Original Communication

The Role of Test Anticipation in the Link Between Performance-Approach Goals and Academic Achievement

A Field Experiment with Science, Technology, Engineering, and Mathematics (STEM) Classes

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Abstract. Performance-approach goals (i.e., the desire to outperform others) have been found to be positive predictors of test performance, but research has also revealed that they predict surface learning strategies. The present research investigates whether the high academic performance of students who strongly adopt performance-approach goals stems from test anticipation and preparation, which most educational settings render possible since examinations are often scheduled in advance. We set up a longitudinal design for an experiment conducted in high-school classrooms within the context of two science, technology, engineering, and mathematics (STEM) disciplines, namely, physics and chemistry. First, we measured performance-approach goals. Then we asked students to take a test that had either been announced a week in advance (enabling strategic preparation) or not. The expected interaction between performance-approach goal endorsement and test anticipation was moderated by the students' initial level: The interaction appeared only among low achievers for whom the pursuit of performance-approach goals predicted greater performance – but only when the test had been scheduled. Conversely, high achievers appeared to have adopted a regular and steady process of course content learning whatever their normative goal endorsement. This suggests that normative strivings differentially influence the study strategies of low and high achievers.

Keywords: performance-approach goals, test anticipation, performance, classroom setting, STEM

"Strong students read before classes, review their course material/notes after every class, and study throughout the entire 15 weeks of the semester – not just before the exam." This statement – which can be found under the heading "Study Tools and Tips" on the Florida State University website (Florida State University, 2014) – reflects a common piece of advice that most students hear repeatedly at the beginning of the academic year. However, despite this official portrayal, depicting ideal students as studying on a regular basis rather than just before exams, evaluations play a central role in their study agenda. Indeed, students' competence and knowledge acquisition are predominantly measured through exams that lead instructors or examiners to attribute some value, most often in the form of a grade, to their performance (Deutsch, 1979; Pulfrey, Buchs, & Butera, 2011). Since the resulting grades and outcomes have important consequences for academic progress and career, students may choose to deliberately focus their efforts and study time on preevaluation periods, thus favoring a strategic approach rather than regular studying to assure good performance on exams.

The investigation of how student motivation influences their academic behaviors in achievement situations has given rise to an extensive literature dealing with the achievement goals construct (Elliot, 2005) – a construct referring to the way individuals represent and pursue competence in challenging settings. In particular, the achievement goal framework traditionally contrasts mastery goals and performance goals while also taking into account an approach-avoidance distinction (Elliot, 1999; Elliot & McGregor, 2001). Thus, mastery-approach goals (i.e., the desire to develop competence and acquire knowledge) are distinguished from mastery-avoidance goals (i.e., the desire to avoid learning failures). Furthermore, as far as performance goals are concerned, students who are strongly driven by the desire to obtain high grades and to outperform their classmates are described as pursuing performance-approach goals (Elliot & Harackiewicz, 1996), while performance-avoidance goals refer to avoiding doing worse than others.

The beneficial as well as detrimental aspects and effects of performance-approach goal pursuit on academic outcomes have been a subject of extensive debate, which has also been fueled by paradoxical findings (for reviews, see Elliot & Moller, 2003; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002;

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Midgley, Kaplan, & Middleton, 2001). Indeed, the aim to outperform others has been found to positively predict maladaptive academic behaviors (such as surface studying), but also crucial outcomes such as academic achievement. The present research investigates this paradox by exploring whether students who strongly pursue performance-approach goals obtain good grades because most tests and evaluations that take place in academic setting are scheduled in advance - thus allowing them to prepare for the upcoming tests to get good grades.

The Paradox of Performance-Approach Goals and Academic Outcomes

A large amount of research that has explored behaviors and the academic outcomes resulting from performance-approach goal adoption has shown a rather complex and inconsistent profile. Indeed, the existing data present a paradox, namely, between the seemingly positive effect of performance-approach goal endorsement on academic achievement, on the one hand, and the negative effect of performance-approach goal endorsement on various other academic behaviors (e.g., study processing and cooperation intentions), on the other.

The consequences of performance-approach goal adoption on academic achievement have mainly been explored in classroom settings using longitudinal designs, which explored the relationship between students' self-reported achievement goal endorsement - measured during the academic year via questionnaires - and their subsequent final exam performance. This research has consistently identified performance-approach goal adoption as being positively related to academic success (Barron & Harackiewicz, 2003; Darnon, Butera, Mugny, Quiamzade, & Hulleman, 2009; Elliot & McGregor, 2001; see also Senko, Hulleman, & Harackiewicz, 2011, for a review). This link has been replicated among college students (Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000), middle-school students (Wolters, Yu, & Pintrich, 1996), in large introductory courses (Elliot & Church, 1997), and in advanced seminars (Barron & Harackiewicz, 2003). In line with this positive profile, some studies have highlighted a positive link between performance-approach goal adoption and effort (Elliot, McGregor, & Gable, 1999), challenge construal (McGregor & Elliot, 2002), and deep processing strategies (Howell & Watson, 2007).

However, other studies point out the maladaptive effects of performance-approach goals on various academic outcomes. Indeed, these goals have been associated with low persistence after failure, preference for easy rather than challenging tasks (Grant & Dweck, 2003; Midgley et al., 2001), and a greater amount of cheating intentions and behaviors (Pulfrey & Butera, 2013). As far as interpersonal behaviors within the classroom are concerned, performance-approach goals have also been linked with deleterious forms of conflict regulation (Darnon, Muller, Schrager, Pannuzzo, & Butera, 2006), a lower amount of cooperation intentions with classmates (Poortvliet, Janssen, Van Yperen, & Van de Vliert, 2007), an exploitation orientation - that is, a higher level of motivation to obtain than to give information during an exchange (Poortvliet, Janssen, Van Yperen, & Van de Vliert, 2009) -, as well as fewer help-seeking behaviors (for a review of the antecedents and consequences of performance-approach goals in educational contexts, see Darnon, Dompnier, & Poortvliet, 2012). In addition, performance-approach goals have often been found to be related to the use of surface learning strategies (Elliot & McGregor, 2001; Harackiewicz et al., 2000) such as rote memorization (Elliot et al., 1999), which depicts performance-oriented students as prone to rely on shortcuts that may prove to be temporarily useful for obtaining high grades on an exam, but that do not seem to be directed toward deep and long-term learning. Thus, it appears that the importance of obtaining a high score and outperforming others can promote a strategic attitude toward academic achievement.

Can Test Anticipation Account for the Good Grades of Performance-Approach-Oriented Students?

How, then, can the robust positive impact of performance-approach goal endorsement on academic achievement be accounted for? Senko et al. (2011) reviewed the possibility that surface learning might prove to be adaptive and allow one to obtain good grades while circumventing arduous work, but concluded that "no study supported the assumption that surface learning can explain the normative goal link with achievement" (p. 39). The learning agenda framework recently proposed to test another noteworthy hypothesis, proposing that performance-approach goal adoption, instead of promoting a fixed (i.e., deep vs. surface) type of task learning and studying, renders students more vigilant toward cues related to teachers' expectations and topics they consider most important. Accordingly, Senko, Hama, and Belmonte (2013) found evidence for this vigilant approach and showed that it had the potential to help achievement by promoting "strategic flexibility in how students approach their learning" (p. 8). In particular, in two online studies carried out among university students, they found that self-reported performance-approach goals predicted a vigilant approach toward the course topics that were the most important and likely to be assessed in the exams (assessed through items such as "I tried to figure out what the professor thought was important because it gave me clues about which topics were tested on the exam") - a relationship that was not observed when looking at mastery-approach goal endorsement. Moreover, their results showed

that performance-approach goal adoption positively predicted high grades, and that this relationship was partly mediated by students' vigilance regarding the teachers' expectations and the most valued material.

While the research carried out by Senko et al. (2013) focused on the question of *what* students strategically choose to study, we will investigate performance-oriented students' achievement from a different perspective: by examining *when* they study. In particular, we believe that finding evidence demonstrating the importance of test anticipation in the positive relationship between performance-approach goal pursuit and students' grades would help explain the paradox of performance-approach goals, that is, the use of shortcut learning strategies and at the same time high test performance.

Exams and assessments are usually scheduled in advance: Most of the time teachers set a fixed date for the exam and inform the class accordingly. This procedure gives students the opportunity to study in order to be optimally prepared for the evaluation and maximize their chances of success. We propose that the higher the students' concern for their normative performance (i.e., the higher their performance-approach goals), the more they will rely on a test-focused study schedule and, consequently, the more they will choose to tactically concentrate their resources and efforts on preevaluation periods rather than study regularly throughout the academic year. Following this reasoning, we propose that the time lag between test announcement and the test itself should constitute, for a performance-driven student, a key period that allows for test preparation to attain normative competence.

We carried out a field experiment in a public high school. We first measured the students' performance-approach goals and then manipulated test announcement (scheduled vs. pop quiz) at the end of regular classes. We thought that high schools would be a particularly appropriate setting to test our hypothesis, given that tests are frequent and pop quizzes are a common practice in this environment. Our hypothesis is therefore that, if students who strongly adopt performance-approach goals in academic settings choose strategically to only study before scheduled evaluations (rather than regularly), then performance-approach goal adoption should predict test performance under scheduled test conditions more so than under conditions that do not give students the opportunity to anticipate the evaluation (pop quiz).

Method

Participants

A group of 196 10th-grade students at a French public high school took part in this experiment. Twenty-three students were dropped from the analyses: Twenty of them were absent the day of the final test, one student did not fill out the questionnaire measuring achievement goals completely, and two students answered either 1 or 7, respectively, to every question in the questionnaire, suggesting a lack of serious participation in the task. The final sample consisted of 173 students (81 girls, 92 boys), with a mean age of 15.48 (SD = 0.62), in six classes. Three classes were randomly assigned to each of the two experimental conditions (three classes per condition: scheduled test, n = 83 students, and unscheduled test, n = 90). Before the experiment, we obtained permission to conduct the study from the regional inspector of public education, the school principal, and the teachers; we obtained informed consent from the students' parents.

Procedure

In the first stage of the experiment, the students completed a questionnaire that assessed performance-approach goals; we used Elliot and McGregor's scale (2001; validated in French by Darnon & Butera, 2005). This stage of the experiment was carried out by one of the authors at the beginning of a regular physics and chemistry class one week prior to the beginning of the course session that was part of the experiment. With the collaboration of the teachers, the questionnaire was presented to the students as a survey investigating high school students' motivation. The students were told that their responses to the questionnaire would be treated anonymously, and that it was crucial for the success of the survey that they provided true and honest responses. The scale was adapted to fit the physics and chemistry class. The participants were asked to report, on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), the extent to which each statement was true for them. Our measure included three items measuring performance-approach goals (e.g., "In this class, it is important for me to outperform others," α = .82, M = 3.75, SD = 1.42).[1] The questionnaire also included items measuring performance-avoidance, mastery-approach, and mastery-avoidance goals.[2] In particular, four items measured

[1] All three items of this scale focus exclusively on the normative component (i.e., the desire to perform better than others) of performance-approach goals. This point, which will be mentioned again later, is currently a subject of debate in the achievement goal literature (see Senko et al., 2011, for a review): While some researchers opt for a conceptualization that considers the desire to demonstrate competence (i.e., the appearance component) as a core feature of performance-approach goals (Grant & Dweck, 2003; Nicholls, 1984), other researchers consider the appearance component a separate construct that refers to the overarching reason to pursue the goal as opposed to an essential aspect of the goal (Elliot, 2005).

[2] Even if our hypothesis only dealt with performance-approach goal endorsement, we also included the items of the scale measuring mastery-approach goals, mastery-avoidance goals, and performance-avoidance goals. We had no hypotheses associated with these three achievement goals, and conducted additional analyses as a control, in order to assess whether any of them interacted with test announcement and initial level

Table 1. Zero-order correlations among variables

Variable	1	2	3	4	5	6
1. Performance-approach goals	–					
2. Mastery-approach goals	.32**	–				
3. Performance-avoidance goals	.32**	.16*	–			
4. Mastery-avoidance goals	.09	.11	.43**	–		
5. Initial level	.34**	.38**	–.04	–.30**	–	
6. Test score	.33**	.31**	.01	–.12	.53**	–

Note. *$p < .05$, **$p < .001$.

performance-avoidance goals (e.g., "My goal in this exercise is to avoid performing poorly," $\alpha = .61$, $M = 4.58$, $SD = 1.10$), three items measured mastery-approach goals (e.g., "In this class, my aim is to completely master the content of the lessons," $\alpha = .80$, $M = 4.90$, $SD = 1.26$), and three items measured mastery-avoidance goals (e.g., "I'm afraid I might not learn as much as I could from this class," $\alpha = .76$, $M = 4.11$, $SD = 1.37$). All intercorrelations among variables are presented in Table 1.

In the second stage of the experiment, which lasted two weeks, all of the students from the six classes attended a lesson that was taught by their regular teachers during their regular physics and chemistry class. The three teachers who were involved in the experiment – but blind to the specific hypotheses – had come to an agreement regarding the course content as well as the practical exercises that would be addressed in the classroom. Thus, the content of the lesson was strictly identical throughout the six classes. The lesson dealt with distillation and extraction techniques, and consisted of both theoretical presentations and practical workshop sessions. Importantly, this part of the experiment was rigorously monitored and directed by the authors, so as to ensure that the content was similar for each class.

Our manipulation, that is, the final test that took place at the end of the 2-week period, occurred before the third stage of the experiment. For three classes (scheduled test condition), the final test was announced by the teacher one week in advance, thereby enabling test preparation. For the remaining three classes (unscheduled test condition), the final test was not announced by the teacher in advance; they thus had no opportunity for test preparation. The test was a multiple-choice test, consisting of 20 questions, designed to assess students' understanding and integration of the lesson content. To ensure that the test was difficult enough, for each question, either none, one, or several of the four answer options were correct and had to be accurately identified by the student; only then was the answer counted as correct. Finally, all the tests were corrected by the teachers, and graded on a scale from 0 to 20 ($M = 12.73$, $SD = 3.41$), which corresponds to the standard grading scale in France.

In addition to test scores, we collected the average grade obtained by each student in the physics and chemistry class, in the first and second quarter, as a baseline. Because the first- and second-quarter grades were strongly correlated with each other ($r = .83$, $p < .001$), we averaged them into an overall grade that we labeled *initial level*, which was also rated on a scale ranging from 0 to 20 ($M = 10.43$, $SD = 3.53$).

Results

The analyses were conducted at the student – not the class – level. According to Kenny, Mannetti, Pierro, Livi, and Kashy (2002), with the present number of classes and students, analyses at the individual level are still valid if intra-class correlations are low. The intra-class correlation of final test scores was $\rho = .09$, 95% CI = [.02, .34], indicating that the effect of non-independence on the variance of final test performance was low. Thus, the use of multilevel modeling was not necessary (see Rabe-Hesketh & Skrondal, 2012) and we used the individual student as the unit of analysis.

Test Score

We hypothesized that, if normative goal pursuit leads students to prefer to study just before scheduled examinations, rather than regularly, performance-approach goal endorsement would better predict the final test score in the scheduled test condition than in the unscheduled test condition. To test this hypothesis, we carried out a linear regression analysis, which included performance-approach goals (mean-centered), the experimental conditions (with the unscheduled test condition coded –0.5 and the scheduled test condition coded 0.5), as well as the interaction between performance-approach goals and the experimental condition. In addition, as recommended by Yzerbyt, Muller, and Judd (2004), we entered the initial level grade (mean-centered) as a covariate as well as the interactions between the covariate and the two independent variables.

We also controlled for mastery-approach goal endorsement. Mastery-approach goals have occasionally been found to be positive predictors of achievement in the classroom (e.g., in Senko et al., 2013) and, in the present research, preliminary analyses revealed a positive correlation between this goal endorsement and the final test score ($r = .31$, see Table 1). Moreover, we observed a positive correlation between students' self-reported mastery-approach goals and performance-approach goals ($r = .32$) – a rather modest correlation that has often been reported in the achievement goal litera-

to predict test score. These analyses, together with the means and standard deviations of these variables, are reported in full in the supplementary analyses section.

Table 2. Unstandardized regression parameters (*b*s) and significance

Variable	*b*
Performance-approach goals	0.31
Test announcement (scheduled, unscheduled)	1.60**
Initial level	0.43**
Performance-approach goals × Test announcement	0.21
Performance-approach goals × Initial level	0.03
Test announcement × Initial level	−0.07
Performance-approach goals × Test announcement × Initial level	−0.23*
Mastery-approach goals	0.19
Mastery-approach goals × Test announcement	0.14
Mastery-approach goals × Performance-approach goals	−0.20
Mastery-approach goals × Initial level	−0.02
Mastery-approach goals × Initial level × Performance-approach goals	0.02
Mastery-approach goals × Test announcement × Performance-approach goals	0.42
Mastery-approach goals × Test announcement × Initial level	0.01
Mastery-approach goals × Test announcement × Initial level × Performance-approach goals	−0.08

Note. *$p < .03$, **$p < .01$.

ture (see Harackiewicz, Barron, & Elliot, 1998) and suggests that both goals can be simultaneously pursued. For these reasons, it appeared reasonable to control for the variance captured by mastery-approach goal adoption when testing the joint effect of performance-approach goals and our manipulation on test performance. Hence, we entered self-reported adoption of masteryapproach goals (mean-centered) as a covariate, together with the interactions between this covariate and the aforementioned terms.

The final regression model thus contained 15 terms: two main effect terms (performance-approach goals and experimental conditions), two covariates (the initial level grade and mastery-approach goals), six two-way interaction terms (the one between performance-approach goals and experimental conditions, as well as five interactions between the covariates and independent variables), four three-way interactions, and one four-way interaction among performance-approach goals, mastery-approach goals, the experimental conditions, and the initial level grade.

This linear regression analysis revealed that the initial level grade, $b = 0.43$, $t(157) = 6.23$, $p < .01$, $PRE = .20$, positively predicted the final test score. Moreover, the experimental manipulation had a significant impact on test performance, $b = 1.60$, $t(157) = 3.37$, $p < .01$, $PRE = .07$, revealing that students in the scheduled test condition obtained a higher score than their counterparts in the unscheduled test condition. In addition, the endorsement of performance-approach goals appeared to marginally predict test performance, $b = 0.31$, $t(157) = 1.74$, $p < .10$, $PRE = .02$. The predicted interaction between experimental conditions and performance-approach goals appeared to be nonsignificant, $b = 0.21$, $t < 1$. However, there was a significant three-way interaction between performance-approach goals, the experimental conditions, and the initial level grade, $b = -0.23$, $t(157) = -2.35$, $p < .03$, $PRE = .03$, revealing a noteworthy pattern, which is displayed in Figure 1. All unstandardized regression parameters and levels of significance can be found in Table 2. No other effects were significant.

The three-way interaction revealed that the impact of announcing the final test in advance was quite different depending on performance-approach goal endorsement as well as initial level grade. Furthermore, the analyses of simple slopes indicated that, for students with a low initial level grade in physics and chemistry, performance-approach goal adoption positively predicted test performance in the scheduled test condition, $b = 0.70$, $t(157) = 2.01$, $p < .05$, $PRE = .03$, but not in the unscheduled test condition, $b = -0.33$, $t < 1$, a pattern that is in line with our hypothesis. Moreover, students with a low initial level grade who strongly endorsed performance-approach goals obtained a higher test score in the scheduled test as compared to the unscheduled test condition, $b = -3.30$, $t(157) = -3.32$, $p < .01$, $PRE = .07$ – a difference that did not appear among students with a low initial level grade who weakly endorsed performance-approach goals, $b = 0.36$, $t < 1$. However, a different pattern emerged among students with a high initial level grade since performance-approach goal adoption was not related to test performance in the scheduled test condition, $b = 0.13$, $t < 1$, but marginally predicted test performance in the unscheduled test condition, $b = 0.73$, $t(157) = 1.94$, $p = .054$, $PRE = .02$. In addition, a marginally significant difference emerged among students who weakly endorsed performance-approach goals, showing that they obtained a higher score in the scheduled test as compared to the unscheduled test condition, $b = -2.23$, $t(157) = -1.94$, $p = .054$, $PRE = .02$. No difference appeared among students with a high initial level grade who strongly endorsed performance-approach goals, $b = 0.51$, $t < 1$.

It should be noted that a similar linear regression analysis that did not include mastery-approach goal adoption as a covariate revealed comparable patterns. In particular, this analysis, which involves seven predictors – performance-approach goal adoption, the experimental conditions, the initial level grade, three two-way interaction terms, and a threeway interaction – revealed that both performance-approach goals, $b = 0.42$, $t(165) = 2.65$, $p < .01$, $PRE = .04$, and the initial level grade, $b = 0.45$, $t(165) = 6.95$, $p < .01$, $PRE = .22$, positively predicted the final test score, and that students from the scheduled test condition obtained a higher score than their counterparts from the unscheduled test condition, $b = 1.78$, $t(165) = 3.99$, $p < .01$, $PRE = .09$. Moreover, the three-way interaction between performance-approach goals, the experimental conditions, and the initial level grade also proved to be significant, $b = -0.18$, $t(165) = -1.98$, $p < .05$, $PRE = .02$. No other effects were significant.

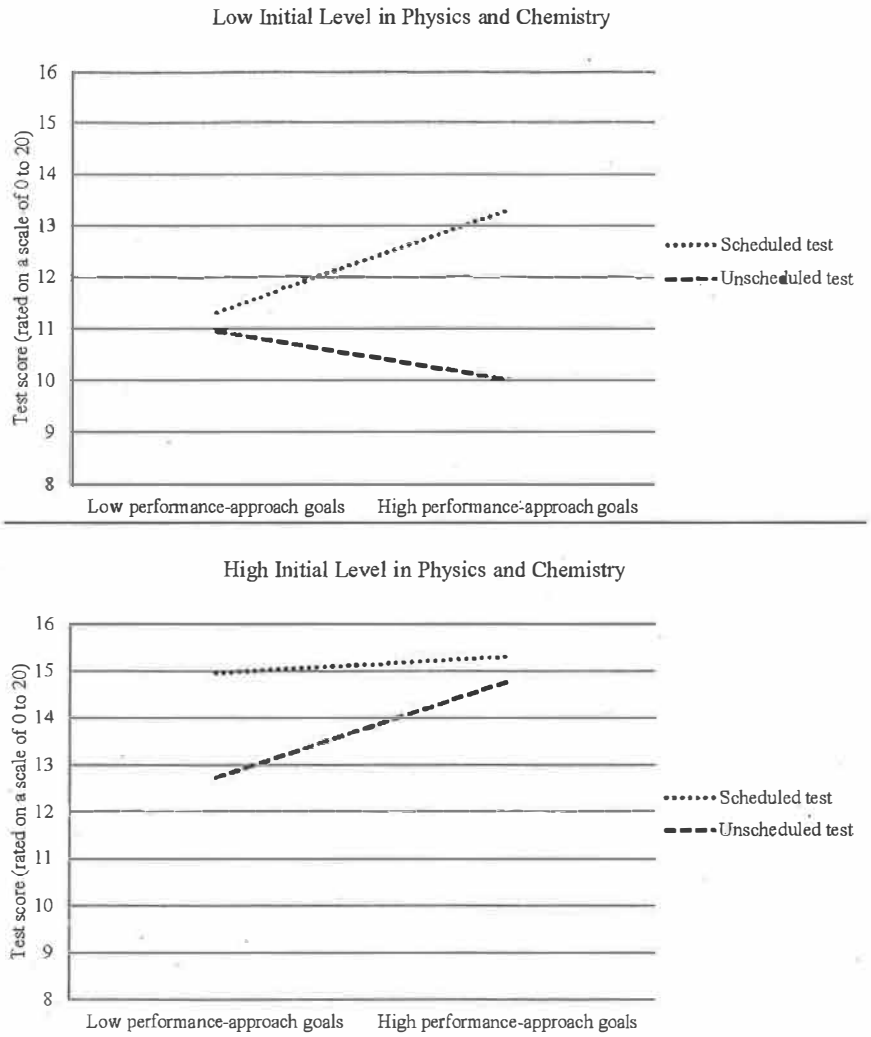

Figure 1. Test scores on the final multiple-choice questionnaire, as a function of self-reported performance-approach goal endorsement and test announcement (scheduled, unscheduled), for students having a low (top panel) and high (bottom panel) initial level in physics and chemistry. Self-reported mastery-approach goals are controlled.

Supplementary Analyses

Gender Effects

Because this experiment took place within the context of STEM subjects - an area in which boys are often found to obtain higher grades than girls (Organization for Economic Cooperation and Development [OECD], 2012) - it was important to ensure that the above results were not driven, or suppressed, by a gender effect. Thus, we performed a regression analysis that included performance-approach goals, test announcement, the initial level grade, all interactions between these terms, together with gender as well as all the interactions between gender and the seven aforementioned predictors, as supplementary factors. These interactions between gender and our main predictors were not statistically significant and were thus trimmed from the analysis. The final regression model, which included eight predictors, revealed a main effect of gender, $b = -1.05$, $t(164) = -2.39$, $p < .02$, $PRE = .03$, showing that male students obtained higher final test scores than their female counterparts. In addition, both students' initial level grade, $b = 0.48$, $t(164) = 7.38$, $p < .01$, $PRE = .25$, and test announcement, $b = 1.78$, $t(164) = 4.03$, $p < .01$, $PRE = .09$, positively predicted final test score. Moreover, the three-way interaction between performance-approach goals, the experimental conditions, and the initial level grade remained significant, $b = -0.17$, $t(164) = -1.99$, $p < .05$, $PRE = .02$. No other effects were significant.

Other Achievement Goals

Since our hypothesis was specifically concerned with performance-approach goal endorsement, performance-avoidance, mastery-approach, and mastery-avoidance goals were not expected to interact with our manipulation. However, to rule out the possibility that our findings are not limited to performance-approach goal pursuit, we performed supplementary regression analyses, including performance-avoidance, mastery-approach, and mastery-avoidance goals, respectively, as a control. Each of these analyses contained seven terms: the achievement goal, test announcement, the initial level grade, 3 two-way interaction terms, and the three-way interaction.

As far as mastery-approach goals are concerned, the regression analysis revealed that students' initial level grade, $b = 0.45$,

$t(165) = 6.63$, $p < .01$, $PRE = .21$, as well as mastery-approach goal endorsement, $b = 0.38$, $t(165) = 2.00$, $p < .05$, $PRE = .02$, positively predicted test performance. We also observed a main effect of test announcement on test score, $b = 1.68$, $t(165) = 2.65$, $p < .01$, $PRE = .04$, revealing that students from the scheduled test condition obtained higher scores than their counterparts from the unscheduled test condition. No other effects were significant.

A similar regression analysis including performance-avoidance goal adoption revealed that both initial level grade, $b = 0.49$, $t(165) = 7.44$, $p < .01$, $PRE = .25$, and test announcement, $b = 1.50$, $t(165) = 3.45$, $p < .01$, $PRE = .07$, positively predicted final test score. No other effects were significant. Similarly, the regression analysis including mastery-avoidance goals revealed that both students' initial level grade, $b = 0.54$, $t(165) = 7.52$, $p < .01$, $PRE = .26$, and test announcement, $b = 1.52$, $t(165) = 3.35$, $p < .01$, $PRE = .06$, positively predicted final test score. No other effects were significant.

Discussion

Normative strivings have been found to positively predict students' academic achievement and exam performance (Elliot, 2005), but they have also been frequently associated with the use of strategic behaviors (e.g., cheating, surface processing of course content, heightened vigilance toward teachers' expectations; Senko et al., 2011) and thus depicted performance-approach goals as fostering a desire to guarantee exam success while sparing oneself a rigorous and effortful study of the course content. The present research sought to find evidence that students driven by normative strivings achieve high test performance because most tests and evaluations that are performed within academic settings are usually scheduled beforehand, which enables test preparation. In other words, we studied whether performance-driven students specifically review the course content when a graded examination is upcoming, thus resulting in enhanced test scores for those students. To test this hypothesis, we set up an experiment with a longitudinal design that would take place in the natural setting of a physics and chemistry class and manipulated students' anticipation of the final evaluation, which was either announced beforehand or not. Our hypothesis was that, if test anticipation plays an important role in the positive impact of performance-approach goal endorsement on performance in the classroom, then its predictive power should be increased in the condition that allows test preparation - and reduced in the condition that does not allow test anticipation.

The results unexpectedly revealed that the predicted interaction between performance-approach goal endorsement and test announcement on test performance - which was nonsignificant - was actually moderated by students' initial level in chemistry and physics (as measured by their average grade in the first and second quarter). In particular, our data indicated that the pattern that was expected to emerge - that is, the higher the students' performance-approach goal adoption, the higher their test score, especially when the test had been announced ahead of time - only appeared among low achievers, that is, students with a low initial level in physic and chemistry. A more surprising pattern emerged among students with a high initial level: While their adoption of performance-approach goals did not affect test performance when the test had been announced, it marginally predicted test performance in the unscheduled test condition.

Why is this? The present research does not allow us to fully understand the mechanisms underlying this moderating effect, but nonetheless paves the way to promising directions for future research. In particular, the diverging patterns observed for students with a low versus high initial level suggest that the pursuit of performance-approach goals lead students to adopt different study behaviors depending on their level of competence. Because our research took place in a late stage of the academic year - namely, in April - it is reasonable to assume that, at this point in time, each student's average level of competence in the classroom - based on the grades and ranking they had so far obtained throughout the year in this discipline - was already well-established. This would associate the lowest- and highest-performing students with the status of low and high achievers, or bad and good pupils, respectively. In particular, data concerning the students' initial level in this class indicated that low-performing students had reached an average of 6.90 out of 20 - meaning they were indeed failing to reach the pass mark (i.e., 10) - while high-performing students had so far obtained an average of 13.96 out of 20 (which, in France, corresponds to modestly high-average).

Brophy (1983) reports that, as compared to low achievers, "high achievers tend to be more attentive to lessons and engaged in tasks, more likely to volunteer to answer questions or offer comments" (p. 637). Similarly, research conducted by Monteil and Huguet (2001, 2002) revealed that high achievers are more comfortable in academic contexts that combine public individuation (i.e., social visibility) of evaluation and intermediary success feedback, a situation that matches their performance history and degree of social visibility, but that is unusual and distractive for low achievers. This suggests that high achievers are used to dealing with high visibility and others' high expectations during class and that this may in turn influence their study behaviors during class time. Following this reasoning, it is plausible that success expectations (e.g., stemming from teachers, classmates, parents) may create - especially among those students more focused on outperforming others - concerns related to the desire to maintain this positive normative status and image in the classroom, thereby pushing them to pay more attention and be more actively involved during class, even when a test is not announced, than their low-performing and high-performing but less performance-focused counterparts.

It should be noted that this kind of explanation - which remains speculative and needs to be addressed in further research - puts an emphasis on appearance and the self-presentational concerns associated with performance-approach goal pursuit. As stated in the introduction, our assessment of performance-approach goals, for which we used Darnon and Butera's (2005) French translation of Elliot and McGregor's (2001) scale, was exclusively focused on the normative (i.e., the desire to rise above others) - and not on the appearance (i.e., the wish to demonstrate competence to others) - component of these goals. As there is still a lack of agreement regarding the core features of performance-approach goals (Elliot, 2005), we join Senko et al. (2013) in pointing out that it may "be useful to compare different types of performance-approach goals" (namely, the normative and the appearance types), since "the two definitions can overlap insofar as outperforming peers is an effective way to appear talented," even if they "need not overlap" (p. 8). In particular, we believe that more research investigating how these two components interact or are subordinated to each other, and how such interplay may influence academic behaviors within the classroom, could pave the way to fruitful research directions.

Furthermore, as far as mastery-approach goals are concerned, it should be noted that while their pursuit positively predicted the final test score, this relationship did not differ as a function of test announcement. Even if no conclusion can be drawn from such nonsignificant results, this may suggest that the study behaviors of the students who strongly pursue mastery-approach goals were not influenced by the evaluation schedule, implying that they work regularly. This possibility finds significant support in the literature since the pursuit of mastery-approach goals has frequently been associated with positive outcomes such as interest in class, deep learning strategies, and an interest-based approach to studying (Harackiewicz et al., 2002; Senko & Miles, 2008; Senko et al., 2013). By contrast, pursuing performance-approach goals may subordinate interest to concerns about exams and the desire to succeed. Moreover, even if we found performance-approach goals to be positively correlated with performance-avoidance goal endorsement (a modest relationship that is frequently reported; see Murayama, Elliot, & Yamagata, 2011), the latter did not predict the test score and appeared to be unaffected by the test announcement manipulation.

The present research has some limitations. For one, the present design did not include a longterm learning measurement - an outcome that might have added noteworthy information regarding the either adaptive or deleterious longterm consequences of study strategy behaviors. Second, this study does not provide a direct measure of study strategies (Elliot et al., 1999). For instance, future research may resort to self-report questionnaires that ask students to report their study habits - and especially their tendency to work regularly versus restrict their study to preevaluation periods. However, it should be noted that such measurements may be significantly influenced and distorted by self-presentation concerns (Dompnier, Darnon, & Butera, 2009). Indeed, studying regularly and independently of the evaluation schedule is a behavior that is more desirable than waiting to study until the last minute before - and for - the test, and students may be reluctant to admit this propensity.

Moreover, this study does not provide information regarding the role played by test anxiety in the present results. In particular, the unscheduled test condition may have generated more temporary anxiety than the scheduled test condition. However, to our knowledge, no empirical research has reported a relationship between the administration of pop quizzes in the classroom and an increase in students' anxiety as compared to announced evaluation contexts. On the contrary, scheduled examinations have been shown to trigger high levels of stress among students (see Lewin, 2011; Pope, 2001). In addition, as far as the achievement goal literature is concerned, there is a lack of empirical evidence associating performance-approach goal pursuit to test anxiety. Notably, research studying achievement emotions has found performance-avoidance, but not performance-approach goals, to be positively associated with anxiety during the academic year (Pekrun, Elliot, & Maier, 2009). It thus appears unlikely that anxiety may have intervened in the effect we observed, and played a significant role in the final score outcome, in that it was not expected to vary as a function of self-reported performance-approach goal endorsement. Future research should nonetheless examine how test anxiety, in particular under situations where evaluative stakes are salient, may differ as a function of students' level of achievement.

Notwithstanding these limitations, we believe that the present work allows a first understanding of how traditional features of testing (here, test anticipation) are prone to influence performance-driven students' preparation and achievement. Our findings are thus likely to fuel the debate regarding when, not whether, performance-approach goals are beneficial or detrimental to academic achievement, and for whom - an issue that is still widely discussed in the achievement goal literature (Elliot & Moller, 2003; Senko et al., 2011). We believe this is an important endeavor as it would allow us to shed light on the motivational dynamics underlying students' study behaviors and eventually influencing crucial outcomes such as test performance and learning.

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