



The power of anticipated feedback: Effects on students' achievement goals and achievement emotions[☆]



Reinhard Pekrun^{a,*}, Aisling Cusack^b, Kou Murayama^c, Andrew J. Elliot^d, Kevin Thomas^e

^a Department of Psychology, University of Munich, Leopoldstrasse 13, 80802 Munich, Germany

^b University College Dublin, School of Psychology, Newman Building, Belfield, Dublin 4, Ireland

^c University of California at Los Angeles, Department of Psychology, 1285 Franz Hall Box 951563, Los Angeles, CA 90095-1563, USA

^d University of Rochester, Department of Clinical and Social Sciences in Psychology, 488 Meliora Hall, Rochester, NY 14627, USA

^e Bournemouth University, Department of Psychology, Poole House P116, Talbot Campus, Fern Barrow, Poole BH12 5BB, United Kingdom

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ABSTRACT

In an experimental study ($N = 153$ high school students), we tested a theoretical model positing that anticipated achievement feedback influences achievement goals and achievement emotions, and that achievement goals mediate the link between anticipated feedback and emotions. Participants were informed that they would receive self-referential feedback, normative feedback, or no feedback for their performance on a test. Subsequently, achievement goals and discrete achievement emotions regarding the test were assessed. Self-referential feedback had a positive influence on mastery goal adoption, whereas normative feedback had a positive influence on performance-approach and performance-avoidance goal adoption. Furthermore, feedback condition and achievement goals predicted test-related emotions (i.e., enjoyment, hope, pride, relief, anger, anxiety, hopelessness, and shame). Achievement goals were documented as significant mediators of the influence of feedback instruction on emotions, and mediation was observed for seven of the eight focal emotions. Implications for educational research and practice are discussed.

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1. Introduction

Affective variables can profoundly influence students' learning and achievement (Christenson, Reschly, & Wylie, 2012; Pekrun & Linnenbrink-Garcia, in press; Zeidner, 1998). Two groups of affective variables that are deemed to be critically important are achievement goals and achievement emotions. During the past dozen years, researchers have moved beyond traditional research perspectives addressing these two constructs in isolation and have started to examine their combined effects on achievement-relevant outcomes (Linnenbrink & Pintrich, 2002; Pekrun, Elliot, & Maier, 2009). The functional relevance of achievement goals and emotions suggests that researchers should attend to their joint antecedents as well, in order to provide educators with information about educational practices fostering students' engagement.

However, as yet the joint antecedents of students' achievement goals and emotions have generally been neglected.

In the present research, we seek to extend the existing research by considering achievement goals and emotions in the context of one powerful contextual factor shaping students' engagement, namely, anticipated achievement feedback. Goals and emotions can be affected by numerous contextual factors including classroom goal structures, the quality of classroom instruction, autonomy support provided by teachers, and the didactic approaches used (Murayama & Elliot, 2009; Pekrun, 2006; Zeidner, 1998). Among these variables, the ways in which students' achievement is evaluated is likely one of the most salient factors (Ames, 1992; Hattie & Timperley, 2007). A few studies have examined the effects of anticipated feedback on students' achievement goals; in contrast, the impact of anticipated feedback on achievement emotions has been neglected, as has the joint influence of anticipated feedback and goals on emotions.

Based on work by Pekrun, Elliot, and Maier (2006, 2009), we developed a theoretical model linking anticipated feedback to subsequent achievement goals and emotions. Feedback is conceived as information about a student's performance on a task or a test, and anticipated feedback as a student's expectations about the kind of feedback they will receive. More specifically, the model

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* Corresponding author. Tel.: +49 89 2180 5149; fax: +49 89 2180 5250.

E-mail addresses: pekrun@lmu.de (R. Pekrun), cusack.aisling@gmail.com (A. Cusack), murakou@orion.ocn.ne.jp (K. Murayama), andy@psych.rochester.edu (A.J. Elliot), kthomas@bournemouth.ac.uk (K. Thomas).

addresses anticipated self-referential feedback based on students' improvement of performance over time, and anticipated normative feedback based on comparing a student's performance with the performance of other students. It is posited that these kinds of anticipated feedback influence students' achievement goals and subsequent achievement emotions, and that achievement goals mediate the impact of anticipated feedback on achievement emotions. These hypotheses were examined in an experimental study with high school students.

In the following sections, we first provide an overview of extant studies on the links between anticipated feedback, achievement goals, and achievement emotions. We then outline our theoretical model on these links and provide a summary of the hypotheses examined in the present study.

2. Prior research

2.1. Achievement goals and emotions

There is preliminary evidence suggesting that achievement goals influence students' emotions (Huang, 2011). However, the majority of the studies conducted to date have used a dichotomous model of achievement goals that distinguishes between mastery and performance goals only. Similarly, most studies have used a two-dimensional conception of affective states and employed summary measures of positive and negative affect that do not account for diverse emotional experience (Pekrun et al., 2006).

Mastery goals have been consistently found to relate to positive affect in students from upper elementary school to university (Huang, 2011). Furthermore, mastery goals related positively to various discrete positive emotions including enjoyment, hope and pride in studies with university students (Daniels et al., 2009; Pekrun et al., 2006, 2009) as well as middle and high school students (Mouratidis, Vansteenkiste, Lens, & Auweele, 2009). Findings for mastery goals and negative affect have been less consistent, with some studies reporting negative relations for students across age groups (e.g., Linnenbrink, 2005) and other studies reporting no relationship (e.g., Turner, Thorpe, & Meyer, 1998). These inconsistencies are likely a result of the use of summary measures of negative affect. The few studies to consider qualitative differences between emotions (Daniels et al., 2009; Mouratidis et al., 2009; Pekrun et al., 2006, 2009) found that mastery goals were negatively related to anger and boredom, whereas relations with anxiety or shame were weak or non-significant. This shows the importance of distinguishing between types of valenced emotions, as different goals can relate to some types of positive or negative emotions but not others; the use of summated measures of affect can mask these differences.

Studies investigating the relations between performance goals and achievement emotions in students across age groups have produced a mixed yield (Huang, 2011), with some reporting a link (Turner et al., 1998) and others reporting null results (Roesser, Midgley, & Urdan, 1996). Most studies, however, have utilized a dichotomous model of goals, examining the effects of performance goals without attending to the approach-avoidance distinction. Studies that have distinguished between approach and avoidance forms of performance goals have documented their differential effects on affective experience. Sideridis (2003) found that upper elementary students' performance-approach goals were unrelated to positive and negative affect; performance-avoidance goals were unrelated to positive affect, but were positively related to negative affect. In the studies by Pekrun et al. (2006, 2009), university students' performance-approach goals were unrelated to enjoyment, but were positively related to hope and pride, whereas

performance-avoidance goals were positively related to anxiety, shame, and hopelessness.

In summary, the available evidence highlights the importance of focusing on discrete emotions when investigating the relations between achievement goals and emotions in educational settings. Generally, mastery goals have shown a consistent positive link with students' positive affect and enjoyment of learning, and a negative link with anger and boredom. Performance-approach goals have been shown to be positively related to students' pride and hope, and performance-avoidance goals to their anxiety, shame, and hopelessness. This pattern of findings suggests that there are clear links between mastery goals and activity emotions (enjoyment, anger, and boredom), and between performance-based goals and outcome emotions (hope, pride, anxiety, hopelessness, and shame).

2.2. The influence of anticipated achievement feedback on goals and emotions

A number of studies have examined the impact of the type of feedback received after task engagement on achievement goal adoption and emotional experience. In contrast, almost no research has been conducted on the influence of anticipated feedback on achievement goals and emotions.

Success versus failure feedback has been shown to influence college students' achievement goals, with success promoting the adoption of mastery and performance-approach goals, and failure promoting performance-avoidance goals (Senko & Harackiewicz, 2005). In addition, a few studies have demonstrated that the type of feedback given to upper elementary and college students influenced processes associated with achievement goal foci, with feedback focused on performance improvement prompting mastery-based attributions and aims, and feedback focused on relative performance prompting performance-based attributions and aims (Butler, 1987; Steele-Johnson, Heintz, & Miller, 2008).

Most relevant to the present research, Butler (2006) conducted a study in which middle school students were instructed to expect either a) temporal evaluation, where they would be informed whether their problem solving had improved, remained stable or deteriorated; b) normative evaluation, where they would receive their percentile score in relation to other students' performance; or c) no evaluation. The results indicated that the anticipation of temporal evaluation enhanced the adoption of mastery goals, whereas the anticipation of normative evaluation enhanced performance goals. This study represents an initial attempt to investigate how feedback instructions can be manipulated to induce achievement goals in educational settings.

Regarding achievement emotions, research has shown that failure feedback is a major source of students' anxiety. Children who experienced failure in academic tasks subsequently reported anxiety when performing new tasks (Hill & Eaton, 1977). The failure feedback implied by poor grades has also been found to increase students' test anxiety across age groups (Zeidner, 1998). Research has yet to be conducted on the link between anticipated achievement feedback and students' emotional experience.

3. Theoretical framework

The present research is grounded in the model proposed by Pekrun et al. (2006, 2009) to explain the effects of achievement goals on emotions, and expands this approach to include the effects of anticipated achievement feedback on both goals and emotions. Achievement goals are conceptualized in terms of the trichotomous goal model that includes the goals most commonly endorsed by students, namely mastery, performance-approach, and performance-avoidance goals (Elliot & Church, 1997; Elliot &

McGregor, 2001; for an extension, see Elliot, Murayama, & Pekrun, 2011). To conceptualize achievement emotions, we used the 2×2 taxonomy proposed by Pekrun, Goetz, Titz, and Perry (2002). The taxonomy distinguishes between positive (i.e., pleasant) versus negative (i.e., unpleasant) emotions, and between activity emotions linked to achievement activities versus outcome emotions linked to the success and failure outcomes of these activities. We address major emotions from all four quadrants of the taxonomy, including two activity emotions (enjoyment, anger), three positive outcome emotions (hope, pride, relief), and three negative outcome emotions (anxiety, hopelessness, shame).

3.1. Achievement goals and emotions

Achievement goals are thought to direct the attentional focus of students as they frame the control and value appraisals underlying achievement emotions, thereby influencing these emotions. Specifically, mastery goals are viewed as focusing attention on ongoing mastery of the activity and the positive value of the activity itself. Therefore, mastery goals are expected to facilitate positive activity emotions (enjoyment) and inhibit negative activity emotions (anger). In contrast, performance goals are viewed as focusing attention on the outcome of achievement activities. Performance-approach goals are thought to focus attention on the perceived controllability and positive value of success outcomes, implying that they should facilitate positive outcome emotions (hope and pride), whereas performance-avoidance goals are thought to focus attention on the perceived uncontrollability and negative value of failure outcomes, implying that they should evoke negative outcome emotions (anxiety, hopelessness, and shame). In addition, we hypothesize that performance-avoidance goals can promote relief. In an achievement context, relief is a positive outcome emotion that is likely to be experienced when anticipated failure does not occur. Due to its link with the anticipation of failure, the positive emotion relief is expected to be promoted by performance-avoidance goals, similar to the negative emotions anxiety, hopelessness, and shame.

3.2. Influence of anticipated feedback on achievement goals

We propose that the type of achievement feedback that students expect to receive shapes their definition of competence and promotes the adoption of related achievement goals. Different types of achievement feedback use different definitions of competence. Specifically, in self-referential feedback, competence is defined in terms of the improvement of a student's present performance over his or her past performance. In normative feedback, competence is defined relative to other students'

performance. These definitions of competence are equivalent to the definitions underlying mastery and performance goals, in that mastery goals define competence in terms of self-improvement, and performance goals define competence in terms of performance relative to others. Given this equivalence, we posit that anticipating self-referential feedback promotes the adoption of mastery goals, and anticipating normative feedback promotes the adoption of performance goals, both performance-approach and performance-avoidance.

3.3. Joint influence of anticipated feedback and goals on achievement emotions

Both anticipated feedback and goals are expected to influence students' achievement emotions, but the role of these two factors is proposed to be different. Contextual variables such as anticipated feedback are posited to be distal predictors of students' achievement emotions, and achievement goals are posited to be proximal predictors of achievement emotions (Church, Elliot, & Gable, 2001; Pekrun, 2006; Roeser et al., 1996). As such, achievement goals are viewed as mediators of the link between the feedback that students expect to receive and their emotional experience (Fig. 1).

Anticipating self-referential feedback is expected to have a positive effect on students' enjoyment and a negative effect on their anger, due to the positive influence of this type of feedback on mastery goal adoption and the subsequent influence of mastery goals on these emotions. Anticipating normative feedback is expected to have a positive effect on students' hope and pride, due to the positive influence of this type of feedback on performance-approach goal adoption and the subsequent influence of performance-approach goals on hope and pride. Furthermore, anticipating normative feedback is expected to have a positive effect on students' anxiety, hopelessness, shame, and relief, due to the positive influence of this type of feedback on performance-avoidance goal adoption and the subsequent influence of performance-avoidance goals on these emotions.

4. The present research and hypotheses

We examined the impact of self-referential versus normative feedback instructions on high school students' adoption of achievement goals and their subsequent achievement emotions related to taking a test. Anticipated feedback was experimentally manipulated by telling students that they would receive either self-referential, normative, or no feedback after taking the test. After the feedback manipulation, we assessed students' mastery, performance-approach, and performance-avoidance goals for the test, and later assessed their enjoyment, hope, pride, boredom,

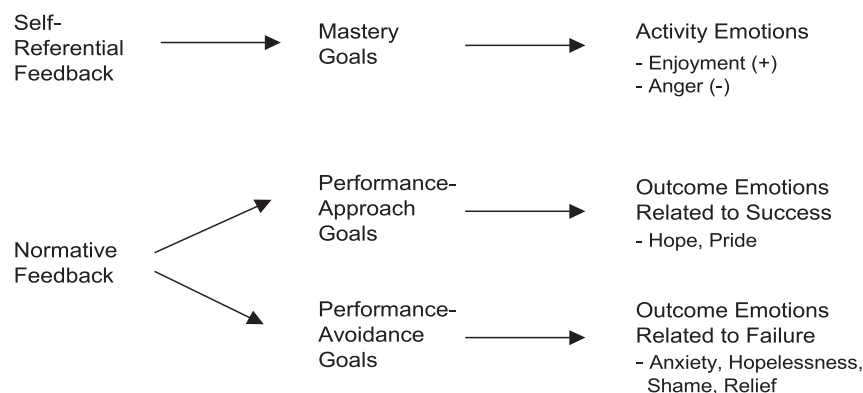


Fig. 1. Summary of theoretical propositions for feedback instructions, achievement goals, and achievement emotions.

anger, anxiety, shame, and hopelessness related to taking the test. The following primary hypotheses were examined (Fig. 1):

Hypothesis 1 (anticipated feedback → goals). Anticipating self-referential feedback has a positive influence on mastery goal adoption; anticipating normative feedback has a positive influence on performance-approach and performance-avoidance goal adoption.

Hypothesis 2 (anticipated feedback → emotions). Anticipating self-referential feedback has an influence on activity emotions (positive for enjoyment, negative for anger); anticipating normative feedback has a positive influence on outcome emotions (hope, pride, anxiety, hopelessness, shame, and relief).

Hypothesis 3 (goals → emotions). Mastery goals have an influence on activity emotions (positive for enjoyment, negative for anger); performance-approach goals have a positive influence on outcome emotions related to success (hope and pride); and performance-avoidance goals have a positive influence on outcome emotions related to failure (anxiety, hopelessness, shame, and relief).

Hypothesis 4 (mediational role of goals). Achievement goals mediate the influence of anticipated achievement feedback on achievement emotions.

5. Method

5.1. Participants and design

The sample comprised 153 Irish secondary school students (80 males, 73 females; mean age 16.92, $SD = .73$; all students were Caucasian). Participants were randomly assigned to one of three feedback instruction conditions in a single-factor between-subjects design: the self-referential feedback condition ($n = 50$), the normative feedback condition ($n = 52$), or the no feedback condition ($n = 51$).

5.2. Procedure

To enhance ecological validity, the experiment took place in class-size groups in an actual classroom setting, with participants within each group obtaining the same treatment. The experimenter informed participants that they would be taking a speed and accuracy test, and that they would also be answering some questionnaires. In the test booklet, the test was described as “designed to measure one’s ability to think quickly and accurately under exam time constraint”. Participants were informed that the test consisted of two parts each of which contained 100 items, and that each of the two parts was timed at 4 min. Sample items were provided showing that each test item consisted of two sets of letters and numbers, and that participants were asked to identify as many differences as possible between the two sets. Participants were not familiar with the test, thus preventing prior experiences from dominating participants’ reactions.

In the self-referential feedback condition, the instruction in the test booklet told participants to expect feedback that would be based entirely on their individual level of improvement between the first and second part of the test (“Your performance will be evaluated in relation to your individual level of progress between Part 1 and Part 2 of the test”). In the normative feedback condition, participants were told to expect feedback informing them if their performance was among the highest 10%, 25%, or 50%, or the lowest 50%, 25%, or 10% of all participants (“Your performance on the test will be evaluated in relation to the performance of other students taking this same test”). In the no feedback (i.e., control) condition, participants were told not to

expect any feedback (“Feedback will not be available for your performance on this test”).

After having received these instructions, participants completed the achievement goal questionnaire related to taking the test. Then, participants took the test and answered the self-report scales for achievement emotions. More specifically, participants took the first part of the test, and subsequently the second part of the test. Immediately before the first part of the test, in the break between the two parts of the test, and immediately after the second part of the test, participants completed the self-report scales for prospective emotions (hope, anxiety, hopelessness), activity emotions (enjoyment, anger), and retrospective emotions (pride, relief, shame) related to taking the test, respectively. Using this procedure, we aimed to ensure that the emotion assessment was fully embedded in the test-taking situation, thus minimizing recollection bias. Participants were then debriefed on the purpose of the study and informed that they would not actually be receiving performance feedback.

5.3. Measures

5.3.1. Achievement goals

Participants’ goals were assessed using adapted versions of the mastery, performance-approach, and performance-avoidance three-item scales of the Achievement Goal Questionnaire-Revised (Elliot & Murayama, 2008). In order to assess participants’ goals related to the upcoming test, a reference to the test was added to the items (e.g., “My goal is to improve as much as possible during the test”; “My aim is to perform well compared to other students taking this test”; “My goal is to avoid performing poorly in this test compared to others”; 1 = *strongly disagree* to 5 = *strongly agree*). Scores were averaged to form the achievement goal indexes ($\alpha = .82$, $.79$, and $.77$ for mastery, performance-approach, and performance-avoidance goals, respectively).

5.3.2. Achievement emotions

Participants’ emotions related to taking the test were assessed using short versions of the test emotions scales of the Achievement Emotions Questionnaire (AEQ; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011). The instructions for the scales assessing prospective emotions, activity emotions, and retrospective emotions asked respondents to describe how they felt before, during, and after taking the test, respectively. Participants responded on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale, and scores were averaged to form the achievement emotion indexes. The prospective emotion scales assessed hope (5 items; e.g., “I am quite confident that I am prepared for the test”; $\alpha = .81$), anxiety (9 items; e.g., “I am worried that the test will be too difficult for me”; $\alpha = .82$), and hopelessness (7 items; e.g., “I feel hopeless”). The activity emotion scales assessed enjoyment (8 items; e.g., “I am enjoying taking this test”; $\alpha = .72$) and anger (8 items; e.g., “I am getting angry”; $\alpha = .79$). The retrospective emotion scales assessed pride (6 items; e.g., “I’m proud of how well I mastered this test”; $\alpha = .85$), relief (6 items; e.g., “I feel relieved”; $\alpha = .77$), and shame (7 items; e.g., “I feel ashamed”; $\alpha = .83$).

6. Results

6.1. Preliminary analyses

Table 1 presents the intercorrelations between the goal and emotion variables. Mastery goals did not correlate with performance goals; the performance-approach and performance-avoidance goal correlation was moderately positive. Enjoyment, hope, and pride exhibited positive intercorrelations, as did anger,

Table 1
Pearson product moment correlations for achievement goals and achievement emotions.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Mastery goals	–									
2. Performance-approach goals	.01	–								
3. Performance-avoidance goals	–.08	.53**	–							
4. Enjoyment	.14	.21*	.04	–						
5. Hope	.19*	.29**	–.03	.68**	–					
6. Pride	.18	.12	–.04	.69**	.64**	–				
7. Relief	.15	.30**	.41**	.05	–.06	.06	–			
8. Anger	–.19*	.02	.28**	–.46**	–.47**	–.36**	.28**	–		
9. Anxiety	–.19*	.06	.41**	–.29**	–.45**	–.39*	.45**	.63**	–	
10. Hopelessness	–.09	–.07	.21*	–.53**	–.54**	–.48**	.20*	.74**	.64**	–
11. Shame	–.22*	.08	.30**	–.41**	–.43**	–.46**	.19	.71**	.65**	.71**

Note. * $p < .05$, ** $p < .01$.

anxiety, hopelessness, and shame; the correlations between these two groups of emotions were moderately negative. Relief was unrelated to enjoyment, hope, and pride, but was positively correlated with anger, anxiety, and hopelessness. Furthermore, we examined the achievement goal and achievement emotion variables for gender differences using *t*-tests. There were no gender differences for any of the goal or emotion variables.

6.2. Effects of anticipated feedback on achievement goals

The effects of feedback condition on participants' goals for the test were analyzed with univariate ANOVAs (Table 2). Feedback condition had a significant effect on mastery goals, $F(2,150) = 13.81$, $p < .01$. Multiple comparison tests using Fisher's LSD method showed that mastery goals were significantly higher in the self-referential feedback condition than in the normative feedback and control conditions ($ps < .01$). The difference between the normative feedback and control conditions was not significant. Furthermore, feedback condition had significant effects on performance-approach goals, $F(2,150) = 3.60$, $p < .05$, and performance-avoidance goals, $F(2,150) = 9.21$, $p < .01$. Multiple comparisons showed that both performance-approach goals and performance-avoidance goals were significantly higher in the normative condition than in the self-referential and control conditions ($ps < .01$). These performance-based goals did not differ significantly between the self-referential feedback and control

conditions. Effect sizes for the differences between the self-referential and normative conditions were substantial, with $d = .94$, $-.42$, and $-.76$ for mastery, performance-approach, and performance-avoidance goals, respectively (Table 2).

6.3. Effects of anticipated feedback on achievement emotions

The effects of feedback condition on participants' emotions were also analyzed using univariate ANOVAs (Table 2). For positive emotions, feedback condition did not have a significant effect on enjoyment ($F[2,150] = 1.43$, $p > .24$), but had significant effects on hope ($F[2,150] = 3.69$, $p < .05$), pride ($F[2,150] = 3.53$, $p < .05$), and relief ($F[2,150] = 4.01$, $p < .05$). For hope and pride, multiple comparisons showed that these emotions were significantly higher in the self-referential condition than in the normative and control conditions ($ps < .05$), with differences between the normative feedback and control conditions being non-significant. Relief differed significantly between the self-referential and the normative conditions ($p < .01$), whereas the differences between these two conditions and the control condition were not significant. Effect sizes for the differences between the self-referential and normative conditions ranged from $d = .21$ to $.47$ (Table 2).

Feedback condition had a significant effect on all four negative emotions: anger ($F[2,150] = 6.39$, $p < .01$), anxiety ($F[2,150] = 8.32$, $p < .01$), hopelessness ($F[2,150] = 3.41$, $p < .05$), and shame ($F[2,149] = 10.47$, $p < .01$). Multiple comparisons showed that anger and hopelessness were lower in the self-referential condition than in the normative and control conditions ($ps < .05$), with differences between the latter two conditions being non-significant. Anxiety was higher in the normative condition than in the self-referential and control conditions ($p < .05$); the difference between the self-referential and control conditions was not significant ($p = .058$). Shame was higher in the normative condition than in the control and self-referential conditions, and higher in the control condition than in the self-referential condition ($ps < .01$). Effect sizes for the differences between the self-referential and normative conditions were medium to large ($d = -.44$ to $-.86$; Table 2).

6.4. Joint and mediated effects of anticipated feedback and goals on achievement emotions

Structural equation modeling (Mplus; Muthén & Muthén, 2012) was used to conduct path analyses examining the joint effects of anticipated feedback on goals and emotions, and the hypothesized role of goals as mediators of the effects of feedback on emotions (Figs. 2–4; Table 3). To reduce complexity, separate analyses were performed for activity emotions (enjoyment, anger), positive outcome emotions (hope, pride, relief), and negative outcome

Table 2
Achievement goals and achievement emotions in the self-referential, normative, and No feedback conditions: means, standard deviations, and effect sizes.

	Self-referential feedback		Normative feedback		No feedback		F (2, 150)	d^a
	M	SD	M	SD	M	SD		
Mastery goals	3.87 _a	1.00	2.93 _b	1.00	3.12 _a	.90	13.81**	.94
Performance-approach goals	3.25 _a	1.17	3.71 _b	.80	3.31 _a	.80	3.60*	–.46
Performance-avoidance goals	3.09 _a	1.13	3.88 _b	.94	3.23 _a	.73	9.21**	–.76
Enjoyment	3.00 _a	.90	2.83 _a	.73	2.76 _a	.67	1.43	.21
Hope	3.65 _a	.87	3.24 _b	.87	3.27 _b	.78	3.69*	.47
Pride	3.13 _a	1.01	2.74 _b	.94	2.69 _b	.77	3.53*	.40
Relief	2.12 _a	.96	2.67 _b	1.02	2.39 _{ab}	.95	4.01*	–.55
Anger	1.61 _a	.64	2.11 _b	.85	1.96 _b	.66	6.39**	–.66
Anxiety	1.72 _a	.65	2.31 _b	.90	2.00 _a	.64	8.32**	–.75
Hopelessness	1.51 _a	.66	1.83 _b	.78	1.81 _b	.59	3.41*	–.44
Shame	1.36 _a	.47	2.04 _b	1.01	1.72 _c	.65	10.47**	–.86

Note. Means that did not differ significantly bear the same subscript; means that differed significantly ($p < .05$) bear different subscripts (a, b, or c).

* $p < .05$, ** $p < .01$.

^a Effect size *d* for the difference between the self-referential and normative feedback conditions.

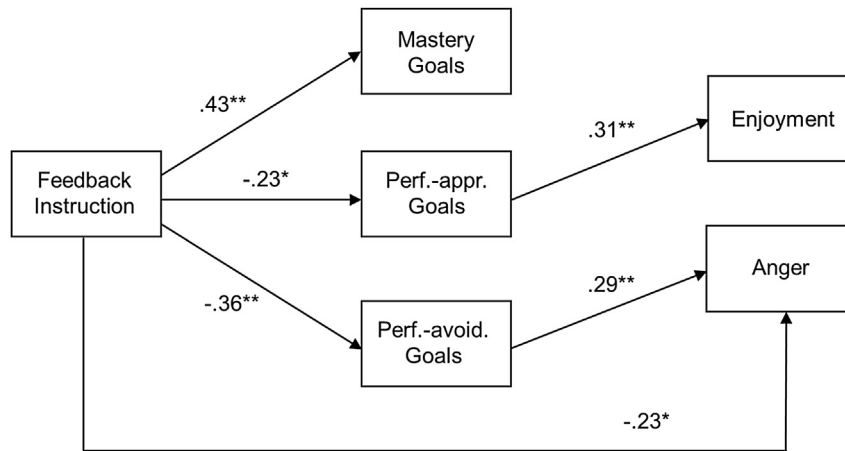


Fig. 2. Path analysis for activity emotions. Significant effects are displayed only. Self-referential and normative feedback was coded +1 and –1, respectively. Explained variance was $R^2 = .11$ and $.17$ for enjoyment and anger, respectively. * $p < .05$, ** $p < .01$.

emotions (anxiety, hopelessness, shame), respectively. Manifest variables were included in the models to keep the ratio of sample size to number of estimated parameters in balance. To assess the effects of feedback instruction, a dummy variable was included representing the contrast between the two focal conditions, the self-referential feedback condition (coded +1) and the normative feedback condition (coded –1).

In each of the three path-analytical models, we estimated the effects of feedback condition on the three goals and the focal emotions, as well as the effects of the three goals on these emotions. We also calculated the indirect effects of feedback condition on emotions as mediated by the three goals. The indirect effect mediated by a goal variable was assessed based on the analytic distribution of the product of the two unstandardized path coefficients (MacKinnon, Fritz, Williams, & Lockwood, 2007). As such, the models were fully saturated by estimating all possible direct and mediated effects of feedback on goals and emotions.¹

6.4.1. Path analysis for activity emotions

The path analysis for activity emotions (Fig. 2) revealed that feedback condition had a positive effect on mastery goals, $\beta = .43$, $p < .001$, and negative effects on performance-approach goals, $\beta = -.23$, $p < .05$, and performance-avoidance goals, $\beta = -.36$, $p < .001$. These findings are in accord with the ANOVA results.

Mastery goals exhibited a non-significant positive trend with regard to enjoyment, $\beta = .16$. Performance-approach goals were a positive predictor of enjoyment, $\beta = .31$, $p < .01$. The direct and total effects of feedback instruction on enjoyment were not significant. Because feedback instruction was a positive predictor of performance-approach goals, and performance approach goals were a positive predictor of enjoyment, mediation was possible. In fact, there was a non-significant indirect effect of feedback condition on enjoyment mediated by performance-approach goals, $\beta = -.07$, $p = .071$. This effect was offset by a non-significant indirect effect, $\beta = .07$, mediated by mastery goals.

Mastery goals exhibited a non-significant negative trend with regard to anger, $\beta = -.07$. Performance-avoidance goals were a positive predictor of anger, $\beta = .29$, $p < .01$. Feedback instruction had a

negative direct effect on anger, $\beta = -.23$, $p < .05$, and a negative indirect effect mediated by performance-avoidance goals, $\beta = -.11$, $p < .05$. The total effect of feedback instruction on anger was $\beta = -.33$, $p < .01$. As such, the analysis documents performance-avoidance goals as a mediator of the effects of feedback condition on anger, with the indirect effect accounting for 32.8% of the total effect.

6.4.2. Path analysis for positive outcome emotions

In the analysis for positive outcome emotions (Fig. 3), feedback condition had the same effects on mastery goals, performance-approach goals, and performance-avoidance goals as in the analysis for activity emotions described earlier.

Performance-approach goals were a positive predictor of hope, $\beta = .44$, $p < .01$. Feedback instruction had a positive direct effect on hope, $\beta = .23$, $p < .05$, and a negative indirect effect mediated by performance-approach goals, $\beta = -.10$, $p < .05$. This negative indirect effect was offset by two non-significant but positive indirect effects mediated by mastery and performance-avoidance goals. The total effect of feedback instruction on hope was $\beta = .23$, $p < .01$.

There was a non-significant trend for performance-approach goals as a positive predictor of pride, $\beta = .20$, $p = .068$. Feedback condition did not have a significant effect on pride, $\beta = .17$. The indirect effects of feedback condition on pride mediated by achievement goals were not significant either. As such, mediation via goals was not present. The total effect of feedback condition on pride was $\beta = .20$, $p < .05$.

Mastery goals and performance-avoidance goals were positive predictors of relief, $\beta = .29$, $p < .01$, and $\beta = .31$, $p < .01$, respectively. Feedback condition had a negative direct effect on relief, $\beta = -.27$, $p < .01$, a positive indirect effect mediated by mastery goals, $\beta = .12$, $p < .05$, and a negative indirect effect mediated by performance-avoidance goals, $\beta = -.11$, $p < .05$. The total effect of feedback instruction on relief was $\beta = -.27$, $p < .01$. As such, the analysis documents mastery goals and performance-avoidance goals as mediators of the effects of feedback instruction on relief.

6.4.3. Path analysis for negative outcome emotions

In the analysis for negative outcome emotions (Fig. 4), feedback condition again had the same effect on mastery goals, performance-approach goals, and performance-avoidance goals as in the analysis for activity emotions described earlier.

Performance-avoidance goals were a positive predictor of anxiety, $\beta = .45$, $p < .01$, whereas performance-approach goals were a

¹ We also performed an analysis including all of the emotion variables. As expected, the results were identical with the results for the three separate analyses. The saturation of the models implies that they show perfect fit to the data, making goodness-of-fit indices redundant.

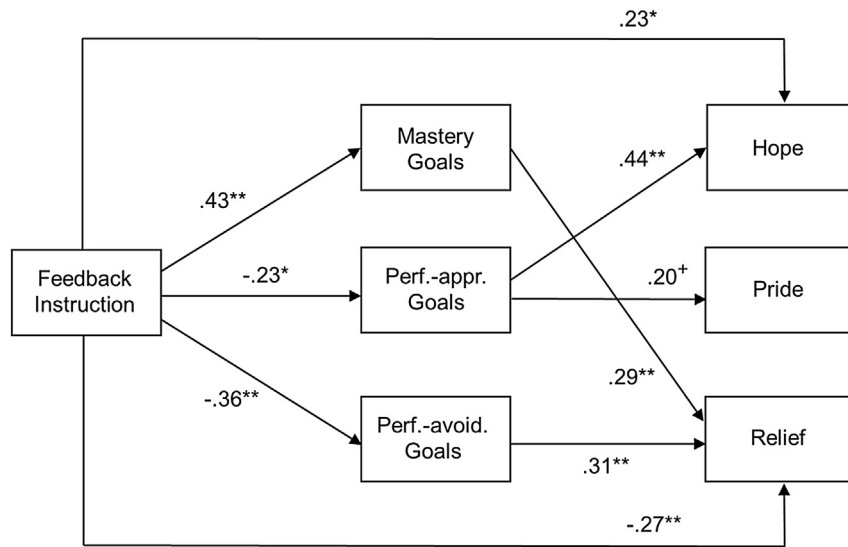


Fig. 3. Path analysis for positive outcome emotions. Significant effects are displayed only. Self-referential and normative feedback was coded +1 and –1, respectively. Explained variance was $R^2 = .20, .08, \text{ and } .27$ for hope, pride, and relief, respectively. $+p < .10, *p < .05, **p < .01$.

negative predictor of anxiety, $\beta = -.22, p < .05$. Feedback instruction had a negative direct effect on anxiety, $\beta = -.22, p < .05$, and a negative indirect effect mediated by performance-avoidance goals, $\beta = -.16, p < .01$. The total effect of feedback condition on anxiety was $\beta = -.36, p < .01$. As such, the analysis documents performance-avoidance goals as a mediator of the effect of feedback condition on anxiety. The indirect effect mediated by performance-avoidance goals accounted for 44.7% of the total effect.

Performance-avoidance goals were a positive predictor of hopelessness, $\beta = .30, p < .01$, whereas performance-approach goals were a negative predictor of hopelessness, $\beta = -.27, p < .05$. Feedback instruction had a negative indirect effect on hopelessness mediated by performance-avoidance goals, $\beta = -.11, p < .05$. The direct effect of feedback instruction was not significant. The total effect of feedback instruction on hopelessness was $\beta = -.22, p < .05$. Thus, the analysis shows performance-avoidance goals to be mediators of the effect of feedback condition on hopelessness. This indirect effect accounted for 49.5% of the total effect.

Finally, performance-avoidance goals were a positive predictor of shame, $\beta = .25, p < .05$. Feedback condition had a negative direct effect, $\beta = -.30, p < .01$, and a negative indirect effect mediated by performance-avoidance goals, $\beta = -.11, p < .05$. The total effect of feedback instruction on shame was $\beta = -.40, p < .01$. As such, the analysis reveals that performance-avoidance goals were mediators of the effect of feedback condition on shame. This indirect effect accounted for 22.5% of the total effect.

7. Discussion

The study of achievement goals and achievement emotions has taken place in relative isolation. Moreover, in the research traditions addressing these two constructs, researchers have focused on documenting educational relevance by analyzing links with academic outcomes, whereas the impact of contextual factors has received less attention. Most relevant to the present work, there is a conspicuous lack of research examining the impact of feedback

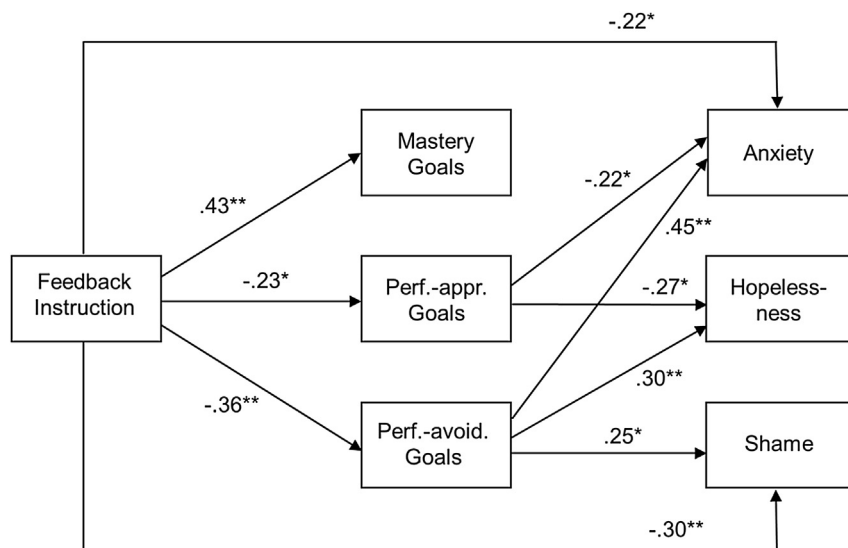


Fig. 4. Path analysis for negative outcome emotions. Significant effects are displayed only. Self-referential and normative feedback was coded +1 and –1, respectively. Explained variance was $R^2 = .26, .12, \text{ and } .20$ for anxiety, hopelessness, and shame, respectively. $*p < .05, **p < .01$.

Table 3
Results of path analyses: direct, mediated, and total effects of feedback condition and goals on emotions.

	Effects of goals on emotions			Effects of feedback condition on emotions				
	Mastery goals	Perf.-appr. goals	Perf.-avoid. goals	Direct effect	Indirect effects mediated by:			Total effect
					Mastery goals	Perf.-appr. goals	Perf.-avoid. goals	
Enjoyment	.16	.31**	-.09	.08	.07	-.07†	.03	.13
Hope	.08	.44**	-.18	.23*	.03	-.10*	.07	.23*
Pride	.10	.20†	-.08	.17	.04	-.05	.03	.20*
Relief	.29**	.07	.31**	-.27**	.12**	-.02	-.11*	-.27**
Anger	-.07	-.18	.29**	-.23*	-.03	.04	-.11*	-.33**
Anxiety	-.06	-.22*	.45**	-.22*	-.03	.05	-.16**	-.36**
Hopelessness	.01	-.27*	.30**	-.17	.00	.06	-.11*	-.22*
Shame	-.07	-.12	.25*	-.30**	-.03	.03	-.10*	-.40**

† $p < .10$, * $p < .05$, ** $p < .01$.

instruction on students' achievement goals and emotions. The present research aims to rectify this oversight. In doing so, we proposed a model linking anticipated achievement feedback, achievement goals, and achievement emotions that extends prior work in this area.

The model is consistent with achievement motivation theories such as the hierarchical model of approach-avoidance achievement motivation (Elliot & Church, 1997; Elliot & Thrash, 2001), and with achievement emotion theories such as the control-value theory of achievement emotions (Pekrun, 2006). As argued by Pekrun et al. (2006, 2009), these two types of theories emphasize different variables as focal constructs (goals versus emotions), but are best viewed as complementary rather than mutually exclusive. When integrated, they provide a more complete portrait of psychological functioning in achievement contexts than either theoretical perspective alone.

7.1. Effects of anticipated feedback on achievement goals

In line with Hypothesis 1, feedback instructions had clear effects on students' achievement goal adoption: anticipating feedback based on self-improvement prompted mastery goals, whereas anticipating feedback based on social comparison prompted performance goals. These effects are consistent with our proposal that the definition of competence used in feedback instructions prompts achievement goals grounded in that same definition of competence. The size of the observed effects was substantial, suggesting that anticipated achievement feedback is a critically important contextual factor influencing students' achievement goal adoption.

Our results indicate that normative feedback facilitates the adoption of both performance-approach and performance-avoidance goals. Typically, when normative grading is used in educational settings, students are informed that their performance will be compared to that of others, with no specific focus on doing better than others or doing worse than others. Individual difference factors are presumed to impact the degree to which an emphasis on normative comparison leads to an appetitive focus or an aversive focus. For example, students with a high need for achievement may be likely to adopt performance-approach goals, whereas those high in fear of failure may adopt performance-avoidance goals (Elliot & Church, 1997). Thus, both contextual and individual difference factors are likely to be operative in the goal adoption process (Fryer & Elliot, 2007).

7.2. Effects of anticipated feedback on achievement emotions

Consistent with Hypothesis 2, anticipated feedback had substantial effects on students' achievement emotions related to taking the test. With regard to activity emotions, anticipating self-

referential feedback produced a trend toward more enjoyment and substantially reduced students' anger. With regard to outcome emotions, anticipating self-referential feedback had a positive influence on hope and pride, whereas anticipating normative feedback had a positive influence on anxiety, hopelessness, shame, and relief.

Previous research has shown that success versus failure feedback influences students' test anxiety (Zeidner, 1998). The present research expands this work in two important ways. First, our findings indicate that feedback processes influence other achievement emotions as well. Second, beyond the receipt of success versus failure feedback, it appears that the type of feedback that students expect to receive can profoundly influence their emotions. Specifically, our findings indicate that anticipating self-referential feedback facilitates positive emotions, relief being the exception, whereas anticipating normative feedback generally evokes negative emotions.

For the outcome emotions hope and pride, the results were not consistent with our initial hypotheses. We had expected that these emotions would be facilitated by normative feedback, but the results indicated that they were instead facilitated by self-referential feedback. Two explanations are possible for this finding. First, it may be that anticipating self-referential feedback has positive effects on hope and pride in creativity- and learning-based achievement contexts, whereas normative feedback facilitates hope and pride in outcome- and performance-based achievement contexts. Second, we found that anticipating normative feedback evokes performance-avoidance goals and negative emotions, which may interfere with the emergence of hope and pride.

7.3. Goals as predictors of achievement emotions

In line with Hypothesis 3, mastery goals exhibited a positive trend with regard to enjoyment and a negative trend with regard to anger. Performance-approach goals were a positive predictor of hope and showed a positive trend with regard to pride, and performance-avoidance goals were a positive predictor of anxiety, hopelessness, shame, and relief. These findings imply that the hypothesized relations between performance-based goals and outcome emotions were confirmed, whereas those between mastery goals and activity emotions were less clearly supported. A likely explanation again lies in the type of achievement context focused on in our research. The study involved an exam context where performance contingencies were particularly salient, and in such contexts the predictive utility of performance-based goals may be stronger than the utility of mastery goals.

A few additional links were observed that were not expected. Specifically, performance-approach goals were a positive predictor of enjoyment and a negative predictor of anxiety and hopelessness.

That performance-approach goals predicted students' enjoyment, as well as their hope and pride, suggests that focusing on the appetitive attainment of normative success is helpful for a broad array of positive emotions in an exam context. The negative link between performance-approach goals and anxiety, as well as hopelessness, is intriguing as well. In studies not attending to the distinction between approach and avoidance forms of performance goals, such goals are sometimes positively related to measures of anxiety (e.g., Daniels et al., 2009). The present findings suggest that it is the avoidance form of performance goals that prompts anxiety and hopelessness, whereas performance-approach goals help sustain positive emotions and reduce negative emotions in exam situations.

Overall, the findings lend further support to the contention that neither the dichotomous model of achievement goals (mastery vs. performance) nor the dichotomous model of achievement emotions (positive vs. negative affect) is sufficient to capture the complex links between students' goals and emotional experience. Specifically, the results corroborate previous findings (Pekrun et al., 2006, 2009) showing that approach and avoidance goals promote different emotions, and that the links between achievement goals and students' subsequent affective reactions are clearer for discrete emotions, relative to general positive and negative affect. Our findings for relief are especially noteworthy in this regard. Relief is a positive emotion; nevertheless, similar to negative outcome emotions, it was promoted by performance-avoidance goals. This finding runs counter to conceptions of approach goals as predictors for all types of positive emotions, and counter to conceptions of avoidance goals as predictors of negative emotions alone.

7.4. Joint and mediated effects of anticipated feedback and goals on emotions

Our findings are nicely in accord with the prediction that achievement goals mediate the link between anticipated feedback and emotions (Hypothesis 4). Feedback instruction had both direct and indirect effects on emotions, with achievement goals serving as mediator variables. Mediation was documented for all three goals, and for seven of the eight focal emotions. However, for most of the emotions, feedback still had significant direct effects on emotion when the mediational role of goals was considered, and the proportion of the feedback–emotion relation that was accounted for by goals was moderate. This points to the need to attend to additional mediational processes in subsequent work. While achievement goals are important sources of students' achievement emotions, there may be additional factors shaping these emotions that should be taken into account, such as social comparison processes (Festinger, 1954), causal attributions (Butler, 1987), and appraisals of the controllability and value of achievement (Pekrun, 2006).

7.5. Limitations, suggestions for future research, and implications for educational practice

There are some limitations of the present research that should be noted and that may be used to suggest directions for future research. First, the generalizability of the findings to different age groups and cultures should be examined, and a broader range of feedback, goal, and emotion variables could be used, relative to the variables employed herein. Achievement feedback was conceptualized as anticipated feedback using self-referential and normative standards; future research should address other types of feedback, such as feedback using absolute standards or standards based on group achievement, and should address the effects of received

rather than anticipated feedback. Mastery goals were conceptualized as mastery-approach goals; mastery-avoidance goals were not considered. Eight achievement emotions were examined; future studies should attend to other achievement-relevant emotions as well, such as surprise, disappointment, frustration, or confusion (D'Mello, Lehman, Pekrun, & Graesser, 2013).

Second, the present study used an experimental approach with non-curricular test material to examine the influence of anticipated feedback on goals and emotions. Relative to non-experimental studies, such an approach has clear advantages with regard to documenting causal effects. It should also be noted that our approach aimed to enhance ecological validity by conducting the study in an actual classroom environment. Nevertheless, some degree of artificiality was introduced into the achievement context by our manipulation and by the test material used, and subsequent work measuring ongoing feedback processes with curricular material is needed to confirm the robustness of our findings.

Furthermore, the study examined the effects of anticipated feedback on goal adoption and emotions but did not consider the influence of these variables on subsequent performance. Achievement feedback as well as achievement-related goals and emotions are known to affect students' achievement (Elliot & McGregor, 2001; Hattie & Timperley, 2007; Zeidner, 1998); as such, future research would do well to examine the joint impact of feedback, goals, and emotions on students' academic achievement, as well as possible reciprocal effects linking these four groups of variables (Pekrun, 2006).

Finally, the present research has several implications for educational practice. The findings suggest that educators should attend to students' achievement goals as antecedents of the emotions that they experience in the classroom. Although intuition may lead one to expect that mastery goals are beneficial and performance-based goals are detrimental to students' emotional experience, the data suggest a more nuanced picture. It appears that both mastery and performance-approach goals may be beneficial to students by promoting positive emotions in exam contexts, and that it is performance-avoidance goals that are the main type of goal that needs to be discouraged. Our findings also indicate that the type of feedback that teachers promise to students has a direct impact on students' goals and emotions. Self-referential feedback is clearly preferable to normative feedback in this regard. As a whole, our research leads to the conclusion that educators would do well to provide students with self-referential, as opposed to normative, feedback, and that they should seek to discourage students from pursuing performance-avoidance goals, but not necessarily performance-approach goals, in the classroom.

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