Performing Under Challenge: The Differing Effects of Ability and Normative Performance Goals

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The effects of ability performance goals, normative performance goals, and mastery goals on anxiety, interest, and performance were examined in a series of experiments. Challenging problem-solving tasks that would demonstrate the effects of each performance goal more clearly were designed. Groups of early adolescents (Study 1) and college students in Korea (Studies 2 and 3) participated in similar experiments to strengthen the generalizability of the findings. Across the 3 studies, students assigned to the ability-goal condition exhibited significantly higher anxiety and lower interest compared with those in the normative- and mastery-goal conditions, except that the anxiety between the 2 performance-goal conditions did not differ after experiencing failure in Study 3. The ability-goal students persisted for significantly less time than did those in the other 2 conditions (Study 1) and demonstrated significantly lower challenge appraisal and weaker reengagement intention compared with those in the normative-goal condition (Study 2). The effects of achievement goals on problem-solving performance varied across the studies.

Educational Impact and Implications Statement
This study suggests that students who pursue the goal of proving their ability to others while performing challenging problem-solving tasks are more vulnerable to anxiety and lack of interest compared with those whose goal is to perform better than others or to improve their competence. Although it was those students who strived to outperform others that received performance benefits, it was those who focused on learning new skills and developing their competence that demonstrated the highest level of persistence when engaging in a difficult problem-solving task. The results highlight the importance of providing a safe learning environment in which students can focus on learning and performing well without having to worry about how their ability will be evaluated.

Keywords: achievement goal, performance goal, ability goal, normative goal, anxiety

The past two decades have witnessed remarkable growth in achievement goal theory and research, establishing the construct as one of the central determinants of motivation and performance (Kaplan & Maehr, 2007). Although the efforts by many researchers to achieve greater conceptual clarity and methodological precision have yielded many fruitful results (e.g., A. J. Elliot & Murayama, 2008; A. J. Elliot, Murayama, & Pekrun, 2011), several unresolved issues remain. One such issue has to do with performance-approach goals. A number of empirical (e.g., Grant & Dweck, 2003) and meta-analytic (e.g., Hulleman, Schrager, Bodmann, & Harackiewicz, 2010; Senko & Dawson, 2017) studies have compared the effects of ability and normative performance-approach goals. However, except for the agreement that ability goals are detrimental and normative goals are beneficial for performance, the effects of the two performance-approach goals on specific psychological outcomes have been either inconsistent or improbable in light of their contrasting relationships with performance. In the present research, we aimed to gather evidence that could help clarify this lack of consensus by experimentally manipulating achievement goals and comparing their effects on anxiety, interest, and performance.

Background

Achievement goals, in their original conceptualization, referred to the purposes and reasons for engaging in achievement-relevant strivings (Ames, 1992; Butler, 1992; Dweck, 1986). They were thought to stem from contrasting beliefs about ability: Students believing in the incremental nature of ability adopt learning (or mastery) goals and strive to improve their competence, whereas those believing in the fixed nature of ability adopt performance goals and strive to gain favorable—and avoid unfavorable—judgments of their competence (Dweck, 1986; Dweck & Leggett, 1988). Students who are oriented toward learning and task mastery...
display an adaptive motivational pattern, such as challenge seeking, the use of effective learning strategies, persistence in the face of difficulty, effort failure attribution, and positive affect, regardless of the level of their perceived competence. In contrast, students who are performance-oriented show a helpless pattern characterized by challenge avoidance, the deterioration in the quality of strategies employed, the premature abandonment of taxing tasks, ability failure attribution, and negative affect, particularly when their perceived competence is low (Dweck, 1986; E. S. Elliott & Dweck, 1988).

The initial achievement goal dichotomy was expanded to the achievement goal trichotomy when A. J. Elliot and Harackiewicz (1996) made explicit the then-ignored distinction between the approach and avoidance components of performance goals. The striving to demonstrate competence by outdoing others, referred to as performance-approach goals, was now formally separated from the striving to avoid the demonstration of incompetence, known as performance-avoidance goals. In subsequent studies espousing the trichotomy (e.g., A. J. Elliot & Church, 1997; A. J. Elliot & McGregor, 1999; Skaalvik, 1997), mastery goals best predicted intrinsic motivation and performance-approach goals best predicted performance, whereas performance-avoidance goals proved damaging for both. This portrayal of performance-goal approaches as a potentially positive orientation within an achievement context generated intense debate about their possible benefits and harm (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Midgley, Kaplan, & Middleton, 2001), a topic of relevance to the present research.

A closely intertwined issue has been how to define the achievement goal construct itself. The trichotomous achievement goal model has undergone further modifications and has been developed into the $2 \times 2$ (A. J. Elliot & McGregor, 2001; Pintrich, 2000), $3 \times 2$ (A. J. Elliot et al., 2011), and goal complex models (Vansteenkiste, Lens, Elliot, Soenens, & Mouratidis, 2014; Vansteenkiste et al., 2010). Although it is beyond the scope of the present research to discuss how these models differ from each other, one thing that should be noted is that achievement goals in these later models have been redefined as competence-based aims rather than purposes (A. J. Elliot, 1999). According to Dweck’s original model (Dweck, 1986, 1996; Dweck & Leggett, 1988), achievement goals represent the overarching purposes embraced in achievement situations, working as a cognitively based meaning system for processing achievement-relevant information and determining the nature of cognitive, affective, and behavioral consequences associated with an achievement event (see also Ames, 1992; Kaplan & Maehr, 2007). Elliot and his colleagues (A. J. Elliot, 1999; A. J. Elliot & Murayama, 2008) believed that this definition was too broad and imprecise and have interpreted it more narrowly as a cognitively represented aim or end-state that guides behavior. When defined this way, achievement goals can be divided into mastery and performance goals (A. J. Elliot & McGregor, 2001), based on the standard against which competence is evaluated (or self vs. task vs. other; A. J. Elliot et al., 2011), and into approach and avoidance goals, by the valence of competence. The reasons underlying achievement behaviors are no longer an essential element and are considered separate from the construct, except in achievement goal complexes that combine aims with reasons for pursuing the aims (Sommet & Elliot, 2017; Vansteenkiste et al., 2014).

How the construct is defined makes a critical difference in the design of studies and the interpretation of results (Hulleman, Godes, Hendricks, & Harackiewicz, 2010; Sommet & Elliot, 2017). In this research, we define achievement goals as the underlying reasons and purposes for engaging in achievement-oriented behaviors in a given situation, consistent with the original conceptualization (Dweck & Leggett, 1988; Grant & Dweck, 2003). By adopting this definition, we assume that individuals can strive to achieve the same end-state for different reasons and that these reasons and overall purposes pursued in the situation determine how they would construe and respond to their achievement experiences (Kaplan & Maehr, 2007).

The Effects of Mastery and Performance-Approach Goals Revisited

In the dichotomous model, mastery goals represented an adaptive orientation and performance goals represented a maladaptive one (Ames, 1992; Dweck, 1986, 1996; E. S. Elliott & Dweck, 1988). As introduced earlier, performance goals have not always been found to be harmful to intrinsic motivation or performance across a range of studies, prompting their bifurcation into approach and avoidance performance goals (A. J. Elliot & Church, 1997; A. J. Elliot & Harackiewicz, 1996). However, even after the approach–avoidance split, the effects of performance-approach goals on intrinsic motivation and achievement have remained inconsistent (e.g., Midgley et al., 2001). The positive effects of mastery goals on performance have also been called into question (e.g., Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000).

Different Types of Mastery and Performance-Approach Goals

Grant and Dweck (2003) attributed these inconsistencies around the achievement goal effects to multiple operationalizations of the constructs. They noted that there were two possible forms of learning goal (i.e., learning vs. challenge-mastery goals) and three possible forms of performance-approach goal (i.e., ability vs. normative vs. outcome goals) in the literature and that performance-approach goals could be further divided into normative and nonnormative goals by the presence or absence of a normative comparison component. To clarify the nature and effects of mastery and performance-approach goals, the researchers first developed items to measure learning (e.g., “I strive to constantly learn and improve in my courses”) and challenge-mastery goals (e.g., “It is very important to me to feel that my coursework substantially learn and improve in my courses”) and challenge-mastery (e.g., “It is very important to me to confirm my intelligence through my schoolwork”), outcome (e.g., “It is very important to me to do well in my courses”), normative ability (e.g., “It is very important to me to confirm that I am more intelligent than other students”), and normative outcome goals (e.g., “It is very important to me to do well in my course compared with others”). Both exploratory and confirmatory factor analyses yielded only four independent factors: Learning, Ability, Outcome, and Normative Goals (Study 1).

Grant and Dweck (2003) then compared the relationship of these goals with a host of cognitive, affective, and behavioral coping measures in a hypothetical failure scenario (Study 4) and a difficult college course in real life (Study 5). Learning goals were...
associated with mastery-oriented responses, such as the attribution of failure to effort, active cognitive and behavioral coping with a setback and failure, and higher intrinsic motivation, persistence, and performance throughout difficulties. Ability goals predicted a helpless pattern of responses characterized by failure attribution to ability, loss of self-worth and intrinsic motivation, as well as cognitive and behavioral disengagement from the task. Normative goals predicted denial and behavioral disengagement after a setback and failure but remained largely unrelated to other indexes of maladaptive cognition, affect, and behavior. Finally, outcome goals displayed few and mixed associations with dependent measures in the presence of learning or ability goals.

These results led Grant and Dweck (2003) to conclude that ability and normative goals are the two main manifestations of performance goals to be investigated in future studies. The researchers suspected that normative goals might be “a harder form of performance goals” (p. 547) and, unlike ability goals, would not necessarily produce vulnerable responses to challenges and setbacks. They also asked researchers to stop operationalizing performance goals as outcome goals because wanting to perform well could easily be a part of either a learning or a performance framework. In fact, this reasoning is in line with the later conceptualization of goal complexes, in which individuals want to achieve a good outcome for a variety of reasons, and it is these reasons associated with the end-state goal that make a difference in the processes and outcomes associated with it (Vansteenkiste et al., 2010, 2014; cf. Sommet & Elliot, 2017).

A subsequent meta-analysis conducted by Hulleman, Schrager, et al. (2010) confirmed the suspicion of Grant and Dweck (2003). When they analyzed the goal-outcome correlations from 243 studies, the magnitude and direction of the relationship varied depending on how the goal was operationalized. Mastery goals demonstrated positive overall relationships with performance outcomes and interest, which, although differing slightly by the operational definition employed, remained largely stable. In contrast, the relationships of performance-approach goals with outcome measures, especially with performance outcomes, fluctuated considerably. Similar to mastery goals, performance-approach goals displayed positive overall associations with both performance outcomes and interest. However, moderator analysis revealed that their relationship with performance outcomes was positive when measured with items and scales emphasizing the attainment of normative competence and negative when measured with items and scales focusing on the appearance and demonstration of ability to others. These findings helped resolve the question of why performance-approach goals, even when they no longer contain avoidance components, continued to demonstrate mixed relationships with performance outcomes.

Effects of Ability and Normative Performance-Approach Goals

Although Hulleman, Schrager, et al.’s (2010) meta-analysis made clear that ability and normative performance-approach goals maintain contradictory connections to performance outcomes, it did not explain why the consequences of adopting seemingly analogous goals are so vastly dissimilar. To answer this question, Senko and Dawson (2017) performed another meta-analysis with 296 studies that included performance-approach goals and at least one educationally relevant outcome. Performance-approach goals were divided into ability1 goals and normative goals, following the classification methods used in Hulleman, Schrager, et al. (2010). The results showed that normative goals correlated positively with students’ competence perceptions relative to both tasks and peers, and this relationship was stronger compared with the effect of ability goals. Normative goals also correlated positively with students’ self-regulation and the use of deep and adaptive surface strategies, whereas ability goals correlated with none of these positive study strategies and instead correlated with the negative strategies of self-handicapping and help avoidance. Normative goals correlated with neither of these undesirable strategies. This pattern of associations is consistent with the findings of Hulleman, Schrager, et al. by demonstrating the adaptive potential of normative goals and the detrimental nature of ability goals in the processes leading to performance outcomes.

However, although they differ in their association with competence, self-regulation, and strategy use, no significant differences have been detected in the association of ability and normative goals with achievement emotions. Both ability and normative goals display positive correlations of similar magnitude with indexes of positive affect and enjoyment as well as those of negative affect and anxiety (Senko & Dawson, 2017). Previous meta-analytic studies have also reported similar findings, with performance-approach goals maintaining a modest positive correlation with interest, enjoyment, and positive affect as well as with anxiety and negative affect, regardless of whether they are assessed with the Patterns of Adaptive Learning Scales (Midgley et al., 2000), a central component of which is ability validation, or the Achievement Goal Questionnaire (A. J. Elliot & McGregor, 2001), which stresses normative competence (Huang, 2011; Hulleman, Schrager, et al., 2010).

The parallel relationship of the two performance-approach goals with opposing emotions is puzzling and runs counter to the results for performance outcomes (Hulleman, Schrager, et al., 2010) and study strategies (Senko & Dawson, 2017). Available meta-analytic evidence suggests that ability goals are clearly harmful, whereas normative goals are helpful, to performance outcomes, self-regulation, and strategy use. Given these findings and the established relationship between performance outcomes and emotions (e.g., Harackiewicz, Durik, Barron, Linnenbrink-Garcia, & Tauer, 2008; Hembree, 1988; Seipp, 1991), we would expect pursuing ability goals to increase negative emotions such as anxiety while reducing positive emotions such as interest. We would expect the opposite for normative goals. Thus, it is curious why the meta-analytic results did not support this pattern.

Testing Achievement Goal Effects When Challenged

A review of key literature suggests that the maladaptive qualities of ability goals may be most apparent when students confront challenging tasks or perform under taxing achievement situations, a claim also advanced by Grant and Dweck (2003). For example, in past experiments that have clearly documented the detrimental effects of ability goals on intrinsic motivation, affect, and perfor-

1 Performance goals based on demonstrating one’s ability and validating competence are referred to in the literature as either ability goals (e.g., Grant & Dweck, 2003) or appearance goals (e.g., Senko & Dawson, 2017). We refer to them as ability goals in this article.
mance, the participating subjects either engaged in complex tasks with strong ability implications (E. S. Elliott & Dweck, 1988), received failure feedback during task performance (Diener & Dweck, 1978), imagined hypothetical failure situations (Grant & Dweck, 2003, Study 4), enrolled in a difficult course in which many experienced setbacks (Grant & Dweck, 2003, Study 5), or performed under evaluative conditions in which an upcoming social comparison was salient (Butler, 2006). In these studies, students with mastery (Butler, 2006; E. S. Elliott & Dweck, 1988) or normative goals (Grant & Dweck, 2003) either demonstrated successful coping behaviors or were not influenced much by the challenges. In particular, the adverse consequences of pursuing ability goals stood in direct contrast to a wide array of resilient responses associated with mastery goals.

**Anxiety and Interest of Mastery- and Ability-Goal Students When Challenged**

Compared with mastery goals, whose adoption is undergirded by an incremental belief of intelligence, ability goals are popular among students espousing an entity theory of intelligence (Dweck, 1986); they regard task engagement as an ability confirmation process and achievement outcomes as irrefutable indicators of their ability. It is not surprising that they do not welcome any hint of failure, because it projects an image of incompetence for others and jeopardizes their self-worth (Ames, 1992; Dweck, 1996). When a challenge or evaluative threat is encountered, these students quickly become anxious and lose interest in the task. Haimovitz, Worwington, and Corpus (2011) followed students in Grades 3 to 8 for a year and observed that students believing in an entity theory of intelligence were more likely to adopt ability goals and subsequently become “decliners,” who suffered from a substantial drop in intrinsic motivation toward schoolwork from the fall to spring semesters, than “maintainers,” whose intrinsic motivation remained constant over the same period.

Dykman (1998) similarly demonstrated that validation-seeking orientations were associated with greater anxiety and depression, lower self-esteem and persistence, and weaker self-actualization tendencies (Study 1). College students with a strong validation-seeking orientation further reported significantly higher levels of anticipatory anxiety compared with those with a strong growth-seeking orientation when they were thinking about an upcoming examination that was believed to represent an ego-threatening event. Of greater importance to the present research, this difference in anticipatory anxiety between validation-seeking and growth-seeking students disappeared when they were thinking about a nonthreatening situation such as reading a magazine or newspaper (Study 2). Compared with growth-seeking students, validation-seeking students also displayed a greater propensity for depressive symptoms, but, again, only under stressful situations (Study 5). These findings suggest that the loss of intrinsic motivation and heightened anxiety associated with ability goals may not become visible unless the condition poses a clear threat or a challenge.

**Anxiety and Interest of Normative-Goal Students When Challenged**

The affective experience accompanying normative goals appears to be quite different from that associated with ability goals. Like ability goals, normative goals sometimes correlate positively with negative emotions. Unlike ability goals, these relationships with negative emotions seem to be nullified by concurrent connections to positive emotions or challenge construal. For example, in McGregor and Elliot (2002, Studies 1 and 3), normative performance-approach goals correlated positively with not only threat construal, threat affect, and anticipatory test anxiety assessed prior to a test but also challenge construal, challenge affect, and grade aspirations. Despite their ties to both negative and positive reactions to an achievement event, normative goals behaved almost the same way that mastery goals did in the regression model. Both mastery and normative goals were positive predictors of challenge construal and challenge affect and negative predictors of desire to escape. Neither predicted threat construal, threat affect, anticipatory test anxiety, or ability-related self-esteem. Only when the goals were assessed in reference to a specific test during test preparation did normative goals positively predict threat affect, unlike mastery goals, which maintained a null relationship even when the test was imminent (Study 2).

The dispositional antecedents of normative goals are hybrid in nature, including the need for achievement, competitiveness, and the fear of failure (A. J. Elliot & McGregor, 2001). Whereas the fear of failure could evoke anxiety when facing a challenge, the other two appetitive traits could trigger approach-oriented responses and reduce aversive emotions such as anxiety. Normative goals might even activate positive emotions such as interest if difficult tasks are construed as an opportunity to obtain useful diagnostic information for improving one’s ability (Festinger, 1954).

Past research has primarily reported positive effects of mastery goals on task interest (Harackiewicz et al., 2000; Harackiewicz, Barron, Tauer, & Elliot, 2002; Linnenbrink, 2005). However, several experimental studies have documented an effect of normative goals on interest that is similar to that of mastery goals. For example, A. J. Elliot and Harackiewicz (1996) reported that college students in a normative-goal group had levels of enjoyment and involvement in a puzzle-solving activity that were comparable with those in a mastery-goal group. The same pattern was obtained with adolescents engaged in a basketball dribbling activity (Cury, Elliot, Sarrazin, Da Fonseca, & Rufo, 2002). Students in the normative-goal group demonstrated degrees of intrinsic motivation and task absorption similar to those displayed by students in the mastery-goal group. Correlational evidence presented by Edwards (2014) also points to interest being negatively linked to ability goals but positively linked to normative goals.

Further, there is evidence that individuals pursuing normative goals embrace challenges and perform even better in difficult situations. When Senko, Durik, Patel, Lovejoy, and Valentin (2013) tested the effect of normative goals on achievement under easy and challenging conditions, better performance was observed under the challenging conditions, regardless of whether the challenge was real (Study 2) or merely anticipated (Study 1). Similar to students with mastery goals, those pursuing normative goals also do not show lower achievement even after experiencing failure (Diekhäuser, Buch, & Dickhäuser, 2011). Given these findings and those of Senko and Dawson’s (2017) meta-analysis, which reported positive benefits of normative goals on students’ self-regulation and their use of deep learning strategies, it might be premature to rule out the prospect of normative goals increasing...
task interest. At worst, normative goals might not lower task interest, a possibility we tested in this study.

In sum, existing evidence indicates that adopting either mastery, ability, or normative goals in specific achievement contexts creates critical differences in subsequent motivation and performance and that these differences may be most evident in challenging and evaluative situations. In the following three studies, we experimentally manipulated mastery, ability, and normative goals and compared their effects on anxiety, interest, and performance, along with other related variables specific to each study. Students in all three studies were presented with challenging performance situations that were designed to maximize the distinct effects of the three achievement goals.

Study 1

Study 1 was a cluster-randomized trial that recruited a group of early adolescents in Korea. The effects of ability, normative, and mastery goals on anxiety, interest, performance, and persistence were compared in a challenging problem-solving situation. We predicted that ability goals would activate helplessness and avoidance in these taxing situations, intensifying anxiety while hampering interest and performance. We hypothesized that mastery goals would help generate positive emotional and behavioral responses toward challenging tasks, resulting in lower anxiety, higher interest, and better performance. We expected normative goals to function similar to mastery goals except for the possibility that they could increase both anxiety and interest simultaneously when facing a challenge. Students in the ability-goal condition were thus predicted to report significantly higher anxiety before engaging in a challenging task and demonstrate significantly lower interest, performance, and persistence in the same task compared with students assigned to the mastery- or the normative-goal conditions.

Although it was not a major focus of this research, we also explored the role of anxiety as a mediator of the detrimental effects associated with ability goals in a challenging performance situation. In the achievement goal literature, anxiety has often been posited to mediate the relationship between performance-avoidance goals and intrinsic motivation (Cury et al., 2002), task performance (Dickhäuser et al., 2011; A. J. Elliot & McGregor, 1999), and persistence (Cury, Da Fonseca, Rufo, Peres, & Sarrazin, 2003). Given the undesirable effects of ability goals in taxing performance situations (e.g., Grant & Dweck, 2003) that are similar to those associated with performance-avoidance goals, we suspected that the effects of ability goals on subsequent motivation and performance might be mediated also by heightened anxiety.

Method

Participants. For this study, 103 students from the fifth and sixth grades attending a public elementary school in a metropolitan area in Korea participated in the experiment. Their socioeconomic status was lower middle class. Two students were late on the day of the experiment and another two failed to submit their task sheet, reducing the final sample size to 99. This was a cluster-randomized trial in which students of six classes were randomly assigned into each of the three achievement goal conditions based on their class membership. There were 32 students (17 boys, 15 girls) in the ability-goal group, 34 (16 boys, 18 girls) in the normative-goal group, and 33 (16 boys, 17 girls) in the mastery-goal group.

Procedure and materials. A nonverbal reasoning task believed to be challenging and unfamiliar to the participating students was selected. Novelty was taken into consideration when choosing the experimental task to prevent any preexisting task-related perceptions from influencing the results. The selected task required students to identify the common factor in a given set of figures and then apply that rule to select a single figure out of five options that they thought was most analogous to the given set of figures.

After being instructed on how to perform the task, the students were asked to report their self-efficacy in terms of performing the task successfully. Following this, achievement goal manipulation took place, using PowerPoint slides that presented the main ideas behind the achievement goal assigned to each group. The goal manipulation instructions were similar to those used in previous studies (e.g., A. J. Elliot & Harackiewicz, 1996; E. S. Elliott & Dweck, 1988). The explanation for the ability-goal manipulation was as follows, with the parentheses indicating common statements presented across the three conditions:

This task was devised to test your ability for reasoning. (You may not know what this ability is and how well you will perform this task, for it is not always related to your school grades. However, this ability has become essential in a diverse range of fields in the current age.) It is important that you do well on this task because your performance will show how much of this ability you possess. I will be able to judge how smart you are by examining your problem-solving. (Once you have completed this task, it will be sent to [the name of the research institute] for scoring and, within two days, sent back to you with the result.) I will share this result with your teacher, as it reveals an important aspect of your ability. I hope you will take advantage of this opportunity to demonstrate your potential ability and earn recognition.

The following is the explanation for the normative-goal condition:

This task was devised to compare your ability for reasoning with that of others. . . . When I asked other peers of your age to solve this task, most of them demonstrated fairly comparable performances to each other, but some stood out because they were clearly ahead of their peers. It will be extremely helpful for you to know whether you are superior to others in this ability. . . . I hope you will take advantage of this opportunity to test your potential capability by outperforming other students.

The explanation for the mastery-goal manipulation was as follows:

This task was devised to improve your ability for reasoning. . . . Each problem requires you to think from various perspectives. In the process of thinking in such a diverse manner, you will be able to learn how to think strategically and improve your thinking skills. . . . I hope you will take advantage of this opportunity to learn new skills by developing and improving your ability for reasoning.

After the instruction, the participants were asked to write down the purpose of the task as they understood it in an open-ended format. This method is often used to check whether the achievement goal manipulation was successful without the participants being exposed to other types of goal that might generate a priming effect (e.g., Dickhäuser et al., 2011; A. J. Elliot & Harackiewicz, 1996; Senko et al., 2013). Immediately afterward, the participants responded to six items for state anxiety. They were then asked to
solve 25 problems within 10 min. This time limit was intended to increase the demands of the task, thereby making the problem-solving context more challenging.

After the performance phase, the participants reported their task interest and perceived task difficulty. Upon completion of the questionnaire, they were informed that they could either continue to solve the problems that they had not been able to solve, even though this would not be included in their scores, or if they did not want to reengage in the task, do free activities in their seat without disrupting other students. They were also told to raise their hand when they had completed or wanted to quit the second problem-solving session. The experimenter recorded the number of the participants who wanted to continue with the task and the time they took to express the desire to stop. The maximum duration the participants could spend on the second problem-solving session was 10 min (600 s), which was until the end of the regular class hour during which the experiment took place. At the end of the experiment, all of the students were thoroughly debriefed, thanked, and offered a small gift for their participation. Figure 1 presents the overall experimental process.

Measures.
Self-efficacy. Self-efficacy for solving the reasoning problems was assessed with one item. Students rated how confident they were that they could successfully solve the given reasoning problems on a 100-point scale, ranging from 0 (“I cannot do it”) to 100 (“I am completely certain I can do it”) with 10-point intervals (Bandura, 2006). This was measured to ensure that self-efficacy did not significantly differ across the conditions, because it could otherwise affect task performance.

Task difficulty. Students reported their subjective perceptions of task difficulty by responding to three items (e.g., “It was difficult to solve this reasoning task”) on a 7-point Likert scale. This measure was included to confirm that the participants in all three achievement goal conditions construed the experimental task to be equally challenging. The Cronbach’s alpha was .92.

State anxiety. Six items adopted from Marteau and Bekker (1992) were used on a 4-point Likert response scale. This scale was developed as a shorter form of the state scale of the State–Trait Anxiety Inventory (STAI) introduced by Spielberger (1972), who depicted state anxiety as a transitory reaction to various threats. This scale has three anxiety-absent and three anxiety-present items (with the responses to the latter three items reverse-coded during analysis) and measures how threatening respondents perceive a given context to be. It was deemed suitable to capture the negative arousal elicited by the goal manipulation. A sample item is “I am worried” (α = .80).

Interest. Four items adapted from Hulleman, Godes, et al. (2010) were rated on a 7-point Likert scale. The items assess interest in a specific experimental task and have also been proven to function well with different groups of Korean elementary school students (Song, 2015). A sample item is “I was really interested in this reasoning task.” The Cronbach’s alpha was .87.

Performance. The number of problems correctly solved during the performance phase was used as a performance index. There were 25 reasoning problems and, hence, performance scores could range from 0 to 25.

Persistence. The time students spent engaging in additional problem-solving activities during the second optional behavioral reengagement phase was taken as evidence of persistence. The persistence scores could range from 0 s to 600 s (10 min).

Results
Manipulation check. We coded the students’ responses to the open-ended question on the purpose of the experimental task. A score of 1 was assigned when the response corresponded to the intended achievement goal; a score of 0 was assigned to all other responses. For example, responses such as “demonstrating ability” and “showing how smart I am to others” were taken to correspond to the ability-goal manipulation, “doing better than my peers” and “getting higher scores than others” were suitable for the normative-goal manipulation, and “learning new reasoning skills” and “solving problems in diverse ways” were reflective of the mastery-goal manipulation. Chi-square tests for each achievement goal condition indicated that most of the participants correctly stated the intended purpose of the experimental task in the ability-goal condition, χ²(1, N = 32) = 21.13, p < .001 (91% correct), normative-goal condition, χ²(1, N = 34) = 26.47, p < .001 (94% correct), and mastery-goal condition χ²(1, N = 33) = 16.03, p < .001 (85% correct). Participants whose remarks were assigned a score of 0 provided ambiguous statements that could belong to any condition, such as “doing my best.” Because the manipulation proved successful at the group level, all participants were included in the analysis.

We also conducted one-way ANOVA for self-efficacy and perceived task difficulty to determine whether the participants felt equally confident about successfully answering the reasoning questions before the goal manipulation and whether they considered the task to be sufficiently and equally challenging across the

Figure 1. Experimental process for Study 1.
three achievement goal conditions. There was no significant difference in self-efficacy, \( F(2, 96) = 0.84, p < .05 \) or perceived task difficulty, \( F(2, 96) = 1.05, p = .36 \), across the three goal conditions. The mean for task difficulty was 4.52 or higher on a 0 to 7 scale across the three goal conditions, indicating that the participants perceived the task to be difficult (see Table 1).

**Data analysis.** The missing data rate was less than 2% for all variables. The expectation maximization algorithm was applied to deal with missing values for state anxiety and interest. Listwise deletion was used for the measures of performance and persistence. Descriptive statistics for the variables are reported in Table 1. A one-way ANOVA was conducted with the SPSS 23.0 package, and the path analyses testing the mediation effect were run with AMOS 18.0 software.

**Effects of achievement goals on state anxiety, interest, performance, and persistence.** There were statistically significant differences in the mean values of state anxiety, \( F(2, 96) = 4.41, p < .05 \) (\( \eta^2 = .08 \)), interest, \( F(2, 96) = 3.42, p < .05 \) (\( \eta^2 = .07 \)), and persistence, \( F(2, 96) = 7.54, p < .01 \) (\( \eta^2 = .14 \)) between the three experimental conditions. However, performance scores did not differ between the conditions, \( F(2, 96) = 2.41, p = .10 \).

As illustrated in Figure 2, post hoc comparisons using the least significant difference (LSD) method revealed that students in the ability-goal group felt significantly higher state anxiety (\( M = 2.60 \)) than those in the normative- (\( M = 2.13, d = 0.67 \)) or mastery-goal groups (\( M = 2.22, d = 0.59 \)). The ability-goal participants also expressed significantly lower interest in the reasoning task (\( M = 3.70 \)) compared with the students in the normative- (\( M = 4.43, d = 0.52 \)) and mastery-goal conditions (\( M = 4.54, d = 0.64 \)). For the post hoc comparison of persistence scores, we used the Games-Howell method instead of the LSD method because the assumption of the homogeneity of variance was not met. Students in the normative- and mastery-goal conditions had a stronger effect than the other two types of goal on interest and persistence in Study 1. Error bars indicate standard error. * \( p < .05 \), ** \( p < .01 \), *** \( p < .001 \).

**Main effects for achievement goals on state anxiety, interest, and persistence in Study 1.** The main effects for achievement goals on state anxiety, interest, and persistence in Study 1. Error bars indicate standard error. * \( p < .05 \), ** \( p < .01 \), *** \( p < .001 \).

![Figure 2](image-url)

**Table 1** Descriptive Statistics for Study 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ability goal (n = 32)</th>
<th>Normative goal (n = 34)</th>
<th>Mastery goal (n = 33)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>57.47 16.26</td>
<td>57.62 23.23</td>
<td>62.88 26.07</td>
</tr>
<tr>
<td>Task difficulty</td>
<td>5.09 1.39</td>
<td>4.52 1.57</td>
<td>4.78 1.84</td>
</tr>
<tr>
<td>State anxiety</td>
<td>2.60b 0.69</td>
<td>2.13b 0.71</td>
<td>2.22b 0.60</td>
</tr>
<tr>
<td>Interest</td>
<td>3.70b 1.24</td>
<td>4.43b 1.54</td>
<td>4.54b 1.38</td>
</tr>
<tr>
<td>Performance</td>
<td>7.16 3.34</td>
<td>5.53 3.29</td>
<td>6.85 3.00</td>
</tr>
<tr>
<td>Persistence</td>
<td>28.13b 86.19</td>
<td>130.59b 213.27</td>
<td>214.55b 241.88</td>
</tr>
</tbody>
</table>

**Note.** No statistically significant difference between the conditions was observed in terms of self-efficacy or task difficulty. Mean values in each row that share the same subscript do not differ significantly from each other at \( p < .05 \). Performance scores ranged from 0 (did not solve any problems) to 25 (solved all problems). Scores for persistence ranged from 0 s (did not engage in any further problem solving during the behavioral reengagement phase) to 600 s (engaged in additional problem solving for the entire behavioral reengagement phase).

**Table 2** Number of Students Who Reengaged in the Task in Study 1

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Ability goal (n = 32)</th>
<th>Normative goal (n = 34)</th>
<th>Mastery goal (n = 33)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reengaged</td>
<td>4 (12.5%)</td>
<td>12 (35.3%)</td>
<td>17 (51.5%)</td>
</tr>
<tr>
<td>Did not reengage</td>
<td>28 (87.5%)</td>
<td>22 (64.7%)</td>
<td>16 (48.5%)</td>
</tr>
</tbody>
</table>
and significant negative link to interest ($\beta = -.27, p < .05$), which became nonsignificant ($\beta = -.18, p = .18$) when state anxiety entered the model. The goal contrast demonstrated a direct positive path to state anxiety ($\beta = .34, p < .01$), and state anxiety, in turn, demonstrated a direct negative path to interest, although this latter path was only marginally significant ($\beta = -.26, p = .07$). State anxiety did not mediate the effect of the ability-normative goal contrast on persistence. Whereas the goal contrast negatively and directly predicted persistence ($\beta = -.27, p < .05$), state anxiety did not ($\beta = -.10, p = .50$).

The ability-mastery goal contrast produced similar results. It predicted interest negatively and significantly ($\beta = -.34, p < .05$) when only the direct path was considered. This path became nonsignificant ($\beta = -.19, p = .15$) when state anxiety entered the model as a mediator. The ability-mastery goal contrast had a positive relationship with state anxiety ($\beta = .32, p < .05$), which, in turn, was negatively associated with interest ($\beta = -.45, p < .01$). The indirect effect of the goal contrast-anxiety-interest path was significant ($\beta = -1.4, p < .05, 95\% \text{ CI} [-.99, -.02]$). Again, state anxiety did not mediate the path from goal contrast to persistence. The ability-mastery goal contrast had a negative relationship with persistence ($\beta = -.45, p < .001$) and a positive one with state anxiety ($\beta = .32, p < .05$), but state anxiety did not significantly predict persistence ($\beta = -.04, p = .79$).

**Discussion**

Consistent with our hypotheses, students who were assigned the goal of proving their ability became significantly more anxious than those assigned the goals of besting others or learning new skills, even before the problem-solving session began. The subjective difficulty of the problem-solving task cannot explain this result because there was no difference in the levels of perceived task difficulty across the three goal conditions. Rather, these results substantiate the theoretical argument that learners who are compelled to equate their ability with their performance feel threatened in a challenging situation because of the potential for failure (Covington, 1992, 2009). As in previous studies (Crocker & Park, 2004; Dykman, 1998), students who were preoccupied with validating their ability by performing well suffered from higher anxiety, lower interest, and less persistence compared with those who strived to outperform others or to improve their own reasoning ability.

Heightened levels of anxiety negatively mediated the relationship between ability goals and task interest. Students assigned to the ability-goal group reported relatively stronger state anxiety compared with those assigned to the normative- and the mastery-goal groups. As students felt stronger anxiety, their interest in the problem-solving task fell. Further, the direct negative predictive path from ability goals to interest disappeared when mediation by state anxiety was accounted for. The pattern of mediation by state anxiety suggests that the detrimental effects associated with ability goals observed in the extant literature may be due, at least in part, to the anxiety invoked by the perceived threat to self-worth.

We remain cautious, however, in proposing anxiety as the sole psychological mechanism underlying the motivational and behavioral impairment associated with ability goals because it did not significantly mediate the relationship between achievement goals and persistence. State anxiety is a transient emotional reaction (Spielberger, 1972) and was assessed before the students performed the task. Also, it was assessed in a general manner (e.g., “I am tense”) without specific reference to the reasoning task that the students were about to perform. In comparison, persistence was measured after the participating students had experienced the problem-solving task. It is thus possible that the current index of state anxiety did not represent the students’ true feelings of anxiety at the time of reengagement.

Also supporting our hypothesis and consistent with prior reports (Cury et al., 2002; Dickhäuser et al., 2011; Edwards, 2014; A. J. Elliot & Harackiewicz, 1996), students in the normative-goal and mastery-goal groups did not differ in terms of their anxiety, interest, and persistence in the difficult problem-solving task. It is thus possible that the current index of state anxiety did not represent the students’ true feelings of anxiety at the time of reengagement.

Whereas most of our a priori hypotheses received support in Study 1, the detrimental effect of ability goals on performance was not observed. On the contrary, students in the ability-goal condition attained the highest score ($M = 5.53$) of the three goal groups, although this was not statistically different from the scores from the normative- ($M = 5.16$) or mastery-goal conditions ($M = 6.85$). Still, if the ability-goal students were significantly more anxious and less interested in the task than the normative- and mastery-goal participants, why did these motivational differences fail to translate into differences in performance?

We offer two explanations for this pattern of performance. First, the problem-solving task might have failed to pose a challenge that was threatening enough to the self-worth of the ability-goal students and, consequently, their performance was not affected. Although the task was rated as difficult by students in all three goal
conditions, with mean scores above 4.52 on a 7-point scale, simply being difficult may not have been equated with inescapable failure.

Students assigned to the ability-goal condition, therefore, might have tried harder than those in the other two conditions to avoid receiving low scores and to save themselves from embarrassment.

Second, the unanticipated pattern of performance across the three goal conditions might have been an artifact of using multiple-choice questions in the problem-solving task. Completing all 25 reasoning problems of moderate to high difficulty within 10 min had been assumed to be beyond the capacity of the participating students. The average performance scores of 7.16 or below for the three conditions out of the maximum possible score of 25 prove our assumption to be correct. However, there is a possibility that some students might have chosen their answers without actually having solved the problems in an effort to improve their scores, because this is advice that Korean students regularly receive from their tutors at test preparation academies before important examinations.

In fact, blindly filling out the answer sheet was clearly evident among the ability-goal students. Whereas only 26.5% (n = 9) of the students in the normative-goal group and 33.3% in the mastery-goal group (n = 11) provided answers to all 25 problems, 68.8% of the students (n = 22) in the ability-goal condition did so. As might have been expected, there was a significant positive correlation between the number of problems attempted and the response accuracy in the normative- (r = .62, p < .01) and mastery-goal (r = .34, p = .05) conditions but not in the ability-goal condition (r = .15, p = .41). This strongly suggests that the ability-goal students randomly selected their answers from among the multiple-choice options provided.

Study 2

The effects of ability and normative goals on anxiety, interest, and performance were again investigated in Study 2, this time with a different age group in order to extend the generalizability of the findings. We also improved the study design in several aspects to fix the limitations identified in Study 1.

In this study, individual students, instead of full classes, were randomly assigned to the experimental groups, making this study a true experiment. The level of difficulty posed by the problem-solving tasks was increased compared with Study 1, so they could pose a sufficient challenge to the participating college students. Also, instead of broadly tapping state anxiety before performance, anxiety was assessed in explicit reference to the target performance. Finally, measures of challenge appraisal and reengagement intention were included to test whether students pursuing normative goals indeed demonstrated a stronger tendency to view the task as a positive challenge and a stronger willingness to engage in the task under a difficult condition (McGregor & Elliot, 2002; Senko et al., 2013).

Method

Participants. Fifty students attending a private university in Incheon, Korea, were recruited via an online advertisement on the university bulletin board. The experiment was described as consisting of two paper-and-pencil tasks and lasting approximately 30 min. Participating students were randomly assigned to three achievement goal conditions on a random basis. Three participants were excluded from analysis because they expressed doubts about the overall purpose of the experiment. Of the 47 remaining participants, 16 (ten men, six women) were assigned to the ability-goal group, 17 (eight men, nine women) to the normative-goal group, and 14 (six men, eight women) to the mastery-goal group.

Procedure and materials. The nonverbal reasoning task used in Study 1 was combined with a new verbal reasoning task to create the problem-solving materials. The verbal reasoning task provided respondents with a minimum of four to a maximum of six propositions and then asked them to choose a logically deduced conclusion based on the given information. Types of problems were varied to increase the credibility of the goal manipulation instruction that performance on the task could be used to test, compare, or improve the integrated reasoning ability of the participants. Some of the easier items in the previous nonverbal reasoning task were replaced with more difficult ones to adjust the difficulty level to be suitable for college students and, at the same time, make the task sufficiently challenging to the participating students. A pilot test was run with 12 undergraduate and graduate students for a set made up of 20 such problems. It yielded an average accuracy score of 11 out of 20, indicating the task was sufficiently difficult for an adult sample. All the students in the pilot sample also verbally reported that the task was quite challenging.

After being instructed on how to perform the two types of tasks, achievement goal manipulation took place using PowerPoint slides. The achievement goal explanation given to the participants was similar to that used in Study 1, except that the two experimental tasks were explained as having been devised to test (ability-goal condition), compare (normative-goal condition), or develop (mastery-goal condition) their ability for integrated reasoning.

To ensure that the manipulation had been successful, they were asked to indicate the extent to which they would pursue each achievement goal during problem-solving by marking on a 1 to 7 scale the statements that explicitly stated the three achievement goals. They were then given six verbal reasoning and 18 nonverbal reasoning tasks to solve within 12 min. This time limit was intended to increase the demands of the task, thereby making the problem-solving context more challenging.

Upon completion of the task, the participants filled out survey items before moving on to the next problem-solving phase, which, unbeknownst to the participants, was not going to take place. The participants also reported perceived difficulty and perceived importance of the task. After the survey, all of the participants were debriefed, thanked, and paid 5,000 Korean Won (equivalent to approximately US$5) for their participation in the experiment.

Measures. The response scale for all items ranged from 1 (strongest disagreement) to 7 (strongest agreement).

Task difficulty. The same three items as in Study 1 were used. The Cronbach’s alpha was .89.

Task importance. Students reported their subjective perception of task importance by responding to a single item, “It is important for me to do well on this task.” This item was included to ascertain that the participants in all three achievement goal conditions perceived the given task to be equally important, and any difference in task performance could not be explained away by differences in the value attached to the experimental task.

Anxiety. Three items assessing the worry (as opposed to the emotionality) component of test anxiety were administered imme-
diately after the problem-solving phase. They were adapted from Duncan and McKeachie (2005) and Pintrich and De Groot (1990). The phrase “When I take a test” was revised to “When I solved the problems” to fit the nature of the experiment. A sample item is “When I solved the problems, I thought of the consequences of performing badly.” The Cronbach’s alpha was .62.

Interest. The same four items as in Study 1 were used. The Cronbach’s alpha was .90.

Performance. The number of problems correctly solved during the performance phase was used as a performance index. The performance scores could range from 0 to 24.

Challenge appraisal. Two items were used to assess the degree to which the participants perceived the problem-solving to be a positive challenge. One item (“I view the rest of the problem-solving as a positive challenge”) was adapted from McGregor and Elliot (2002), and the other item (“I am looking forward to solving the remaining problems”) was generated for the present study. The Cronbach’s alpha was .87.

Reengagement intention. Two items were generated to measure the participants’ intention to reengage in the problem-solving task after the performance phase. A sample item is “I would like to solve these kinds of problems more.” The Cronbach’s alpha was .83.

Results

Manipulation check. The mean score of responses for pursuing each of the assigned achievement goals was 6.67, 6.53, and 6.07 on a 1 to 7 scale for the ability-goal, the normative-goal, and the mastery-goal conditions, respectively. The lowest value of all responses was 4, reported by a single participant in the mastery-goal condition. Therefore, the achievement goal manipulation was deemed successful.

We also conducted one-way ANOVA on perceived task difficulty and task importance. There was no significant difference in perceived task difficulty, $F(2, 44) = .41, p = .67$, or perceived task importance, $F(2, 44) = .37, p = .69$, between the goal conditions. The mean for task difficulty was 5.12 or higher on a 1 to 7 scale across the three conditions, indicating the task was judged to be difficult. The average task difficulty rating under each goal condition was higher than the corresponding rating provided by the same goal condition in Study 1. The mean for task importance was 4.31 or higher, indicating that the participants perceived the task to be reasonably important. Descriptive statistics for the variables in Study 2 are reported in Table 3.

Effects of achievement goals on anxiety, interest, performance, challenge appraisal, and reengagement intention. We conducted one-way ANOVA for each of the dependent variables. Statistically significant mean differences were detected in anxiety, $F(2, 44) = 4.38, p < .05$ ($\eta^2 = .17$), interest, $F(2, 44) = 6.41, p < .01$ ($\eta^2 = .23$), challenge appraisal, $F(2, 44) = 5.32, p < .05$ ($\eta^2 = .20$), and reengagement intention, $F(2, 44) = 4.91, p < .05$ ($\eta^2 = .18$), between the three experimental conditions. Although the normative-goal students obtained the highest performance scores ($M = 8.65$) of the three goal groups, the difference from the ability-goal ($M = 7.69$) or the mastery-goal ($M = 8.00$) conditions did not reach statistical significance, $F(2, 44) = .58, p = .56$.

As Figure 4 displays, post hoc comparisons using the LSD method revealed that students in the ability-goal group felt significantly higher anxiety ($M = 5.06$) than those in the normative- ($M = 4.10, d = 0.74$) or the mastery-goal ($M = 3.88, d = 1.30$) conditions. The ability-goal participants also exhibited significantly lower interest in the reasoning task ($M = 4.58$) compared with the students in the normative- ($M = 5.68, d = 1.16$) and the mastery-goal ($M = 5.54, d = 0.90$) conditions. In contrast, the normative-goal students expressed significantly more positive challenge appraisal ($M = 5.76$) and significantly stronger reengagement intention in the upcoming problem-solving task ($M = 5.47$) compared with the ability-goal students ($M = 4.44, d = 1.07$ for challenge appraisal; $M = 4.06, d = 1.00$ for reengagement intention). The mastery-goal students also gave challenge appraisal ($M = 5.21, d = 0.61$) and reengagement intention ($M = 5.00, d = 0.68$) ratings that were higher than the ability-goal students, but the differences were not significant for both variables ($ps = .08$ and .06, respectively). Indirect effects of achievement goals on outcome measures via anxiety were not examined because, unlike Study 1, anxiety and other variables were measured concomitantly after the problem-solving phase.

Discussion

The main effects of achievement goals on anxiety and interest observed in Study 1 were replicated in Study 2 with an older group of college students. As hypothesized, students pursuing ability goals reported significantly higher anxiety and lower interest in the difficult problem-solving task compared with students pursuing normative and mastery goals. They also reported significantly more negative challenge appraisal and weaker reengagement intention compared with students pursuing normative goals.

There was no significant difference between the normative- and mastery-goal conditions in any of the dependent measures, including challenge appraisal and reengagement intention. Study 2 thus provided evidence that students who chase normative goals face challenging tasks in not only a more constructive fashion than students who adopt ability goals but also a manner similar to students who pursue mastery goals.

Still, the advantage of espousing normative goals over ability goals (e.g., Hulleman, Schrager, et al., 2010) or mastery goals

<table>
<thead>
<tr>
<th>Variable</th>
<th>Achievement goal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ability goal ($n = 16$)</td>
</tr>
<tr>
<td></td>
<td>Normative goal ($n = 17$)</td>
</tr>
<tr>
<td></td>
<td>Mastery goal ($n = 14$)</td>
</tr>
<tr>
<td>Task difficulty</td>
<td>M  5.38  SD 1.09  M  5.12  SD 0.71  M  5.29  SD 0.58</td>
</tr>
<tr>
<td>Task importance</td>
<td>M  4.31  SD 1.70  M  4.59  SD 1.58  M  4.79  SD 1.18</td>
</tr>
<tr>
<td>Anxiety</td>
<td>M  5.06  SD 0.98  M  4.10  SD 1.45  M  3.88  SD 0.83</td>
</tr>
<tr>
<td>Interest</td>
<td>M  4.58  SD 1.16  M  5.68  SD 0.67  M  5.54  SD 0.96</td>
</tr>
<tr>
<td>Performance</td>
<td>M  7.69  SD 2.12  M  8.65  SD 2.83  M  8.00  SD 2.83</td>
</tr>
<tr>
<td>Challenge appraisal</td>
<td>M  4.44  SD 1.47  M  5.76  SD 0.94  M  5.21  SD 1.03</td>
</tr>
<tr>
<td>Reengagement intention</td>
<td>M  4.06  SD 1.65  M  5.47  SD 1.11  M  5.00  SD 1.06</td>
</tr>
</tbody>
</table>

Note. No statistically significant difference between the conditions was observed in terms of task difficulty, task importance, or performance. Mean values in each row that share the same subscript do not differ significantly from each other at $p < .05$. Performance scores ranged from 0 (did not solve any problem) to 24 (solved all problems).
e.g., Harackiewicz et al., 2000) in task performance was not observed. Although there was a clear trend favoring the students assigned to the normative-goal condition, the benefits in terms of performance fell short of being statistically significant. It was not the case that the combination of nonverbal and verbal reasoning problems used in this study was not difficult enough for the participating students because the performance scores from both the pilot test ($M_{1} = 11$ out of 20) and the main experiment ($Ms = 7.69, 8.65, \text{and } 8.00$ out of 24) clearly attest to the challenge the problems posed. Instead, we suspect that the students might have erroneously underestimated the complexity of the problems because they did not receive any feedback on their performance when providing the difficulty ratings. If this conjecture is true, then even the students in the ability-goal condition would have been able to avoid the typical performance impairment that they would otherwise experience under threatening situations. We tested this possibility in Study 3.

Study 3

The same set of main dependent variables (i.e., anxiety, interest, and performance) was examined in Study 3, with the level of challenge substantially increased from Study 2. Unlike Study 2, in which the target problems were difficult yet solvable, the task in Study 3 was intentionally designed to be unsolvable. Therefore, regardless of the achievement goal condition, all participants would experience failure before engaging in subsequent solvable tasks. We incorporated failure into this study based on previous findings that individuals with ability goals are most vulnerable to failure (E. S. Elliott & Dweck, 1988), and thus we assumed that the harmful effects of ability goals on performance would emerge most clearly in failure situations.

We hypothesized that, as in Study 2, the participants in the ability-goal group would show significantly higher anxiety and significantly lower interest in the task compared with those in the normative- and mastery-goal groups. The ability-goal students were also expected to demonstrate significantly lower performance than the normative- and mastery-goal students. Also consistent with the results of Study 2, students in the normative-goal condition were hypothesized to exhibit comparable levels of anxiety, interest, and performance to those in the mastery-goal condition.

Method

Participants. As in Study 2, we posted an online advertisement on the university bulletin board to recruit participants. Eighty students attending a private university in Seoul, Korea, responded to the call. Students were randomly assigned to three achievement goal conditions. Four participants were excluded from analysis because they cast doubt on the failure task and the overall purpose of the experiment, leaving 76 participants. There were 27 students (15 men, 12 women) in the ability-goal group, 25 (11 men, 14 women) in the normative-goal group, and 24 (nine men, 15 women) in the mastery-goal group.

Procedure and materials. Figure 5 summarizes the experimental process. Although random assignment assumes that individual differences among the participants will be evenly distributed across the experimental conditions, we decided to assess trait anxiety in this study because the sample size was small and the accidental allotment of a few highly anxious students into the same condition could dramatically alter the results. The trait anxiety scores of the participants were collected at least 3 days before the experiment began.

PowerPoint slides were prepared to help the participants understand the achievement goal assigned to each group as well as the two experimental tasks. Task 1 was a figure puzzle designed to lead to failure. The participants had to restructure each of the given shapes into two identical halves by linking the grid dots. Unbeknownst to the participants, however, the large original shapes had been purposely distorted to yield the intended failure outcome. Task 2 was the nonverbal reasoning task that had been used in Study 2.

To ensure that the manipulation had been successful, the participants were asked to write down the purpose of the task in their own words after the explanation, as in Study 1. They were then given three figure puzzles (Task 1) to solve within 15 min. Upon completion of Task 1, the participants reported whether they believed their overall performance was successful or not.
then received the nonverbal reasoning problems (Task 2) that they had to solve within 10 min. Their scores on this task were taken as a performance index. After Task 2, they filled out a questionnaire on anxiety, interest, and the perceived difficulty of the nonverbal reasoning problems. After the survey, they were debriefed, thanked, and paid 5,000 Korean Won (equivalent to approximately US$5) for their participation in the experiment.

**Measures.** Except for trait anxiety, the response scale for all items ranged from 1 (strongest disagreement) to 7 (strongest agreement).

- **Trait anxiety.** Twenty items on a 4-point Likert response scale were used. The original items came from the STAI developed by Spielberger, Gorsuch, and Lushene (1970); we used the items translated and standardized by Kim (1978) for Korean adolescents. The Cronbach’s alpha was .91 in the present study.

- **Task difficulty.** The same three items from Study 2 were used. The Cronbach’s alpha was .84.

- **Anxiety.** The same three items from Study 2 were used. The Cronbach’s alpha was .60.

- **Interest.** The same four items from Study 2 were used. The Cronbach’s alpha was .94.

- **Performance.** The number of correct answers in the nonverbal reasoning test (Task 2) was counted. The maximum possible performance score was 20.

**Results**

**Manipulation check.** As in Study 1, a chi-square test within each achievement goal condition indicated that most participants correctly wrote down the intended purpose of the experimental tasks: χ²(1, N = 27) = 16.33, p < .001 (89% correct) for the ability-goal condition and χ²(1, N = 25) = 17.64, p < .001 (92% correct) for the normative-goal condition. All participants in the mastery goal condition provided a correct statement (100% correct), so a chi-square test was not performed for this group.

As anticipated, all participants across the three achievement goal conditions uniformly reported that their performance on the figure puzzle task (Task 1) was a failure. One-way ANOVA showed that there was no significant difference between the achievement goal conditions in terms of trait anxiety, F(2, 73) = 1.23, p = .30, or perceived task difficulty, F(2, 73) = 0.46, p = .64. As shown in Table 4, the mean value of task difficulty was 5.90 or higher on a 7-point scale across the three goal conditions, indicating that the participants perceived the task to be highly difficult.

**Effects of achievement goals on anxiety, interest, and performance.** A one-way ANOVA was conducted using anxiety, interest, and performance on the nonverbal reasoning task (Task 2) as dependent measures. There was a marginally significant difference in anxiety, F(2, 73) = 3.15, p = .05 (η² = .08), and a significant difference in interest, F(2, 73) = 3.62, p < .05 (η² = .09), and performance, F(2, 73) = 6.79, p < .05 (η² = .16), between the goal conditions.

As Figure 6 illustrates, post hoc comparisons using the LSD method showed that participants in the ability-goal condition felt significantly higher anxiety (M = 5.23) than those in the mastery-goal condition (M = 4.44, d = 0.51). As was the case in Studies 1 and 2, the ability-goal participants reported significantly lower interest in the nonverbal reasoning task (M = 3.53) than students in the normative-goal (M = 4.43, d = 0.64) and mastery-goal (M = 4.33, d = 0.61) conditions. In contrast, participants in the normative-goal condition demonstrated significantly better performance in Task 2 (M = 9.64) compared with those in the ability-goal (M = 6.93, d = 1.03) and mastery-goal (M = 7.58, d = 0.74) conditions.

![Figure 5. Experimental process for Study 3.](image)

**Table 4**

**Descriptive Statistics for Study 3**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ability goal (n = 27)</th>
<th>Normative goal (n = 25)</th>
<th>Mastery goal (n = 24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait anxiety</td>
<td>M = 2.23, SD = .43</td>
<td>M = 2.03, SD = .53</td>
<td>M = 2.08, SD = .48</td>
</tr>
<tr>
<td>Task difficulty</td>
<td>M = 6.10, SD = .73</td>
<td>M = 5.96, SD = .85</td>
<td>M = 5.90, SD = .69</td>
</tr>
<tr>
<td>Anxiety</td>
<td>M = 5.23, SD = 1.13</td>
<td>M = 4.69, SD = 1.15</td>
<td>M = 4.44, SD = 1.90</td>
</tr>
<tr>
<td>Interest</td>
<td>M = 3.53, SD = 1.50</td>
<td>M = 4.43, SD = 1.33</td>
<td>M = 4.33, SD = 1.11</td>
</tr>
<tr>
<td>Performance</td>
<td>M = 6.93, SD = 2.70</td>
<td>M = 9.64, SD = 2.55</td>
<td>M = 7.58, SD = 2.99</td>
</tr>
</tbody>
</table>

**Note.** No statistically significant difference between the conditions was observed in terms of trait anxiety or perceived task difficulty. Mean values in each row that share the same subscript do not differ significantly from each other at p < .05. Performance scores ranged from 0 (did not solve any problem) to 20 (solved all problems).
Study 3 largely replicated the findings of Studies 1 and 2 and successfully extended them to performance differences. Pursuing ability goals increased anxiety compared with pursuing mastery goals; it lowered interest compared with pursuing normative or mastery goals for the same task. Unlike Study 2, in which no significant difference existed between the conditions in terms of task performance, significant differences were observed in Study 3 between the achievement goal groups. Consistent with our hypothesis, students with ability goals demonstrated a significantly poorer performance compared with those with normative goals. Students in the normative-goal group also performed significantly better than students in the mastery-goal group.

In explaining the nonsignificant difference in performance between the achievement goal groups in Study 2, we conjectured that the problem-solving task used in that study, while demanding enough for the participants, might not have been perceived to be difficult enough to negatively affect the performance of the ability-goal students. We tried to address this concern in Study 3 by presenting students with a more taxing performance situation. All students thus experienced failure before they embarked on the second nonverbal reasoning task, which was believed to reinforce their perception of the task being challenging. Reflecting this change in the study design, students provided difficulty ratings that were considerably higher than the difficulty ratings obtained in the previous two experiments, with the lowest rating of 5.90 on a 1 to 7 scale.

As anticipated, students pursuing ability goals demonstrated the highest anxiety, lowest interest, and poorest performance among the students in the three achievement goal groups after experiencing failure. Performance was higher among the students in the normative-goal group compared with those in the ability- and mastery-goal groups. This result corroborates Senko et al. (2013), who found that the benefit of normative goals was most apparent when asked to perform in a challenging situation. However, unlike Study 2, the level of anxiety expressed by the normative-goal students was not significantly lower than that reported by the ability-goal students. It appears that the students in the normative-goal condition also felt heightened anxiety as the challenge became more intense, especially after their initial failure. The students in the mastery-goal condition seemed to be the least affected by their experience of failure, as indicated by their significantly lower anxiety and significantly higher interest in the second task compared with the ability-goal participants.

Summary of Findings

For both early adolescents and college students, pursuing ability goals heightened anxiety (Studies 1 and 2) and lowered interest (Studies 1, 2, and 3) in a challenging problem-solving task compared with pursuing normative and mastery goals. When assessed, students with ability goals also demonstrated the lowest persistence (Study 1), the most negative challenge construal, and the weakest reengagement intention among the three goal conditions (Study 2).

It was not until the challenge became more serious and involved failure that the ability-goal students showed clear signs of performance impairment (Study 3). It was also under this condition that the normative-goal students displayed a level of anxiety that was not significantly different from that of the ability-goal students, whereas the anxiety of the mastery-goal students was maintained at a level significantly lower than that of the ability-goal students, as in the previous two experiments. Nevertheless, students pursuing normative goals demonstrated significantly better performance than either the ability- or the mastery-goal students after experiencing initial failure.

General Discussion

There has been extensive debate in the achievement goal literature on the benefits and disadvantages of performance goals (e.g., Harackiewicz, Barron, Pintrich, et al., 2002; Midgley et al., 2001). This debate has been settled, in part, by splitting performance goals into approach and avoidance (A. J. Elliot & Harackiewicz, 1996) or ability and normative elements (Grant & Dweck, 2003). Although distinguishing between approach and avoidance performance goals has explained many previously contradictory findings, approach performance goals have continued to yield mixed results. Hulleman, Schrager, et al.’s (2010) meta-analysis was informative on this issue by demonstrating that ability performance-approach goals maintain a negative relationship, and normative performance-approach goals a positive relationship, with achievement. Researchers have since started to pay renewed attention to these two types of performance goal and their varying consequences (Edwards, 2014; Senko & Dawson, 2017; Warburton & Spray, 2014).

Although meta-analyses are helpful for recognizing the distinctive mechanisms underlying each performance goal, the extant literature still contains several gaps that need to be filled. For instance, the overwhelming majority of related studies involve college students, which makes it unclear whether the two forms of performance-approach goals produce similar effects for younger
students as for older learners (but see Senko & Dawson, 2017, for an exception). A majority of past studies have also been correlational in nature, which makes it difficult to fully accept the causal relationship between the two performance-approach goals and their presumed outcomes. Most of all, the similar relationships to anxiety and interest demonstrated by ability and normative goals (Huang, 2011; Senko & Dawson, 2017) require further investigation, given the negative effect of anxiety (Hembree, 1988; Seipp, 1991) and the positive effect of interest on performance (Harackiewicz et al., 2008) as well as the significant negative and positive association, respectively, of ability and normative goals with performance outcomes reported in Hulleman, Schragér, et al.’s (2010) meta-analysis.

Effects of Ability Performance Goals Under Challenge

In a series of three studies, we compared the effects of mastery, ability, and normative goals on anxiety, interest, and performance among groups of early adolescents (Studies 1) and college students (Studies 2 and 3) to improve the generalizability of the findings. The achievement goals were experimentally manipulated, thereby strengthening the causality between the variables. The relationship between goals and outcomes were examined under challenging conditions that were presumed to help detect the distinct effects associated with each achievement goal (Grant & Dweck, 2003). The level of challenge was varied across the three experiments, which helped shed light on the mixed and sometimes contradictory relationship between the variables.

Overall, students focusing on demonstrating ability turned out to be most susceptible to difficult situations. Compared with students who strived to improve their competence or to outperform others, the ability-goal students expressed higher anxiety, lower interest, and less persistence while solving challenging problem-solving tasks. They also displayed more negative challenge appraisal and weaker reengagement intention and, especially when the situation involved failure, deteriorated performance on the problem-solving task compared with students striving to outperform others.

For learners who try to validate their ability, an achievement task becomes a means by which they can prove the possession of the required ability (Dweck & Leggett, 1988). Success in a task verifies that they have this ability, whereas failure indicates that they do not. As the desire to perform well and protect one’s self-worth becomes stronger, evaluative concerns and worry about potential failure also become greater (Covington, 1992, 2009; Crocker & Park, 2004), subsequently reducing interest in the task, as witnessed in Study 1. However, whether anxiety is the main psychological mechanism underlying the maladaptive processes associated with ability goals remains unclear because it did not mediate the relationship of ability goals with persistence or performance.

As demonstrated in Studies 1 and 2, the ability-goal students may sometimes demonstrate a level of performance that equals to the performance of students pursuing normative and mastery goals when the failure is judged to be avoidable. Previous studies have shown that the performance of ability-goal students indeed fluctuates considerably according to task demand and previous failure experience. In one study, undergraduate students were told that class scheduling was an example of a problem-solving task and their performance in it reflected their basic cognitive capacities (Steele-Johnson, Beauregard, Hoover, & Schmidt, 2000, Study 1). They were then asked to perform a computerized class scheduling task under simple (i.e., five rules to satisfy) or difficult task conditions (i.e., seven rules to satisfy). When the task was difficult, the performance did not differ between the ability-goal and mastery-goal groups. When the task was simple, however, the ability-goal students outperformed the mastery-goal students and the performance gap between the two groups increased with repeated trials (Steele-Johnson et al., 2000, Study 1). Grant and Dweck (2003, Study 5) also reported that the final exam grades of ability-goal students were higher because they were more strongly committed to ability goals in a difficult chemistry course if they had experienced earlier success in the course. In contrast, students pursuing ability goals with poor prefinal grades attained lower final exam grades when their ability goal scores were high.

These results are consistent with the findings of the present research; the performance of ability-goal students even on a difficult problem-solving task deteriorated only after experiencing failure and was similar to the performance of others when the threat was not imminent. Although the consequence could be a comparable performance with that of others, these desperate attempts to guard one’s self-esteem spur detrimental psychological processes, as indicated by heightened anxiety and reduced interest during task performance. The ability-goal students’ fragile goal pursuit was not sustained after experiencing failure, resulting in significantly poorer performance compared with students striving to perform better than others.

Effects of Normative Performance Goals Under Challenge

Normative goals generated the opposite pattern in most cases. Students with normative goals exhibited lower anxiety (but only in Studies 1 and 2) and, higher interest, and greater persistence in solving difficult problems and this was comparable with patterns of students pursuing mastery goals. These results are in line with both previous findings that normative goals help learners cope with challenging situations more effectively (McGregor & Elliot, 2002; Senko et al., 2013) and the argument made by multiple goal theorists (Harackiewicz, Barron, Pintrich, et al., 2002), and supported by meta-analytic evidence (Senko & Dawson, 2017), that normative performance-approach goals represent a potentially adaptive form of motivation regulation.

Difficult tasks provide diagnostic information on an individual’s ability (Trope & Brickman, 1975). With a strong basis in the need for achievement and competitiveness (A. J. Elliot & McGregor, 2001), students who endorse normative goals could construe difficult tasks as an opportunity to obtain useful diagnostic information for the subsequent improvement of their ability (Festinger, 1954). Supporting this conjecture, students pursuing normative goals prefer upward comparison when they seek information about their ability (Bounoua et al., 2012). If one performs better than someone else with superior competence, this provides concrete evidence for enhanced competence; even if one fails to perform better, the result could still deliver valuable information such as what subsequent goal needs to be set (Suls, Martin, & Wheeler, 2002). A challenging situation is thus inherently diagnostic and promotes higher aspirations for competitive individuals who, in this research, were represented by those students pursuing normative goals.
Despite normative goals’ relative advantage over ability validation and mastery goals in terms of performance, caution is required about whether or not to promote normative goals in achievement contexts. As seen in previous research (Bong, Chung, Lee, & Lee, 2016; Bong, Woo, & Shin, 2013), ability and normative goals often correlate strongly with each other and also exhibit a similar pattern of correlations with other variables. The strength of achievement goals also fluctuates over time (Bong, 2009), especially as perceptions of competence change (Jagacinski, Kumar, Boe, Lam, & Miller, 2010). Learners who have adopted approach performance goals switch to avoidance performance goals when their confidence in achieving success starts to dwindle (Bong, 2005). In a competitive environment such as sports, normative goals often result in undesirable consequences such as negative emotion and attentional deficit and are viewed only as an interim solution to satisfy ability-validation goals (Mouratidis, Vansteenkiste, Lens, & Auweele, 2009; Vansteenkiste, Matos, Lens, & Soenens, 2007). Further, upon experiencing initial failure, the normative-goal students in the present research exhibited a heightened level of anxiety that was not significantly different from that of the ability-goal students.

The results of Study 3 pose one interesting question. If both the ability- and normative-goal students displayed levels of anxiety that were not significantly different from each other, why did only the performance of the ability-goal students and not that of the normative-goal students suffer? The normative-goal students continued to maintain their interest in the problem-solving task even in a failure situation, whereas the ability-goal students did not. Pekrun (2006) suggests that anxiety is an outcome-based emotion and interest is a task-based emotion. This difference in the nature of the two emotions allows us to infer that students with ability goals may focus primarily on the negative consequences of their task performance, whereas students with normative goals may also attend to the informative properties of the task that work to generate and uphold interest, independent of their concerns over potential outcomes.

The decision to persist in a challenging task could simultaneously summon interest and anxiety. Tulis and Fulmer (2013) examined changes in the task-related emotional states of sixth and seventh graders while performing a challenging math (Study 1) and a reading task (Study 2). Students reported their situational interest and state anxiety three times during task performance, with the first assessment taking place before the onset of the task. After embarking on the task for a short duration, students were given the option to stop or to continue with the task, after which they completed two additional ratings of their emotions. Across the two studies, the situational interest of the students who decided to persist either remained high or increased over the three assessments—not only that, the state anxiety of these students also increased during the same period. In comparison, both situational interest and state anxiety of the nonpersistence students steadily decreased over time. The higher levels of interest and the concomitantly higher levels of anxiety displayed by the persisting students during task engagement mirror the patterns observed for the normative-goal students in Study 3.

Situationally triggered interest is known to improve performance by stimulating positive affective responses and persistence (Ainley, Hidi, & Berndorff, 2002), whereas anxiety is presumed to impair performance (Hembree, 1988; Seipp, 1991). However, there is evidence that a moderate level of anxiety is conducive to performance under certain situations (Rocklin & Thompson, 1985). Eysenck, Derakshan, Santos, and Calvo (2007) also argued that anxiety may not necessarily undermine performance when compensatory strategies, such as increased effort, are recruited. Considering the finding of Senko and Dawson (2017) that normative goals correlate positively with self-regulation and the use of deep learning and adaptive surface strategies, similar compensatory strategies might have been employed by the students in the normative-goal condition in the present research.

Effects of Mastery Goals Under Challenge

Mastery goals once again emerged as a constructive motivational orientation in taxing performance situations. Although the general pattern associated with mastery goals was similar to that for normative goals, several findings were unique to mastery goals. Of the three achievement goal types, they produced the greatest persistence levels in the difficult problem-solving task in Study 1. Even after experiencing the same failure in Study 3 as did the students in the other two conditions, students with mastery goals demonstrated significantly lower anxiety about the problem-solving task than did those with ability goals. For learners who perform a task for the purpose of developing their competence, temporary failure would not be perceived as a threat but rather as a worthwhile and instructive event that can be harnessed to improve their skills (E. S. Elliott & Dweck, 1988). Although the short-term benefit in performance outcomes was less than that of normative goals, the characteristics of the psychological and behavioral outcomes associated with mastery goals when facing a challenge demonstrated in this research suggest that they may prove more beneficial in the long term.

Limitations and Future Directions

In this research, we attempted to understand how the students had felt during their task engagement process. Because the broad assessment of the students’ emotional state in Study 1 did not refer to the specific task to be performed, we asked students to report their emotional reactions in a retrospective manner in the subsequent studies. Although the three studies produced similar results regarding anxiety and interest regardless of the manner with which they were assessed, measuring emotions after task performance also has limitations, such as the possibility that the participants’ responses are positively or negatively influenced by their experience with the task. One way to ameliorate this problem may be to use the experience sampling approach (e.g., Goetz, Sticca, Pekrun, Murayama, & Elliot, 2016) or thinking-aloud protocols (e.g., E. S. Elliott & Dweck, 1988) while students are solving the problems. We did not use these methods because repeated measures can bias responses (e.g., Scollon, Kim-Prieto, & Diener, 2003) and thinking-aloud assessment can make certain positive or negative emotions more salient, resulting in a biased emotional sampling (Schooler, Ohlsson, & Brooks, 1993). However, future research should take advantage of these methods because they could generate critical insights into the emotional experience that students undergo when faced with a challenge.

The mediating role of anxiety was tested in Study 1, which provided only partial support for the hypothesized indirect links from ability goals to outcomes. This indicates that mechanisms other than heightened anxiety might be responsible for the lower
performances produced by learners striving to demonstrate their ability in a difficult performance situation. Identifying these mechanisms in future investigations will aid in better understanding the inimical nature of ability goals and their associated processes.

A. J. Elliot and McGregor (1999) maintained that normative goals could have both a positive and negative effect on performance by simultaneously activating appetitive and aversive motivation. Although normative goals, in general, have proved to be a positive predictor of performance (Hulleman, Schrager, et al., 2010), it has been difficult to predict a priori other psychological and behavioral consequences associated with these goals because of their hybrid nature. The present research revealed that normative goals with an approach orientation tend to decrease anxiety, increase interest, and improve performance in a difficult situation. The deleterious outcomes typically attributed to performance-avoidance goals were observed with ability goals in the current research. Because only approach goals were assessed in this research, it was not possible to test how avoidance normative goals might differ from ability goals. However, Hulleman, Schrager, et al.’s (2010) meta-analysis reported that the negative association of performance-avoidance goals with interest and performance outcomes was significantly stronger when the goals were measured with normative-competence items rather than with ability-demonstration items. This finding hints at the possibility that normative-avoidance goals may have a more negative impact than ability goals on student motivation and performance, a conjecture that requires systematic investigation.

Culture is another important moderator to be considered in evaluating the generalizability of the present findings. Independent and interdependent self-construal are the two dominant self-views that explain the characteristics of Western and Eastern cultures, respectively (Markus & Kitayama, 1991). In Eastern cultures, in which interdependent self-construal is common, individuals tend to define themselves in relation to or based on the acceptance of significant others, unlike those in Western cultures, who tend to be relatively less influenced by the opinions and approval of others. Ability-validation goals, therefore, may be more ubiquitous in Korean educational colleges. Students who have become habituated to such a system may come to view normative-avoidance goals as the norm. However, Hulleman, Schrager, et al.’s (2010) meta-analysis reported that the negative association of performance-avoidance goals with interest and performance outcomes was significantly stronger when the goals were measured with normative-competence items rather than with ability-demonstration items. This finding hints at the possibility that normative-avoidance goals may have a more negative impact than ability goals on student motivation and performance, a conjecture that requires systematic investigation.

**References**


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