments or work responsibilities, SDT predicts that rationale provision will facilitate the sense that one would choose the task if it were not required, because that individual understands the value of the task.

Although SDT primarily refers to rationale provision as an autonomy supportive practice, SDT theorists argue that rationale may also support satisfaction of the need for competence, that is, the sense of being able to succeed at a task, by providing structure or information about the link between behaviors and outcomes (Grolnick, Deci, & Ryan, 1997; Grolnick, Gurland, Jacob, & Decourcey, 2002). For example, Grolnick et al. (2002) suggest that parents explain cleaning to a young child in terms of having enough "space to play on the floor" (p. 159), thus connecting cleaning up to the child's own goals (autonomy support) and helping the child understand how to achieve desired outcomes (competence support). Thus, SDT expects rationale provision to support motivation primarily because it supports an individual's experience of autonomy and, secondarily, because it supports his or her sense of competence.

In contrast to SDT, which is intended to apply across contexts, expectancy value theory (EVT), as proposed by Eccles, Wigfield and colleagues (Eccles et al., 1983; Wigfield & Eccles, 2000), theorizes motivation within achievement contexts, but, like SDT, provides predictions about the effects of rationale provi-

sion. EVT holds that subjective task value, or beliefs about the reasons for undertaking a given task as well as an individual's expectancies, beliefs about how well he or she will perform on a given task, are central to achievement motivation, predicting engagement, persistence, and performance (Wigfield & Eccles, 2000). To the extent that rationales lead to increased subjective task value, EVT suggests that motivation and performance will also increase. Thus, the EVT model suggests that subjective task value is an important outcome and mechanism of effect of rationale.

Although both SDT and EVT suggest that rationale provision likely supports subjective task value, motivation, engagement, and performance, the theories differ in their explanations for the mechanism by which rationales have such benefits. SDT emphasizes the mediating role of enhanced autonomy and competence in explaining why the provision of rationales is expected to have benefits for more distal outcomes like intrinsic motivation, engagement, and performance, whereas EVT emphasizes the mediating role of enhanced subjective task value. Moreover, while SDT suggests that enhanced competence may be an outcome and mechanism of effect for rationale provision, empirical research emanating from EVT has found that the effect of rationale on perceived competence may depend characteristics of the individual, including individual interest and/or perceived competence (Durik & Harackiewicz, 2007; Durik, Shechter, Noh, Rozek, & Harackiewicz, 2015). Given the conflicting theory and evidence, it is difficult to make a prediction regarding whether the provision of a rationale will enhance or diminish perceptions of competence overall. However, taking both theories into consideration, we expected that the provision of rationale would enhance perceptions of competence more often that it does not.

Empirical findings generally support theoretical predictions that rationale yields motivational benefits. In both field and laboratory studies with individuals of varied ages, the provision of a rationale has been found to lead to: Subjective task value (Durik & Harackiewicz, 2007), interest/enjoyment (Deci et al., 1994), engagement (Jang, 2008; Sansone, Wiebe, & Morgan, 1999), learning (Jang, 2008), and performance (Kuczynski, 1983). For instance, Jang (2008) provided a rationale for learning about correlations that pointed

out how learning about correlations would be useful for participants' future role as teachers. Participants who heard the rationale reported higher levels of autonomous motivation, demonstrated more behavioral engagement, and learned more. Despite these positive effects, a thorough review of the empirical literature does not suggest a clear picture. Some research has found rationales to have null effect on outcomes including free-choice engagement (Deci et al., 1994), performance (Durik & Harackiewicz, 2007; Shin, 2010), and other motivational variables (Gillison, Standage, & Skevington, 2013; Shin, 2010). Further, it would seem that the generally positive effects of rationale may be enhanced or diminished by a number of factors.

Factors That May Influence the Effectiveness of Rationale

Mixed findings suggest that the effects of rationale are complex and may not always be positive. First, we discuss factors for which strong theoretical logic exists for expecting variation in the effects of rationale along the factor. We then discuss factors that may be important to explore as moderators of the effects of rationale, though theoretical reasons for expecting variation along these factors are more limited.

Type of Rationale

A central question regarding the effects of rationale is what practitioners should say when providing a rationale. SDT provides a useful framework for categorizing these statements of rationale into two types: autonomous and controlling and suggests that autonomous rationales will lead to larger effects on adaptive outcomes than controlling rationales. Specifically, they suggest that because of their association with the fundamental needs of autonomy, competence, and relatedness, both autonomous forms of regulation and intrinsic goal contents lead to more adaptive outcomes than controlled regulation or extrinsic goal contents. Next, we define and discuss various forms of regulation and goal contents and their application to explaining variation in the effects of rationale.

According to SDT (Ryan & Deci, 2000a), motivation can be conceptualized on a continuum ranging from autonomous to controlled.

Autonomous motivation includes intrinsic, identified, and integrated forms of motivation and reflects doing a task because it is interesting or enjoyable, personally meaningful, or because it has been "brought into congruence with one's other values and needs" (Ryan & Deci, 2000b, p. 73). In contrast, more extrinsic or controlled motivation reflects doing a task because of externally imposed incentives or consequences (external motivation) or because of internal feelings of obligation or pride (introjected regulation). Whereas all types of motivation may lead an individual to engage in a task, a key insight of SDT and corresponding empirical research is that the quality of motivation differs across these types of motivation, autonomous motivation being more strongly associated with adaptive outcomes like learning and well-being than controlled motivation (Grolnick & Ryan, 1987). Given that some rationales express value in ways that correspond to these types of regulation, rationales referring to autonomous reasons for engagement are expected to lead to larger effects on adaptive outcomes than rationales referring to more extrinsic or controlled reasons, which we refer to as controlling rationales.

In addition, another aspect of SDT relates to this question of what practitioners should say when providing a rationale: goal contents, which is another important factor impacting motivation and performance outcomes. Specifically, pursuit of intrinsic goals, which are "congruent with actualizing and growth tendencies natural to humans," and include "health and growth" and prosocial goals like "community and helpfulness" (Kasser & Ryan, 1996, p. 280), is associated with well-being and reduced distress. In contrast, the pursuit of extrinsic goals, which depend on the reactions of others, and include "money . . . , social recognition . . . , and . . . appearance" (Kasser & Ryan, 1996, p. 280), is associated with less self-actualization and vitality and more physical symptoms. The goal framing hypothesis applies these otherwise intraindividual goal contents directly to rationale provision: rationales referring to intrinsic goals may promote motivation and performance, whereas rationales referring to extrinsic goals may undermine such outcomes (Vansteenkiste, Niemiec, & Soenens, 2010). In fact, evidence has supported goal framing predictions that autonomous rationales have greater

effects on adaptive outcomes than controlling rationales (Reeve et al., 2002; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004; Vansteenkiste, Simons, Lens, Soenens, et al., 2004; Vansteenkiste, Simons, Soenens, & Lens, 2004).

The distinction among types of rationales may be further complicated by the fact that some rationales reflect a prosocial value, meaning they refer to the value that task engagement will accrue to someone other than the participant him or herself. In the present analysis, we distinguish between prosocial rationales and autonomous rationales focused only on benefits to the self in light of some findings that prosocial rationales may bring about the biggest boost to motivation and performance.[1] For example, Grant and colleagues (e.g., Grant, 2008b, 2012; Grant et al., 2007) argued that focusing on the beneficiaries of a given task may promote motivation to a greater extent compared with focusing on oneself and found in one study in which autonomous and prosocial rationales were explicitly compared (Grant & Hofmann, 2011) that a prosocial rationale emphasizing the benefits to patients' health led to more hand washing among health care professionals than a rationale that emphasized the benefits to participants' own health. Though few other studies have explicitly compared autonomous and prosocial rationales, studies have certainly varied on this dimension (see Table 1 for definitions and examples of each type of rationale). In other words, whereas prosocial rationales are other-focused or "self-transcendent" (Yeager et al., 2014), both autonomous and controlling rationales refer to value that is self-focused. In terms of the fundamental needs theorized by SDT, prosocial rationales may have a particularly pronounced positive effect because they may also support feelings of relatedness. While the goal contents theory of SDT considers prosocial goals as a subtype of intrinsic goals, more recently, researchers have theorized considering the two as separate but complementary: Grant (2008a) found that intrinsic motivation strengthens the effect of prosocial motivation and Yeager et al. (2014) found that interventions referring to both prosocial and self-oriented reasons for learning may provide benefits greater than intereventions that refer only to self-oriented reasons. Given these findings and theoretical debate regarding the categoriza-

tion of prosocial goals/motivation, the present work will compare the effects of prosocial and autonomous rationales.

Finally, it is worth noting at this point that the above predictions regarding differential effects across types of rationale are in some contrast to predictions that might be derived from EVT. EVT defines subjective task value as a multidimensional construct composed of four subtypes: personal importance or significance of a task to one's sense of self or identity (attainment value), usefulness of the task to obtaining personal goals in the future (utility value), enjoyment associated with a task (intrinsic value), and resources needed or negative consequences of task engagement such as loss of time, exertion of effort, negative affect, or inability to engage in other valued tasks (cost; Eccles et al., 1983). Whereas attainment value, utility value, and intrinsic value each increase subjective task value, cost decreases subjective task value.

Despite the distinction between these types of subjective task value, EVT makes little distinction between forms of subjective value in terms of the nature of their effects (Vansteenkiste, Lens, & Deci, 2006; Vansteenkiste et al., 2010). Hulleman, Barron, Kosovich, and Lazowski (2016) suggest that the types of subjective task values vary along the same dimension as the types of motivation, from more intrinsic or autonomous (e.g., intrinsic value) to less so (e.g., utility value or attainment value). Given that EVT does not differentiate the benefits of various forms of value (or the rationales that refer to each form) and SDT predicts that the effects of rationales will vary along a continuum from controlling to autonomous, the predictions of each theory are somewhat in conflict. This meta-analysis provides an opportunity to compare and test the predictions of each theory.

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[1] By type of rationale, we refer to the type of value referred to in the rationale expression itself. This variable is distinct from characteristics of the setting in which the rationale was provided and from the task for which the rationale was provided. For example, a task that one might consider prosocial, such as recycling, may be justified with a controlling rationale, such as by referring to the money that subjects will get if they recycle (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004, Study 1). In this example, the rationale, would be considered to be controlling although it was provided for a prosocial task. See Table 1 for further examples and definitions.

Table 1
Type of Rationale

Type	Definition	Example	Task (Setting)
Autonomous	Statements of value that emphasize doing a task because of benefits to the self, including how a task is: • interesting or enjoyable, personally meaningful, or aligned with personal "values and needs" (Ryan & Deci, 2000b, p. 73) • aligned with the goal of growth, (e.g. personal improvement, learning) • aligned with the goal of health	"Hand hygiene prevents you from catching diseases" (Grant & Hoffman, 2011).	Hand-washing (Workplace setting of health care professionals)
		"Doing a little tae-bo helps you remain physically fit and prevents you from becoming sick at a later age" (Vansteenkiste, Simons, Soenens, et al., 2004).	Tae-bo (High School Physical Education Class)
		". . . if you choose to eat healthy foods like apples you will have more energy to play and be active, especially with your friends" (Bannon & Schwartz, 2006)	Healthy snack choice (Kindergarten classroom)
Controlling	Statements of value that emphasize doing a task because of benefits to the self, including: • externally imposed incentives or consequences (e.g. money, grades) associated with the task • internal feelings of obligation or pride (also including guilt) • aligned with the goal of social recognition • aligned with the goal of a positive appearance	"Reading the text could teach you how to save money by reusing materials" (Vansteenkiste, Simons, Lens, et al., 2004).	Learning about recycling (College students, laboratory setting)
		"Doing a little tae-bo helps you remain physically appealing to others and prevents you from gaining weight at a later age." (Vansteenkiste, Simons, Soenens, et al., 2004).	Tae-bo (High School Physical Education Class)
		"The reason we are asking you to try hard during conversational Chinese is because we are going to give you a test on the material to evaluate how well you studied the information." (Reeve et al., 2002, Study 1)	Learning conversational Chinese (College students, laboratory setting)
Prosocial	Statements of value that emphasize doing a task because of benefits to ***others***, including alignment of the task with: • the goal of community • the goal of helpfulness	"Hand hygiene prevents patients from catching diseases" (Grant & Hoffman, 2011).	Hand-washing (Workplace setting of health care professionals)
		"Reading the text could help you know how to teach your future toddlers that they can do something to help the environment" (Vansteenkiste, Simons, Lens, et al., 2004).	Learning about recycling (College students, laboratory setting)
		"We've received letters from the dean's office written by students who have benefited from scholarships that were made possible by the alumni donations that you've solicited. We wanted to share these letters with you to give you a sense of the impact that your work is having on students." (Grant et al., 2007, Study 1)	Fundraising calls (College students employed as fundraisers)

Autonomy-Support

Beyond type of rationale, SDT suggests that the effects of rationales may also vary to the extent that they are delivered alone or in combination with other autonomy-supportive practices. Research examining the causal effects of other autonomy-supportive practices, including choice provision, acknowledgment of negative affect, and noncontrolling language, either individually or together as a whole, has often found such practices to support motivation, engagement, and performance (Reeve, Jang, Carrell, Jeon & Barch, 2004; Vansteenkiste, Simons, Soenens, & Lens, 2004). SDT suggests a gestalt hypothesis, that the effects of autonomy supportive practices are synergistic and specifically that the effects of each practice are heightened when combined (Deci et al., 1994). As such, providing rationales within the context of an autonomy-supportive environment overall is expected to lead to more positive effects than rationales delivered in an otherwise controlling context. Previous research supports this prediction. Vansteenkiste, Simons, Lens, Soenens, and Matos (2005) found that, regardless of rationale type (autonomous, controlling), rationales provided using noncontrolling language led to more positive effects on autonomous motivation, performance, and engagement than rationales delivered with controlling language. Similarly, Deci et al. (1994) found that the effects of rationales on motivation and engagement were greatest when combined with noncontrolling language and acknowledgment of negative affect. This synergy or gestalt effect suggested that the effects of autonomy supportive practices were amplified as more practices were provided simultaneously. That is, the effect of all three practices provided simultaneously was larger than that of one or two practices.

Uninteresting Tasks

In addition to the characteristics of the rationale, characteristics of the task may also influence the effects of rationale provision. Specifically, if the value of the task in question is evident to the individual, then the rationale may have a smaller effect because, regardless of an intervention such as rationale, individuals are likely to be highly motivated for the task. Ac-

cording to scholars from a variety of perspectives including interest theories (Sansone, Weir, Harpster, & Morgan, 1992; Sansone et al., 1999) and SDT (Deci et al., 1994; Jang, 2008; Reeve et al., 2002), rationales will be more effective when the task or activity is relatively boring or uninteresting because more interesting activities do not require as much external support for motivation (Hidi & Renninger, 2006; Ryan & Deci, 2000a). Some research suggests that an individual's personal interest in the domain may also moderate the effect of rationale on motivation and performance (Durik & Harackiewicz, 2007; Shechter, Durik, Miyamoto, & Harackiewicz, 2011) whereas more recent work has suggested that such moderation may be an artifact of the relationship between interest and perceived competence (Durik et al., 2015). Though this research is important for understanding the effects of rationale, the role of personal interest could not be tested in the present analysis due to lack of reporting or variability in individual's level of personal interest. Rather, the present analysis examines interest as a feature of the task.

Exploratory and Methodological Factors

Given heterogeneity in research findings, we thought it might also be useful to explore whether the effects of rationale provision vary by type of task, gender, or outcome measurement, although the theoretical reason to expect such variation is more limited. First, we examined if the effects of rationales depend on the type of task for which the rationale is provided. Studies included in the analysis included rationales for school tasks (Shin, 2010) as well as learning tasks outside of the classroom (Jang, 2008; Reeve et al., 2002), health tasks (Bannon & Schwartz, 2006; Vansteenkiste, Simons, Soenens, & Lens, 2004; Williams et al., 2001), and work tasks (Grant, 2008b, 2012; Grant et al., 2007). We therefore sought to determine if the effects of rationale for academic tasks differ from effects for work or health-related tasks.

Next, we tested whether or not the effects of rationale depend on the proportion of the sample that is female. Research suggests that women report a higher need for affiliation (Hill, 2009) and a higher priority on communal goals (Diekman & Eagly, 2013) compared with men. Therefore, given the social nature

of rationale, women may be more likely to endorse rationales provided, and in turn experience motivational benefits than men. Despite this reasoning, few studies have examined variation in the effects of rationale by sex. One study tested this question and found that a prosocial rationale led to a significantly higher rate of work among boys who received the rationale compared to the control group, but not for girls (Kuczynski, 1983).

As for methodological characteristics, the effects of rationale on motivation and performance may also depend on the type of measure used to assess the outcomes. In a classic meta-analysis of the effects of rewards on intrinsic motivation, Deci et al. (1999) found that type of measure was a significant moderator, with the negative effects of reward being stronger for behavioral compared to self-report measures of intrinsic motivation. Given the finding of this related meta-analysis, it may be important to explore if outcome measurement moderates the observed effects of rationales.

Need for a Synthesis on the Effects of Rationale

Rationales are used in a variety of settings to motivate others. Indeed, a substantial body of research has accumulated testing the effects of rationale on motivation and performance outcomes, although there has not yet been an attempt to synthesize this evidence. Further, existing research suggests that the effects of rationale on motivation and performance outcomes may depend on characteristics of the rationale, task, sample, and outcome, though conclusions about the importance of various factors is difficult to decipher without synthesizing the existing evidence. Thus, given the importance of rationale in theories of motivation and applied settings, a meta-analysis of the effects of rationale on motivation and performance outcomes was needed.

The purposes of this meta-analysis were twofold. One purpose was to simply answer the most basic question of the extent to which rationales produce a positive effect on motivation and performance outcomes. Perhaps more importantly, the second purpose was to examine factors that may influence the effects of rationale. A number of predictions regarding moderators have emerged based on existing theory

and research on rationale provision, though evidence has often been mixed across studies or limited within a single study to draw firm conclusions regarding the role of most of these factors. The present meta-analysis provides an opportunity to use variation between studies, in addition to that within studies, to examine the role of characteristics of the rationale, task, sample, or outcome as moderators of rationale effects. Resolving the conflict between competing hypotheses of SDT and EVT related to differential effects of various types of rationales is a particular aim of this meta-analysis.

To summarize our hypotheses given the theory and empirical evidence previously reviewed, we predicted the following:

1. Rationale provision will lead to an overall positive effect on all adaptive outcomes such as subjective task value, autonomous motivation, engagement, performance, perceived autonomy, perceived competence, and perceived relatedness and negative effects on maladaptive outcomes such as controlled motivation.
2. Prosocial and autonomous rationales will lead to larger positive effects than controlling rationales, with prosocial rationales having the largest effects.
3. Rationales will lead to larger effects when combined with other autonomy-supportive practices, including acknowledgment of negative affect or noncontrolling language compared to rationale alone. Further, the effect of all three practices combined will be greater than the effect two practices or rationale alone.
4. Rationales will lead to larger effects when the task is uninteresting.

We were less certain of predictions regarding type of task, sex of participants and outcome measurement. Nonetheless, we suspected that:

5. Rationales will lead to larger effects for academic tasks than for health or work tasks.
6. Rationales will lead to larger effects among samples with a higher proportion of females compared to samples with a smaller proportion of females.

7. Rationale will lead to larger effects on behavioral measures of outcomes compared to self-report measures.

Method

Literature Search Procedures

Four complementary search strategies were used in order to retrieve as many published and unpublished tests of the effect of rationale as possible: (a) systematic electronic database searches, (b) ancestry and descendant searches, (c) contact with researchers through professional networks and organizations, and (d) contact with prolific researchers. The first strategy involved searches of the *ERIC, PsycINFO, Academic Search Complete, and ProQuest Dissertation & Theses,* for documents catalogued before January 1, 2014. The following terms were entered simultaneously linked with "OR"s: rationale, instrumental, instrumentality, relevance, meaningful, meaningfulness, explanation, explanatory, autonomy-support, purpose, goal content, motivation, engagement, effort, persistence, performance, achievement, and learning. The search of the two main databases (*ERIC & PsycINFO*) returned approximately 7,730 results.

Next, reference sections of relevant documents were examined to determine whether any cited works had titles that also might be relevant to the topic. We also used Web of Science (Reuter's Web of Knowledge) to identify relevant reports that had cited 7 seminal papers on the effects of rationales (e.g., Deci et al., 1994; Durik & Harackiewicz, 2007; Jang, 2008; Reeve et al., 2002; Vansteenkiste et al., 2005; Vansteenkiste, Simons, Soenens, & Lens, 2004).

Finally, members of several professional organizations in fields related to the topic, including Educational Psychology (Division 15 of the American Psychological Association; Division C of the American Educational Research Association [AERA]; Motivation in Education Special Interest Group [associated with AERA]) and Social Psychology (Society for Personality and Social Psychology), were contacted and asked to provide information on relevant research. Likewise, researchers who our search indicated had conducted more than two studies

examining the effects of rationale were asked for other relevant research.

Criteria for Including Studies

Each study meeting the following six criteria were included in the analysis. First, studies were required to have used an experimental design in which the provision of rationale was manipulated and participants were randomly assigned to conditions, or cluster-randomized experiments in which clusters were randomly assigned to condition (Bannon & Schwartz, 2006; Gillison et al., 2013; Grant, 2012; Grant & Hofmann, 2011; Vansteenkiste, Simons, Soenens, & Lens, 2004). Second, studies were required to have included at least one condition that received a rationale and a control condition that did not receive a rationale.

Both gain-framed and loss-framed messages were included in the analysis (Bannon & Schwartz, 2006; Williams et al., 2001). However, the literature examining these two types of messages have predominantly compared gain-framed to loss-framed messages and omitted a control group. Therefore, most were excluded due to a lack of control group. Akl et al. (2011) synthesized the effects of gain versus loss framed messages on behavior, but limited their analysis to effects on health outcomes. In addition to gain- and loss-framed messages, other studies that compared different types of rationales and omitted a true control group were also excluded (Benware & Deci, 1984; Sheldon, Ryan, Deci, & Kasser, 2004; Simons, Dewitte, & Lens, 2003; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004; Vansteenkiste, Simons, Lens, Soenens, et al., 2004; Wang, Hu, & Guo, 2013).

Third, given the definition of rationale provision within the SDT framework as an external or contextual factor in which another individual provides a reason for putting forth effort, only studies that operationalized rationale provision as an external explanation of the value of an activity were included. Manipulations of utility value that prompted participants to self-generate an explanation for the benefits of the task or activity were excluded (Hulleman, Godes, Hendricks, & Harackiewicz, 2010). Although evidence suggests that these interventions indeed influence subjective task value and other adaptive outcomes, these interventions do not involve the external provision

of a rationale and thus, may function differently (Canning & Harackiewicz, 2015). Although external provision of rationales can provide ideas about the value that is "otherwise hidden" (Jang, 2008, p. 798) to individuals, such rationales depend on the individual endorsing this externally expressed value as something important to them personally. In contrast, self-generated utility value interventions depend on existing knowledge about the value of a task and capitalizes on that knowledge by encouraging individuals to adopt or endorse the value.

Fourth and similarly, only studies in which the rationale expressed value of the task that participants were to take part in were included. Studies in which the rationale was not relevant to the task or which explained why the task was not relevant (Roser, 1990) were excluded. Fifth, included studies needed to have measured the effect of rationale on at least one of the outcomes of interest, namely subjective task value, autonomous motivation, engagement, performance, perceived autonomy, competence, relatedness, or controlled motivation. However, these outcome categories each included a set of related constructs. The next section defines each outcome category and provides examples of included constructs. Sixth and finally, in order to be included, each study needed to contain sufficient information to estimate the effect of rationale on at least one outcome of interest.

Dependent Measures

This synthesis assessed the effect of rationale on eight related outcomes: value, autonomous motivation, engagement, and performance, perceived autonomy, competence, or relatedness, and controlled motivation. Studies varied in how these constructs were operationalized and most outcomes had conceptual subcategories. *Subjective task value* included importance (Reeve et al., 2002), usefulness or utility value (Deci et al., 1994; Shechter et al., 2011). Competence valuation, the perceived importance of task success, was also considered a form of value due to the academic nature of the task in question, there was little distinction between the importance of task success and the importance of the task (Durik & Harackiewicz, 2007; Shechter et al., 2011).

Autonomous motivation included forms of motivation that are generated by the self or are endorsed by the self. Intrinsic value and interest value were categorized as autonomous motivation, as they are conceptually more related to intrinsic motivation than to other forms of value. Other autonomous motivation outcomes included interest or enjoyment (Durik & Harackiewicz, 2007; Gillison et al., 2013; Shechter et al., 2011), intrinsic regulation, and identified regulation (Vansteenkiste, Simons, Soenens, & Lens, 2004).

Engagement was conceptualized as a multidimensional construct with three components: behavioral, cognitive, and emotional (Fredricks, Blumenfeld, & Paris, 2004). Although these components are useful in explicating the variety of manifestations of engagement, the distinctions among them are not always clear. The present analysis included behavioral engagement outcomes, including effort, free choice persistence (Deci et al., 1994), time on task (Grant et al., 2007), and behavioral engagement (Jang, 2008), as well as cognitive engagement, such as interest-enhancing strategies (Jang, 2008; Sansone et al., 1999).

Performance outcomes included learning, which were commonly measured with an experimenter-created test (e.g., Durik & Harackiewicz, 2007; Vansteenkiste et al., 2005). In other studies, performance was a measure or observation of the behavior of interest (e.g., Bannon & Schwartz, 2006).

Few studies measured the effects of rationale on the three needs for *autonomy, competence,* or *relatedness*. All studies that measured effects on needs referred to the need construct exactly, with a few exceptions: autonomy included perceived self-determination (Reeve et al., 2002), competence included self-efficacy (Hall, Bishop, & Marteau, 2003), and relatedness included affective commitment to beneficiaries (Grant et al., 2007). Finally, *controlled motivation* included introjected and external regulation (Vansteenkiste, Simons, Soenens, & Lens, 2004).

Information Retrieved From Studies and Coder Reliability

Numerous characteristics of each study were included in the database. These characteristics encompassed six categories: (a) research report, (b) rationale manipulation, (c) task, (d) sample, (e) outcome measure, and (f) estimate of effect size. Table 2 lists the characteristics retrieved

Table 2
Complete List of Information Retrieved From Studies

Report characteristics
  1. Author
  2. Year
  3. Type of research report (journal article, dissertation, unpublished data)
Sample
  1. Country
  2. Setting (laboratory, school, health care center, work)
  3. Developmental stage of the sample (elementary, middle, high, college, adults)
  4. Socioeconomic status (low, middle, high, mixed)
  5. Age
  6. Grade level, when appropriate
  7. % Female
  8. Ethnicity (Caucasian, African-American, Asian, Native American, Hispanic)
Rationale manipulation
  1. Type of task (academic, work, health, environmental, other)
  2. Task reported as interesting (yes/no)
  3. Type of rationale (autonomous, controlling, prosocial)
  4. Language (noncontrolling, controlling)
  5. Acknowledgment of negative affect (yes/no)
Outcome measure
  1. Outcome category (subjective task value, autonomous motivation, engagement, performance, autonomy, competence, relatedness, controlled motivation) and description
  2. Type of outcome measure (self-report, behavioral)
  3. Time point of outcome measurement (delay from the provision of rationale)
Estimate of the effect
  1. Direction of the effect
  2. Magnitude of the effect
  3. Sample size

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from each study. Lack of reporting was common among the studies, especially with respect to characteristics of the sample, such as the gender of participants.

Every report was independently coded by the first and third authors. Of 12,159 codes, only approximately 2.4% were discrepant. Discrepancies were noted, discussed, and, if agreement could not be reached, the second author resolved the disagreement.

Effect Size Estimation

We used the *d*-index (Cohen, 1988), a standardized mean difference, as our index of effect. For the present analysis, we computed the *d-index* for each effect by subtracting the control mean from the experimental mean and dividing by the pooled standard deviation. As such, positive effects indicate that participants in the rationale condition had higher outcome scores than those in the control condition. When means, standard deviations, and sample sizes were unavailable, an inference test or proportion was used to calculate the *d*-index. When means and standard deviations were reported and the overall, but not group, sample size was reported, we assumed equal sample sizes among the groups. When effects could not be calculated from information provided in the report, we contacted the author(s) for the required information.

Methods of Data Integration

For each outcome, the set of effects was examined for values greater than 3 standard deviations from the mean, which were Winsorized and replaced with the effect size value three standard deviations in the same direction from the mean. Also, although both published and unpublished studies were included in the analysis, we took additional steps to ensure that publication bias did not unduly influence analysis results. To test for publication bias, two complementary methods were

used. First, the trim and fill procedure suggested by Duval and Tweedie (2000) was used on the set of effects for each outcome category before Winsorization. This technique tests whether the distribution of observed effect sizes in an analysis represents a symmetrical distribution. If it does not, the technique imputes missing values to create a normal distribution and adjusts the effect estimate given the imputed studies. In addition to trim and fill, publication status was tested as a moderator of the effect of rationale on each outcome with more than 10 effect sizes. This technique tests whether the effects are significantly smaller for unpublished studies, which would indicate publication bias.

Calculating average effect sizes. We calculated the average effect of rationale on each outcome by weighting each effect size by the inverse variance of the effect (Hedges & Olkin, 1985). In addition to the average effect, 95% confidence intervals around the average effect size were calculated. The null hypothesis that the effect was equal to zero was rejected if the 95% confidence interval did not contain zero. We determined whether the effect sizes for a given outcome category varied significantly using a within-class goodness of fit statistic (Qw) which follows a chi-square distribution having ($k-1$) degrees of freedom where k is the number of effect sizes in the analysis.

Identifying independent hypothesis tests. Many studies include multiple estimates of effects of rationale on different outcomes that are grouped in the same outcome category. This happens for a number of reasons. For example, multiple experimental groups might have been compared to a control group, groups might have been compared on several measures of the same construct, or the same outcome might have been measured at multiple time points. For instance, de Young et al. (1993) compared three experimental groups with a common control group. To maintain the assumption that effect sizes are independent, effects coming from the same sample within each outcome category were averaged prior to calculation of the overall effect of rationale on the outcome category. However, when testing moderators, this approach limits variability and obscures true differences in effects. Thus, for moderator analyses, we used a shifting unit of analysis approach (Cooper, 2010) and allowed a single sample to contribute one effect to each level of the moderator for which an effect was available. Effects within the same level of a moderator were averaged so that each sample only contributed one effect within a level of a moderator.

Tests for moderators of effects. We used homogeneity analyses to assess moderator effects (Cooper, Hedges, & Valentine, 2009). Specifically, a between class goodness of fit statistic (Q_b) was used to test whether the difference between groups varied more than would be expected due to sampling error alone. The between class statistic follows a chi-square distribution with $p - 1$ degrees of freedom, where p is equal to the number of groups in the moderator analysis. A significant between-class goodness of fit test indicates significant variation between the groups of effects for each level of the moderator. Moderator tests were run when at least two independent samples were available for at least two levels of the moderator variable and levels that had only one effect were dropped before analysis. Because each moderator was tested individually, it is possible that moderators were confounded. Confounded moderators might lead to interpreting a moderator as significant only because it co-occurs with another moderator in the sample of effects (see Cooper, 2010 for a review). To explore the extent to which confounding among moderators might have unduly impacted results or interpretation, we conducted a series of chi-square tests to examine the relations among moderator variables.

Fixed and random error models. The calculation of overall average effects and the testing of moderator effects both rely on several statistical assumptions. Two models with differing assumptions are often used: fixed-error and random-error models. The fixed-error model assumes that the variance in effect sizes is due only to variance in sampling of participants. In contrast, the random-error model assumes that the effect sizes are affected by other factors of studies, which are assumed to vary randomly. Therefore, the random-error model is more conservative than the fixed-error model.

Because it is impossible to determine which set of assumptions reflects the true reasons for variation in the distribution of observed effects, analyses were conducted using both fixed and random-error models in order to examine the impact of each set of assumptions on the results.

Following Greenhouse and Iyengar (1994), we conducted all analyses using both fixed and random error models in order to provide a sensitivity analysis. This analytic choice enables inferences regarding the impact of different assumptions on analysis results. Indeed, while some meta-analysts use the empirical results of heterogeneity tests to determine the appropriate error model, meta-analytic experts generally agree that theory should be used to guide the choice of error model and either error model may be appropriate for both main and moderator analyses and that the findings for the overall test of heterogeneity should not determine choice of model (Borenstein, Hedges, Higgins, & Rothstein, 2010; Hedges & Vevea, 1998).

Results

The literature search uncovered 23 reports that tested the effect of rationale on at least one of the following outcomes: value, autonomous motivation, engagement, performance, perceived autonomy, competence, relatedness, and controlled motivation between 1983 and 2013. From these reports, 37 independent samples contributed 289 effects, with sample sizes ranging from 18 to 265. Characteristics of included studies are listed in Table 3. Using Grubbs (1950) test, one outlier was found among the sample sizes (western sample in Study 1 of Shechter et al. (2011) and Winsorized to its nearest neighbor.

Overall Effects of Rationale Provision

Average effects of rationale on each outcome are listed in Table 4. Results showed a significant average effect of rationale on five of the eight outcomes under both fixed-effect (FE) and random-effects (RE) models: subjective task value, engagement, performance, perceived competence, and perceived autonomy. Average effect sizes ranged from a small effect on performance (FE: $d = .16$, $p < .001$; RE: $d = .19$, $p < .001$) to medium effects on perceived autonomy (FE: $d = .40$, $p < .001$; RE: $d = .38$, $p < .01$) and subjective task value (FE: $d = .33$, $p < .001$; RE: $d = .34$, $p < .001$). In addition, and contrary to expectations, the average effect of rationale on perceived competence was negative under both fixed and random-error assumptions (FE: $d = -.19$, $p < .05$; RE: $d =$

$-.19$, $p < .05$). Effects of rationale on autonomous motivation, perceived relatedness, and controlled motivation were not significant. There was significant heterogeneity in the effects of rationale on subjective task value, but not on any other outcome. However, given our theoretical reasons for exploring most moderators and the low power of heterogeneity tests, we conducted moderator analyses for outcomes with more than 10 independent effects including subjective task value, autonomous motivation, engagement, and performance.

Trim and fill analyses were conducted and results are listed in Table 5. Results suggest that the true average effects of rationale on performance and engagement may be smaller than the observed set of effect sizes suggest, with 7 missing effects being imputed on the left side of the distribution for both outcomes. After including imputed effect sizes, the effect of rationale on engagement was no longer significant under either model while the effect on performance remained significant under the fixed effects model but not the random effects model. However, publication status did not significantly moderate effects on any of the four outcomes for which moderators were tested, suggesting that the publication status of included studies did not significantly explain variability in effect sizes (see Tables 6–9). Even so, results of the trim and fill analyses suggest that findings for engagement and performance outcomes should be interpreted with caution.

Moderator Analyses

Several variables that we intended to test as moderators could not be tested because of lack of variability and/or reporting in the primary literature (developmental level, ethnicity, outcome measure for all outcomes except engagement).

Subjective task value. Moderation by six factors was tested for the effects of rationale on subjective task value: rationale type, autonomy supportive practices, interest level of the task, type of task, proportion of the sample that was female, and publication status (see Table 6). The interestingness of the task and percentage female of the sample each moderated the effect of rationales on value under fixed effects but not random effects assumptions. Results suggested that the effect of rationale on subjective task

Table 3
Characteristics of Experimental Studies Included in the Meta-Analysis

Author (year)	Report type	Subsample (n)	Rationale type	Acknowledge negative affect/ noncontrolling language	Uninteresting task	Proportion female	Time point	Outcome category (behavioral measure)	Specific outcome	d	var(d)
Bannon and Schwartz (2006)	J	32	A	NCL/N		L		P	Snack choice	.7	.15
		36	A	NCL/Y		L		P	Snack choice	.7	.13
Behrens (1999)	M	71	A	/N		H		AM	Snack choice	.29	.06
				/N				P	Cognitive L	−.19	.06
				/N				V	Pertinence	.82	.06
				/N				V	Relevance	.43	.06
		62	A	/N		H		AM		.24	.07
				/N				P	Cognitive L	.02	.06
				/N				V	Pertinence	1	.07
				/N				V	Relevance	.58	.07
		66	C	CL/N		H		AM		.18	.06
				/N				P	Cognitive L	.45	.06
				/N				V	Pertinence	.47	.06
				/N				V	Relevance	.47	.06
Behrens (1999), Pilot		56	A	/N		.		V	Pertinence	1.05	.08
				/N				V	Relevance	.69	.08
			A	/N				V	Pertinence	.83	.08
				/N				V	Relevance	.84	.08
			C	CL/N		.		V	Pertinence	.23	.07
				/N				V	Relevance	.19	.07
de Young et al. (1993)	J	46	.	/N		H		P		.5	.09
		48	.	/N				P		1.27	.1
		53	.	/N				P		.41	.08
Deci et al. (1994)	J	32	.	NCL/N	U	L		AM	Interest	.75	.13
				NCL/N	U			E(B)	Free choice	.7	.13
				NCL/N	U			V	Utility	.87	.14
		32	.	CL/Y	U	L		AM	Interest	−.01	.13
				CL/Y	U			E(B)	Free choice	.29	.13
				CL/Y	U			V	Utility	.4	.13
		64	.	NCL/Y	U	L		AM	Interest	−.26	.08
				NCL/Y	U			E(B)	Free choice	.03	.08
				NCL/Y	U			V	Utility	.81	.09

(table continues)

Table 3 (*continued*)

Author (year)	Report type	Subsample (*n*)	Rationale type	Acknowledge negative affect/ noncontrolling language	Uninteresting task	Proportion female	Time point	Outcome category (behavioral measure)	Specific outcome	*d*	var(*d*)
		64	.	CL/N	U	L		AM	Interest	.56	.09
				CL/N	U			E(B)	Free choice	−.33	.08
				CL/N	U			V	Utility	1.05	.09
Durik and Harackiewicz (2007)	J	145	A	./N		L		AM	Interest	.34	.03
				./N				E(SR)	Involvement	.07	.03
				./N				P		0	.03
				./N				V	Comp. val	.55	.03
				./N				V	Utility	.46	.03
				./N				PC		−.14	.03
Gillison et al. (2013)	J	194	C	NCL/Y		L		AM	Interest	−.05	.02
				NCL/Y				AM		.28	.02
				NCL/Y				AM	Intrinsic goal	.11	.02
				NCL/N				E(SR)	Effort	−.33	.02
				NCL/Y				V		.02	.02
		240	C	CL/N		L		AM		.13	.02
				CL/N				AM	Interest	.27	.02
				CL/N				AM		.51	.02
				CL/N				E(SR)	Intrinsic goal	.12	.02
				CL/N				V		.38	.02
		200	A	NCL/Y		L		AM	Interest	−.04	.02
				NCL/Y				AM		.1	.02
				NCL/Y				AM	Intrinsic goal	.27	.02
				NCL/Y				E(SR)	Effort	−.25	.02
				NCL/Y				V		.03	.02
		210	A	CL/N		L		AM	Interest	−.12	.02
				CL/N				AM		−.08	.02
				CL/N				AM	Intrinsic goal	−.14	.02
				CL/N				E(SR)	Effort	−.21	.02
				CL/N				V		−.03	.02
Grant et al. (2007), 1	J	22	P	./.		L		E(B)	Time	−.53	.19
				./.				P		−.04	.18
		27	P	./.		L		E(B)	Time	.7	.17
				./.				P		.9	.17
Grant et al. (2007), 2	J	30	P	./N		L		E(B)	Free choice	.8	.14
				./N				V	Significance	.91	.15

Table 3 (*continued*)

Author (year)	Report type	Subsample (n)	Rationale type	Acknowledge negative affect/noncontrolling language	Uninteresting task	Proportion female	Time point	Outcome category (behavioral measure)	Specific outcome	d	var(d)
Grant et al. (2007), 3	J	64	P	/N		H		E(B)	Persistence	−.17	.06
				/N				FR	Affective	.54	.03
		58	P	/N		H		E(B)	Persistence	.52	.07
				/N				FR	Affective	.54	.03
Grant et al. (2008), 1	J	21	AC	/N		L		P	# Donations	.32	.19
				/N				P	Dollars raised	.32	.19
		23	P	/N		L		P	# Donations	1.41	.22
				/N				P	Dollars raised	1.19	.2
Grant et al. (2007), 3	J	34	CP	/N		H		P	# Donations	1.4	.15
Grant (2012) [a]	J	38	CP	/N		H		P	Dollars raised	.71	.13
				/N				P	Revenue/Shift	−.09	.12
				/N				P	Sales	.6	.13
				/N				P		.02	.12
		41	CP	/N		H		P	Revenue	1.5	.13
				/N				P	Revenue/Shift	−.27	.11
				/N				P	Sales	1.22	.12
				/N				P	Sales/Shift	−.13	.11
		44	CP	/N		H		P	Revenue	3.35	.22
				/N				P	Revenue/Shift	.44	.1
				/N				P	Sales	3.42	.23
				/N				P	Sales/Shift	.64	.1
Grant and Hofmann (2011)	J	43	P	/N		.		P	Soap usage	.64	.1
		44	A	/N		.		P	Soap usage	−.27	.09
Hall et al. (2003)	J	122	A	/Y		H		PC	Self-efficacy	−.46	.03
		119	A	/Y		H		PC	Self-efficacy	−.06	.03
Harackiewicz et al. (2012)	J	181	A	/N		L		P	STEM courses	.31	.02
Jang (2008)	J	136	A	NCL/Y	U	H	1H	E(B)		.43	.03
				NCL/Y	U			AUT		.55	.03
				NCL/Y	U		2H	E(B)		.64	.03
				NCL/Y	U			E(SR)	Strategies	.56	.03
				NCL/Y	U			E(SR)		.42	.03
				NCL/Y	U			P	Conceptual L	.46	.03
				NCL/Y	U			P	Rote L	.3	.03
				NCL/Y				V	Importance	.7	.03
Johnson (2004)	D	265	A	/N		.		V	Relevance	.46	.02

(*table continues*)

Table 3 (*continued*)

Author (year)	Report type	Subsample (n)	Rationale type	Acknowledge negative affect/ noncontrolling language	Uninteresting task	Proportion female	Time point	Outcome category (behavioral measure)	Specific outcome	d	var(d)
Kuczynski (1983)	J	18 (Female)	P	/N	U	H		P	Rate of work	.47	.23
		18 (Male)		/N	U	L		P	Rate of work	2.09	.34
McCall (2004)	J	36	AC	/N		L	1M	P		.61	.12
				/N			2M	P		.39	.11
				/N			3M	P		.32	.11
				/N				V	Benefits	.17	.11
		33	AC	/N			1M	P	Benefits	.38	.13
				/N		L	2M	P		.47	.13
				/N			3M	P		.12	.13
				/N				V	Benefits	.11	.13
Reeve et al. (2002), 1	J	70	C	CL/N	U	H		AUT	Self-determ.	−.16	.06
				CL/N	U			E(B;SR)	Effort	.39	.06
				CL/N	U			V	Importance	−.07	.06
		70	AP	NCL/Y	U	H		AUT	Self-determ.	.62	.06
				NCL/Y	U			E(B;SR)	Effort	.59	.06
				NCL/Y	U			V	Importance	.52	.06
		70	CP	CL/N	U	H		AUT	Self-determ.	−.03	.06
				CL/N	U			E(B;SR)	Effort	.49	.06
				CL/N	U			V	Importance	−.16	.06
Reeve et al. (2002), 2	J	70	AP	NCL/Y	U	H		AUT	Self-determ.	.63	.06
				NCL/Y	U			E(B;SR)	Effort	.38	.06
				NCL/Y	U			V	Importance	.7	.06
Sansone et al. (1999)	J	111	P	/Y	U	L		E(B)	Strategy use	.34	.04
Shechter et al. (2011), 1	J	72 (Eastern)	A	/N		H		AM	Involvement	.52	.06
				/N				E(B)	Free choice	.24	.06
				/N				P		.09	.06
				/N				V	Utility	.21	.06
		210 (Western)	A	/N		L		AM	Involvement	.02	.02
				/N				E(B)	Free choice	.02	.02
				/N				P		−.22	.02
				/N				V	Utility	.08	.02
Shechter et al. (2011), 2	J	52 (Eastern)	A	/N		L		AM	Involvement	.38	.08
				/N				PC		−.25	.08
				/N				E(SR)	Effort	.5	.08
				/N				E(SR)	Involvement	.16	.08

Table 3 (*continued*)

Author (year)	Report type	Subsample (*n*)	Rationale type	Acknowledge negative affect/noncontrolling language	Uninteresting task	Proportion female	Time point	Outcome category (behavioral measure)	Specific outcome	*d*	var(*d*)
				/N				P		.09	.06
				/N				V	Comp. val	.06	.08
				/N				V	Utility	.24	.08
		56	A	/N		L		AM	Interest	−.33	.07
				/N				PC		−.62	.08
				/N				E(SR)	Effort	−.22	.07
				/N				E(SR)	Involvement	−.34	.07
				/N				P		.07	.07
				/N				V	Comp. val	−.22	.07
				/N				V	Utility	.18	.07
		61 (Western)	A	/N		L		AM	Interest	−.55	.07
				/N				PC		−.35	.07
				/N				E(SR)	Effort	−.17	.07
				/N				E(SR)	Involvement	−.1	.07
				/N				P		−.49	.07
				/N				V	Comp. val	−.13	.07
				/N				V	Utility	−.34	.07
		60	A	/N		L		AM	Involvement	−.26	.07
				/N				PC		.32	.07
				/N				E(SR)	Effort	.27	.07
				/N				E(SR)	Involvement	.38	.07
				/N				P		−.18	.07
				/N				V	Comp. val	.36	.07
				/N				V	Utility	−.21	.07
Shin (2010)	D	43	A	/N		.	U3	AM		−.2	.1
				/N			U5	AM		−.46	.1
				/N				AM		0	.1
				/N				AM	Interest	.18	.1
				/N				AM	Intrinsic value	−.06	.1
		41		/N		.		P	Application	−.93	.12
				/N				P	Definitions	.57	.12
				/N				P	Terminology	−.11	.11
		43		/N		.		P	Grade	−.58	.11
				/N				V	Utility	−.3	.1
				/N				AUT		−.18	.1

(*table continues*)

Table 3 (*continued*)

Author (year)	Report type	Subsample (*n*)	Rationale type	Acknowledge negative affect/ noncontrolling language	Uninteresting task	Proportion female	Time point	Outcome category (behavioral measure)	Specific outcome	*d*	var(*d*)
				/N			U3	CM		−.09	.1
				/N			U5	CM		−.67	.11
				/N				CM		−.35	.1
				/N				FR	to peers	.28	.1
				/N				FR	to teachers	.23	.1
				/N				PC		.41	.1
		44	A	/N		.	U3	AM		.23	.1
				/N			U5	AM		0	.1
				/N				AM		.06	.1
				/N				AM	Interest	−.06	.1
				/N				AM	Intrinsic value	−.17	.1
		43		/N		.		P	Application	.05	.1
				/N				P	Definitions	.45	.1
				/N				P	Terminology	.16	.1
		44		/N		.		P	Grade	.34	.1
				/N				V	Utility	.25	.1
				/N				AUT		.15	.1
				/N			U3	CM		.21	.1
				/N			U5	CM		−.05	.1
				/N				CM		0	.1
				/N				FR	to peers	.31	.1
				/N				FR	to teachers	−.76	.1
				/N				PC		0	.1
Steingut et al. (2012)	U	34 (Black)	AC	/N		H		AM	Interest	.24	.12
				/N				PC		−.55	.12
				/N				E(SR)		.37	.12
				/N				P		.18	.12
				/N				V		.26	.12
				/N				FR	to peers	.02	.12
		40 (White)	AC	/N		H		AM	to teachers	−.27	.1
				/N				PC		−.25	.1
				/N				E(SR)		.44	.1
				/N				P		.09	.1
				/N				V		.22	.1
				/N				FR	to teachers	−.17	.1

Table 3 (*continued*)

Author (year)	Report type	Subsample (*n*)	Rationale type	Acknowledge negative affect/ noncontrolling language	Uninteresting task	Proportion female	Time point	Outcome category (behavioral measure)	Specific outcome	*d*	var(*d*)
Vansteeenkiste et al. (2005)	J	47	C	NCL/N		L	1M	P	Conceptual	−.62	.09
				NCL/N				P		−.06	.08
				NCL/N			1M	P	Rote	.39	.09
				NCL/N				P		.13	.08
		48	C	CL/N		L	1M	P	Conceptual	−1.33	.1
				CL/N				P		−1.13	.1
				CL/N			1M	P	Rote	.28	.08
				CL/N				P		.39	.09
		48	A	NCL/N		L	1M	P	Conceptual	1.22	.1
				NCL/N				P		1.18	.1
				NCL/N			1M	P	Rote	−.64	.09
				NCL/N				P		−.2	.08
		48	A	CL/N		L	1M	P	Conceptual	1.22	.1
				CL/N				P		1.18	.1
				CL/N			1M	P	Rote	−.64	.09
				CL/N				P		−.2	.08
Vansteeenkiste et al. (2004)	J	123	C	NCL/N		L		AM	Identified	−.99	.04
				NCL/N				AM	Intrinsic reg.	−.86	.04
				NCL/N				E(SR)		−1.47	.04
				NCL/N			1W	E(B)	Persistence	−.37	.03
				NCL/N			1M	E(B)	Persistence	.45	.03
				NCL/N			4M	E(B)	Persistence	.48	.03
				NCL/N				P	Grade	−.48	.03
				NCL/N				P	Joining gym	0	0
				NCL/N				CM	Introjected	−.07	.03
				NCL/N				CM	Identified	−.06	.03
		121	C	CL/N		L		AM	Identified	−.13	.03
				CL/N				AM	Intrinsic reg.	−.65	.03
				CL/N				E(SR)		−.87	.04
				CL/N			1W	E(B)	Persistence	−.4	.03
				CL/N			1M	E(B)	Persistence	.38	.03
				CL/N			4M	E(B)	Persistence	−.09	.03
				CL/N				P	Grade	−.34	.03
				CL/N				P	Joining gym	0	0
				CL/N				CM		.89	.04

(*table continues*)

Table 3 (*continued*)

Author (year)	Report type	Subsample (n)	Rationale type	Acknowledge negative affect/ noncontrolling language	Uninteresting task	Proportion female	Time point	Outcome category (behavioral measure)	Specific outcome	d	var(d)
		133	.	CL/N		L		CM	Introjected	−.39	.03
				NCL/N				AM	Identified	−.21	.03
				NCL/N				AM	Intrinsic reg.	−.42	.03
				NCL/N			1W	E(SR)	Persistence	−.02	.03
				NCL/N			1M	E(B)	Persistence	−.35	.03
				NCL/N			4M	E(B)	Persistence	.18	.03
				NCL/N				E(B)	Persistence	.45	.03
				NCL/N				P	Grade	−.26	.03
				NCL/N				P	Joining gym	0	0
		123	.	CL/N		L		CM	Introjected	.61	.03
				CL/N				CM	Identified	.75	.03
				CL/N				AM	Intrinsic reg.	.21	.03
				CL/N			1W	E(SR)	Persistence	−.05	.03
				CL/N			1M	E(B)	Persistence	−.32	.03
				CL/N			4M	E(B)	Persistence	0	.03
				CL/N				E(B)	Persistence	1.01	.04
				CL/N				P	Grade	−.05	.03
				CL/N				P	Joining gym	−.01	.03
				CL/N				P	Joining gym	0	0
		123	A	NCL/N		L		CM	Introjected	−.6	.03
				NCL/N				CM	Identified	1.32	.04
				NCL/N				AM	Intrinsic reg.	.8	.04
				NCL/N			1W	E(SR)	Persistence	.71	.03
				NCL/N			1M	E(B)	Persistence	1	.04
				NCL/N			4M	E(B)	Persistence	.48	.03
				NCL/N				E(B)	Persistence	1.22	.04
				NCL/N				E(B)	Persistence	2.8	.06
				NCL/N				P	Grade	.46	.03
				NCL/N				P	Joining gym	1.33	.04
		122	A	NCL/N		L		CM	Introjected	−1.04	.04
				CL/N				CM	Identified	.06	.03
				CL/N				AM	Intrinsic reg.	0	.03
				CL/N				E(SR)	Persistence	.93	.04
				CL/N				AM	Intrinsic reg.	1.41	.04
				CL/N			1W	E(B)	Persistence	.02	.03

Table 3 (*continued*)

Author (year)	Report type	Subsample (n)	Rationale type	Acknowledge negative affect/ noncontrolling language	Uninteresting task	Proportion female	Time point	Outcome category (behavioral measure)	Specific outcome	d	var(d)
				CL/N			1M	E(B)	Persistence	.83	.04
				CL/N			4M	E(B)	Persistence	.44	.03
				CL/N				P	Grade	.27	.03
				CL/N				P	Joining gym	.23	.03
				CL/N				CM		0	.03
				CL/N				CM	Introjected	−.43	.03
Williams et al. (2001)	J	84 (HSE)	A	/N		H		P	Breast examination	−.01	.08
			A	/N				P	Breast examination	.52	.07
		105 (LSE)	A	/N		H		P	Breast examination	.07	.06
			A	/N				P	Breast examination	−.02	.06
		113 (MSE)	A	/N		H		P	Breast examination	.18	.05
			A	/N				P	Breast examination	.25	.05

Note. For studies in which there were a number of subgroups or experimental conditions effect sizes are presented separately. When effects from the same study cross several pages, the author and year are repeated in the first row of the new page. "." = Information not reported or did not fit any of the categories and excluded from the relevant moderator analysis. Author(year)-Numbers appearing after the year indicate studies within the report testing effects on independent samples. Report type. J = journal article; M = Master's Thesis; D = dissertation; U = unpublished manuscript. Subsample; HSE = high self-efficacy; LSE = low self-efficacy; MSE = medium self-efficacy. Rationale Type. A = Autonomous; C = controlling; p = Prosocial. For the purposes of rationale type moderator analysis, rationales that included more than one type were excluded from this moderator analysis. Proportion Female. The set of proportions was median split such that H (High) proportion female refers to a sample with greater than the median value 55% female and L (low) proportion female refers to a sample with less than the median value 55% female. Uninteresting task. U = Tasks explicitly described as uninteresting. Acknowledgment of negative affect. Y = acknowledgement of negative affect was provided; N = no acknowledgment of negative affect. In cases when we could not inspect the specific text of the rationale, we assumed there was no acknowledgment of negative affect. Noncontrolling Language. NCL = Noncontrolling language; CL = Controlling-language. When we could not examine the specific language of the text of the rationale, or the language was neither clearly noncontrolling or controlling, we assumed the language was neutral and these effects were excluded from the noncontrolling language moderator analysis. Outcome Category. p = performance; E = engagement; V = Subjective task value; AM = autonomous motivation; PC = perceived competence; AUT = perceived autonomy; FR = feelings of relatedness; CM = controlled motivation. Behavioral Measure: for engagement outcomes only, refers to whether outcomes were measured using behavioral measures (B) or self reports (SR). Time point. H = hour; W = week; M = month; U = unit. Specific Outcome = further information about outcome if relevant. a = Grant (2012) reported sales, revenue and each adjusted by number of shifts worked, raw and adjusted outcomes were averaged prior to analysis. Cognitive L = Cognitive Learning; Conceptual L = Conceptual Learning; Rote L = Rote Learning; Comp. Val = Competence Valuation; Time = Time on the phone; Affective = Affective Commitment to Beneficiaries; Reg. = Regulation.

Table 4
Results of Analyses Examining the Overall Effect of Rationale on All Outcomes

Outcome	k	n_{es}	N	d	95% confidence interval		Q_w
					Low estimate	High estimate	
Subjective task value	18	45	1,700	.33*** (.34)***	.23 (.20)	.43 (.48)	28.02*
Autonomous motivation	13	50	1,293	.08 (.08)	−.03 (−.04)	.19 (.20)	13.40
Engagement	18	59	1,686	.20*** (.22)***	.10 (.10)	.29 (.34)	20.08
Performance	27	91	2,005	.16*** (.19)***	.07 (.08)	.25 (.30)	36.52†
Autonomy	4	7	320	.40*** (.38)**	.18 (.10)	.62 (.66)	4.50
Competence	7	11	502	−.19* (−.19)*	−.37 (−.37)	−.01 (−.01)	4.06
Relatedness	4	8	182	.11 (.11)	−.20 (−.20)	.41 (.41)	2.30
Controlled motivation	3	18	300	.05 (.05)	−.19 (−.19)	.29 (.29)	.62

Note. Fixed-effects values presented outside of parentheses and random-effects values presented within parentheses. k = number of independent effects; n_{es} = number of effect sizes; N = number of participants; d = standardized mean difference; Q_w = within-class goodness of fit statistic.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

value was larger when the rationale was provided for an uninteresting task (vs. an interesting task) and for samples with a high proportion of females (vs. a low proportion of females).

Autonomous motivation. All of the moderators that were tested for subjective task value were tested for autonomous motivation with the exception of task interest level, which could not be tested due to lack of variability (see Table 7). Results suggested that type of rationale was a significant moderator. Specifically, the average weighted effect of autonomous rationales on autonomous motivation was significantly larger than the average weighted effect of controlling rationales on autonomous motivation under both fixed and random effects. There were no prosocial rationales among the set of effects of rationales on autonomous motivation.

Engagement. All of the moderators that were tested for subjective task value were tested for engagement as well. In addition, the type of

outcome measure was tested as a moderator of the effect on engagement (see Table 8). The effect of rationale on engagement varied depending on the type of rationale, autonomy supportive practices, the interestingness of the task, the proportion of females in the sample, and the type of outcome measure. Specifically, the average weighted effect of rationale on engagement differed significantly by type of rationale under the fixed, but not random-effects model. The effect of autonomous ($Q(1) = 10.12$, $p < .01$) and prosocial rationales ($Q(1) = 6.55$, $p < .05$) on engagement were significantly larger than the effect of controlling rationales. Furthermore, prosocial and autonomous rationales did not significantly differ in their effects on engagement ($Q(1) = 1.23$, $p = .27$). The average effect of rationale depended on the autonomy supportive practices provided simultaneously under the fixed error model only and so pairwise comparisons were conducted under fixed error

Table 5
Trim & Fill Analysis Results

Outcome	Side	Imputed	Observed	Total	d	95% confidence interval		Q_w
						Low estimate	High estimate	
Subjective task value	left	0	18	18	.32*** (.33)***	.22 (.19)	.42 (.46)	30.34* (30.45)*
Autonomous motivation	left	0	12	12	.08 (.08)	−.03 (−.04)	.19 (.2)	13.40 (13.40)
Engagement	left	7	18	25	.08† (.09)	−.01 (−.04)	.16 (.21)	44.84** (44.93)**
Performance	left	7	27	34	.10* (−.11)	.01 (−.06)	.18 (.28)	92.54*** (92.99)***
Competence	right	0	7	7	−.19* (−.19)*	−.37 (−.37)	−.01 (−.01)	4.06 (4.06)

Note. Fixed-effects values are presented outside of parentheses and random-effects values are within parentheses.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 6
Results of Moderator Analyses Examining the Effect of Rationale on Subjective Task Value

Moderator	k	n_{es}	N	d	95% confidence interval		Q_b
					Low estimate	High estimate	
Rationale type							.81 (.44)
Autonomous	11	26	1,326	.30*** (.32)***	.19 (.14)	.41 (.49)	
Controlling	4	7	432	.20* (.20)	.00 (−.10)	.39 (.50)	
Autonomy-supportive practices							5.76† (3.04)
All practices	5	6	540	.42*** (.50)***	.25 (.23)	.60 (.77)	
Noncontrolling Language & rationale	5	7	427	.12 (.15)	−.07 (−.14)	.31 (.44)	
Rationale only	14	31	1,211	.34*** (.34)***	.22 (.16)	.46 (.52)	
Uninteresting task							5.51* (3.36)†
Not reported	14	36	3,133	.27*** (.28)***	.16 (.13)	.38 (.42)	
Uninteresting	4	9	608	.57*** (.57)***	.35 (.29)	.80 (.84)	
Task type							3.22† (1.52)
Academic	15	35	1,360	.36*** (.36)***	.25 (.21)	.47 (.50)	
Health	2	6	276	.11 (.11)	−.15 (−.26)	.36 (.48)	
Percentage female							4.29* (1.65)
High	7	14	493	.46*** (.44)***	.28 (.21)	.64 (.66)	
Low	8	22	842	.21** (.24)*	.07 (.05)	.36 (.44)	
Publication status							1.31 (.31)
No	6	17	510	.42*** (.40)*	.23 (.15)	.61 (.66)	
Yes	12	28	1,190	.29*** (.32)***	.17 (.15)	.41 (.48)	

Note. Fixed-effects values presented outside of parentheses and random-effects values presented within parentheses. k = number of independent effects; n_{es} = number of effect sizes; N = number of participants; d = standardized mean difference; Q_b = between-class goodness of fit statistic.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

assumptions. Specifically, the effect of all three practices was greater than effect of rationale alone ($Q(1) = 4.97$, $p < .05$) and rationale accompanied by noncontrolling language ($Q(1) = 7.63$, $p < .01$). The effect of rationale accompanied by acknowledgment of negative affect did not differ from all practices ($Q(1) = .25$, $p = .62$), rationale accompanied by noncontrolling language ($Q(1) = 2.18$, $p = .14$), or rationale alone ($Q(1) = .94$, $p = .33$). The effect of rationale alone did not significantly differ from the effect of rationale accompanied by noncontrolling language ($Q(1) = 1.42$, $p = .23$). The average weighted effect of rationale on engagement for uninteresting tasks was significantly greater than the effect of rationale for other tasks under both models. The effect of rationale on engagement was significantly larger in samples with a high proportion of females than in samples with a low proportion of females under both models. Finally, the effect of rationale on behavioral measures of engagement was larger than on self-report measures of engagement under fixed, but not random-error assumptions.

Performance. All of the moderators that were tested for subjective task value were tested for performance (see Table 9). The effect of rationale on performance depended on the type of rationale, autonomy-supportive practices, task interestingness, type of task, and proportion of female participants. Moderation of the average weighted effect of rationale on performance by type of rationale was significant under both models. Prosocial rationales had the largest average effect on performance, which was significantly larger than the effect of both controlling rationales (FE: $Q(1) = 18.44$, $p < .001$; RE: $Q(1) = 10.39$, $p < .01$) and autonomous rationales (FE: $Q(1) = 9.27$, $p < .001$; RE: $Q(1) = 6.91$, $p < .01$) under both models. Autonomous rationales led to a larger effect on performance than controlling rationales under the fixed model only (FE: $Q(1) = 8.87$, $p < .01$; RE: $Q(1) = 2.07$, $p = .15$). The effect of rationale on performance depended on autonomy supportive practices under fixed but not random error assumptions and so pairwise comparisons were conducted under fixed assumptions only. Specifically, the effect of all practices combined

Table 7
Results of Moderator Analyses Examining the Effect of Rationale on Autonomous Motivation

Moderator	k	n_{es}	N	d	95% confidence interval		Q_b
					Low estimate	High estimate	
Rationale Type							13.48*** (3.93)*
Autonomous	11	33	1,178	.21*** (.21)†	.09 (−.02)	.33 (.45)	
Controlling	4	11	550	−.19* (−.23)	−.36 (−.61)	−.01 (.14)	
Autonomy-supportive practices							.23 (.21)
All practices	2	7	264	.04 (−.01)	−.21 (−.42)	.29 (.39)	
Noncontrolling language & rationale	6	11	560	.06 (.09)	−.11 (−.16)	.23 (.34)	
Rationale only	10	31	877	.1 (.08)	−.04 (−.12)	.23 (.28)	
Task type							.56 (.45)
Academic	9	22	733	.11 (.11)	−.04 (−.06)	.26 (.27)	
Health	3	24	496	.02 (.01)	−.17 (−.21)	.20 (.23)	
Percentage female							1.43 (1.34)
High	4	6	217	.23† (.23)	−.04 (−.05)	.51 (.51)	
Low	8	34	1,032	.05 (.05)	−.08 (−.09)	.18 (.18)	
Publication status							.02 (.02)
No	4	15	189	.06 (.06)	−.23 (−.25)	.36 (.37)	
Yes	9	35	1,104	.08 (.08)	−.04 (−.05)	.21 (.22)	

Note. Fixed-effects values presented outside of parentheses and random-effects values presented within parentheses. k = number of independent effects; n_{es} = number of effect sizes; N = number of participants; d = standardized mean difference; Q_b = between-class goodness of fit statistic.
† $p < .10$. * $p < .05$. *** $p < .001$.

was greater than the effect of rationale accompanied by noncontrolling language ($Q(1) = 6.50, p < .05$), but did not differ from the effect of rationale alone ($Q(1) = 3.17, p = .08$). The effects of rationale alone did not differ from the effects of rationale accompanied by noncontrolling language ($Q(1) = 3.06, p = .08$). The effects of rationale on performance were greater when provided for uninteresting tasks compared with other tasks under fixed error only. The effects of rationale on performance depended on the type of task under both models. Rationale had the greatest effect on performance of work tasks, which was greater than effect on academic (FE: $Q(1) = 16.94, p < .001$; RE: $Q(1) = 14.62, p < .001$) and health tasks (FE: $Q(1) = 12.57, p < .001$; RE: $Q(1) = 12.57, p < .001$). The effect of rationale on performance on academic and health tasks did not differ (FE: $Q(1) = .92, p = .33$; RE: $Q(1) = .86, p = .35$). Finally, the effect of rationale on performance was significantly larger in samples with a high proportion of females under the fixed-effect model only.

Relations among moderators. Finally, we examined the extent to which moderators may be confounded in a series of chi-square tests (see Table 10). Results did suggest that three

pairs of moderators may be related. Specifically, the autonomy-supportive practices moderator was related to task interestingness: fewer studies tested rationale alone or rationale accompanied by noncontrolling language for uninteresting tasks whereas all practices combined were more commonly provided for uninteresting tasks. Second, the number of autonomy supportive practices was related to the proportion of the sample that was female: rationale accompanied by noncontrolling language was more likely to be provided for samples that had a low-proportion of females than high. Finally, type of rationale was related to type of task such that work tasks were tested with prosocial rationales.

Discussion

Consistent with both self-determination (SDT) and expectancy-value theories (EVT), the results of this meta-analysis suggested that rationale provision had positive effects on adaptive motivation and performance outcomes, including subjective task value, engagement, performance, and perceived autonomy. These effects can be considered robust because they are significant under both fixed and random

Table 8
Results of Moderator Analyses Examining the Effect of Rationale on Engagement

Moderator	k	n_{es}	N	d	95% confidence interval		Q_b
					Low estimate	High estimate	
Rationale type							11.88^{**} (2.63)
Autonomous	10	29	1,199	$.24^{***}$ $(.30)^*$	.12 (.04)	.36 (.55)	
Controlling	4	11	554	$-.10$ $(-.06)$	$-.27$ $(-.45)$	.08 (.33)	
Prosocial	4	6	232	$.33^*$ (.34)	.06 $(-.11)$	.59 (.79)	
Autonomy-supportive practices							8.97^* (4.19)
Acknowledgement & rationale	2	2	143	$.33^{\dagger}$ (.32)	.00 $(-.08)$	.66 (.73)	
All practices	4	7	340	$.43^{***}$ $(.41)^{***}$	.21 (.14)	.65 (.69)	
Noncontrolling language & rationale	7	21	760	.05 (.10)	$-.09$ $(-.10)$	.20 (.29)	
Rationale only	12	29	953	$.12^{\dagger}$ $(.14)^{\dagger}$	$-.01$ $(-.02)$	.25 (.31)	
Uninteresting task							6.49^* $(5.69)^*$
Not reported	13	46	4,984	$.12^*$ $(.12)^*$	.00 (.00)	.23 (.25)	
Uninteresting	5	13	1,127	$.41^{***}$ $(.41)^{***}$	.22 (.21)	.60 (.61)	
Task type							2.00 (.97)
Academic	11	22	924	$.24^{***}$ $(.27^{**})$	.11 (.10)	.37 (.43)	
Health	3	28	496	.08 (.11)	$-.11$ $(-.15)$	.26 (.37)	
Percentage female							6.40^* $(5.39)^*$
High	7	13	486	$.39^{***}$ $(.39)^{***}$	.21 (.20)	.57 (.58)	
Low	11	46	1,200	$.11^{\dagger}$ $(.12)^{\dagger}$	$-.01$ $(-.01)$	.23 (.25)	
Measure							5.39^* $(3.18)^{\dagger}$
Self-report	9	23	968	.07 (.09)	$-.06$ $(-.07)$	.21 (.26)	
Behavioral	10	32	970	$.29^{***}$ $(.31)^{***}$	.16 (.14)	.43 (.47)	
Publication status							1.46 (.97)
No	3	3	144	$.40^*$ $(.40)^*$	.07 (.04)	.73 (.76)	
Yes	16	56	1,612	$.19^{***}$ $(.21)^{**}$	.09 (.08)	.29 (.33)	

Note. Fixed-effects values presented outside of parentheses and random-effects values presented within parentheses. k = number of independent effects; n_{es} = number of effect sizes; N = number of participants; d = standardized mean difference; Q_b = between-class goodness of fit statistic.
$^{\dagger} p < .10.$ $^* p < .05.$ $^{**} p < .01.$ $^{***} p < .001.$

error models. Further, the estimated magnitudes of significant effects were moderate and generally similar to the size of effects found in other meta-analyses testing motivational strategies from a psychological needs perspective, including rewards (Deci et al., 1999) and choice (Patall et al., 2008). In contrast to predictions based in SDT, both autonomous and controlled motivation seemed unaffected by rationale. The estimate of the effect of rationale on relatedness was in the predicted direction, but did not reach statistical significance. Most surprisingly, contrary to predictions grounded in SDT, results under both models suggested that rationale may have a significant negative effect on perceived competence.

Despite theoretical reasons for believing that rationale may support competence (Grolnick et al., 1997, 2002), our results suggested that rationale provision may decrease competence. Citing a finding that rationale led to decreases in interest among low-competence students (Godes, Hulleman, & Harackiewicz, 2007), Hulleman et al. (2010) explained that "for a student who does not do well . . . , being told that math is important may be threatening and intensify negative reactions" (p. 881). Further work should explore the conditions under which rationale may promote or undermine competence, including moderation by individual interest and perceived competence.

These unexpected negative and null effects, particularly on competence and autonomous motivation, may be explained by several factors. First, as discussed in the introduction, individual interest may be an important moderator of the effect of rationale on outcomes including perceived competence (Durik & Harackiewicz, 2007), situational interest (Durik et al., 2015), performance (Shechter et al., 2011), and behavioral effort (Shechter et al., 2011). However, the present analysis was

Table 9
Results of Moderator Analyses Examining the Effect of Rationale on Performance

Moderator	k	n_{es}	N	d	95% confidence interval		Q_b
					Low estimate	High estimate	
Rationale type							21.06*** (10.42)**
Autonomous	17	41	1,667	.15** (.16)[†]	.05 (.00)	.26 (.31)	
Controlling	4	13	358	−.14 (−.08)	−.30 (−.37)	.03 (.21)	
Prosocial	5	7	129	.75*** (.77)***	.38 (.34)	1.12 (1.19)	
Autonomy-supportive practices							8.06* (5.35)[†]
All practices	2	3	172	.44** (.46)*	.13 (.08)	.75 (.83)	
Noncontrolling language & rationale	7	19	637[a]	−.01 (.01)	−.16 (−.18)	.15 (.20)	
Rationale only	20	67	1,365	.20*** (.21)**	.08 (.08)	.31 (.34)	
Uninteresting task							5.03* (3.38)[†]
Not reported	24	87	5,503	.14** (.19)**	.05 (.06)	.24 (.32)	
Uninteresting	3	4	308	.51** (.61)*	.21 (.18)	.82 (1.04)	
Task type							17.00*** (15.57)***
Academic	12	39	1,098	.07 (.07)	−.05 (−.07)	.19 (.20)	
Health	7	26	630	.16* (.17)[†]	.00 (−.01)	.32 (.35)	
Work	4	19	128	.93*** (.93)***	.54 (.52)	1.32 (1.33)	
Percentage female							5.16* (2.08)[†]
High	12	31	804	.32*** (.34)***	.17 (.15)	.47 (.53)	
Low	13	50	1,097	.10[†] (.15)[†]	−.01 (−.02)	.21 (.32)	
Publication status							.36 (.67)
No	4	13	189	.09 (.09)	−.21 (−.28)	.39 (.46)	
Yes	23	78	1,816	.19*** (.25)***	.09 (.11)	.8 (.40)	

Note. Fixed-effects values presented outside of parentheses and random-effects values presented within parentheses. k = number of independent effects; n_{es} = number of effect sizes; N = number of participants; d = standardized mean difference; Q_b = between-class goodness of fit statistic.
[a] Based on Grubbs test, this sample size for the purposes of analysis was 608.
[†] $p < .10$.   * $p < .05$.   ** $p < .01$.   *** $p < .001$.

unable to explore the role of individual interest.

In addition to individual interest, perceived competence has been proposed as an important moderator of the effects of rationale provision. Durik et al. (2015) suggested that the effect of rationale on situational interest may be moderated by perceived competence to a greater ex-

tent than it is moderated by individual interest. Furthermore, Patall, Sylvester, and Han (2014) also found moderation by perceived competence with respect to the effects of choice, another autonomy-supportive practice: for students with low competence, choice had a negative effect on perceived competence and interest, whereas for high competence students,

Table 10
Relations Between Moderator Variables

Moderator variable	1	2	3	4	5	6
Rationale type (1)						
Autonomy supportive practices (2)			$\chi^2(3, N = 119) = 52.22^{***}$		$\chi^2(6, N = 109) = 20.84^{**}$	
Uninteresting task (3)						
Task type (4)	$\chi^2(4, N = 80) = 45.29^{***}$					
Percentage female (5)						
Behavioral (6)						

Note. Only significant results reported. Behavioral moderator only tested for engagement outcomes.
** $p < .01$.   *** $p < .001$.

choice had positive effects on these outcomes. Recent research has examined ways in which rationales can be altered to address the null or negative effects for individuals low in perceived competence. For example, Durik et al. (2015) provided a rationale along with a manipulation intended to boost perceived competence and Canning and Harackiewicz (2015) provided a rationale accompanied by a self-generated utility value intervention. Both studies found that these manipulations led to significant positive effects on interest for participants low in perceived competence, but no effects for those high in perceived competence. Essentially, the moderation pattern typically found with rationales alone was reversed.

Moderator Analyses

Moderator analyses intended to test theoretical predictions based in SDT produced mixed results. In line with predictions, type of rationale significantly moderated the effects of rationale on three outcomes: autonomous motivation, engagement, and performance, although the effect on engagement was significant under fixed models only and should therefore be interpreted with caution. Results suggested that the effects of autonomous and prosocial rationales were significantly larger than the effects of controlling rationales. Furthermore, prosocial rationales led to larger effects on performance than autonomous rationales under both models, but did not differ from autonomous rationales in effects on engagement. Results suggesting that type of rationale moderated the effects of rationale are not surprising and supports findings of previous work, in particular the work of Vansteenkiste and colleagues (Vansteenkiste et al., 2005; Vansteenkiste, Simons, Soenens, & Lens, 2004). The stronger effect for prosocial rationales on performance in particular lend some support to our speculation that such rationales may be particularly effective, which we believe may be due to prosocial rationales' association with the need for relatedness as well as needs for autonomy and competence. The practical implication of this finding is that to improve motivation and performance, people should provide rationales that are either prosocial or autonomous by highlighting how tasks can help individuals serve others, meet personal goals, and/or grow, as opposed to providing controlling rationales that appeal to external consequences such as grades, money, or appearance.

In addition to testing rationale type, the present work also tested the effect of rationales combined with other autonomy-supportive practices, including acknowledgment of negative affect and noncontrolling language as well as the effect of all three practices combined. Effects on performance and engagement depended on the number of autonomy supportive practices presented simultaneously. Evidence supported the idea that all practices have greater effects than fewer practices, although these findings were significant under fixed effects only. Contrary to predictions, the effects of all practices did not differ from the effects of rationale alone and did not differ from effects of rationale accompanied by acknowledgment of negative affect on engagement, the only outcome for which there was sufficient variability to test rationale combined with acknowledgment. Although the pattern of findings confirmed that autonomy supportive practices is an important variable to study, the support for the synergy or gestalt hypothesis is qualified. Few studies have experimentally examined the effect of rationales in combination with one or more other autonomy-supportive practices, despite the assertions of SDT that the most autonomy-supportive environments are created by a collective whole of practices (Deci et al., 1994; Reeve et al., 2002). Further, beyond acknowledgment of negative affect and noncontrolling language, future studies might test rationales in combination with other autonomy-supportive practices, such as perspective-taking or choice provision. Taken together, it remains somewhat unclear whether rationales combined with other autonomy-supportive practices may produce different effects than rationales alone. These might be fruitful directions for future research to take.

The interest level of the task significantly moderated the effects of rationale on value, engagement, and performance, all three outcomes for which this test was possible. Taken together, results suggest that, as predicted, the effects of rationale may be greater when the task is uninteresting. Although findings are in line with our predictions that rationales would have the greatest opportunity for effect when it is otherwise unclear why one would want to engage in a task, the situation may be more com-

plex than at first glance. For example, Durik and Harackiewicz (2007) found the effect of rationale on interest, task involvement, and perceived competence was greater for individuals high in baseline individual interest in math. The discrepancy between the findings of Durik and Harackiewicz (2007) and those of the present meta-analysis may be attributable in part to the fact that tasks may be normatively interesting or uninteresting even as people vary in their personal levels of interest for particular tasks. There is a precedent for such findings. Patall (2013) found the opposite patterns of moderation for the effects of choice, another autonomy-supportive practice, depending on whether the interestingness of the task or the interest level of the individual was examined as a moderator. Indeed, some of the studies that included uninteresting tasks emphasized that the learning content may not have been uninteresting, but rather that the format in which the content was provided was uninteresting (Jang, 2008; Reeve et al., 2002). Future research should explore variation in the effects of rationale across task formats and participants' interest levels.

Moderator analyses also suggested that the positive effects of rationale on subjective task value, engagement, and performance were larger for samples with a greater proportion of females. While we have suggested that a greater need for affiliation or greater communality may explain the heightened effects for females, these hypotheses have yet to be formally tested. Thus, future research should confirm the current findings of gender differences as well as examine mechanisms of this difference. Finally, given the finding that rationales are more effective for samples with a high proportion of females, it may be worthwhile to explore if rationales can be created that are more effective for men, perhaps by referring to agentic goals.

Implications and Limitations

Taken together, the present analysis has important practical implications. Individuals seeking to motivate others, including teachers, parents, employers, and doctors, may find it most beneficial to use prosocial or autonomous rationales that emphasize benefits to others, personal goals, and/or growth. They may also consider using rationales in combination with other autonomy-supportive practices and for tasks that they believe to be

uninteresting or aversive to the individuals in question. Finally, they may consider providing rationales when they are trying to facilitate motivation and performance among girls or women. In addition, the present analysis has important theoretical implications and has facilitated identification of important areas for future research about the provision of rationale. In particular, our findings suggest that type of rationale is a significant moderator, in line with predictions based in SDT and somewhat in contrast to predictions based in EVT, which suggests that more value should be better, regardless of type.

Still it is important to note several limitations of the current synthesis. First, a number of findings were based on a relatively small number of effect sizes. In addition, trim and fill analyses suggested that estimates of the effect size of rationale on engagement and performance may be overestimated as a result of publication bias. Therefore, caution is warranted in interpreting effects on engagement and performance. Analytic results should also be considered within the context of the error model adopted. Results that are the same under both fixed and random error models are robust to different distributional assumptions, whereas results that differ between the two models should be qualified by those assumptions. For instance, if a result is significant under fixed but not random error model, readers should note that the result is based on the assumption that all variance is due to sampling error.

Evidence regarding moderators generated from a meta-analysis should not be interpreted as supporting statements of causality because studies have not been randomly assigned to levels of each moderator (see Cooper, Hedges, & Valentine, 2009, chapter 28). Future research should examine significant moderators to determine causal effects. Along similar lines, moderator analyses can only be conducted for variables that are reported in primary studies and for which some variability exists between effects. Future research should explore areas of theoretical interest that this meta-analysis was unable to explore because of lack of variability in existing research.

Conclusion

When trying to motivate another individual, should we use rationales as a motivational strategy? This meta-analysis suggests that rationale provision leads to positive effects on motivation

and performance and can therefore be recommended as a motivational strategy. These effects seem to hold across various outcomes. However, effects of rationales vary from negative to positive depending on important characteristics of the rationale, such as the type of rationale, the proportion of women in the sample, and how interesting the task is considered to be. Although more research is needed to clearly understand the mechanism of the effects of rationale on motivation and performance, we hope that this synthesis serves as a useful guide for practitioners hoping to use rationales as a motivational tool and a springboard for research that can uncover the intricacies of using rationales to motivate others.

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* References marked with an asterisk indicate studies included in the meta-analysis.

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