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Achievement Goals, Reasons for Goal Pursuit, and Achievement Goal Complexes as Predictors of Beneficial Outcomes: Is the Influence of Goals Reducible to Reasons?

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In the present research, we proposed a systematic approach to disentangling the shared and unique variance explained by achievement goals, reasons for goal pursuit, and specific goal-reason combinations (i.e., achievement goal complexes). Four studies using this approach (involving nearly 1,800 participants) led to 3 basic sets of findings. First, when testing goals and reasons *separately*, mastery (-approach) goals and autonomous reasons explained variance in beneficial experiential (interest, satisfaction, positive emotion) and self-regulated learning (deep learning, help-seeking, challenging tasks, persistence) outcomes. Second, when testing goals and reasons *simultaneously*, mastery goals and autonomous reasons explained independent variance in most of the outcomes, with the predictive strength of each being diminished. Third, when testing goals, reasons, and goal complexes *together*, the autonomous mastery goal complex explained incremental variance in most of the outcomes, with the predictive strength of both mastery goals and autonomous reasons being diminished. Comparable results were observed for performance (-approach) goals, the autonomous performance goal complex, and performance goal-relevant outcomes. These findings suggest that achievement goals and reasons are both distinct and overlapping constructs, and that neither unilaterally eliminates the influence of the other. Integrating achievement goals and reasons offers the most promising avenue for a full account of competence motivation.

Educational Impact and Implications Statement

The present research seeks to disentangle the influence of "what" individuals want to achieve (type of goals), "why" they want to achieve (type of reasons), and specific "what" and "why" combinations (type of goal-reason combinations). In four studies, we showed that mastery goals (striving for task mastery), autonomous reasons (striving because it is stimulating and valued), and a specific mastery goal—autonomous reason combination (striving for task mastery because it is stimulating and valued) all made separate positive contributions to beneficial achievement-relevant outcomes (e.g., interest, positive emotion, deep learning). Comparable results were observed for performance goals (striving to outperform others) and a specific performance goal—autonomous reason combination (striving to outperform others because it is stimulating and valuable). The present findings indicate that both type of goals and type of reasons are important for a full understanding of achievement motivation.

Keywords: achievement goal, autonomous and controlled reasons, self-determination theory, achievement goal complex

The achievement goal approach provides a framework for understanding the direction of behavior, addressing the question of *what* individuals want to achieve (Dweck, 1986; Maehr & Nicholls, 1980; Nicholls, 1984). However, a complete conceptual framework of achievement motivation must also account for the energization of behavior, addressing the question of *why* individuals want to achieve (Elliot & Thrash, 2001).

The "whys" (i.e., reasons) behind achievement goals can be conceptualized in many ways (e.g., social values, achievement motives, Dompnier, Darnon, & Butera, 2009; McClelland, 1985). However, in recent years researchers have focused mostly on reasons derived from self-determination theory (SDT, Ryan & Deci, 2000). In several studies, researchers have reported that the influence of achievement goals on beneficial outcomes is no longer statistically significant when partialing out the variance explained by the SDT-derived reasons connected with the achievement goals (for a review, see Vansteenkiste, Lens, Elliot, Soenens, & Mouratidis, 2014). These findings are sometimes interpreted as indicating that the influence of achievement goals is reducible to the reasons behind them, thereby questioning the importance of achievement goals in the study of motivation.

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In the present research, we take a step back to carefully examine this empirical work and to reconsider the conclusions that can be drawn from it. We propose a systematic approach for studying achievement goals, reasons, and specific achievement goal-reason combinations (i.e., achievement goal complexes; Elliot & Thrash, 2001). We use this approach in four studies to disentangle the shared and unique variance explained by these motivational constructs in predicting the most commonly investigated beneficial outcomes in the achievement domain. We believe that this approach holds considerable promise, in that it demonstrates how achievement goals fit in a broader theory of achievement motivation.

Mastery Goals as a Predictor of Beneficial Outcomes

Achievement goals are social–cognitive mental foci that direct individuals' responses in competence-relevant situations (Elliot, 1999). Achievement goal researchers focus primarily on two types of competence-based goals, crossed by the approach-avoidance distinction (for a historical review, see Elliot, 2005). Mastery-focused individuals use a task- or self-referenced standard in competence evaluation, whereas performance-focused individuals use an other-referenced standard. Both mastery and performance goals involve striving to approach competence or avoid incompetence, resulting in a 2 × 2 model of achievement goals: mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance.

In the literature, mastery-approach goals are primarily linked to a pattern of adaptive outcomes, performance-approach goals to a mixed pattern of adaptive and maladaptive outcomes, and the two avoidance goals to varied patterns of maladaptive outcomes (for meta-analyses, see Baranik, Stanley, Bynum, & Lance, 2010; Huang, 2011, 2016; Hulleman, Schrager, Bodmann, & Harackiewicz, 2010; Van Yperen, Blaga, & Postmes, 2014, 2015). In the present research, we are interested in separating the influence of achievement goals from the influence of reasons when predicting beneficial achievement-relevant outcomes. It is therefore critical to select goals and reasons that are clearly adaptive (and whose beneficial influences are comparable in nature and scope). Accordingly, our primary focus is on mastery-approach goals (i.e., mastering a task, improving over time; hereafter referred to as mastery goals), although in our final study we extend the focus to performance-approach goals (i.e., outperforming others; hereafter referred to as performance goals).

Two types of adaptive achievement-relevant outcomes are reliably associated with mastery goals. First, mastery goals are positively related to beneficial *experiential* outcomes, that is, positive affective and phenomenological responses to achievement tasks (Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997: Pekrun, 2006). Mastery goals are thought to direct attention to the achievement activity itself and increase appraisals of task controllability and self-efficacy, thereby facilitating the positive subjective value of the task (Dweck, 1999; Kaplan & Maehr, 2007; Pekrun, Elliot, & Maier, 2006). For instance, in the workplace, mastery goals have been shown to positively predict job interest (Retelsdorf, Butler, Streblow, & Schiefele, 2010), job satisfaction (Janssen & Van Yperen, 2004), and job positive emotion (Fisher, Minbashian, Beckmann, & Wood, 2013). Second, mastery goals are positively related to beneficial s*elf-regulated learning* outcomes, that is, metacognitive, strategic, proactive responses to achievement tasks (Pintrich, 1999; Zimmerman, 1989). Mastery goals require the attainment of task-focused and intrapersonal standards, which promote a fully engaged approach to learning and full effort expenditure (Meece, Anderman, & Anderman, 2006; Nicholls, 1989; Senko, Hama, & Belmonte, 2013). As such, mastery goals have been shown to positively predict deep-processing (Diseth, 2011), interpersonal help-seeking behavior (Karabenick, 2004), a preference for challenging tasks (Ames & Archer, 1988), and task persistence (Sideridis & Kaplan, 2011).

Autonomous Reasons as a Predictor of Beneficial Outcomes

SDT is a theory of motivation that highlights the importance of underlying reasons for behavior, including goal-directed behavior (Deci & Ryan, 2000; Sheldon, 2004). The theory distinguishes between two primary types of reasons for goal pursuit. Autonomous reasons include pursuing goals because they are fun or enjoyable (intrinsic regulation), or because one identifies with them as important or meaningful (identified regulation); controlled reasons include pursuing goals because they enable one to bolster the ego or avoid feeling shame (introjected regulation), or because they allow one to obtain a reward (external regulation; Deci & Ryan, 2000). In the literature, autonomous reasons are most commonly predictors of beneficial outcomes, whereas controlled reasons are most commonly predictors of detrimental outcomes (Ratelle, Guay, Vallerand, Larose, & Senécal, 2007). Accordingly, our primary focus is on autonomous reasons (although in all of our studies we assessed and controlled for controlled reasons, as well).

Autonomous reasons for goal pursuit are associated with the same beneficial outcomes as those reviewed above for mastery goals (for a review, see Ryan & Deci, 2006). First, autonomous reasons are positively related to beneficial *experiential* outcomes, because they involve acting in a more volitional way, thereby making the activity more enjoyable and immersive (Vansteenkiste, Lens, et al., 2014). For instance, in the workplace, autonomous reasons have been shown to positively predict job interest (Gagné & Deci, 2005), job satisfaction (Lam & Gurland, 2008), and job positive emotion (Gagné et al., 2010). Second, autonomous reasons are positively related to beneficial s*elf-regulated learning* outcomes, because goal pursuit is viewed as a positive challenge, providing a meaningful impetus for effort expenditure and personal growth (Deci, Vallerand, Pelletier, & Ryan, 1991). Specifically, empirical work has shown that these reasons positively predict deep learning strategy (Vansteenkiste, Zhou, Lens, & Soenens, 2005), interpersonal help-seeking behavior (Skaalvik & Skaalvik, 2013), a preference for challenge (Standage, Duda, & Ntoumanis, 2005), and persistence (Vallerand, Fortier, & Guay, 1997).

Combining Mastery Goals and Autonomous Reasons as Predictors of Beneficial Outcomes

Any given achievement goal may be adopted for a variety of reasons. These reasons may vary from competence-relevant (e.g., to succeed at university; Dompnier et al., 2009) to not competence-relevant (e.g., to gain respect from others; Urdan & Mestas, 2006), and from intrapersonally evoked (e.g., a desire to experience pride; Urdan, 2004a) to environmentally evoked (e.g., a teacher demand; Wolters, 2004). Recently, researchers have shown an interest in conceptualizing these reasons using SDT (see Vansteenkiste & Mouratidis, 2016). Vansteenkiste, Mouratidis, and Lens (2010) were the first to publish empirical work relying on such a conceptualization. Soccer players first reported their performance goals (e.g., "It is my goal to perform better than my direct opponent"); then, they reported the autonomous and controlled reasons connected to their performance goals (e.g., "[It is my goal to perform better than my direct opponent] because this goal is a challenge to me," pp. 223–230). The relations between performance goals and beneficial experiential outcomes were found to drop to nonsignificance (e.g., for positive emotion) or considerably (e.g., for subjective vitality) when controlling for the positive influence of the autonomous reasons connected to performance goals (for comparable results in educational settings, see Gillet, Lafrenière, Vallerand, Huart, & Fouquereau, 2014; Vansteenkiste, Smeets, et al., 2010).

Gillet, Lafrenière, Huyghebaert, and Fouquereau (2015) used this same approach to study the SDT-derived reasons connected to mastery goals. Workers first reported their mastery goals, and then they reported the autonomous and controlled reasons connected to their mastery goals (e.g., "[My goal is to improve] because of the fun and enjoyment that it provides me," p. 862). The relations between mastery goals and beneficial experiential (e.g., positive emotion) and self-regulated learning (e.g., engagement) outcomes dropped to nonsignificance when controlling for the positive influence of the autonomous reasons connected to mastery goals (see also Gaudreau & Braaten, 2016; for related research with dominant achievement goals, see Michou, Vansteenkiste, Mouratidis, & Lens, 2014; Ozdemir Oz, Lane, & Michou, 2015; Vansteenkiste, Mouratidis, van Riet, & Lens, 2014).

In interpreting these results, researchers commonly state that their methodology has enabled them to detach reasons from goals, and that the autonomous reasons connected to the achievement goals are stronger (Gillet et al., 2015), more robust (Vansteenkiste, Mouratidis, et al., 2010), and more important (Deci & Ryan, 2016) predictors of beneficial outcomes than the achievement goals per se. We do not agree with these interpretations (see also Vansteenkiste, Mouratidis, et al., 2014, for a more nuanced view). We believe that the reason-based variable focused on in the extant work is best represented as an achievement goal complex. An achievement goal complex is a composite motivational construct, comprised of an achievement goal combined with information regarding the reason for pursuing the goal (Elliot & Thrash, 2001). The structural form of an achievement goal complex is "ACHIEVEMENT GOAL because REASON," which is the typical form of the reason-based variables used in the aforementioned research, for example "MY GOAL IS TO IMPROVE because OF THE FUN AND ENJOYMENT THAT IT PROVIDES ME".

The consequence of such a reinterpretation is twofold. First, in the approach used to date, autonomous and controlled reasons have only been operationalized with reference to the specific, focal achievement goal; there has been no assessment of reasons in and of themselves, separate from the focal achievement goal. Thus, from our perspective, the results of the existing research actually indicate that autonomous achievement goal complexes eliminate or reduce the influence of achievement goals per se, *not* that autonomous reasons in and of themselves eliminate or reduce the influence of achievement goals per se. Second, it is important to bear in mind that in the approach used to date there is redundancy in the measurement of achievement goals: The achievement goal is assessed multiple times, both alone as a focal goal and in the reason-based variable that connects the goal with reasons (see Senko & Tropiano, 2016, for a related point). Thus, it should not be surprising that autonomous achievement goal complexes eliminate or reduce the influence of achievement goals per se, because the two variables have overlapping content. In the following, we seek to clarify and extend the existing research by proposing a systematic approach to studying achievement goals, reasons for goal pursuit, and specific achievement goal complexes.

A Systematic Approach to Studying Goals, Reasons, and Goal Complexes

Goal complexes are multicomponent constructs. In studying them, it is important to carefully distinguish between their component parts and to design assessments accordingly. A first component is the focal goal that represents an aim per se without any accompanying reason. In measurement, it is critical to use a "pure goal" assessment uncontaminated by reason content (e.g., for mastery goals: "My goal is to learn;" see Elliot & Murayama, 2008, on this contamination issue). A second component is the focal reason that represents a more general form of motivation without any specific aim. In measurement, it is critical to also use a "pure reason" assessment uncontaminated by specific goal content (e.g., for autonomous reasons: "I pursue goals because I find them challenging").[1] Combining the pure goal with the pure reason creates a third construct, the integrated goal complex. It represents an instrumental relation between the goal and the reason: The goal serves the reason and the reason provides the impetus for goal adoption and pursuit. In measurement, this functional relation is explicitly expressed (e.g., for the autonomous mastery goal complex: "My goal is to learn because I find this a highly challenging goal").[2]

Once these three constructs—goal, reason, and goal complex—are separately assessed, they may be used in three sets of analyses. First, goals and reasons may be tested *separately* to determine their

[1] In the literature, SDT-derived reason assessments are often tied to a generic goal-directed behavior (e.g., "I work because it is fun;" Gagné & Deci, 2005, p. 334). However, goal complex assessments are not tied to a behavior, but to a particular goal (e.g., "In my work, my goal is to learn because I find it fun"; see Vansteenkiste, Lens, et al., 2014). When studying goal complexes, as distinct from other motivational complexes (see Murray, 1938), it is critical to operationalize reasons, goals, and goal complexes in a symmetrical manner: Each motivational construct should be measured with respect to the same reference component. Specifically, in order to isolate the influence of reasons from the influence of goals and goal complexes, SDT-derived reason assessments need to be stripped of behavioral elements and tied to goal regulation in general (e.g., "In my work, I pursue goals because I find them fun;" for such an operationalization, see Sheldon & Elliot, 1998).

[2] In past research, an achievement goal complex was sometimes operationalized as the product term between an achievement goal and a reason variable (e.g., Gaudreau, 2012; for experimental work, see Benita, Roth, & Deci, 2014; Spray, John Wang, Biddle, & Chatzisarantis, 2006). In our approach, however, the product term between the "pure mastery goal" variable and the "pure autonomous reason" variable would *not* correspond to an autonomous mastery goal complex. "Pure mastery goals" may be energized by reasons other than autonomous reasons (e.g., controlled reasons), whereas "pure autonomous reasons" may be directed by goals other than mastery goals (e.g., performance goals), therefore the interaction between mastery goals and autonomous reasons does not necessarily represent an autonomous mastery goal complex. In other words, high mastery goals and high autonomous reasons do not always indicate a high autonomous mastery goal complex, and a third composite variable is needed to capture the extent to which these goals and reasons combine to form a single, inseparable, and additional achievement goal complex variable.

individual links to outcomes. Second, goals and reasons may be tested *simultaneously* to determine their unique links to outcomes. Third, goal complexes may be tested together with goals and reasons to determine the incremental contribution of goal complexes to outcomes, as well as the contribution of goals per se and reasons per se. In the following, we apply this approach to the central constructs studied in our research herein: mastery goals, autonomous reasons, and autonomous mastery goal complexes.

Testing Mastery Goals and Autonomous Reasons as *Separate* Predictors

As reviewed earlier, mastery goals and autonomous reasons have been shown to similarly predict beneficial achievement-relevant outcomes. We expected to find the same predictive patterns for mastery goals and autonomous reasons as that found in prior work.

> ***Hypothesis 1:*** Mastery goals (H1a) and autonomous reasons (H1b) are positive predictors of beneficial experiential and self-regulated learning outcomes.

Testing Mastery Goals and Autonomous Reasons as *Simultaneous* Predictors

Mastery goals and autonomous reasons are both distinct and overlapping constructs. They are conceptually distinct in that they have unique properties, operate at different levels of specificity, and have different functions. Mastery goals are concrete cognitive representations of future competence-relevant possibilities that proximally direct individuals' behavior (Elliot & Fryer, 2008). Autonomous reasons are general need-based internal forces that provide energy for action (Deci & Ryan, 2008). Furthermore, principal component factor analysis has revealed that mastery goal and autonomous reason items loaded on different factors (Dysvik & Kuvaas, 2010). Given their conceptual and empirical distinctiveness, we expected mastery goals and autonomous reasons to explain independent variance in the beneficial experiential and self-regulated learning outcomes to which they are (separately) linked.

> ***Hypothesis 2:*** Mastery goals (H2a) and autonomous reasons (H2b) explain independent variance in beneficial experiential and self-regulated learning outcomes.

Although they are conceptually and empirically distinct, mastery goals and autonomous reasons are also overlapping constructs. Mastery goals are sometimes described as intrinsic goals (Pintrich & Garcia, 1991) and emerge from autonomy-supportive contexts (Diseth & Samdal, 2014); autonomous reasons are viewed as facilitating the expression of one's agentic tendency to learn (Ryan & Powelson, 1991) and emerge from mastery-focused climates (Standage et al., 2005). Furthermore, a positive correlation is commonly observed between mastery goals and autonomous reasons (e.g., Katz, Assor, & Kanat-Maymon, 2008). Given this conceptual and empirical overlap, the predictive utility of mastery goals should be diminished when partialing out the variance explained by autonomous reasons—this is consistent with the position articulated in the extant research on SDT-derived reasons and achievement goals, but has not yet been tested. Conversely, the predictive utility of autonomous reasons should also be diminished when partialing out the variance explained by mastery goals—this also has not been tested in the extant research.

> ***Hypotheses 3:*** The predictive strength of mastery goals is diminished when controlling for autonomous reasons (H3a), and the predictive strength of autonomous reasons is diminished when controlling for mastery goals (H3b).

Testing Autonomous Mastery Goal Complexes Together With Goals and Reasons

According to gestalt principles, a goal complex should be more than the mere sum of a goal and a reason (Lewin, 1951). That is, autonomous reasons combined with a mastery goal should do more than just add an exogenous reason element to the goal, they should alter the functional significance of the goal and the experience of goal regulation (Deci & Ryan, 1985; Elliot, 2006). Both mastery goals and autonomous reasons are commonly portrayed as optimal forms of motivation (Kaplan & Maehr, 2007; Sheldon, 2004), and it is likely that their integration in the form of an achievement goal complex would be particularly beneficial for achievement-relevant outcomes. Autonomous reasons may enhance mastery goal persistence and attainment via challenge appraisals (Ntoumanis et al., 2014), and mastery goals may help maintain a focus on the positive value of the task and facilitate interest-based engagement (Huang, 2011; Senko & Miles, 2008). In other words, autonomous reasons are assumed to predict goal success (i.e., effective goal regulation), and when *specifically* combined with mastery goals, goal success is assumed to further lead to beneficial experiential and self-regulated learning outcomes (i.e., effective behavior regulation). This would be consistent with the findings observed in the extant research on SDT-derived reasons and achievement goals, although in that work autonomous reasons in and of themselves were not accounted for.

> ***Hypotheses 4:*** The autonomous mastery goal complex explains incremental variance in beneficial experiential and self-regulated learning outcomes.

As noted above, there is measurement redundancy when achievement goal complexes and their component parts are assessed. As such, the predictive utility of mastery goals should be diminished when examining the autonomous mastery goal complex—this is how we interpret the findings in the extant research on SDT-derived reasons and achievement goals. Likewise, given the measurement redundancy with regard to autonomous reasons, the predictive utility of autonomous reasons should be diminished when examining the autonomous mastery goal complex—this has not been considered in the extant research.

> ***Hypotheses 5:*** The predictive strength of mastery goals (H5a) and autonomous reasons (H5b) is diminished when controlling for the autonomous mastery goal complex.

Overview of the Studies

We designed four studies to disentangle the influence of achievement goals (especially mastery goals), reasons (especially autonomous reasons), and achievement goal complexes (especially the autonomous mastery goal complex) on the most commonly investigated beneficial experiential and self-regulated learning outcomes. In Study 1, we tested Hypotheses 1a–1b, 2a–2b, and 3a–3b (detaching goals from reasons); in Studies 2 to 4, we additionally tested Hypotheses 4 and 5a–5b (detaching goal complexes from goals and reasons). In Studies 1 and 2, we assessed beneficial experiential outcomes (i.e., interest, satisfaction, positive emotion); in Studies 3 and 4, we assessed beneficial self-regulated learning outcomes (i.e., deep learning, help-seeking, challenging tasks, persistence). In Studies 1 to 3, we focused solely on the goal variable of central interest, namely mastery goals; in Study 4, we extended the hypotheses to performance goals and performance goal-relevant outcomes. Studies 1 to 3 were conducted in a work setting; Study 4 was conducted in an educational setting. In each study we also assessed controlled reasons (and associated controlled achievement goal complexes). Given that our research focused on beneficial outcomes and that controlled reasons and controlled goal complexes are more likely to be predictors of detrimental outcomes, no predictions were made for these variables. However, as in prior research, these variables were entered as covariates (e.g., Gillet et al., 2015) and the influence of controlled achievement goal complexes will be addressed in the General Discussion section.

Table 1 provides a summary and guide for the research; it states each hypothesis, its rationale, its operationalized predictor(s), and the studies and outcomes to which it relates. In all studies, sample sizes were determined a priori, and all manipulations, data exclusions, and measures analyzed are reported. Questionnaires, raw data, and syntax files for the four studies are available through FigShare (https://figshare.com/s/18543835e916a359b33e).

Study 1. Mastery Goals, Reasons, and Experiential Outcomes

Study 1 was designed to test mastery goals and SDT-derived reasons as predictors of three experiential outcomes. Participants reported their work-based mastery goals, and their autonomous and controlled reasons for goal pursuit. Participants also reported their job interest, satisfaction, and positive emotion; we assessed these variables with measures used in prior work in this area (Gillet et al., 2015, 2014; Ozdemir Oz et al., 2015).

Method

Participants. Amazon Mechanical Turk (MTurk) was used as the crowdsourcing platform for data collection. MTurk workers are more demographically diverse than standard Internet samples and American undergraduate samples (Buhrmester, Kwang, & Gosling, 2011). An a priori power analysis revealed that 395 participants were needed to detect small-sized effects ($f^2 = .02$) in a multiple linear regression model with power of .80. We oversampled to make sure that we exceeded our target sample size after excluding missing data. To participate, MTurk workers had to currently have a job. A total of 467 participants completed the questionnaire; seven were excluded a priori due to missing data on the outcome variables. The final sample consisted of 460 U.S. residents, 278 men and 181 women (one not reported), with a mean age of 32.18 (*SD* = 9.04), and having held their job for 6.03 years (*SD* = 5.70). Individuals received 0.20 USD for participating.[3]

Procedure. Participants stated their current job and reported their work-based mastery goals and reasons for goal pursuit. The goal and reason variables were counterbalanced: 249 participants completed the reason items first, 211 completed the goal items first. Then, job interest, satisfaction, and positive emotion were assessed.

Measures. Table 2 presents the descriptive statistics and correlation matrix. Participants responded using a 1 = *not at all*, 4 = *somewhat*, 7 = *completely* scale.

Mastery goals. Elliot and Murayama's (2008) Achievement Goal Questionnaire—Revised (AGQ-R) was adapted to assess work-based mastery goals. The three items were presented as "descriptions of how [one] might pursue goals at [his/her] job" (e.g., "In my job, my goal is to learn as much as possible").

Autonomous and controlled reasons for goal pursuit. Michou et al. (2014) measure was adapted to assess work-based autonomous and controlled reasons for goal pursuit. To disentangle the goal component from the reason component, we adjusted these items so that they did *not* refer to a specific achievement goal. The items were presented as "explanations for why [one] might pursue goals at [his/her] job." Two items assessed autonomous reasons (e.g., "In my job, I pursue goals because I find them highly stimulating and challenging") and four items assessed controlled reasons (e.g., "In my job, I pursue goals because others will reward me only if I achieve these goals").

Job interest. Ryan's (1982) six-item Intrinsic Motivation Inventory was adapted to assess job interest (e.g., "I would describe my work as very interesting").

Job satisfaction. Diener, Emmons, Larsen, and Griffin's (1985) five-item Satisfaction with Life Scale was adapted to assess job satisfaction (e.g., "I am satisfied with my work").

Job positive emotion. Watson, Clark, and Tellegen's (1988) Positive and Negative Affect Schedule was adapted to assess job positive emotion. Participants were asked to indicate the extent they feel 10 positive emotions in their work (e.g., "excited," "proud").

Results

Overview. We used sequential linear regression for our analyses. For each outcome variable, three models were built. First, in the "goal-only" model, only mastery goals were included as a predictor (Model 1 in Table 3). Second, in the "reason-only" model, only autonomous and controlled reasons were included as predictors (Model 2 in Table 3). Third, in the "goal-and-reason" model, mastery goals *and* autonomous and controlled reasons were included as predictors (Model 3 in Table 3). This enabled us to estimate the independent contribution of the two focal variables—mastery goals and autonomous reasons—as well as the reduction of their predictive strength when partialing out the variance accounted for by the other variable.

Preliminary analysis. We conducted a preliminary analysis to examine potential covariates: sex ("1" = male, "2" = female, for all studies), age, and seniority. In addition, we tested the

[3] For this and the subsequent studies, the payment was way well above the reservation wage of $1.38 per hour (i.e., the minimum wage a worker is willing to accept to complete a task; Horton & Chilton, 2010). Payment level has been found not to affect data quality (Buhrmester et al., 2011).

Table 1
Summary of the Hypotheses, Their Rationale, Their Operationalized Predictors, and the Studies and Outcomes to Which They Relate

Hypotheses	Rationale	Predictors and “operationalization”	Studies: Types of outcome
H1a. Mastery goals are a positive predictor of beneficial outcomes	Replication of prior research	Mastery goals alone “My goal is to learn”	S1–2: Experiential S3–4: Self-regulated learning S4: Extended to performance goals
H1b. Autonomous reasons are a positive predictor of beneficial outcomes	Replication of prior research	Autonomous reasons alone “I pursue goals because I find them challenging”	S1–2: Experiential S3–4: Self-regulated learning
H2a–b. Mastery goals (H2a) and autonomous reasons (H2b) explain independent variance in beneficial outcomes	Mastery goals and autonomous reasons differ	Mastery goals *plus* autonomous reasons	S1–2: Experiential S3–4: Self-regulated learning S4: Extended to performance goals
H3a–b. The influence of mastery goals is diminished when controlling for autonomous reasons (H3a), and vice versa (H3b)	Mastery goals and autonomous reasons overlap		S1–2: Experiential S3–4: Self-regulated learning
H4. The autonomous mastery goal complex explains incremental variance in beneficial outcomes	The autonomous mastery goal complex is more than the mere sum of goal and reason	Mastery goals *plus* autonomous reasons *plus* autonomous mastery goal complex “My goal is to learn because I	S2: Experiential S3–4: Self-regulated learning S4: Extended to performance goals
H5a–b. The influence of mastery goals (H5a) and autonomous reasons (H5b) is diminished when controlling for the autonomous mastery goal complex	Measurement redundancy	find this a highly challenging goal”	S2: Experiential S3–4: Self-regulated learning S4: Extended to performance goals

interactions between order (“1” = reasons first, “2” = goals first, for all studies) and our predictor variables (i.e., mastery goals and autonomous and controlled reasons; see Yzerbyt, Muller, & Judd, 2004). None of the covariates attained significance ($ps \geq .088$), and neither order main nor interactive effects were observed ($ps \geq .152$). Hence these terms were not considered further (including them did not change the pattern of results).

Main analyses. For this and all subsequent studies, our report of the results is hypothesis driven. Nontheoretically relevant findings are not reported in the narrative, but are included in Table 3 (which presents the full set of results). Effect size estimates are also included in the tables. These estimates are partial eta squared (η^2_p), that is, the proportion of variance *uniquely* explained by a predictor (i.e., while partialing out the effect of the other predictors).

“Goal-only” model. In line with Hypothesis 1a, mastery goals were a positive predictor of interest, $B = 0.62$ [0.53, 0.71], $p < .001$, satisfaction, $B = 0.52$ [0.42, 0.63], $p < .001$, and positive emotion, $B = 0.57$ [0.49, 0.67], $p < .001$ (numbers in brackets represents 95% confidence intervals).

“Reason-only” model. In line with Hypothesis 1b, autonomous reasons were a positive predictor of interest, $B = 0.66$ [0.59, 0.73], $p < .001$, satisfaction, $B = 0.62$ [0.54, 0.70], $p < .001$, and positive emotion, $B = 0.58$ [0.51, 0.64], $p < .001$.

“Goal-and-reason” model. In line with Hypothesis 2a, mastery goals remained a positive predictor of interest, $B = 0.26$ [0.16, 0.36], $p < .001$, and positive emotion, $B = 0.20$ [0.10, 0.30], $p <$

Table 2
Studies 1 and 2: Descriptive Statistics and Correlation Matrix for the Main Variables

	Descriptive statistics (Study 1/Study 2)			Correlation matrix (Study 1 below the diagonal, Study 2 above the diagonal).							
	α	*M*	*SD*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mastery goals (1)	.87/.84	5.84/5.85	1.13/1.05	—	.65***	.32***	.73***	.47***	.58***	.49***	.58***
Autonomous reasons (2)	.86/.80	5.33/5.51	1.38/1.21	.60***	—	.28***	.81***	.37***	.64***	.67***	.67***
Controlled reasons (3)	.65/.70	4.85/4.96	1.14/1.19	.28***	.26***	—	.30***	.83***	.07	.29***	.28***
Autonomous mastery goal complex (4)	n/a/.91	n/a/5.48	n/a/1.11	n/a	n/a	n/a	—	.42***	.62***	.60***	.66***
Controlled mastery goal complex (5)	n/a/.91	n/a/5.05	n/a/1.13	n/a	n/a	n/a	n/a	—	.21***	.36***	.38***
Job interest (6)	.88/.84	5.02/5.07	1.31/1.22	.54***	.68***	.11*	n/a	n/a	—	.71***	.68***
Job satisfaction (7)	.91/.89	4.91/5.12	1.43/1.33	.41***	.61***	.19***	n/a	n/a	.74***	—	.71***
Job positive emotion (8)	.94/.94	5.32/5.54	1.26/1.16	.52***	.66***	.26***	n/a	n/a	.78***	.76***	—

Note. n/a = applicable (i.e., the variable was not measured in the study).
* $p < .05$. *** $p < .001$.

Table 3

Studies 1 and 2: Coefficient Estimates and Effect Sizes for the Models Testing the Influence of Mastery Goals Alone (Model 1; "Goal-Only" Model), Autonomous and Controlled Reasons Alone (Model 2; "Reason-Only" Model), Mastery Goals and Reasons (Model 3; "Goal-and-Reason" Model), and Mastery Goals, Reasons, and Mastery Goal Complexes (for Study 2: Model 4; "Goal Complex" Model)

Study 1	Job interest Model 1 B	η_p^2	Job interest Model 2 B	η_p^2	Job interest Model 3 B	η_p^2	Job satisfaction Model 1 B	η_p^2	Job satisfaction Model 2 B	η_p^2	Job satisfaction Model 3 B	η_p^2	Job positive emotion Model 1 B	η_p^2	Job positive emotion Model 2 B	η_p^2	Job positive emotion Model 3 B	η_p^2
Intercept	1.37	—	1.86	—	1.15	—	1.84	—	1.38	—	1.13	—	1.94	—	1.73	—	1.18	—
Mastery goals (MAp)	$.62^{***}$	.29			> $.26^{***}$	.06	$.52^{***}$	.17			> .09	—	$.58^{***}$	.27			> $.20^{***}$	.04
Autonomous reasons			$.66^{***}$	.46	> $.54^{***}$	.29			$.62^{***}$	.35	= $.58^{***}$	.24			$.58^{***}$	.40	> $.49^{***}$	.25
Controlled reasons			$-.07^{\dagger}$	—	$-.11^{**}$	.02			.05	—	.03	—			$.11^{**}$	.01	$.08^{\dagger}$	—

Study 2	Job interest Model 1 B	η_p^2	Job interest Model 2 B	η_p^2	Job interest Model 3 B	η_p^2	Job interest Model 4 B	η_p^2	Job satisfaction Model 1 B	η_p^2	Job satisfaction Model 2 B	η_p^2	Job satisfaction Model 3 B	η_p^2	Job satisfaction Model 4 B	η_p^2	Job positive emotion Model 1 B	η_p^2	Job positive emotion Model 2 B	η_p^2	Job positive emotion Model 3 B	η_p^2	Job positive emotion Model 4 B	η_p^2
Intercept	1.13	—	1.92	—	1.08	—	1.01		1.48	—	.64	—	.46	—	.39	—	1.76	—	1.67	—	1.07	—	.98	—
Mastery goals (MAp)	$.67^{***}$	.33			> $.37^{***}$	.10	> $.28^{***}$	.05	$.62^{***}$	.24			> .08	—	.00	—	$.65^{***}$	.34			> $.27^{***}$	.06	> $.15^{*}$	.02
Autonomous reasons			$.68^{***}$	.42	> $.49^{***}$	.20	> $.39^{***}$	.09			$.70^{***}$	.41	= $.66^{***}$	.28	> $.56^{***}$	.14			$.61^{***}$	.41	> $.47^{***}$	.21	> $.34^{***}$	.08
Controlled reasons			$-.12^{**}$	.02	$-.17^{***}$	.04	$-.24^{***}$	.03			$.12^{**}$	.02	$.11^{*}$	.02	.05	—			$.10^{**}$	.02	$.07^{\dagger}$	—	−.02	—
Autonomous MAp complex							$.18^{*}$	.01							$.18^{*}$	.01							$.24^{***}$	.03
Controlled MAp complex							.09	—							.08	—							.11	—

Note. Variables are not centered." > " means that the predictive strength of mastery goals in Model 1 is significantly greater than the predictive strength of mastery goals in Model 3 (i.e., there is a significant reduction from Model 1 to Model 3); " = " means that the difference is not significant. This is the case for the other model comparisons (i.e., Model 2 vs. 3, and Model 3 vs. 4) and variable (i.e., autonomous reasons) as well.

$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

.001; contrary to the hypothesis, mastery goals no longer predicted satisfaction, $B = 0.09$ [−0.02, 0.21], $p = .117$. In line with Hypothesis 2b, autonomous reasons remained a positive predictor of interest, $B = 0.54$ [0.46, 0.62], $p < .001$, satisfaction, $B = 0.58$ [0.48, 0.67], $p < .001$, and positive emotion, $B = 0.49$ [0.41, 0.56], $p < .001$.

In this and the subsequent studies, we used the Monte Carlo method (with 50,000 simulations) to estimate the confidence intervals for reduction of the predictive strength of mastery goals when controlling for autonomous reasons, and vice versa (MacKinnon, Lockwood, & Williams, 2004). In addition, percentage reductions in the effect and Sobel tests are reported in parentheses (Z tests and p values). In line with Hypothesis 3a, the reduction of the relations between mastery goals and interest, $B = 0.38$ [0.31, 0.45] (59% reduction), satisfaction, $B = 0.40$ [0.32, 0.42] (81%), and positive emotion, $B = 0.34$ [0.27, 0.41] (63%), due to the inclusion of autonomous reasons were significant (Zs ≥ 9.30, ps $<$ .001). In line with Hypothesis 3b, the reduction of the relations between autonomous reasons and interest, $B = 0.12$ [0.07, 0.17] (18%), and positive emotion, $B = 0.09$ [0.05, 0.14] (16%), due to the inclusion of mastery goals were significant (Zs ≥ 3.96, ps $<$ .001); contrary to the hypothesis, the reduction of the relation between autonomous reasons and satisfaction, $B = 0.04$ [−0.01, 0.10] (7%), was not significant ($Z = 1.56$, $p = .118$).

Discussion

Mastery goals (Hypothesis 1a) and autonomous reasons (Hypothesis 1b) accounted for variance in interest, satisfaction, and positive emotion *when tested separately*. More importantly, mastery goals (Hypothesis 2a) and autonomous reasons (Hypothesis 2b) each explained independent variance in interest and positive emotion *when tested simultaneously*. Moreover, the predictive strength of mastery goals (Hypothesis 3a) and autonomous reasons (Hypothesis 3b) for interest and positive emotion were diminished *when taking the other into account*. This suggests that neither construct "captured" all of the variance explained by the other: Mastery goals and autonomous reasons shared predictive utility with regard to these outcomes, but their overlap was not so substantial as to conclude that one eliminates the influence of the other. For satisfaction, however, Hypothesis 2a and 3b were not supported. Mastery goals no longer explained a significant portion of variance in satisfaction when autonomous reasons were controlled, and controlling for mastery goals did not significantly diminish the influence of autonomous reasons. This suggests that for at least some outcomes, the influence of reasons may indeed outweigh the influence of goals.

One important issue that Study 1 left unaddressed is the autonomous mastery goal complex. Prior goal complex research has shown (from our perspective) that controlling for the autonomous mastery goal complex leads to a decrease in the predictive strength of mastery goals; however, it has not tested for a parallel decrease in the predictive strength of autonomous reasons. In Study 2, we unambiguously separate achievement goals, reasons, and achievement goal complexes in order to test whether the autonomous mastery goal complex explains incremental variance in interest, satisfaction, and positive emotion, and whether it diminishes the predictive strength of both mastery goals and autonomous reasons.

Study 2. Mastery Goals, Reasons, Goal Complexes, and Experiential Outcomes

Study 2 was designed to test mastery goals, SDT-derived reasons, and achievement goal complexes as predictors of the same experiential outcomes used in Study 1. Participants reported their work-based mastery goals, their autonomous and controlled reasons for goal pursuit, and their autonomous and controlled mastery goal complexes. Participants also reported their job interest, satisfaction, and positive emotion.

Method

Participants. The target sample size was the same as in Study 1. To participate, MTurk workers had to currently have a job and not have participated in Study 1. A total of 407 participants completed the questionnaire; one was excluded a priori due to missing data on the outcome variables. The final sample consisted of 406 U.S. residents, 236 men and 170 women, with a mean age of 33.18 ($SD = 10.07$), and having held their job for 6.36 years ($SD = 5.87$). Individuals received 0.20 USD for participating.

Procedure. Participants stated their current job and reported their work-based mastery goals, reasons, and goal complexes. As in Study 1, the goal and reason variables were counterbalanced: 206 participants completed the reason items first, 200 completed the goal items first. Then, job interest, satisfaction, and positive emotion were assessed.

Measures. Table 2 presents the descriptive statistics and correlation matrix. Participants responded using a 1 = *not at all*, 4 = *somewhat*, 7 = *completely* scale.

Mastery goals. The same measure used in the prior study was used in this study.

Autonomous and controlled reasons for goal pursuit. The same measure used in the prior study was used in this study.

Autonomous and controlled mastery goal complexes. Each of the three items measuring mastery goals were combined with each of the six items measuring autonomous and controlled reasons to assess work-based autonomous and controlled mastery goal complexes. The statements thus produced were presented as "descriptions of how you might pursue goals at your job, together with explanations for why you might pursue them." Six items (3 goal items × 2 reason items) assessed the autonomous mastery goal complex (e.g., "In my job, my goal is to learn as much as possible because I find this a highly stimulating and challenging goal"), and 12 items (3 goal items × 4 reason items) assessed the controlled mastery goal complex (e.g., "In my job, my goal is to learn as much as possible because others will reward me only if I achieve this goal").

Job interest, satisfaction, and positive emotion. Job interest, satisfaction, and positive emotion were assessed using the same measures used in Study 1.

Results

Overview. We used the same analytical strategy as in Study 1, albeit with a fourth step added to test the "goal complex" model. In this model, mastery goals, autonomous and controlled reasons, and autonomous and controlled mastery goal complexes were included as predictors (Model 4 in Table 3). This enabled us to estimate the incremental contribution of the autonomous mastery goal complex, as well as the reduction of the predictive strength of mastery goals and autonomous reasons when controlling for this goal complex.[4]

Preliminary analysis. As in Study 1, we conducted a preliminary analysis to examine potential covariates (sex, age, seniority) and order effects. None of the covariates attained significance ($ps \geq .061$), excepting a positive association between seniority and interest, $B = 0.02$ [0, 0.04], $p = .025$. Although no order main effects were observed ($ps \geq .634$), order interacted with mastery goals in predicting interest, $B = -0.26$ [-0.49, -0.04], $p = .021$, and with autonomous reasons in predicting interest, $B = 0.23$ [0.03, 0.42], $p = .021$, and positive emotion, $B = 0.19$ [0.01, 0.37], $p = .042$. As including these terms was neither theoretically relevant nor changed the pattern of results, they were not considered further.

Main analyses. Table 3 presents the full set of results.

"Goal-only" model. In line with Hypothesis 1a, mastery goals were a positive predictor of interest, $B = 0.67$ [0.58, 0.77], $p < .001$; satisfaction, $B = 0.62$ [0.51, 0.73], $p < .001$; and positive emotion, $B = 0.65$ [0.56, 0.73], $p < .001$.

"Reason-only" model. In line with Hypothesis 1b, autonomous reasons were a positive predictor of interest, $B = 0.68$ [0.60, 0.76], $p < .001$; satisfaction, $B = 0.70$ [0.62, 0.79], $p < .001$; and positive emotion, $B = 0.61$ [0.54, 0.68], $p < .001$.

"Goal-and-reason" model. In line with Hypothesis 2a, mastery goals remained a positive predictor of interest, $B = 0.37$ [0.26, 0.48], $p < .001$, and positive emotion, $B = 0.27$ [0.16, 0.37], $p < .001$; contrary to the hypothesis, mastery goals no longer predicted satisfaction, $B = 0.08$ [-0.04, 0.20], $p = .195$. In line with Hypothesis 2b, autonomous reasons remained a positive predictor of interest, $B = 0.49$ [0.39, 0.58], $p < .001$; satisfaction, $B = 0.66$ [0.55, 0.77], $p < .001$; and positive emotion, $B = 0.47$ [0.38, 0.56], $p < .001$.

In line with hypothesis 3a, the Monte Carlo method revealed that the reduction of the relations between mastery goals and interest, $B = 0.35$ [0.28, 0.44] (49% reduction), satisfaction, $B = 0.48$ [0.39, 0.58] (86%), and positive emotion, $B = 0.34$ [0.27, 0.42] (56%), due to the inclusion of autonomous reasons were significant ($Zs \geq 8.54$, $ps < .001$). In line with Hypothesis 3b, the reduction of the relations between autonomous reasons and both interest, $B = 0.19$ [0.13, 0.26] (29%), and positive emotion, $B = 0.14$ [0.08, 0.20] (23%), due to the inclusion of mastery goals were significant ($Zs \geq 4.75$, $ps < .001$); contrary to the hypothesis, the reduction in the relation between autonomous reasons and satisfaction, $B = 0.04$ [-0.02, 0.11] (6%), was not significant ($Z = 1.29$, $p = .196$).

"Goal complex" model. In line with Hypothesis 4, the autonomous mastery goal complex was a positive predictor of interest, $B = 0.18$ [0.03, 0.33], $p = .015$; satisfaction, $B = 0.18$ [0.02, 0.34], $p = .031$; and positive emotion, $B = 0.24$ [0.10, 0.38], $p < .001$.

Again, we used the Monte Carlo method to estimate the reduction of the predictive strength of mastery goals and autonomous reasons when controlling for the autonomous mastery goal complex. In line with Hypothesis 5a, the reduction of the relations between mastery goals and both interest $B = 0.06$ [0.01, 0.11] (18%), and positive emotion $B = 0.08$ [0.03, 0.13] (34%), due to the inclusion of the autonomous mastery goal complex were significant ($Zs \geq 2.34$, $ps \leq .019$; mastery goals remained a significant predictor in both instances, $ps \leq .01$). The analysis was not conducted for satisfaction, given the null relation for mastery goals in the "goal-and-reason" model. In line with Hypothesis 5b, the reduction of the relations between autonomous reasons and interest, $B = 0.10$ [0.02, 0.17] (20%), satisfaction, $B = 0.09$ [0.01, 0.18] (14%), and positive emotion, $B = 0.13$ [0.05, 0.20] (27%), due to the inclusion of the autonomous mastery goal complex were significant ($Zs \geq 2.14$, $ps \leq .032$; autonomous reasons remained a significant predictor in all instances, $ps < .001$).

Discussion

Replicating Study 1's findings, mastery goals and autonomous reasons accounted for variance in interest, satisfaction, and positive emotion when tested separately, and also explained independent variance in interest and positive emotion when controlling for the other variable (with the predictive strength of each being diminished). This suggests that mastery goals and autonomous reasons overlap without canceling one another. However, as in Study 1, satisfaction was more robustly predicted by autonomous reasons than by mastery goals.

Extending Study 1's findings, the autonomous mastery goal complex explained incremental variance in interest, satisfaction, and positive emotion (Hypothesis 4). Thus, mastery goals and autonomous reasons not only have an independent influence on adaptive outcomes, they fuse together in the form of a goal complex that has additional predictive benefits. Moreover, the predictive strength of mastery goals (Hypothesis 5a) and autonomous reasons (Hypothesis 5b) were diminished when controlling for the autonomous mastery goal complex. In line with Gillet et al. (2015) findings (from our perspective), controlling for the autonomous mastery goal complex diminishes the predictive strength of mastery goals per se; however, it also diminishes the predictive strength of autonomous reasons per se.

The effect sizes for mastery goals were descriptively smaller than those for autonomous reasons. One possible reason for this is the nature of the outcome variables used in the first two studies. Building on existing research, we used experiential outcomes, which may be particularly sensitive to feelings of task autonomy (Ryan & Deci, 2006). In Study 3, we switched to self-regulated learning outcomes, which may be equally sensitive to mastery goals and autonomous reasons (see Dysvik & Kuvaas, 2013). Specifically, in Study 3 we tested the same set of five hypotheses with the following self-regulated learning outcomes: deep learning, interpersonal help-seeking behavior, and challenging tasks.

Study 3. Mastery Goals, Reasons, Goal Complexes, and Self-Regulated Learning

Study 3 was designed to test mastery goals, SDT-derived reasons, and achievement goal complexes as predictors of three

[4] Vansteenkiste, Smeets, et al. (2010) noted that variables connecting autonomous or controlled reasons to a given achievement goal could seem odd for a participant not pursuing this achievement goal. Accordingly, we repeated the analyses for the full study, excluding the two participants with an average mastery goal score below 2 (3 in Study 3; 6 in Study 4). The results for the achievement goal complex variables remained essentially the same as those reported in the text (this is the case for all studies).

self-regulated learning outcomes. Participants reported their work-based mastery goals, their autonomous and controlled reasons for goal pursuit, and their autonomous and controlled mastery goal complexes. They also reported their job deep learning, help-seeking, and challenging tasks.

Method

Participants. The target sample size was the same as in the prior studies. To participate, MTurk workers had to currently have a job and not have participated in Studies 1 or 2. A total of 440 participants completed the questionnaire; 11 were excluded a priori due to missing data on the outcome variables. The final sample consisted of 429 U.S. residents, 213 men and 216 women, with a mean age of 34.19 (SD = 10.07), and having held their job for 6.23 years (SD = 6.64). Individuals received 0.30 USD for participating.

Procedure. Participants stated their current job and reported their work-based mastery goals, reasons, and goal complexes. Again, the goal and reason variables were counterbalanced: 211 participants completed the reason items first, 218 completed the goal items first. Then, job deep learning, help-seeking, and challenging tasks were assessed.

Measures. Table 4 presents the descriptive statistics and correlation matrix. Participants responded using a 1 = *not at all*, 4 = *somewhat*, 7 = *completely* scale.

Mastery goals. The same measure used in prior study was used in this study.

Autonomous and controlled reasons for goal pursuit. The same measure used in the prior study was used in this study.

Autonomous and controlled mastery goal complexes. The same measure used in the prior study was used in this study.

Job deep learning. Kirby, Knapper, Evans, Carty, and Gadula's (2003) 10-item deep subscale from the Approaches to Learning at Work Questionnaire assessed job deep learning (e.g., "I spend a good deal of my spare time learning about things related to my work").

Job help-seeking. Holman, Epitropaki, and Fernie's (2001) three-item interpersonal help seeking subscale from the Scale of Learning Strategies in the Workplace assessed job help-seeking (e.g., "I ask others for more information when I need it [at my work]").

Job challenging tasks. Preenen, De Pater, Van Vianen, and Keijzer's (2011) six-item Challenging Assignments Scale was adapted to assess job challenging tasks (e.g., "[In my work I perform tasks] that are challenging").

Results

Overview. We used the same analytical strategy used in Study 2. For each outcome variable, four linear regression models were built (see Models 1 to 4 in Table 5).

Preliminary analysis. As in Studies 1 and 2, we conducted a preliminary analysis to examine potential covariates (sex, age, seniority) and order effects. None of the covariates attained significance (ps ≥ .083), excepting a negative association between age and deep learning, $B = -0.02$ [−0.02, −0.01], $p < .001$, and a positive association between sex and help-seeking, $B = 0.20$ [0.01, 0.38], $p < .001$. An order main effect was observed on help-seeking, $B = 0.20$ [0.01, 0.40], $p = .043$, as well as an interactive effect with autonomous reasons on deep learning, $B = -0.13$ [−0.25, −0.02], $p = .022$. As including these terms was neither theoretically relevant nor changed the pattern of results, they were not considered further.

Main analyses. Table 5 presents the full set of results.

"Goal-only" model. In line with Hypothesis 1a, mastery goals were a positive predictor of deep learning, $B = 0.50$ [0.43, 0.58], $p < .001$; help-seeking, $B = 0.38$ [0.30, 0.46], $p < .001$; and challenging tasks, $B = 0.50$ [0.42, 0.58], $p < .001$.

"Reason-only" model. In line with Hypothesis 1b, autonomous reasons were a positive predictor of deep learning, $B = 0.42$ [0.37, 0.47], $p < .001$; help-seeking, $B = 0.16$ [0.09, 0.22], $p < .001$; and challenging tasks, $B = 0.37$ [0.32, 0.43], $p < .001$.

"Goal-and-reason" model. In line with Hypothesis 2a, mastery goals remained a positive predictor of deep learning, $B = 0.26$ [0.18, 0.34], $p < .001$; help-seeking, $B = 0.36$ [0.26, 0.46], $p < .001$; and challenging tasks, $B = 0.28$ [0.19, 0.37], $p < .001$. In line with Hypothesis 2b, autonomous reasons remained a positive predictor of deep learning, $B = 0.32$ [0.26, 0.38], $p < .001$, and challenging tasks, $B = 0.27$ [0.20, 0.33], $p < .001$; contrary to the hypothesis, these reasons no longer predicted help-seeking $B = 0.02$ [−0.05, 0.09], $p = .560$.

In line with hypothesis 3a, the Monte Carlo method revealed that the reduction of the relations between mastery goals and both deep learning, $B = 0.23$ [0.18, 0.28] (46% reduction), and challenging tasks, $B = 0.19$ [0.14, 0.25] (41%), due to the inclusion of autonomous reasons were significant (Zs ≥ 6.82, ps < .001); contrary to the hypothesis, the reduction in the relation between

Table 4
Study 3: Descriptive Statistics and Correlation Matrix for the Main Variables

	Descriptive statistics			Correlation matrix							
	α	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mastery goals (1)	.88	5.89	1.18	1.00							
Autonomous reasons (2)	.87	5.02	1.56	.54***	1.00						
Controlled reasons (3)	.66	4.67	1.24	.30***	.18***	1.00					
Autonomous mastery goal complex (4)	.91	5.22	1.44	.64***	.82***	.16***	1.00				
Controlled mastery goal complex (5)	.95	4.68	1.23	.32***	.21***	.79***	.24***	1.00			
Job deep learning strategy (6)	.87	4.90	1.08	.55***	.62***	.22***	.70***	.31***	1.00		
Job interpersonal help-seeking (7)	.88	5.91	1.09	.42***	.25***	.16***	.31***	.18***	.28***	1.00	
Job challenging tasks (8)	.85	5.50	1.13	.52***	.54***	.25***	.57***	.28***	.57***	.42***	1.00

*** $p < .001$.

Table 5

Study 3: Coefficient Estimates and Effect Sizes for the Models Testing the Influence of Mastery Goals Alone (Model 1; "Goal-Only" Model), Autonomous and Controlled Reasons Alone (Model 2; "Reason-Only" Model), Mastery Goals and Reasons (Model 3; "Goal-and-Reason" Model), and Mastery goals, reasons, and Mastery Goal Complexes (Model 4; "Goal Complex" Model)

	Job deep learning strategies							
	Model 1		Model 2		Model 3		Model 4	
	B	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2
Intercept	1.91	—	2.33	—	1.53	—	1.35	—
Mastery goals (MAp)	.51***	.31			> .26***	.09	> .14**	.03
Autonomous reasons			.42***	.37	> .32***	.21	> .10*	.02
Controlled reasons			.10**	.02	.04	—	−.06	—
Autonomous MAp complex							.34***	.10
Controlled MAp complex							.16**	.02

	Job interpersonal help-seeking							
	Model 1		Model 2		Model 3		Model 4	
	B	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2
Intercept	3.64	—	4.63	—	3.54	—	3.50	—
Mastery goals (MAp)	.38***	.17			= .36***	.11	.33***	.08
Autonomous reasons			.16***	.05	> .02	—	−.03	—
Controlled reasons			.10*	.01	.03	—	.01	—
Autonomous MAp complex							.08	—
Controlled MAp complex							.04	—

	Job challenging tasks							
	Model 1		Model 2		Model 3		Model 4	
	B	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2
Intercept	2.57	—	2.95	—	2.10	—	2.02	—
Mastery goals (MAp)	.50***	.27			> .28***	.08	> .21***	.04
Autonomous reasons			.37***	.28	> .27***	.13	> .15**	.02
Controlled reasons			.15***	.03	.09*	.01	.06	—
Autonomous MAp complex							.18**	.02
Controlled MAp complex							.06	—

Note. Variables are not centered." > " means that the predictive strength of mastery goals in Model 1 is significantly greater than the predictive strength of mastery goals in Model 3 (i.e., there is a significant reduction from Model 1 to Model 3); " = " means that the difference is not significant. This is the case for the other model comparisons (i.e., Model 2 vs. 3, and Model 3 vs. 4) and variable (i.e., autonomous reasons) as well.
* $p < .05$. ** $p < .01$. *** $p < .001$.

mastery goals and help-seeking, $B = 0.02$ [−0.04, 0.07] (4%), was not significant ($Z < 1$, $p = .560$). In line with Hypothesis 3b, the reduction of the relations between autonomous reasons and deep learning, $B = 0.10$ [0.07, 0.14] (24%); help-seeking, $B = 0.14$ [0.10, 0.18] (87%); and challenging tasks, $B = 0.11$ [0.07, 0.14] (28%) due to the inclusion of mastery goals were significant (*Z*s ≥ 5.52, *p*s < .001).

"Goal complex" model. In line with Hypothesis 4, the autonomous mastery goal complex was a positive predictor of deep learning, $B = 0.34$ [0.24, 0.43], $p < .001$, and challenging tasks, $B = 0.18$ [0.07, 0.30], $p = .001$; contrary to the hypothesis, the autonomous mastery goal complex did not predict help-seeking, $B = 0.08$ [−0.04, 0.21], $p = .205$.

In line with Hypothesis 5a, the Monte Carlo method revealed that the reduction of the relations between mastery goals and both deep learning, $B = 0.11$ [0.07, 0.15] (45%), and challenging tasks, $B = 0.06$ [0.02, 0.10] (23%), due to the inclusion of the autonomous mastery goal complex were significant (*Z*s ≥ 3.01, *p*s ≤ .003; mastery goals remained a significant predictor in both instances, *p*s ≤ .001). In line with Hypothesis 5b, the reduction of the relations between autonomous reasons and both deep learning, $B = 0.21$ [0.15, 0.27] (67%), and challenging tasks, $B = 0.11$ [0.04, 018] (43%), due to the inclusion of the autonomous mastery goal complex were significant (*Z*s ≥ 3.17, *p*s ≤ .002; autonomous reasons remained a significant predictor in both instances, *p*s ≤ .011). The analysis was not conducted for help-seeking, given the null relation for the autonomous mastery goal complex.

Discussion

Consistent with Studies 1 and 2, mastery goals and autonomous reasons accounted for variance in deep learning, help-seeking, and challenging tasks when tested separately, and also explained independent variance in deep learning and challenging tasks when tested simultaneously (with the predictive strength of each being diminished). For help-seeking, however, predictions were not supported. Autonomous reasons no longer explained a significant portion of variance in help-seeking when mastery goals were controlled for, and controlling for autonomous reasons did not significantly diminish the influence of mastery goals. Together with the Studies 1 and 2's findings for satisfaction, this indicates that autonomous reasons may be a more reliable predictor of some variables (satisfaction) and mastery goals a more reliable predictor of others (help-seeking). Rather than concluding that one construct unilaterally reduces the predictive utility of the other, it seems best to view both as important predictors that vary in strength as a function of the outcome in question.

Moreover, consistent with Study 2's findings, the autonomous mastery goal complex explained additional variance in deep learning and challenging tasks (but not help-seeking), and diminished the predictive strength of mastery goals and autonomous reasons. Thus, again, the autonomous mastery goal complex seems important to consider, and it seems to capture some of the variance explained by mastery goals per se and autonomous reasons per se.

We conducted Study 4 in the academic domain rather than the work domain (see Van Yperen et al., 2014, on the importance of attending to different achievement domains). Study 4 had a threefold aim. First, we sought to test the robustness of Study 3's findings regarding mastery goals, autonomous reasons, and the autonomous mastery goal complex as predictors of deep learning and challenging tasks. Second, we sought to extend Studies 1–3's findings by testing our hypotheses with performance goals. In doing so, we included two outcome variables that performance goals have been shown to positively predict in prior research: surface learning and grade aspiration (Elliot & McGregor, 2001; McGregor & Elliot, 2002). Third, we sought to include an additional outcome variable relevant to mastery goals, performance goals, and autonomous reasons, namely study persistence (Elliot, McGregor, & Gable, 1999; Vallerand et al., 1997). We tested all mastery and performance goal hypotheses in multiple regression models with both goals included, thereby allowing us to determine the influence of each goal while controlling for the influence of the other.

Study 4. Achievement Goals, Reasons, Goal Complexes, and Self-Regulated Learning

Study 4 was designed to test achievement goals, SDT-derived reasons, and achievement goal complexes as predictors of five self-regulated learning outcomes in an academic context. Students reported their academic mastery and performance goals, their autonomous and controlled reasons for goal pursuit, and their autonomous and controlled mastery and performance goal complexes. Participants also reported their deep learning, surface learning, challenging tasks, grade aspiration, and study persistence.

First, all hypotheses were the same for mastery goals, autonomous reasons, and the autonomous mastery goal complex predicting *deep learning* and *challenging tasks*. Second, the hypotheses were extended to performance goals. Performance goals were expected to be a positive predictor of *surface learning* and *grade aspiration* (Hypothesis 1a), even when controlling for autonomous reasons (Hypothesis 2a). Because autonomous reasons are neither compatible nor incompatible with these outcomes (e.g., Donche, Maeyer, Coertjens, Van Daal, & Van Petegem, 2013; Kusurkar, Ten Cate, Vos, Westers, & Croiset, 2013), Hypotheses 1b, 2b, 3a, and 3b, were not formulated. However, as autonomous reasons may be an ideal motivational foundation from which to efficiently pursue performance goals, the autonomous performance goal complex was expected to explain independent variance in surface learning and grade aspiration (Hypothesis 4), and to lead to a decrease in the predictive strength of performance goals (Hypothesis 5a). Given the absence of Hypothesis 1b, Hypothesis 5b was not formulated. Third, mastery goals (Hypothesis 1a), performance goals (Hypothesis 1a), and autonomous reasons (Hypothesis 1b) were each expected to be a positive predictor of *study persistence*; accordingly, all remaining hypotheses (Hypotheses 2–5) applied to the relations between the focal predictor variables (mastery goals, performance goals, autonomous reasons, and the autonomous achievement goal complexes) and study persistence.

Method

Participants. The target sample size was the same as in the prior studies. The study was administered via the SONA Psychology Research Participation System of a medium-sized U.S. university. A total of 481 participants completed the questionnaire; 24 were excluded a priori due to missing data on the outcome variables. The final sample consisted of 457 students from various study fields, 103 men and 354 women, with a mean age of 20.21 (SD = 1.77), 81 of which were freshmen, 135 sophomores, 118 juniors, and 122 seniors (1 "other"). Individuals received 0.5 extra course credit for participating.

Procedure. Participants reported their academic achievement goals, reasons, and goal complexes. Again, the goal and reason variables were counterbalanced: 234 participants completed the reason items first, 223 completed the goal items first. Then, deep and surface learning, challenging tasks, grade aspiration, and study persistence were assessed.

Measures. Table 6 presents the descriptive statistics and correlation matrix. Participants responded using a 1 = *not at all*, 4 = *somewhat*, 7 = *completely* scale, unless otherwise specified. The items for all predictor variables are provided in the Appendix.

Mastery and performance goals. Elliot and Murayama's (2008) AGQ-R was used to assess mastery and performance goals. To keep the achievement goal complex variables at a reasonable length, we used only two items to assess mastery goals and two

Table 6
Study 4: Descriptive Statistics and Correlation Matrix for the Main Variables

	Descriptive statistics			Correlation matrix												
	α	*M*	*SD*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Mastery goals (1)	.78	5.40	1.19	1.00												
Performance goals (2)	.79	5.21	1.30	.36***	1.00											
Autonomous reasons (3)	.77	5.15	1.14	.62***	.30***	1.00										
Controlled reasons (4)	.70	4.32	1.17	.10*	.39***	.10*	1.00									
Autonomous mastery goal complex (5)	.88	5.18	1.10	.73***	.30***	.73***	.08†	1.00								
Controlled mastery goal complex (6)	.87	4.21	1.17	.13**	.39***	.09†	.85***	.14**	1.00							
Autonomous performance goal complex (7)	.88	4.74	1.31	.29***	.60***	.36***	.33***	.42***	.39***	1.00						
Controlled performance goal complex (8)	.90	4.22	1.27	−.01	.49***	.02	.72***	.02	.79***	.53***	1.00					
Deep learning strategy (9)	.82	4.61	.91	.48***	.22***	.56***	.17***	.58***	.21***	.39***	.14**	1.00				
Surface learning strategy (10)	.84	4.98	.88	.26***	.34***	.21***	.32***	.24***	.35***	.29***	.32***	.16***	1.00			
Challenging tasks (11)	.82	4.94	.98	.37***	.30***	.45***	.18***	.44***	.21***	.34***	.19***	.43***	.29***	1.00		
Grade aspiration (12)	n/a	10.22	1.25	.14**	.15**	.19***	−.05	.20***	−.06	.19***	−.01	.21***	.00	.01	1.00	
Persistence (13)	.85	5.29	1.15	.48***	.36***	.49***	.13**	.53***	.12**	.36***	.09*	.39***	.43***	.40***	.25***	1.00

Note. n/a means not applicable (i.e., the scale only comprises one item).
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

items to assess performance goals (e.g., "My goal is to perform better than the other students").

Autonomous and controlled reasons for goal pursuit. The same measure used in the prior study was used in this study, albeit "in my job" was replaced by "in my classes."

Autonomous and controlled mastery and performance goal complexes. Autonomous and controlled achievement goal complexes were operationalized in the same way as in the prior studies (i.e., by combining each goal statement with each reason statement): Four items (2 goal items $\times$ 2 reason items) assessed the autonomous mastery goal complex, eight items (2 goal items $\times$ 4 reason items) assessed the controlled mastery goal complex, four items (2 goal items $\times$ 2 reason items) assessed the autonomous performance goal complex, and eight items (2 goal items $\times$ 4 reason items) assessed the controlled performance goal complex.

Deep and surface learning. Kirby et al.'s (2003) Approaches to Learning at Work Questionnaire was adapted to the academic domain. Ten items assessed deep learning (e.g., "I spend a good deal of my spare time learning about things related to my classes") and 10 items assessed surface learning (e.g., "The best way for me to understand what technical terms me is to remember the textbook definitions").

Challenging tasks. Preenen et al.'s (2011) six-item Challenging Assignments Scale was adapted to the academic domain to assess challenging tasks (e.g., "[In my classes I perform tasks] that are challenging").

Grade aspiration. McGregor and Elliot's (2002) single item measure was used to assess grade aspiration. Participants were asked to indicate "the minimum average grade that [they] would be satisfied with in [their] classes this semester" using a 12-point scale ranging from A to F (coded A $=$ 12, A$-$ $=$ 11, B$+$ $=$ 10 . . . , F $=$ 1).

Study persistence. Elliot et al.'s (1999) four-item persistence subscale was used to assess study persistence (e.g., "When something that I am studying gets difficult, I spend extra time and effort trying to understand it").

Results

Overview. We used the same analytical strategy used in Studies 2 and 3, albeit performance goals were included in the goal models. For each outcome variable, four models were built: the "goal-only" model (including mastery and performance goals; Model 1 in Tables 7 and 8), the "reason-only" model (including autonomous and controlled reasons; Model 2 in Tables 7 and 8), the "goal-and-reason" model (including mastery and performance goals *and* autonomous and controlled reasons; Model 3 in Tables 7 and 8), and the "goal complex" model (including achievement goals, reasons, *and* autonomous and controlled mastery and performance goal complexes; Model 4 in Tables 7 and 8).

Preliminary analysis. As in Studies 1–3, we conducted a preliminary analysis to examine potential covariates (sex, age, year at school) and order effects. None of the covariates attained significance ($ps > .111$), excepting a negative association between sex and deep learning, $B = -0.33$ [-0.49, -0.17], $p < .001$, and between age and challenging tasks, $B = -0.06$ [-0.12, 0], $p = .049$. Although no order main effects were observed ($ps > .116$), order interacted with performance goals in predicting persistence, $B = -0.17$ [-0.33, -0.01], $p = .042$. Again, as including these terms was neither theoretically relevant nor changed the pattern of results, they were not considered further.

Main Analyses

Deep learning and challenging tasks. Table 7 presents the full set of results.

"Goal-only" model. In line with Hypothesis 1a, mastery goals were a positive predictor of deep learning, $B = 0.35$ [0.28, 0.42], $p < .001$, and challenging tasks, $B = 0.25$ [0.18, 0.33], $p < .001$.

"Reason-only" model. In line with Hypothesis 1b, autonomous reasons were a positive predictor of deep learning, $B = 0.44$ [0.38, 0.50], $p < .001$, and challenging tasks, $B = 0.38$ [0.30, 0.45], $p < .001$.

Table 7
Study 4 (Deep Learning and Challenging Tasks): Coefficient Estimates and Effect Sizes for the Models Testing the Influence of Achievement Goals Alone (Model 1; "Goal-Only" Model), Autonomous and Controlled Reasons Alone (Model 2; "Reason-Only" Model), Achievement Goals and Reasons (Model 3; "Goal-and-Reason" Model), and Achievement Goals, Reasons, and Goal Complexes (Model 4; "Goal Complex" Model)

	Deep learning strategies										Challenging tasks									
	Model 1		Model 2			Model 3			Model 4		Model 1		Model 2			Model 3			Model 4	
	B	η_p^2	*B*	η_p^2		*B*	η_p^2		*B*	η_p^2	*B*	η_p^2	*B*	η_p^2		*B*	η_p^2		*B*	η_p^2
Intercept	2.52	—	1.97	—		1.69	—		1.47	—	2.85	—	2.51	—		2.15	—		1.95	—
Mastery goals (MAp)	$.35^{***}$	.19			>	$.17^{***}$	.04	>	$.08^{\dagger}$	.01	$.25^{***}$	.09			>	$.10^{*}$	.01	>	.05	—
Performance goals (PAp)	.04	—				$-.02$	—		$-.09^{*}$	.01	$.14^{***}$	.03				$.09^{*}$	.01		.04	—
Autonomous reasons			$.44^{***}$	.31	>	$.34^{***}$	.14	>	$.22^{***}$	.05			$.38^{***}$	.19	>	$.29^{***}$	.08	>	$.21^{***}$	.03
Controlled reasons			$.09^{**}$	.02		$.09^{**}$	.02		.00	—			$.12^{***}$	.02		$.08^{*}$	.01		$-.01$	—
Autonomous MAp complex									$.20^{***}$	.03									$.15^{*}$	.01
Controlled MAp complex									.09	—									.04	—
Autonomous PAp complex									$.13^{***}$	.03									.05	—
Controlled PAp complex									.00	—									.07	—

Note. Variables are not centered." **>** " means that the predictive strength of mastery goals in Model 1 is significantly greater than the predictive strength of mastery goals in Model 3 (i.e., there is a significant reduction from Model 1 to Model 3). This is the case for the other model comparisons (i.e., Model 2 vs. 3, and Model 3 vs. 4) and variable (i.e., autonomous reasons) as well.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 8

Study 4 (Surface learning, Grade aspiration, and Study Persistence): Coefficient Estimates and Effect Sizes for the Models Testing the Influence of Achievement Goals Alone (Model 1; "Goal-Only" Model), Autonomous and Controlled Reasons Alone (Model 2; "Reason-Only" Model), Achievement Goals and Reasons (Model 3; "Goal-and-Reason" Model), and Achievement Goals, Reasons, and Goal Complexes (Model 4, "Goal Complex" Model)

	Surface learning strategies								Grade aspiration								Study persistence							
	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	B	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2	*B*	η_p^2
Intercept	3.36	—	3.27	—	2.83	—	2.71	—	9.00	—	9.39	—	9.07	—	9.05	—	2.22	—	2.43	—	1.68	—	1.54	—
Mastery goals (MAp)	.12***	.02			.11*	.01	.09†	.01	.11*	.01			−.01	—	−.06	—	.39***	.17			> .23***	.04	> .12*	.01
Performance goals (PAp)	.19***	.07			.12***	.03	.09*	.01	.12*	.01			.15**	.02	> .09	—	.19***	.05			> .16***	.04	> .13**	.02
Autonomous reasons			.14***	.04	.03	—	.02	—			.22***	.04	.18**	.02	.10	—			.48***	.23	> .29***	.07	> .15**	.02
Controlled reasons			.23***	.10	.17***	.05	.05	—			−.07	—	−.13*	.01	−.03	—			.09*	.01	.01	—	.10	—
Autonomous MAp complex							.05	—							.12	—							.25***	.03
Controlled MAp complex							.12	—							−.13	—							−.10	—
Autonomous PAp complex							.02	—							.13*	.01							.08†	.01
Controlled PAp complex							.05	—							−.01	—							−.03	—

Note. Variables are not centered. " **>** " means that the predictive strength of mastery (/performance) goals in Model 1 is significantly or marginally greater than the predictive strength of mastery (/performance) goals in Model 3 (i.e., there is a significant or marginal reduction from Model 1 to Model 3); " **=** " means that the difference is not significant. This is the case for the other model comparisons (i.e., Model 2 vs. 3, and Model 3 vs. 4) and variables (i.e., performance goals and autonomous reasons) as well.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

"Goal-and-reason" model. In line with Hypothesis 2a, mastery goals remained a positive predictor of deep learning, $B = 0.17$ [0.09, 0.24], $p < .001$, and challenging tasks, $B = 0.10$ [0.01,0.18], $p = .031$. In line with Hypothesis 2b, autonomous reasons remained a positive predictor of deep learning, $B = 0.34$ [0.26, 0.41], $p < .001$, and challenging tasks, $B = 0.29$ [0.20, 0.37], $p < .001$.

In line with hypothesis 3a, the Monte Carlo method revealed that the reduction of the relations between mastery goals and both deep learning, $B = 0.19$ [0.14, 0.24] (53% reduction), and challenging tasks, $B = 0.16$ [0.11, 0.22] (63%), due to the inclusion of autonomous reasons were significant (Zs ≥ 5.85, ps $< .001$). In line with Hypothesis 3b, the reduction of the relations between autonomous reasons and both deep learning, $B = 0.10$ [0.05, 0.14] (22%), and challenging tasks, $B = 0.06$ [0.01, 0.11] (16%), due to the inclusion of mastery goals were significant (Zs ≥ 2.15, ps $\leq .032$).

"Goal complex" model. In line with Hypothesis 4, the autonomous mastery goal complex was a positive predictor of deep learning, $B = 0.20$ [0.10, 0.31], $p < .001$, and challenging tasks, $B = 0.15$ [0.02, 0.28], $p = .023$.

In line with Hypothesis 5a, the Monte Carlo method revealed that the reduction of the relations between mastery goals and both deep learning, $B = 0.08$ [0.04, 0.13] (49%), and challenging tasks, $B = 0.06$ [0.01, 0.11] (56%), due to the inclusion of the autonomous mastery goal complex were significant (Zs ≥ 2.24, ps $\leq .025$; mastery goals respectively became a marginal, $p = .057$, and a nonsignificant, $p = .374$, predictor). In line with Hypothesis 5b, the reduction of the relations between autonomous reasons and both deep learning, $B = 0.08$ [0.04, 0.13] (27%), and challenging tasks, $B = 0.06$ [0.01, 0.11] (22%), due to the inclusion of the autonomous mastery goal complex were significant (Zs ≥ 2.24, ps $\leq .025$; autonomous reasons remained a significant predictor in both instances, ps $< .001$).

Surface learning and grade aspiration. Table 8 presents the full set of results.

"Goal-only" model. In line with Hypothesis 1a, performance goals were a positive predictor of surface learning, $B = 0.19$ [0.13, 0.25], $p < .001$, and grade aspiration, $B = 0.12$ [0.02, 0.21], $p = .018$.[5]

"Goal-and-reason" model. In line with Hypothesis 2a, performance goals remained a positive predictor of surface learning, $B = 0.12$ [0.06, 0.19], $p < .001$, and grade aspiration, $B = 0.15$ [0.05, 0.26], $p = .004$. Hypothesis 2b, 3a, and 3b were not formulated.

"Goal complex" model. Contrary to Hypothesis 4, the autonomous performance goal complex was not a positive predictor of surface learning, $B = 0.02$ [−0.07, 0.10], $p = .708$; in line with Hypothesis 4, the autonomous performance goal complex was a positive predictor of grade aspiration, $B = 0.13$ [0, 0.27], $p = .047$.

Hypothesis 5a was not tested for surface learning, given the null result for the autonomous performance goal complex. In line with Hypothesis 5a, the Monte Carlo method revealed that the 36% reduction of the relation between performance goals and grade

[5] Thirty-eight participants did not provide an answer to the single-item grade aspiration scale; they were treated as missing values for this outcome variable.

aspiration due to the inclusion of the autonomous performance goal complex was significant, $B = 0.05$, [0, 0.10] (although $Z = 1.94$, $p = .051$; performance goals became a nonsignificant predictor, $p = .158$). Hypothesis 5b was not formulated.

Persistence. Table 8 presents the full set of results.

"Goal-only" model. In line with Hypothesis 1a, both mastery goals and performance goals were a positive predictor of study persistence, $B = 0.39$ [0.31, 0.47], $p < .001$, and $B = 0.19$ [0.11, 0.26], $p < .001$, respectively.

"Reason-only" model. In line with Hypothesis 1b, autonomous reasons were a positive predictor of study persistence, $B = 0.48$ [0.40, 0.57], $p < .001$.

"Goal-and-reason" model. In line with Hypothesis 2a, both mastery goals, $B = 0.23$ [0.13, 0.32], $p < .001$, and performance goals, $B = 0.16$ [0.08, 0.24], $p < .001$, remained a positive predictor of study persistence. In line with Hypothesis 2b, autonomous reasons remained a positive predictor of study persistence, $B = 0.29$ [0.19, 0.39], $p < .001$.

In line with hypothesis 3a, the Monte Carlo method revealed that the 42% reduction of the relation between mastery goals and study persistence due to the inclusion of autonomous reasons was significant, $B = 0.16$ [0.11, 0.22] ($Z = 5.42$, $p < .001$); the corresponding 11% reduction of the relation between performance goals and study persistence was marginal, $B = 0.02$ [0, 0.04] ($Z = 1.77$, $p = .077$). In line with Hypothesis 3b, the 31% reduction of the relation between autonomous reasons and study persistence due to the inclusion of mastery goals was significant, $B = 0.13$ [0.07, 0.19] ($Z = 4.39$, $p < .001$); the corresponding 6% reduction of the relation between autonomous reasons and study persistence due to the inclusion of performance goals was marginal, $B = 0.02$ [0, 0.04] ($Z = 1.69$, $p = .092$).

"Goal complex" model. In line with Hypothesis 4, the autonomous mastery goal complex was a positive predictor of study persistence, $B = 0.25$ [0.11, 0.40], $p < .001$, and the autonomous performance goal complex was a marginally significant positive predictor, $B = 0.08$ [−0.01, 0.18], $p = .092$.

In line with Hypothesis 5a, the Monte Carlo method revealed that the 45% reduction of the relation between mastery goals and study persistence due to the inclusion of the autonomous mastery goal complex was significant, $B = 0.10$ [0.04, 0.16] ($Z = 3.36$, $p < .001$; mastery goals remained a positive predictor, $p = .035$). The 18% reduction of the relation between performance goals and study persistence due to the inclusion of the autonomous performance goal complex was marginal, $B = 0.03$ [0, 0.07] ($Z = 1.66$, $p = .098$). In line with Hypothesis 5b, the 39% reduction of the relation between autonomous reasons and study persistence due to the inclusion of the autonomous mastery goal complex was significant, $B = 0.10$ [0.04, 0.16] ($Z = 3.36$, $p < .001$; autonomous reasons remained a positive predictor, $p = .009$); the corresponding 4% reduction due to the inclusion of the autonomous performance goal complex was nonsignificant, $B = 0.10$ [0, 0.23] ($Z = 1.13$, $p = .260$).

Discussion

Replicating Study 3's findings, mastery goals and autonomous reasons accounted for variance in deep learning and challenging tasks when tested separately or simultaneously (with the predictive strength of each being diminished). Moreover, the autonomous mastery goal complex explained additional variance in deep learning and challenging tasks, and diminished the predictive strength of both mastery goals and autonomous reasons.

Extending Study 3's findings, performance goals accounted for variance in surface learning and grade aspiration, when testing goals and reasons separately or simultaneously. Moreover, the autonomous performance goal complex explained additional variance in grade aspiration, and diminished the predictive strength of performance goals. The autonomous performance goal complex did not explain additional variance in surface learning.

Further extending Study 3's findings, mastery goals, performance goals, and autonomous reasons accounted for variance in study persistence when testing goals and reasons separately or simultaneously (with the predictive strength of each being diminished). Moreover, the autonomous mastery and performance goal complexes explained additional variance in persistence, and diminished the predictive strength of mastery goals, performance goals, and autonomous reasons. The reductions of the influence of performance goals and the influence of the autonomous performance goal complex only attained marginal significance.

General Discussion

Although research on achievement goals and reasons has only recently commenced, there has been a growing interest in studying the SDT-derived reasons connected to achievement goals (see Vansteenkiste, Lens, et al., 2014). The findings from this work have often been interpreted as indicating that the influence of achievement goals on beneficial outcomes is reducible to the influence of reasons. In the present research, we developed a systematic approach to studying goals, reasons, and goal complexes, and utilized this approach to clearly differentiate between the influence of achievement goals, autonomous and controlled reasons, and achievement goal complexes. Our results revealed that all three types of variables accounted for independent variance in experiential and self-regulated learning outcomes.

Summary of Findings

First, we documented the *separate* influence of mastery goals and autonomous reasons for goal pursuit. On the one hand, mastery goals were found to be a positive predictor of beneficial experiential (satisfaction, interest, and positive emotion) and self-regulated learning (deep learning, interpersonal help-seeking, challenging tasks, and persistence) outcomes. This replicates basic findings from the achievement goal literature, showing that mastery goals enhance the subjective value of the achievement activity and foster interest-based learning processes (Daniels et al., 2009). On the other hand, autonomous reasons were found to be a positive predictor of the same beneficial outcomes. This replicates basic findings from the SDT literature, showing that reasons involving the self-endorsement of one's actions enhance task enjoyment and facilitate growth (Deci et al., 1991).

Second, we documented the *simultaneous* influence of mastery goals and autonomous reasons for goal pursuit. On the one hand, both mastery goals and autonomous reasons were found to explain independent variance in most of the beneficial experiential (interest and positive emotion) and self-regulated learning (deep learning, challenging tasks, and persistence) outcomes. This illustrates that mastery goals and autonomous reasons are *distinct* motivational constructs, presumably having similar influences via different processes (Dysvik & Kuvaas, 2010). On the other hand, the predictive strength of mastery goals and autonomous reasons for these same outcomes were each found to be diminished when controlling for the other. This illustrates that mastery goals and autonomous reasons are *overlapping* motivational constructs, both pertaining to an internal investment in the value of learning (Elliot, & Church, 1997). However, controlling for mastery goals eliminated the link between autonomous reasons and interpersonal help-seeking, whereas controlling for autonomous reasons eliminated the link between mastery goals and satisfaction. This suggests that the influence of reasons may outweigh the influence of goals for some outcomes, but that the influence of goals may outweigh the influence of reasons for other outcomes.

Third, we documented the influence of the autonomous mastery goal complex *together* with mastery goals and autonomous reasons for goal pursuit. On the one hand, the autonomous mastery goal complex was found to explain incremental variance in all of the beneficial experiential outcomes (interest, satisfaction, and positive emotion) and most of the beneficial self-regulated learning outcomes (i.e., deep learning, challenging tasks, and persistence). This indicates that the autonomous mastery goal complex is more than the mere sum of a mastery goal and autonomous reasons: Autonomous reasons may give deeper psychological meaning to the mastery goal, and the mastery goal may then foster a pleasurable, interest-driven approach to learning (Ryan & Deci, 2006). On the other hand, the predictive strength of mastery goals and autonomous reasons regarding these same outcomes were each found to be diminished when controlling for the autonomous mastery goal complex. This is likely due to measurement redundancy: Mastery goals and autonomous reasons were each measured (at least) two times, first as a "pure" goal or a "pure" reason, and second as a part of the autonomous mastery goal complex. However, for many outcomes, mastery goals and autonomous reasons still explained residual variance after controlling for the autonomous mastery goal complex. Hence, it appears that mastery goals in and of themselves (or, perhaps more accurately, mastery goals *energized* by reasons not captured by the goal complexes examined herein) and autonomous reasons in and of themselves (or, perhaps more accurately, autonomous reasons *directed* by aims not captured by the goal complexes examined herein) each have remaining, substantive predictive utility.

Fourth, we also documented the influence of performance goals and performance goal complexes. Performance goals were found to be a positive predictor of surface learning, grade aspiration, and study persistence, even after controlling for reasons for goal pursuit. Moreover, the autonomous performance goal complex explained incremental variance in grade aspiration and study persistence, resulting in the diminution of the predictive strength of both performance goals (for grade aspiration) and autonomous reasons (for persistence). In the same way as for mastery goals, these results show that performance goal content matters, and does so in two ways: The influence of performance goals is not reducible to the influence of reasons, and the pattern of results associated with the autonomous performance goal complex differs from that associated with the autonomous mastery goal complex.

Fifth, in ancillary analyses we observed the influence of controlled achievement goal complexes. In nearly all instances, controlled achievement goal complexes did not explain incremental variance in the beneficial experiential and self-regulated learning outcomes (the lone exception—of 22 instances—being controlled mastery goal complexes and deep learning in Study 2). Mastery and performance goals do *not* seem to provide supplementary benefits when combined with controlled reasons, which is consistent with research showing that endorsing these goals for self-presentation purposes (a form of controlled reason) lessens or eliminates their positive influence (Dompnier, Darnon, & Butera, 2013; Smeding et al., 2015).

Both Goals and Reasons Are Needed for a Full Account of Motivation

The present research echoes a past controversy in the motivation literature. SDT researchers have long distinguished between *intrinsic* (e.g., growth, relationships, community) and *extrinsic* (e.g., wealth, fame, image) goal content (for a review, see Vansteenkiste, Lens, & Deci, 2006). Intrinsic goals tend to predict beneficial outcomes, whereas extrinsic goals tend to predict detrimental outcomes (Kasser & Ryan, 1996). In the late 1990s, the relation between intrinsic goals and a self-regulation outcome (self-actualization) was found to be eliminated when partialing out the influence of the autonomous and controlled reasons connected to these goals (Carver & Baird, 1998). The authors interpreted this finding as suggesting that "it often matters more why a goal is being pursued than what the goal is" (p. 292). Later, the relation between extrinsic goals and an experiential outcome (well-being) was also found to be eliminated when controlling for the autonomous-like (i.e., freedom of action motives) and controlled-like (i.e., appearing worthy in others' eyes) reasons connected to these goals (Srivastava, Locke, & Bartol, 2001). Here too the conclusion was reached that the predictive utility of goals is negligible once reasons are considered.

However, Sheldon, Ryan, Deci, and Kasser (2004) critiqued the aforementioned research, highlighting that goal assessment was confounded with reason assessment. After refining the methodology of the prior work, Sheldon et al. (2004) demonstrated that both goal content (i.e., intrinsic vs. extrinsic goals) and goal motives (i.e., autonomous vs. controlled reasons) made significant and independent contributions to psychological well-being. They came to the conclusion that neither the directive focus of goals nor the dynamic processes underlying goals was more critical than the other (for similar work showing that both goal content and reasons are important to understand outcomes in the exercise domain, see Sebire, Standage, & Vansteenkiste, 2009).

Similar reasoning applies to the emerging research on goal complexes within the achievement domain. In prior work, the relation between achievement goals and a series of achievement-relevant outcomes (e.g., positive emotion, engagement, persistence) was found to be eliminated when partialing out the influence of the autonomous reasons connected to these goals (see Gillet et al., 2015; Vansteenkiste, Mouratidis, et al., 2010; Vansteenkiste, Smeets, et al., 2010). Because this prior work did not include "pure reason" assessments, we believe that this type of reduction should be interpreted with caution. Indeed, our findings indicate that the influence of *achievement goal content* is not reducible to the influence of *achievement goal motives*. The influence of achievement goals is not unilaterally exceeded by the influence of reasons, and the influence of achievement goal complexes both depends on the type of goal and the type of reason they encompass. As such, it is best for scholars to resist "either-or" perspectives on achievement motivation: Not only do reasons for goal pursuit matter, but the goals themselves matter as well. Thus, we concur with Vansteenkiste, Mouratidis, et al.'s (2014) statement that "reasons [should] not [be] meant to replace the achievement goals themselves" (p. 142).

Short-Term and Long-Term Research Directions

We believe that a clear conceptual and empirical disentanglement of achievement goals and reasons brings a fresh, exciting, and generative perspective to the achievement goal literature. In the short term, researchers may consider adopting a cumulative approach that involves further investigating the influence of achievement goals, reasons, and achievement goal complexes on achievement-relevant outcomes. Specifically, researchers may focus on other achievement goals (e.g., avoidance-based goals; see Gillet et al., 2015), non SDT-derived reasons (e.g., achievement motives, Elliot, 1999; social motivation, Ryan & Shim, 2008; competitive motives, Murayama & Elliot, 2012), unusual goal complexes (e.g., formed upon the adoption of maladaptive goals and adaptive reasons, such as the autonomous performance-avoidance complex; see Heidemeier & Wiese, 2014), and/or a wider range of outcomes (e.g., beneficial *and* detrimental; see Senko, 2016).

In the long-term, researchers may consider adopting a more comprehensive approach that involves moving beyond comparison of the influence of achievement goals, reasons, and achievement goal complexes. Conceptualizing and operationalizing achievement goal complexes raise two important, intertwined issues that need to be addressed in future work: Complexity and ecological validity. Regarding complexity, the most elaborate achievement goal framework encompasses 3×2 achievement goals (i.e., task-, self-, and other-based standards crossed with approach and avoidance; Elliot, Murayama, & Pekrun, 2011), and the self-determination framework encompasses five main types of reasons (i.e., extrinsic reasons with external, introjected, identified, or integrated regulation, and intrinsic reasons; Ryan & Deci, 2000). Fully integrating these frameworks would result in $3 \times 2 \times 5 = 30$ possible achievement goal complexes, which are clearly too many to rigorously study at the same time. As such, it is important for researchers to select a subset of achievement goals and reasons in any given investigation to avoid overtaxing participants with a large number of related and (seemingly) redundant questions (which would undoubtedly yield poor quality data).

Regarding ecological validity, researchers may consider which achievement goal complexes are more commonly encountered in real-life achievement settings. It is known that mastery-approach, performance-approach, and performance-avoidance are spontaneously generated by participants (in their own words) in open-ended questions or semistructured interviews (Lee & Bong, 2016; Levy, Kaplan, & Patrick, 2004; Urdan, 2004b). However, little is known about the spontaneously generated reasons behind mastery-approach, performance-approach, and performance-avoidance goals (for an exception, see Urdan & Mestas, 2006). Future research would benefit from using *inductive* methods to determine the most prevalent achievement goal-reason combinations (and whether SDT or some other approach or approaches to motivation is/are best suited to conceptualize these achievement goal complexes) and using *deductive* methods to estimate their consequences for achievement-relevant outcomes. Such a mixed method research program (see Johnson & Onwuegbuzie, 2004) would help motivation scientists to focus their conceptual attention and empirical effort on variables of foremost practical significance.

Limitations

The limitations of our work should be acknowledged. First, the present studies were correlational and relied on single-session data collections. Hence, we cannot establish the causal nature of the motivation-to-outcome relations. Subsequent research using prospective methods is needed to acquire more precise insight into these dynamics. For instance, motivational and outcome variables could be assessed at different times (as in Harackiewicz et al., 1997) or a longitudinal design could be employed (as in Daniels et al., 2009).

Second, mastery goals and autonomous reasons were moderately to highly correlated ($r \approx .60$), as in past research (e.g., Katz et al., 2008). That is, the two motivational constructs are multicollinear, suggesting that mastery goals are primarily pursed for autonomous reasons (see Senko & Tropiano, 2016). However, it should be noted that multicollinearity is not a violation of the assumptions of ordinary least squares estimation (Freud & Littell, 2000). Multiple regression analysis has enabled us to estimate the *unique* variance explained by mastery goals, after removing the *shared* variance associated with autonomous reasons (and vice versa). The only risk with multicollinearity stems from a lack of information in the data (e.g., participants with high mastery goals and low autonomous reasons are unusual; see Brambor, Clark, & Golder, 2006). In this regard, multicollinearity may have increased the probability of Type II error (false negative) but not that of Type I error (false positive; see Mason & Perreault Jr, 1991).

Third, the assessment of our main theoretical constructs, namely mastery goals, autonomous reasons, and beneficial outcomes, may be subject to social desirability (see Darnon, Dompnier, Delmas, Pulfrey, & Butera, 2009; Lepper, Corpus, & Iyengar, 2005). Thus, the link between these constructs might be partially explained by covarying interindividual differences in self-presentation. However, it is important to note that such impression-management issues cannot account for the robust finding that both achievement goals and reasons have independent predictive utility. Nevertheless, subsequent research would benefit from controlling for social desirability and incorporating behavioral measures falling outside the categories of the variables studied in the present article (e.g., achievement, see Senko, Hulleman, & Harackiewicz, 2011).

Fourth, our studies were based on U.S. samples. The levels of both achievement goals and self-determined motivation have been found to vary somewhat across culture (Chirkov & Ryan, 2001; Dekker & Fischer, 2008), as have predictive patterns for achievement goals (Zan, Xiang, Louis, Jianmin, & YunPeng, 2008; see Chirkov, 2009 on autonomous motivation, which may have more universal predictive power). Given these cross-cultural differences, research is needed to test the predictive utility of achievement goals, reasons, and achievement goal complexes in a broader array of countries.

Conclusion

The achievement goals approach to achievement motivation identifies a number of possible *goal contents* in competence-relevant contexts that vary according to how competence is defined and valenced (Elliot et al., 2011), whereas SDT designates a continuum of possible *goal motives* ranging from autonomous to controlled (Deci & Ryan, 2000). Our research herein suggests that these two frameworks should be thought of in integrative rather than comparative terms: Achievement goals, reasons for goal pursuit, and achievement goal complexes all make independent contributions to experiential and self-regulated learning outcomes in achievement settings. In our view, conceptualizing, operationalizing, and empirically analyzing both the direction and energization of goal striving using both of these theoretical frameworks offers the most promising avenue for a full and complete account of competence motivation.

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(*Appendix follows*)

Appendix

Achievement Goal Questionnaire, Autonomous and Controlled Reasons Scale, and Autonomous and Controlled Achievement Goal Complex Scale (Study 4)

The first scale contains mastery goal (MAp) and performance approach goal (PAp) items, the second scale contains autonomous reasons (AR) and controlled reasons (CR) items, and the third scale represents autonomous mastery goal complex (MAp × AR), controlled mastery goal complex (MAp × CR), autonomous performance goal complex (PAp × AR), and controlled performance goal complex (PAp × CR) items.

Below you will find statements that **represent descriptions of how you might pursue goals in your classes at the university**. Please indicate how true each statement is for you.

My aim is to completely master the material presented in my classes (MAp).

My goal is to perform better than the other students. (PAp)

My goal is to learn as much as possible. (MAp)

My aim is to perform well relative to other students. (PAp)

Below you will find statements that represent **explanations for why you might pursue goals in your classes at the university**. Please indicate how true each statement is for you.

In my classes, I pursue goals because I find them highly stimulating and challenging. (AR)

In my classes, I pursue goals because I find them personally valuable goals. (AR)

In my classes, I pursue goals because I would feel bad, guilty, or anxious if I didn't do it. (CR)

In my classes, I pursue goals because I can only be proud of myself if I do so. (CR)

In my classes, I pursue goals because I have to comply with the demands of others such as parents, friends, and teachers. (CR)

In my classes, I pursue goals because others will reward me only if I achieve these goals. (CR)

Below you will find statements that represent **descriptions of how you might pursue goals** in your classes at university, together with **explanations for why you might pursue them**. Please ***read each statement carefully***, and indicate how true each of it is for you.

My goal is to learn as much as possible because I find this a highly stimulating and challenging goal. (MAp × AR)

My aim is to completely master the material presented in my classes because I would feel bad, guilty, or anxious if I didn't do it. (MAp × CR)

My goal is to learn as much as possible because I can only be proud of myself if I do so. (MAp × CR)

My aim is to completely master the material presented in my classes because I find this a personally valuable goal. (MAp × AR)

My goal is to learn as much as possible because I have to comply with the demands of others such as parents, friends, and teachers. (MAp × CR)

My aim is to completely master the material presented in my classes because others will reward me only if I achieve this goal. (MAp × CR)

My aim is to completely master the material presented in my classes because I find this a highly stimulating and challenging goal. (MAp × AR)

My goal is to learn as much as possible because I would feel bad, guilty, or anxious if I didn't do it. (MAp × CR)

My aim is to completely master the material presented in my classes because I can only be proud of myself if I do so. (MAp × CR)

My goal is to learn as much as possible because I find this a personally valuable goal. (MAp × AR)

My aim is to completely master the material presented in my classes because I have to comply with the demands of others such as parents, friends, and teachers. (MAp × CR)

My goal is to learn as much as possible because others will reward me only if I achieve this goal. (MAp × CR)

My goal is to perform better than the other students because I find this a highly stimulating and challenging goal. (PAp × AR)

My aim is to perform well relative to other students because I would feel bad, guilty, or anxious if I didn't do it. (PAp × CR)

My goal is to perform better than the other students because I can only be proud of myself if I do so. (PAp × CR)

My aim is to perform well relative to other students because I find this a personally valuable goal. (PAp × AR)

My goal is to perform better than the other students because I have to comply with the demands of others such as parents, friends, and teachers. (PAp × CR)

My aim is to perform well relative to other students because others will reward me only if I achieve this goal. (PAp × CR)

My aim is to perform well relative to other students because I find this a highly stimulating and challenging goal. (PAp × AR)

My goal is to perform better than the other students because I would feel bad, guilty, or anxious if I didn't do it. (PAp × CR)

My aim is to perform well relative to other students because I can only be proud of myself if I do so. (PAp × CR)

My goal is to perform better than the other students because I find this a personally valuable goal. (PAp × AR)

My aim is to perform well relative to other students because I have to comply with the demands of others such as parents, friends, and teachers. (PAp × CR)

My goal is to perform better than the other students because others will reward me only if I achieve this goal. (PAp × CR)

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