Performance-approach goal effects on achievement under low versus high challenge conditions

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\begin{abstract}
Two studies examined the effects of university students’ achievement goals on performance under low versus high challenge conditions. The first was a laboratory experiment in which participants were assigned goals to pursue on a novel mathematics task alleged to be simple or complex to use. The second was a survey study in which students set goals for courses rated by others as easy or hard. In direct opposition to the common premise that performance goals are maladaptive on complex or challenging tasks, both studies found that performance-approach goals facilitated high achievement in the high challenge condition but not in the low challenge condition. Additional findings indicate this pattern may be stronger when the task or class is relatively interesting, perhaps because interest inspires autonomous instead of controlling reasons for pursuing performance-approach goals. Implications for goal theory are discussed.
\end{abstract}

\section{Introduction}

Who persists and succeeds under challenging conditions? This basic question of achievement motivation has long fascinated parents, coaches, supervisors, and educators alike. It also inspired the development of achievement goal theory (Dweck, 1986; Nicholls, 1984). This theory has generated vast amounts of research, much of it exploring the consequences of pursuing different achievement goals. Surprisingly little of this work, however, has examined how those goals influence actual achievement on challenging (versus simple) tasks. We review this theory and the corresponding research below and then provide two studies that systematically test goal effects on challenging versus simple tasks. Throughout, we focus primarily on “performance-approach goals,” which have garnered a great deal of debate about when they might be beneficial versus detrimental to pursue.

Achievement goal theory spotlights two broad goals. Mastery goals focus on skill development and thus define success with self-referenced standards (i.e., improvement or subjective feelings of having learned) or task-based standards (i.e., solving 85% of problems). Performance goals focus on outperforming peers and thus define success with normative standards. Most research also separates performance goals into performance-approach (striving to outperform others) versus performance-avoidant (i.e., striving to avoid being outperformed) types. Mastery goals can be separated into mastery-approach (i.e., striving to learn or improve) or mastery-avoidant (i.e., striving to avoid skill diminishment or learning failures) types as well, but the mastery-avoidant construct is not yet widely accepted within the field. We, too, focus on the original mastery-approach goal and the two performance goals here.

Goal theory posits that mastery-approach (MAP) goals are the most adaptive goal and should match or surpass both performance goals in producing achievement and other benefits (for a historical review, see Elliot, 2005). Nearly three decades of research has examined this broad hypothesis (for reviews, see Baranik, Stanley, Bynum, & Lance, 2010; Hullemann, Schrag, Bodmann, & Harackiewicz, 2010). Much of this work has been done in field settings, using self-report goal measures, though there are also a number of experiments that manipulate goals. With either method, MAP goals produce numerous benefits. For example, MAP goals are critical in the deepening of interest (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002) and promote various benefits that should translate into high achievement, such as self-efficacy and effort, elaborative learning strategies, and help-seeking (e.g., Diseth, 2011; Elliot, McGregor, & Gable, 1999; Vrugt & Oort, 2008). Curiously, despite these benefits, MAP goals seldom directly aid achievement (see Hullemann et al., 2010).
contrast, performance-avoidance (PAV) goals promote mostly negative outcomes, such as low achievement, low self-efficacy, high anxiety, and poor study strategies (see Baranik et al., 2010).

The research summarized above for MAP and PAV goals has been consistent and noncontroversial. That has not been the case for performance-approach (PAP) goals: many studies link PAP goals to mild anxiety and the use of superficial learning strategies (e.g., Huang, 2011; Vrugt & Oort, 2008), yet many also link PAP goals to positive affect, high self-efficacy, effort and persistence, and academic achievement (e.g., Diseth, 2011; Elliot et al., 1999; Huang, 2011). Part of the inconsistency may be due to discrepancies in how researchers define PAP goals. Some measures and manipulations of PAP goals emphasize outperforming others (e.g., Elliot & McGregor, 2001), but others emphasize earning favorable judgments by demonstrating high ability (e.g., Midgley et al., 2000). The first is concerned with how to define and attain competence, the latter with the social consequences of attaining competence. This distinction seems to matter. A recent meta-analysis of approximately 100 studies revealed that PAP goals which focus on outperforming others tend to provide positive links with achievement, whereas those which focus on demonstrating talent tend to provide negative links (Hullemann et al., 2010). As our main research aim is to determine when goals are most likely to aid achievement, we will focus on the normative-based form of the PAP goal in this paper and in the current studies. On the rare occasion that we discuss the competence-demonstration form of the goal, we will, for clarity, apply Urdan and Mestas’s (2006) “appearance goal” label.

To summarize, PAP goals generally predict negative outcomes and MAP goals predict positive outcomes except achievement, while PAP goals often predict high achievement and related processes despite also promoting mild anxiety and surface learning strategies. These effects align well with goal theory, with one exception: the surprising finding that PAP goals predict academic achievement more robustly than do MAP goals. Naturally, this PAP goal link with achievement has come under intense scrutiny, with theorists debating its generalizability to challenging tasks (Brophy, 2005; Harackiewicz et al., 2002; Midgley, Kaplan, & Middleton, 2001).

1.1. PAP goal effects on low versus high challenge tasks

One perspective is that PAP goals facilitate achievement on hard tasks at least as much, if not more, than on simple tasks. Theorists taking this view offer arguments that resonate with classic findings in the need for achievement literature (Atkinson, 1964; Trope, 1975). People with a high level of dispositional achievement orientation seek and thrive in challenging conditions, because success on challenging tasks, compared to simple tasks, offers greater pride and a more meaningful diagnosis of one’s current ability. Thus, the positive impact of achievement orientation on effort and performance is pronounced on challenging tasks but weak on simple ones. Achievement goal theorists later adopted this logic when positing that people who pursue PAP (or MAP) goals seek challenge and perform well in challenging conditions (Dweck, 1986; Elliot, 2005; Nicholls, 1984). Supporting this perspective, research shows that PAP goals are predicted by high achievement orientation (Elliot & McGregor, 2001) and are linked to various indicators of challenge-seeking. For example, students who pursue PAP goals perceive an upcoming exam as a challenge (McGregor & Elliot, 2002) and experience feelings of hope and anticipated pride (Pekrun, Elliot, & Maier, 2006). They also display high effort and persistence when working on extremely challenging problems (Sideridis, 2005). Many studies (e.g., Lee, Sheldon, & Turban, 2003; McGregor & Elliot, 2002) also show that PAP goals predict setting lofty, specific goals (e.g., for grades in a course, or race times in a competition) and, importantly, this effect appears to be stronger for difficult tasks than easy tasks (Horvath, Herleman, & McKie, 2006). Similarly, when given a choice in task difficulty, people pursuing PAP goals tend to choose a hard instead of an easy task, even after just experiencing a failure (Jagacinski, Kumar, & Kokkinou, 2008). Finally, research shows that social comparisons—an intrinsic feature of PAP goals—can boost achievement when focused upward toward role models whose success inspires and challenges people (Blanton, Buunk, Gibbons, & Kuyper, 1999).

The other perspective is that PAP goals facilitate achievement on relatively simple tasks but hinder it on hard tasks. Theorists taking this view offer two arguments. One is that, under challenging conditions in which failure is a real possibility, PAP goals trigger worrisome thoughts about having less ability than others, thus diverting attention away from task demands (Brophy, 2005; Hoffman, 1993). The other argument, offered primarily for learning contexts, traces to the common finding that PAP goals often prompt a shallow learning strategy (i.e., rote memorization) instead of a deeper strategy (i.e., elaboration and synthesis of course material). Thus, it is plausible that PAP goals facilitate achievement on simple tasks requiring only superficial topic knowledge, but undermine it on challenging tasks requiring deeper knowledge (Brophy, 2005; Midgley et al., 2001). A review of studies relevant to each argument showed surprisingly little support for either, however (Senko, Hullemann, & Harackiewicz, 2011). For example, in contrast to the first argument that PAP goals distract attention, PAP goals are typically unrelated or positively related to task focus (e.g., Cury, Elliot, Sarrazin, Da Fonseca, & Rufo, 2002; Dickhäuser, Buch, & Dickhäuser, 2011; Lee et al., 2003). Likewise, although PAP goals do often trigger mild anxiety, it does not appear to be of sufficient magnitude to debilitating task performance and is often countered by equally mild positive affect (Huang, 2011). The available research suggests it is actually PAV goals that arouse high anxiety, distract attention, and undermine achievement. Just like PAP goals, in contrast to the assumption that PAP goals facilitate achievement only in contexts that reward surface comprehension, the use of surface learning strategies is typically unrelated or negatively related to academic achievement and, therefore, cannot explain why PAP goals aid achievement (Senko et al., 2011).

The above two perspectives agree that PAP goals are beneficial (or at least not detrimental) on simple tasks but disagree about whether they are beneficial on challenging tasks. Each is sensible, yet the available research provides stronger support for the position that PAP goals are sometimes beneficial on challenging tasks. However, that research allows, at best, only an indirect test of this issue. A proper test requires comparing PAP goal effects on achievement on simple versus challenging tasks, either in the field

1 Hullemann et al.’s meta-analysis showed that PAV goals often predict low achievement whether defined in terms of normative comparison or competence demonstration. Also, MAP goals predict high achievement when embedded with positive affect or challenge-seeking elements, but not when stripped of these confounding elements.

2 Dweck (1986) and Nicholls (1984) did not use the PAP goal and PAV goal terms; those were introduced later (Elliot & Church, 1997). But they did theorize that performance goals encourage challenge-seeking and related processes among people possessing high confidence (cf. PAP goals), and low challenge-seeking among people lacking it (cf. PAV goals).
(i.e., classrooms) or in the lab. No classroom studies have done this yet. But a few do at least provide a limited test by exploring goal relationships with grades in courses assumed to be challenging because their exams assess “deep comprehension” of the course material (i.e., elaboration, integration of concepts, critical thinking, and so forth). Their results are mixed. Linnenbrink (2005) and Grant and Dweck (2003) found that PAP goals were unrelated to grades in Introductory-level college courses assumed to require deep comprehension. In contrast, Barron and Harackiewicz (2001) found that PAP predicted high grades in seminar-style courses assumed to require deep comprehension, and Darnon, Butera, Mugny, Quiamzade, and Hulleman (2009) found that PAP goals predicted success on oral final examinations in which students applied, analyzed, and synthesized various course concepts. These field studies are informative on this issue, of course, but ultimately are limited because they do not directly compare goal effects in simple versus challenging courses.

This topic has been tested more systematically in laboratory studies. To our knowledge, eight studies have tested the effects of experimentally manipulated achievement goals on performance on simple versus challenging tasks. They used any of three tactics to manipulate task challenge. One tactic, mimicking the classroom studies described above, is to provide participants a learning session and then test them for surface versus deeper comprehension of the material (Barker, McInerney, & Dowson, 2002; Graham & Golan, 1991, studies 1 & 2). Another tactic is to have participants learn a novel activity and then perform several trials that are either of similar or greater difficulty (i.e., transfer tests) to the training trials (Barron & Harackiewicz, 2001, study 2; Escribe & Huet, 2005; Steele-Johnson, Beauregard, Hoover, & Schmidt, 2000, studies 1 & 2). A third tactic is to provide participants novel material to learn and then induce either low or high confidence in their new topic knowledge, thereby making the subsequent quiz on the material seem relatively simple or challenging (Darnon, Butera, & Harackiewicz, 2007). Many of these studies included multiple achievement measures, thus allowing a large number of comparisons between a performance goal (usually appearance-based) and either a No Goal control group or a MAP goal.

Table 1 lists the findings from these experiments.4 For simple tasks, PAP goals yielded equal achievement with No Goal controls on 8 of 8 performance measures and with MAP goals on 14 of 15 performance measures (Cohen’s overall $d = .16$ and $.11$, respectively, with positive scores favoring the PAP goal). A somewhat similar pattern emerged for challenging tasks: PAP goals matched the achievement of No Goal controls on 12 of 14 performance measures, caused lower achievement on one, and caused higher achievement on the other (Cohen’s overall $d = .01$); likewise, the PAP goals matched the MAP goal on 16 of 22 performance measures and caused lower achievement on the other six (Cohen’s overall $d = -.25$, considered ‘small’ by conventional standards). There is scant evidence from these experiments that PAP goals produce gains to achievement on simple tasks, nor gains or great detriments on challenging tasks.5 Importantly, however, all but one of those experiments (Barron & Harackiewicz, 2001) utilized an appearance goal instead of a normative PAP goal. Given that the classroom studies insinuating these experiments have shown that normative PAP goals and appearance goals have positive and negative links with achievement, respectively (Hulleman et al., 2010), there is clear need for new experiments testing normative PAP goal effects on achievement.

In sum, there are two competing, equally plausible hypotheses about the effects of PAP goals on achievement in challenging conditions, but little research has been done to test these hypotheses systematically. The present studies were designed to do this in the laboratory (Study 1) and the classroom (Study 2).

2. Study 1

Study 1 experimentally tested the effects of PAP (and MAP) goals under low versus high challenge conditions. To do this we manipulated participants’ achievement goals plus their expectations for how challenging it would be to learn and apply a novel skill. Based on the reviewed literature, we tested two rival hypotheses. Matching one viewpoint, Hypothesis 1 is that the PAP goal will produce superior performance when the task appears challenging instead of simple. Matching the alternative viewpoint, Hypothesis 2 is that the PAP goal will produce inferior performance when anticipating challenge. The MAP goal served simply as a comparison; we had no hypothesis about its effect on task performance in either condition. Also, given these rival interaction effect hypotheses, we had no firm predict for a PAP main effect.

2.1. Method

2.1.1. Participants and design

Participants were 106 students (50% female; 88% Caucasian, 12% African–American) at a large American university. They were randomly assigned to condition in this 2 (Task Description: Simple vs. Challenging) × 2 (Goal: PAP vs. MAP) between-participants design.

2.1.2. Experimental activity, measures, and procedure

The experimenter, who remained blind to goal condition and the hypotheses, overviewed the study and delivered the first installment of the task description manipulation. Participants in the Simple condition were told, “It’s a simple technique, so it’s pretty easy to learn. And once you get the technique down, it can be really useful in everyday life.” Participants in the Challenging Condition were told instead, “It’s a complex technique, so it’s pretty hard to learn at first. But once you get the technique down, it can be really useful in everyday life.”

Before learning the new technique, participants were given 4 min to solve as many double-digit multiplication problems as they could using the traditional technique taught in American schools. The number correctly solved served as a measure of their baseline

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4 This list excludes three sources of data worth noting. First, as we focused on experimental goal manipulations, we excluded Barron and Harackiewicz’s (2001) Study 1, which examined self-reported goals. PAP goals predicted success in the low challenge condition but not in the high challenge condition; MAP goals were unrelated to achievement in both conditions. Second, as our research question concerns the relative effects of PAP goals on challenging versus simple tasks, this list also excludes three studies that tested goal effects in only challenging task conditions: Bereby-Meyer and Kaplan (2005) found that appearance goals caused worse performance than MAP goals in two studies, whereas Dickhäuser et al. (2011) found that appearance goals and MAP goals yielded similar performance. Third, we excluded a control condition in Graham and Golan’s (1991) Study 2 in which participants were assigned goals after having learned the task. The timing of that goal introduction does not allow a proper test of the assumption that PAP goals cause superficial learning approaches.

5 Yeo, Loft, Xiao, and Kiewitz (2009) tested this issue indirectly in two studies. Each measured goals repeatedly over time and tested their effects on surface comprehension (or familiar tasks) versus deep comprehension (or novel tasks). The findings were mixed. In each study, participants’ average PAP goal level predicted high achievement, mirroring prior research (Hulleman et al., 2010). However, participants who increased in PAP goal pursuit over time performed worse as the task became more challenging. The later finding offers tentative evidence that PAP goals can be detrimental on challenging tasks, however, this was demonstrated only after controlling for each participant’s overall goal pursuit level, which, again, predicted positively high achievement.
multiplication ability. They were then introduced, via a folder of materials and an accompanying audiotape, to a new and interesting technique for multiplying two-digit numbers (see Barron & Harackiewicz, 2001). This technique contrasts with the traditional technique in that, instead of writing numbers, it requires doing multiple operations mentally and then summing them. As it relies on the Left-to-Right technique, participants were told the task is challenging because the way they are taught it in schools is inefficient and cumbersome. The “Left-To-Right” technique they were about to learn, they were told, is faster and can be done mentally, without the need for paper and pencil, thus making it useful for everyday day life calculations, such as determining restaurant tips. We emphasized its utility value to prevent the possibility that participants who were told the task is challenging might devalue the task and, therefore, their goal commitment, as this confounding between task challenge and goal commitment might render any effects on achievement uninterpretable.

The novelty of the task, coupled with the math anxiety common among students, allowed us to credibly manipulate the perceived difficulty of learning the technique. Participants in the Simple Task condition were informed by the tape:

This new technique is pretty simple to learn. It involves just four basic steps that you can do easily in your head. You won’t even need to use paper and pencil for it. So you’ll probably find the new technique straightforward and easy to use right away.

Participants in the Challenging Task condition were instead informed:

For this type of activity, people often pursue a performance goal. Performance goals involve trying to do better than other people who are doing the same activity. We recommend that you adopt a performance goal for today’s session. In other words, try to do better than previous participants. At the end of the session, you will receive feedback about whether you successfully met this performance goal.

Participants in the MAP Goal condition instead heard:

For this type of activity, people often pursue a mastery goal. Mastery goals involve trying to develop and improve your mastery of a skill that you are being taught. We recommend that you adopt a mastery goal for today’s session. In other words, try to develop a good command of the new Left-to-Right technique. At the end of the session, you will receive feedback to help determine if you successfully met this mastery goal.

Participants then completed two manipulation checks. The first was an open-ended check of the goal manipulation, which all participants described accurately. The second was a survey check of the task description manipulation (“The Left-to-Right technique seems like it will be pretty simple to learn”). This questionnaire also included a single-item measure of Goal Commitment (“I am committed to meeting the recommended goal”) so that we could

<table>
<thead>
<tr>
<th>Study</th>
<th>Low challenge condition</th>
<th>Performance measure</th>
<th>Cohen’s d</th>
<th>High challenge condition</th>
<th>Performance measure</th>
<th>Cohen’s d</th>
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<td>Free Recall: Category (Deep) — Day 1</td>
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<td>Free Recall: Category (Deep) — Day 2</td>
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<td></td>
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<td>Average d:</td>
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Notes: Positive effect sizes indicate the PAP goal yielded higher performance. *indicates the comparison was statistically significant, p < .05; ns indicates it was non-significant. n/a = unavailable.
assess whether differences in goal commitment explain any observed goal effects. These and all other self-report measures were collected on 1 (strongly disagree) to 7 (strongly agree) Likert-type scales, and all have been used successfully in prior research (Baron & Harackiewicz, 2001).

Next, the taped instructions taught participants the new multiplication technique and then explained that they would be given one set of 40 problems, with 4 min to solve as many as they could using the technique. Participants were also reminded by the tape of their achievement goal. They then did the problem set. The number solved served as the task performance measure. Also, to test the possibility that PAP goals affect error rates, we measured the number of incorrect solutions.

After completing the problem set, participants reported their task-involvement (three items; e.g., “I got absorbed in doing the problems”) and performance pressure (four items; e.g., “I felt nervous”) while solving the problems. They then received feedback on a form indicating the number of problems solved correctly, as well as goal-relevant information: in the MAP goal condition, it indicated that these scores represented “good” mastery of the task; in the PAP goal condition, it instead indicated that these scores represented “good” performance compared to previous participants, whose putative average was several problems fewer than the participant’s score. Thus, all participants received evidence of goal attainment.

After receiving feedback, participants reported their perceived competence (two items; e.g., “I am satisfied with my performance on the problem set”) and task interest (five items; e.g., “The left-to-right technique is interesting”). Finally, participants were debriefed.

2.2. Results

Multiple ANCOVAs tested the hypothesized effects. Each examined the joint effects of goal type, task challenge, and their interaction, while controlling for participants’ gender and baseline math ability, both of which might influence performance with the new math technique. Covariate interactions with the goal and challenge terms were non-significant and thus omitted from the final model. Any unreported effects were non-significant ($p > .10$)

Table 2 provides the correlations, means, and Cronbach’s alphas for all measures.

### Table 2

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<td>—21*</td>
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<td>.04</td>
<td>.18</td>
<td>.10</td>
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<td>.03</td>
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<td>16.38</td>
<td>.50</td>
<td>5.41</td>
<td>5.00</td>
<td>3.99</td>
<td>4.49</td>
<td>5.31</td>
</tr>
<tr>
<td>SD</td>
<td>5.49</td>
<td>2.48</td>
<td>5.35</td>
<td>.50</td>
<td>1.12</td>
<td>.93</td>
<td>1.15</td>
<td>1.61</td>
<td>1.28</td>
</tr>
</tbody>
</table>

Note: $N = 106$. *$p < .05$. Gender (0 = female, 1 = male), $a =$ Cronbach’s alpha.

2.2.1. Task challenge manipulation check

Participants in the Simple task condition ($M = 4.96$, $SE = .17$) anticipated the task to be easier to learn than those in the Challenging task condition ($M = 3.13$, $SE = .17$), $F(1, 100) = 56.15$, $p < .001$, $eta^2 = .36$. Importantly, this view was shared in both goal conditions. The manipulation was clearly successful.

2.2.2. Self-report measures

We examined effects on participants’ goal commitment prior to learning the task, task involvement and performance pressure while solving the problems, and their perceived competence and task interest after the problem set. Only performance pressure showed significant effects: women reported greater pressure than men, $F(1, 100) = 4.09$, $p < .05$, $eta^2 = .04$, and participants felt more pressure pursuing the PAP goal ($M = 4.23$, $SE = .16$) than the MAP goal ($M = 3.76$, $SE = .15$), $F(1, 100) = 4.44$, $p < .05$, $eta^2 = .04$.

There were no significant effects on the other measures. All participants, irrespective of experimental condition, were highly committed to achieving their assigned goal ($M = 5.41$), felt task involved during the session ($M = 5.00$), and reported moderate levels of perceived competence ($M = 4.49$) and high task interest at the end of the session ($M = 5.31$). Thus, any effects on task performance cannot be traced to these experiential variables.

2.2.2. Task performance

Men solved more problems than women, $F(1, 100) = 17.87$, $p < .001$, $eta^2 = .15$, and those with higher baseline math ability solved more problems than those with lower ability, $F(1, 100) = 17.24$, $p < .001$, $eta^2 = .15$. The main effects for Goal Type and Task Challenge were non-significant, but the hypothesized Goal × Challenge interaction was significant, $F(1, 100) = 3.96$, $p < .05$, $eta^2 = .04$. Planned comparisons of the adjusted means revealed that participants pursuing the PAP goal solved more problems when the task was presented as challenging ($M = 10.17$, $SE = 1.04$) instead of simple ($M = 7.18$, $SE = 1.01$), $p < .05$. By contrast, participants pursuing the MAP goal solved a similar number of problems when the task was described as challenging ($M = 9.13$, $SE = .99$) or simple ($M = 10.70$, $SE = 1.01$).

We also examined the number of errors made with the new technique. No effects were significant, save the ability covariate: more errors were made by participants with greater proficiency using the conventional technique, $F(1, 100) = 4.45$, $p < .05$, $eta^2 = .04$.

2.3. Discussion

Contrary to Hypothesis 2, PAP goals did not harm achievement in the face of challenge. Rather, in support of Hypothesis 1, PAP goals yielded greater achievement when participants believed the task to be complex instead of simple. MAP goals instead showed identical performance in these two conditions.

We measured several process measures to see if they could provide insight into this effect. None did. Although task performance correlated with high perceived competence and task interest, and marginally correlated with low goal commitment and task involvement, there were no goal or challenge effects on any those self-reported processes. Participants instead reported high levels of each in every condition. Similarly, although the PAP goal aroused performance pressure, as in past work (Senko & Harackiewicz, 2005), this was equally true in both task challenge conditions and therefore does not explain why participants with this goal performed better on the challenging task than the simple task.

Though provocative, these findings must be interpreted cautiously because of three methodological issues. One is that, like

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6 Participants’ worksheets revealed that they all actually utilized the new technique.
most achievement goal experiments, Study 1 lacked a No Goal control group. So we cannot tell if PAP goals boosted achievement under challenging conditions or reduced it under simple conditions. We believe the former is more sensible from a theoretical perspective and also corresponds better with prior research linking PAP goals to challenge-seeking (see section 1.1). Furthermore, our process measures (e.g., task involvement, performance pressure, perceived competence) provide no evidence that framing the task as simple to learn somehow made the PAP goal less meaningful, motivating, or satisfying to achieve. Regardless, given the debate about whether PAP goals are more beneficial under low versus high challenge, what matters most is the relative difference between the two conditions: PAP goals caused higher achievement under challenging than simple conditions.

The second methodological concern is that we manipulated anticipated challenge, not actual challenge. We chose this approach for two reasons. First, manipulating anticipated challenge allows the most direct test of our research question. All prior experiments manipulated actual challenge by giving participants two different tasks, one easier than the other. That approach renders meaningful manipulated actual challenge by giving participants two different goals for two reasons. First, manipulating anticipated challenge allows anticipated challenge, not actual challenge. We chose this approach for this reason (e.g., enjoying the challenge of outperforming others, or facilitating achievement when pursued for relatively autonomous reasons when the task itself seems interesting, in which case Vansteenkiste et al. (2010) recently found that PAP goals positively relate to course grades. For this reason, we therefore expected PAP goals to predict high grades within the more challenging courses, especially when students considered the courses interesting (Hypothesis 1). We expected the PAV goals to be negatively related (Hypothesis 2), and the MAP goal unrelated, to grades, regardless of course difficulty or interest.

3. Study 2

Study 2 extends Study 1 in three other ways, too. First, it tests these effects in a more ecologically valid context by utilizing survey methodology within college courses. Second, it tests the effects of PAV goals alongside MAP and PAP goals. Third, it examines the role of task interest in these goal effects. The laboratory task used in Study 1 was highly engaging. Likewise, many of the positive links between PAP goals and academic achievement have been found in courses that students often choose to take and find interesting (e.g., Introductory Psychology). It is conceivable, then, that even though PAP goal pursuit is often unlinked with interest, the benefits of these goals emerge most clearly when interest is high. Consistent with this, Vansteenkiste et al. (2010) recently found that PAP goals facilitate achievement when pursued for relatively autonomous reasons (e.g., enjoying the challenge of outperforming others, or finding normative success more personally worthwhile) instead of extrinsic reasons (e.g., attaining rewards, or meeting others' expectations). Perhaps students pursue these goals for autonomous reasons when the task itself seems interesting, in which case Vansteenkiste et al.'s findings suggest more positive PAP goal effects in interesting courses than dull courses. Study 2 tested this possibility. In particular, we assessed students’ goals for their classes, which varied both in how challenging and how personally interesting they appeared, and then tested these goal relationships with students' course grades.

We expected PAP goals to predict high grades within the more challenging courses, especially when students considered the courses interesting (Hypothesis 1). We expected the PAV goals to be negatively related (Hypothesis 2), and the MAP goal unrelated, to grades, regardless of course difficulty or interest.

3.1. Method

3.1.1. Participants & procedure

First-year undergraduate students at a large American university were recruited to participate in this study during orientation week. For participating, they were entered into raffles for monetary and other prizes. The initial sample included 358 participants (59% women; 59% Caucasian, 18% African-American, and 23% either Hispanic-, Asian-, or Native-American).

3.1.2. Measures

Participants considered their courses for the semester and identified the one they anticipated to be the most interesting and the one they anticipated to be the least interesting. For each course, they then completed Elliot and McGregor's (2001) measure of PAP goals (e.g., “It is important to me to do well compared to others in this class”), PAV (e.g., “I just want to avoid doing poorly in this course”), and MAP (e.g., “I want to learn as much as possible from this class”) goals on 1 (Strongly Disagree) to 7 (Strongly Agree) scales.

We favored a measure of actual challenge for this study, but having participants rate the difficulty of the courses would allow their ratings to be colored by their goal. This potential confound is especially problematic because the PAP and MAP goals use different standards for defining success (Elliot, 2005). We therefore relied on a separate sample (N = 21) of upper-level Psychology students familiar with the courses selected by the participants. They rated the difficulty of 29 courses frequently taken by incoming students at this university. They judged how challenging students in general perceive each course on a 3-point scale: 1 (low challenge), 2 (medium challenge), or 3 (high challenge). The raters had high agreement ($\alpha = .84$), so their averaged challenge ratings were assigned to each course.

Students’ high school rank, standardized college entrance test score (American College Test; ACT), and course grades (0–4 scale) were obtained after the semester ended.

3.2. Results

3.2.1. Overview

Seventy-five students were excluded from all statistical analyses because of incomplete data (e.g., lacking grade data due to dropping out of the university). Additionally, some participants listed courses that could not be classified for challenge level (section 3.1.2) or withdrew from the course before the semester's end. We therefore had data for 220 participants in their most interesting courses, 223 participants in their least interesting courses, and 160 participants with complete data for both courses. Due to these different sample sizes and compositions, we opted to test interesting and uninteresting courses separately, rather than restrict our sample to 160 for one comprehensive analysis.

We conducted two regression analyses, one for the high interest courses and one for the low interest courses, to test the hypotheses concerning goal relationships with course grades. Each analysis included the three achievement goals, the course challenge rating for the students' courses, and, as covariates, gender, high school rank, and ACT score. The MAP × PAP interaction effect, as well as those between covariates and the goal and challenge variables,
were non-significant in preliminary analyses and thus were excluded from this model. Additionally, only significant interactions between each goal and course challenge were retained in the final model. All continuous variables were standardized, and any significant interaction effects involving course challenge were probed with simple slope analyses. All unreported effects were non-significant ($p > .10$). Table 3 provides the correlations, means, and Cronbach's alphas for all variables, separately for the most and least interesting courses.

### 3.2.2. Most interesting courses

The model significantly predicted grades in students' most interesting courses, $F(8, 211) = 5.63, p < .01, R^2 = .18$. High school rank, $t(211) = 4.64, p < .01, \beta = .31$, and ACT score, $t(211) = 2.58, p = .01, \beta = .18$, predicted high grades: not surprisingly, students with the stronger academic background performed better in their most interesting course. In addition, further validating the experts' course ratings, students enrolled in less challenging courses performed better than students enrolled in more challenging courses, $t(211) = -2.17, p = .03, \beta = -.14$.

The main effects for the three goals were non-significant. However, the hypothesized interaction between PAP goals and course challenge was significant, $t(211) = 2.01, p < .05, \beta = -.13$. Simple slope analyses showed that, as expected, PAP goals predicted high performance in the high challenge courses, $t(211) = 2.00, p < .05, \beta = .18$, but did not predict performance in the low challenge courses, $t(211) = -7.1, p = .48, \beta = -.07$.

### 3.2.3. Least interesting courses

The parallel analysis for students' least interesting courses was also significant, $F(7, 215) = 9.29, p < .01, R^2 = .23$. As with the interesting courses, high school rank, $F(215) = 24.01, p < .01, \beta = .32$, and ACT, $t(215) = 2.97, p < .01, \beta = .19$, predicted high grades, while course challenge predicted low grades, $F(215) = -25.30, p < .01, \beta = -.31$. In addition, one goal main effect emerged: students who pursued MAP goals in these courses performed better than those who did not pursue them, $t(215) = 7.02, p < .01, \beta = .21$.

### 3.3. Discussion

Study 2 offers additional evidence that PAP goals may aid achievement more for challenging rather than simple tasks. Matching Hypothesis 1, however, this PAP goal link with grades in challenging courses was stronger if students considered the courses interesting instead of dull. This finding is conceptually consistent with Study 1, which showed a similar PAP goal effect on a math task that participants generally considered highly interesting. Why should this be the case? We believe that PAP goals may take on different meanings in high versus low interest contexts. Elliot (2005) and Urdan and Mestas (2006) observed that students pursue PAP (or MAP) goals for different reasons, potentially with different effects as a result. In line with this, Vansteenkiste et al. (2010) found that PAP goals predict achievement when pursued out of enjoyment in outperforming others, but not when pursued for extrinsic reasons such as to please family. Our findings conceptually replicate theirs: PAP goals predicted high achievement in challenging courses only if students expected them to be interesting. Given that these were for first-year students, it is likely that their duller courses were chosen to satisfy general education requirements, in which case their PAP goal pursuit may have been motivated by relatively extrinsic reasons. Perhaps, then, interesting courses arouse more autonomous motivations for pursuing PAP (or MAP) goals than do dull courses. Future research should examine this possibility directly.

Two secondary findings contradicted expectations. First, in contrast to Hypothesis 2, PAV goals were unrelated to achievement in all courses. Although there is precedent for this null effect (e.g., Senko & Miles, 2008; Shim & Ryan, 2005), PAV goals do typically predict low achievement (Hulleman et al., 2010). Second, in contrast to our expectation for null MAP goal effects, this goal predicted high grades in the dull courses, regardless of challenge level. However, we recommend caution when interpreting this effect because the MAP goal did not correlate with grades ($r = .00$); the relationship became significantly positive only in the regression analysis, when controlling for the other goals. The MAP goal also correlated unusually high with both the PAP and PAV goals in the dull courses ($r's = .51 & .47$), in fact even more so than the correlation between the two performance goals ($r = .25$). Thus, the MAP effect is due to statistical suppression. It is unclear, however, why the high correlations between goals was unique to the dull courses. One possibility is that when relatively inexperienced students, such as our incoming first-year students, set goals for courses they expect to be dull, they conceptualize achievement striving in broader, more unitary ways (i.e., simply try to perform well in any way). If, as argued above, performance goals for dull courses are motivated by more extrinsic concerns, then controlling for these goals may have distilled students' achievement strivings into a purer, positive form of achievement strivings that aids achievement.

### 4. General discussion

Many studies show that PAP goals predict achievement, in fact more robustly than do MAP goals (Hulleman et al., 2010). This finding contradicts initial theorizing (Dweck, 1986; Nicholls, 1984),
and therefore has triggered debate about the validity of the PAP goal link with achievement (see section 1.1). One perspective is that this link is limited to simplistic learning conditions. The rival perspective is that this link is even stronger in challenging conditions. We tested these rival hypotheses with two different methods: a laboratory study using experimental goal manipulations for an interesting activity, and a classroom study using students’ self-reported goals in dull versus interesting courses. Their findings converged to support the second perspective: PAP goals caused higher task performance (Study 1) and positively predicted course grades (Study 2), in both cases for activities that are interesting and challenging. We believe these findings conceptually replicate the prior research linking PAP goals with high academic achievement (Hulleman et al., 2010); those studies, too, have often used courses that many students consider interesting (e.g., Introductory Psychology) and, if our findings are any indication, also fairly challenging. Additional work is needed to further test this possibility.

To this end, researchers must also consider how to define challenge. There are numerous ways, several of which we reviewed earlier (section 1.1). We used two approaches in the current research. Study 1 manipulated the anticipated difficulty of learning a new skill. Study 2 instead relied on shifts (upper-level students) to judge the difficulty of courses taken by participants. Their converging results allow some confidence in each method for defining challenge. Between them, the studies captured relatively easy to moderately high levels of challenge, which we believe mirrors what most students are likely to face in the vast majority of schooling experiences. Nevertheless, future research should test if these effects replicate under a broader range of challenge, including extremely challenging conditions with repeated failures. It will be useful to also test if they generalize to younger populations, who, some argue, might benefit less from PAP goals (Midgley et al., 2001; though see Hulleman et al., 2010).

Finally, we caution against overstating the benefits of PAP goals. Though they provide some benefits, most notably to achievement and related processes, they also sometimes provide drawbacks, such as mild anxiety, exhaustion, and ineffective cooperation (Huang, 2011; Senko et al., 2011; Tuominen-Soini, Salmela-Aro, & Niemivirta, 2008). They also provide few of MAP goal’s benefits (e.g., task interest). Accordingly, we concur with theorists who advocate a “multiple goals” perspective that acknowledges how MAP and PAP goals can each be beneficial in unique and complementary ways (Harackiewicz et al., 2002).

References

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