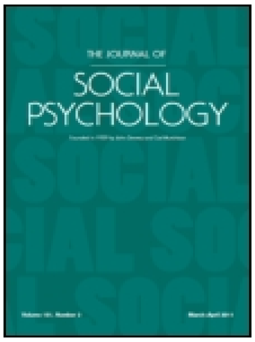

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The Role of Attributional Retraining and Elaborative Learning in College Students' Academic Development

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ABSTRACT. In the present longitudinal study, the authors examined the impact of attributional retraining (AR) techniques on academic motivation and achievement for college students who are either frequently or infrequently using elaborative learning strategies. During the 1st semester, 203 students completed an initial questionnaire assessing elaborative learning followed by 1 of 3 treatment conditions (No AR, Writing AR, Aptitude Test AR). Results indicated improvements in students' end-of-year perceptions of control, success, and emotions, as well as course-specific and overall academic performance for those receiving either AR format, with "high elaborators" showing higher levels on these measures than "low elaborators." The authors discussed the importance of elaborative and attributional processes underlying the effectiveness of the AR treatment and the potential utility of individualized AR techniques in the college classroom.

Key words: achievement motivation, attribution theory, metacognition

WEINER'S (1985, 1995) ATTRIBUTION THEORY of achievement motivation asserts that the ways in which students explain their successes and failures can influence subsequent learning-related affect and achievement striving. Attributional retraining (AR) is a remedial intervention that is based on this premise: to assist college students who perform poorly by encouraging controllable and unstable perceptions of academic failure (see Perry, Hall, & Ruthig, in press; and Perry, Hechter, Menec, & Weinberg, 1993, for reviews). This intervention has typically included a videotape treatment consisting of prescripted scenarios in which the determinants of academic success that are under the direct control of the student are emphasized, primarily the amount of effort invested in his or her studies (Perry & Penner, 1990; Wilson & Linville, 1982, 1985). Although this technique has consistently produced modest increases in academic motivation and achievement in college students, efforts to improve this intervention have been ongoing. Recent research has been directed primarily toward assessing the efficacy of AR methods in general as well as in relation to student risk factors associated with poor academic performance (e.g., Menec et al., 1994; Perry & Struthers, 1994; Struthers & Perry, 1996). Specifically, in the present study we attempted to demonstrate improvements in college students' end-of-year performance, motivation, and affect following individualized AR formats among those infrequently using elaborative learning strategies.

Attributional Retraining Research

According to Weiner's (1985, 1995) Attribution Theory, attributions for failure that are stable and uncontrollable are especially detrimental to student motivation. Attributing poor test performance to an immutable lack of ability, for example, will likely result in feelings of hopelessness and shame (due to the attribution being stable and uncontrollable, respectively), potentially resulting in decreases in motivation, achievement striving, test performance, and class attendance. To counter these developments, AR techniques encourage students to adopt controllable and unstable explanations for academic failure such as a lack of effort or a poor study strategy (see Forsterling, 1985, for a review). In turn, these "modified" attributions encourage greater motivation to succeed because students can try harder or use a better strategy, resulting in increased effort and improved performance (Schunk, 1998).

In a classic study, Wilson and Linville (1982) presented videotaped interviews of senior college students describing how low grades, being unstable in nature, often improve significantly after the first semester. They demonstrated a pronounced increase in Graduate Record Examination (GRE) and grade point average (GPA) scores among college freshmen by the end of the academic year as a result of the intervention. Studies conducted by Van Overwalle, Segebarth, and Goldchstein (1989) and Van Overwalle and De Metsenaere (1990), who used a similar videotape intervention to represent academic success as the product of controllable achievement striving behaviors, have supported these initial findings.

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Exposure to the intervention resulted in higher GPA scores at the end of the academic year.

Improving Attributional Retraining (AR)

Efforts to improve AR techniques have concerned not only the identification of risk characteristics predisposing students to academic failure but also the modification of various intervention techniques to find specific AR procedures that are best suited for those people who are at risk. For instance, Perry and Penner (1990) administered AR under well-controlled laboratory conditions using a videotape presentation in which a male psychology professor presented ability as unstable and encouraged students to attribute poor performance to effort. In their study, improvements in students' performance on a homework assignment and achievement test were found after the administration of the intervention, but these benefits were observed only for students with an external locus of control, which was deemed to be an academic risk variable.

In keeping with Perry and Penner's (1990) focus on risk factors, a laboratory study by Menec et al. (1994) assessed the effectiveness of AR for students defined as at risk because of previous academic failure and maladaptive perceptions of control. Their findings showed significant improvements on a lecture-based achievement test following the videotaped AR intervention, which consisted of a student discussing how poor academic performance was the result of ineffective study strategies and a lack of effort. However, this improvement was evident only for students who had performed poorly on a prelecture GRE-type aptitude test and for low-achieving individuals having an external locus of control. In a similar longitudinal field study, Struthers and Perry (1996) found that an AR treatment including the same videotape presentation followed by a small group discussion was effective in improving academic motivation in at-risk students, namely those with a stable–uncontrollable attributional style.

Perry and Struthers (1994) compared several AR procedures in a longitudinal field study to find the most effective intervention technique (i.e., written handout, videotape, videotape plus discussion) for at-risk students reporting low levels of perceived academic success. Results indicated that only students who were low in perceived success reported improvements on subsequent course exams and end-of-year grades, and only in the videotape-plus-group-discussion condition.

In another longitudinal field study, Ruthig, Perry, Hall, and Hladkyj (2004) also assessed the effectiveness of these AR techniques. In contrast to Perry and Struthers, these authors found all AR conditions to be particularly beneficial for overly optimistic students. Specifically, their study showed that, although highly optimistic 1st-year college students are at risk of academic failure, these AR treatments resulted in higher cumulative GPAs, lower test anxiety, and decreased course attrition for them.

In sum, a major research focus in the research literature on attributional retraining has concerned efforts to improve AR for specific types of at-risk students (cf., Menec et al., 1994; Perry et al., 1993), because students' academic performance can be influenced by both the method of AR and the characteristics of the students. Attributional retraining has typically involved a videotaped treatment followed by an exercise intended to facilitate the cognitive integration of the attributional principles that were presented in the videotape (Forsterling, 1985), an activity referred to as a *consolidation* exercise (Perry et al., in press). Moreover, this research has involved the explicit manipulation of AR consolidation activities so as to match specific at-risk groups with appropriate intervention techniques.

Elaborative Learning

Although previous AR studies have been informative concerning the consolidation efficacy of various techniques, none have explored whether individual differences between students in consolidation processes also contribute to the impact of AR. Elaborative learning, or deep processing, has become an increasingly investigated individual-difference variable within the academic domain, representing the extent to which students are able to incorporate new information with existing knowledge. Its occurrence in an academic setting is manifested as paraphrasing, forming analogies or examples, and summarizing course materials in one's own words (Pintrich, Smith, & McKeachie, 1989; Pintrich & Zusho, 2002). This personal restructuring of academic material is also considered the primary means through which the learning experience can be fully appreciated (Entwistle, 2000). As such, elaborative learning represents not only a potential explanation for the effectiveness of the AR consolidation exercises but also an important individual-difference variable that may inhibit or facilitate the induction of the attributional information that is presented during the AR treatment.

Recent research (Albaili, 1998; Brackney & Karabenick, 1995; Hladkyj, Hunter, Maw, & Perry, 1998; Pintrich, Smith, Garcia, & McKeachie, 1993; Sadowski & Gulgoz, 1996) with college students has shown a positive relationship between elaborative learning and academic performance in terms of actual course grades. In addition, this research has shown elaborative learning to correlate positively with learning-related control beliefs (Brackney & Karabenick; Pintrich et al., 1993), goal orientation (Albaili), critical thinking (Cheung, 2000; Cheung, Rudowicz, Lang, Yue, & Kwan, 2001; Pintrich et al., 1993), self-assessed learning (Cheung & Kwok, 1998), and overall life satisfaction in college student populations (Cheung). This research suggests that, whereas college students who rely on elaborative learning strategies demonstrate superior academic motivation and performance, those college students who infrequently use these strategies are at risk of poor academic performance, making them a prime group for remedial interventions. Furthermore, the most promising interventions for such students at risk of academic failure because of inadequate use of self-regulation strategies are motivational in nature and typically involve control-enhancing techniques (Brackney & Karabenick; Hofer, Yu, & Pintrich, 1998).

At first glance, elaborative learning as an individual-difference variable in AR research represents a type of student risk factor not unlike other academic risk factors involving attributions (Struthers & Perry, 1996), optimism (Ruthig et al., 2004), perceived success (Perry & Struthers, 1994), or past performance (Menec et al., 1994). In an AR context, however, this construct is qualitatively different from risk factors previously assessed in that students who frequently engage in elaborative learning (i.e., "low-risk" students) are also likely to benefit from AR because they are able to deeply reflect on the attributional information presented regardless of the type of consolidation technique administered. In contrast, improvements in academic achievement and motivation for low elaborators are expected to be largely contingent upon the type of consolidation exercise that was used in the AR treatment, with these students benefiting mostly from consolidation activities that foster elaborative processing in either an abstract manner (e.g., writing) or an applied manner (e.g., aptitude test). When assessed in combination with AR techniques, students' elaborative learning is best understood not as a typical student risk factor but rather as a salient individual-difference variable that may facilitate the effectiveness of this control-enhancing, motivational intervention.

Hladkyj et al. (1998) provided empirical support for this subtle yet important distinction. This study showed that after AR was administered in an actual classroom setting (i.e., videotape plus discussion), performance and motivation improved for individuals who frequently used elaborative learning strategies. Their study also showed that low-elaborating students suffered *declines* in academic motivation and performance after the AR treatment. The authors explained this unexpected pattern of results as due, in part, to the experimenters' not being able to fully monitor each group discussion, a task more easily accomplished in a controlled laboratory setting (e.g., Perry & Struthers, 1994; Struthers & Perry, 1996). It is also possible that, for "low elaborators," the unstructured and interpersonal nature of group discussion in a classroom setting was distracting enough to prevent the elaborative processing of the attributional information that is required for motivational gains to occur. These preliminary results serve to highlight the unique and salient nature of elaborative learning as an individual-difference variable in AR research, a variable of theoretical importance concerning the underlying processes of AR techniques and of practical importance with respect to ongoing efforts to provide this intervention to freshmen college students.

Attributional Retraining and Elaborative Learning

In the present study, we examined whether externally structured cognitive consolidation procedures consisting of individualized self-reflective activities would enable students who infrequently use elaborative learning strategies to benefit from AR. If this approach were supported, it would substantiate the assertion that elaborative learning does in fact contribute to the long-term effectiveness of AR, while adding to an extensive body of research demonstrating the importance of assessing AR techniques in relation to student difference variables. Our longitudinal experimental design comprised a 2 × 3 factorial design involving the frequency with which students use elaborative learning strategies (low, high) and the type of AR administered.

AR consisted of two treatment conditions in which an informational AR videotape was presented (Menec et al., 1994; Struthers & Perry, 1996), followed by a consolidation exercise of a practical or abstract nature, as well as a control group that did not receive the intervention. The two AR conditions required students to complete either a timed aptitude test or a writing assignment having three open-ended questions directly related to the attributional information presented (for previous use of writing-based AR techniques, see Jesse & Gregory, 1986–1987, and Noel, Forsyth, & Kelley, 1987). We intended the Aptitude Test AR condition to be difficult to allow students to practice the controllable failure attributions presented in the AR videotape, whereas the Writing Assignment AR condition was structured so as to provide students an opportunity to personally reflect upon the intervention, as in a group discussion, albeit on an individual basis. We did not administer a videotape-only AR condition because of previous laboratory and field studies demonstrating the ineffectiveness of this technique with college students (Hunter & Perry, 1996; Perry & Struthers, 1994).

The dependent variables in our longitudinal design included (a) cumulative and course-specific measures of academic achievement and (b) self-report measures of academic control, motivation for academic success, and academic emotions (positive: hope, pride; negative: guilt, shame) outlined in Weiner's (1985, 1995) Attribution Theory, all of which were obtained at the end of the academic year. We hypothesized a main effect of elaborative learning in which high elaborators would show more favorable results on the dependent measures than would low elaborators, as is consistent with previous research on elaborative learning (Albaili, 1998; Hladkyj et al., 1998; Pintrich et al., 1993; Sadowski & Gulgoz, 1996). Low elaborators were also expected to show improvements on all measures (except pride) following either AR procedure because of the opportunity for elaborative processing extrinsically afforded by the individualized consolidation exercises. Finally, we expected that both AR techniques would also benefit high elaborators because of their intrinsic tendency to process the attributional information in a deep and self-relevant manner. Because elaborative learning does not represent a typical student risk factor but rather an individual-difference variable, potentially augmenting the effectiveness of AR, we did not expect intervention by risk group interaction effects, which have been found in previous AR studies (Menec et al., 1994; Perry & Penner, 1990; Ruthig et al., 2004).

Consistent with Weiner's (1985, 1995) Attribution Theory, we also hypothesized that AR would serve to increase feelings of hope and guilt as found by Struthers and Perry (1996) and to decrease feelings of shame because unstable and controllable attributions were encouraged. No AR effects on pride were anticipated, because this emotion is proposed in Weiner's theory to result primarily from internal attributions (e.g., ability), and the failure attributions fostered by this intervention may be either internal (e.g., lack of attention, procrastination) or external in nature (e.g., inexperience, poor study technique). Considering the myriad of possible controllable attributions that are encouraged by AR, we assessed the emotional consequences of controllable and unstable attributions in general as defined by the controllability and stability dimensions in Attribution Theory.

Method

Participants

Participants were 203 students at a large, Midwestern research-1 university who volunteered in a four-phase study for experimental credit 2 months into the academic year. They were recruited from four sections of a two-semester introductory psychology course. We required them to complete a battery of questionnaires concerning their university experiences at the beginning (Phase 1) and at the end (Phase 2) of the academic year. We conducted AR in Phase 1 immediately after the initial survey. The Phase 1 (October) sample consisted predominantly of 1st-year college students (87%), including 131 females and 70 males (2 students did not indicate their gender), most of whom were between the ages of 17 years and 22 years (90%), whose average high school grade was 76% (obtained from institutional records). The Phase 2 sample was reduced by 26% (n = 150), consistent with recent research conducted by this laboratory showing study attrition rates of up to 55% (Perry, Hladkyj, Pekrun, & Pelletier, 2001). Course attrition also occurred as indicated on the final grades measure, which we obtained in Phase 3 (May) from course instructors, but to a lesser extent than did study attrition (n = 178). Chi-square analyses on attendance in Phase 2 and course completion in Phase 3 (final grades) showed no evidence of disproportionate attrition for the six experimental groups.

Independent Variables

Writing Assignment AR treatment. We presented AR in a videotape format lasting 8 min that was identical to that previously used in Menec et al. (1994) and Struthers and Perry (1996). The videotape depicted two graduate students in psychology discussing how adopting controllable patterns of causal attributions after an exam in introductory psychology contributed to a subsequent improvement in motivation and academic performance. The main points of the videotape were reiterated by a male professor who both introduced and summarized the discussion, emphasizing that the manner in which people interpret events in their university experience can influence future performance. The professor also noted that by perceiving failure as unstable, one can take control of how one responds to these events and that exercising one's academic control is how successful outcomes are ultimately achieved.

After the videotape presentation, we administered a writing exercise to students. The writing assignment was constructed specifically to encourage a deeper appreciation of the AR videotape and included three items that were explicitly based on the three tenets of elaborative processing as described by Entwistle (2000). These factors consist of depth (i.e., interconnections fostering summarization), breadth (i.e., considering a variety of related information), and personal structure (i.e., personally relevant examples). Thus, the writing assignment required students first to summarize the main points of the videotape in their own words, then to list a number of important reasons for why students may not perform as well as they could in their courses, and finally to list examples of how the main points of the videotape could be applied to the way in which they currently approach their studies.

Aptitude Test AR treatment. After the videotape presentation described in the previous section, we administered to participants an aptitude test that was based on that used by Perry and Dickens (1984) entitled the Abstract Reasoning and Abilities Test (ARAT). The test comprised three sections—verbal analogy, quantitative, and sentence completion—which comprised 10, 5, and 10 items, respectively. We allowed students only 5 min to complete each section, after which they completed 6 additional 10-point Likert-style items (from 1 = *very unsuccessful* to 10 = *very successful*) concerning their response to the test (e.g., "How successful do you feel you were on this test"). Responses to these questions indicated that students did not feel that they were very successful on this test (M = 3.45, SD = 1.96, Range = 1–7), which is consistent with the poor overall performance levels (M = 41.43%, SD = 12.47%, Range = 16–64%).

Elaborative learning. Students' use of elaborative learning strategies was measured in Phase 1 using a 6-item scale adapted from Pintrich et al. (1989). Students responded to each item using a 7-point Likert scale (from 1 = *not at all true of me* to 7 = *very true of me*; Cronbach's α = .80). The items included, for example, "I look for analogies between new ideas in the text and things I already know" and "When I study for this class, I pull together information from difference sources, such as lectures, readings, and discussions." Because this domain-specific measure of elaboration was administered to a predominantly 1st-year college student sample during the first few weeks of classes, when students have little or no prior domain knowledge, we consider the elaborative learning measure that we used in the present study as generalizable across college courses (see Alexander, Murphy, Woods, Duhon, & Parker, 1997). A 5-month test-retest reliability estimate demonstrated acceptable stability over time, $r(148) = .59$, $p < .001$. We defined students as low elaborators or high elaborators using a median split: for low elaborators, $M = 22.52$, $SD = 4.26$, Range = 10–28; for high elaborators, $M = 33.93$, $SD = 3.59$, Range = 29–42; $t(200) = 20.61$, $p < .001$.

Dependent Variables

Cumulative GPA. We assessed overall academic performance in Phase 4 by obtaining students' cumulative GPAs from institutional records (4.5 = A+, 4.0 = A, 3.5 = B+, etc.; $M = 2.59$, $SD = 0.87$, Range = 0.20–4.50).

Final course grades. Final course grade percentages in introductory psychology were based on course tests, assignments, essays, etc., completed throughout the academic year, and were provided by course instructors upon completion of the course (Phase 3; $M = 68.37\%$, $SD = 13.13\%$, Range = 16.62–96.90%).

High school grades. We obtained students' average high school grades in Phase 3 from institutional records ($M = 76.98\%$, $SD = 8.21\%$, Range = 58–99%) and used them as covariates in analyses on cumulative GPA, $r(183) = .64$, $p < .001$; final course grades, $r(176) = .60$, $p < .001$ (as in Perry et al., 2001; $r(507) = .51$, $p < .01$); and feelings of pride, $r(137) = .22$, $p < .01$.

Perceived control. In Phase 2, we used a 24-item measure of perceived control—including items from an 8-item measure used by Perry et al. (2001)—in which students indicated on a 5-point Likert scale (from 1 = *strongly disagree* to 5 = *strongly agree*; Cronbach's $\alpha = .85$) the extent to which they agreed with items such as the following: "I have a great deal of control over my academic performance in my psychology course" and "The more effort I put into my courses, the better I do in them." Perceived control was also assessed in Phase 1 using this scale (Cronbach's $\alpha = .78$) and was used as a covariate in analyses on the Phase 2 measure.

Perceived success. We used a five-item 10-point self-report Likert-style measure (from 1 = *not at all successful* to 10 = *totally successful*) to assess overall perceptions of academic success in Phase 2 (Cronbach's $\alpha = .88$), asking students how successful they felt with respect to their grades, learning goals, course requirements, effort invested, and knowledge gained. Perceived success was also assessed in Phase 1 using three single-item 10-point measures probing students' perceptions of academic success in their last year of high school (from 1 = *very unsuccessful* to 10 = *very successful*; $M = 7.15$, $SD = 2.16$), in their introductory psychology course to date (from 1 = *very unsuccessful* to 10 = *very successful*; $M = 4.80$, $SD = 2.43$), and in comparison to other university students (from 1 = *not at all* to 10 = *very much so*; $M = 5.61$, $SD = 2.01$). We used these items as covariates in analyses on the Phase 2 measure.

Academic emotions. In Phase 2, we assessed four 10-point single-item measures of academic emotions that we had derived from Weiner's (1985, 1995) Attribution Theory. Specifically, students were asked to rate (from 1 = *not at all* to 10 = *very much so*) the extent to which they felt *hopeful* (M = 6.84, SD = 1.83), *proud* (M = 5.20, SD = 2.00), *guilty* (M = 4.00, SD = 2.23), or *ashamed* (M = 3.37, SD = 2.55) with respect to their performance in their introductory psychology course to date. No Phase 1 correlates were available for inclusion as covariates on these Phase 2 measures.

Procedure

We assessed our hypotheses within a 2 × 3 longitudinal design comprising three phases over an 8-month period. Phase 1 (October) was conducted one month into the academic year to ensure that all students had completed at least one course exam and received feedback on their performance. Students selected a session time and day to complete Phase 1, during which they first completed the grade release and informed-consent forms. The latter form included a description of the AR intervention for all students except those in the control condition. We then allowed students 45 minutes to complete an initial survey, including the elaborative-learning and covariate measures, after which students who had been assigned to the control condition were free to leave. Students who were assigned to either the Writing Assignment AR or Aptitude Test AR treatment conditions then were shown an 8-min AR videotape, which was followed by a 20-min exercise consisting of either a writing assignment or an aptitude test, respectively, and then as they left were given a handout summarizing the main points of the videotape. We conducted only one intervention condition during any given experimental session.

We administered Phase 2 (March) near the end of the academic year and required students to complete a second survey including measures of perceived control, perceived success, and academic emotions. After they completed the questionnaire, participants received debriefing forms and were free to leave. In Phase 3 (May), course instructors provided final grades for consenting students at the conclusion of the academic year. In Phase 4, two years later, we obtained average high school grades and cumulative GPAs from institutional records.

Results

Rationale for Analyses

The analytic procedures involved assessing students' use of elaborative learning strategies and then classifying students as either *low* or *high* on this measure on the basis of a median split (see Method), a procedure consistent with recent research on individual differences in elaborative learning (Stark, Mandl, Gruber,

& Renkl, 2002). Thus, the main analyses consisted of an elaborative learning (low, high) by AR (No AR, Writing Assignment AR, or Aptitude Test AR) 2×3 analysis of covariance (ANCOVA) using end-of-year cognition, emotion, and achievement measures as dependent variables. To control for initial differences on the dependent variables between AR treatment conditions (i.e., high school grades, $F(2, 182) = 6.33$, $p < .01$; perceived success in high school, $F(2, 199) = 5.71$, $p < .01$), we included corresponding Phase 1 measures as covariates where available (see Method).

We used high school grades as a covariate for analyses on cumulative GPA, on final-course grades, and on pride to control for the relationship between attributions to high ability after academic success and feelings of pride as outlined in Weiner's (1985, 1995) Attribution Theory. Further, our analyses on cumulative GPA controlled for three additional academic background variables available from institutional records: students' academic year, faculty (arts, science, etc.), and registration status (full-time, part-time). We then used one-tailed, a priori t tests to compare the Writing Assignment AR and Aptitude Test AR conditions to the No AR condition and two-tailed t tests to compare the two AR treatments when significant main effects for AR were observed. Consistent with extensive AR research showing improvements in academic achievement at specific levels of the student difference variable under investigation, we also conducted one-tailed, a priori t tests comparing the two AR conditions with the No AR condition for low and high elaborators separately on the two achievement measures. A more liberal significance level of $p < .10$ was adopted for these contrasts because of the atypical nature of elaborative learning as an individual-difference variable in AR research and the cumulative nature of the GPA (across a broad range of courses) and final grades measures (across various classroom experiences), which could obscure important differential treatment effects.

Correlational Analyses

As presented in Table 1, preliminary analyses revealed a number of significant correlations between variables, likely due to the academic nature of these measures. Of particular importance is the cumulative GPA measure, which was correlated with introductory-psychology grades, high school grades, elaborative learning, and Phase 2 measures of perceived control, perceived success, hope, pride, guilt, and shame: rs = .80, .64, .26, .27, .41, .34, .37, −.21, −.34, respectively.

Main Analyses

The results for cumulative GPA and final course grades are illustrated in Figure 1, Panels A and B, respectively. The F table of main effects and interactions is presented in Table 2.

TABLE 1. Zero-Order Correlations Among Study Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Elaborative learning[a]										
2. Perceived control[b]	.33*									
	(144)									
3. Perceived success[b]	.26*	.22*								
	(147)	(143)								
4. Hope[b]	.33*	.36*	.38*							
	(145)	(141)	(144)							
5. Pride[b]	.25*	.22*	.43*	.47*						
	(148)	(144)	(147)	(145)						
6. Guilt[b]	–.12	–.05	–.34*	–.08	–.36*					
	(147)	(143)	(146)	(146)	(147)					
7. Shame[b]	–.23*	–.19*	–.38*	–.38*	–.51*	.52*				
	(149)	(145)	(148)	(146)	(149)	(148)				
8. Cumulative GPA[c]	.26*	.27*	.41*	.34*	.37*	–.21*	–.34			
	(197)	(143)	(146)	(144)	(147)	(146)	(148)			
9. Final course grade[d]	.18*	.25*	.27*	.39*	.42*	–.17	–.31*	.79*		
	(189)	(136)	(139)	(137)	(140)	(139)	(141)	(188)		
10. High school grade[c]	.19*	.17*	.15	.12	.22*	–.13	–.00	.64*	.60*	
	(184)	(135)	(136)	(134)	(137)	(136)	(138)	(183)	(176)	
M	28.28	62.30	30.96	6.84	5.20	4.00	3.37	2.59	68.37	76.98
SD	6.94	6.56	7.95	1.83	2.00	2.23	2.55	0.87	13.13	8.21

Note. Cell sizes are noted in parentheses and differ as a function of the phase in which the measures were administered. GPA = grade point average.
[a]Phase 1 measure. [b]Phase 2 measure. [c]Phase 4 measure. [d]Phase 3 measure.
*$p < .05$.

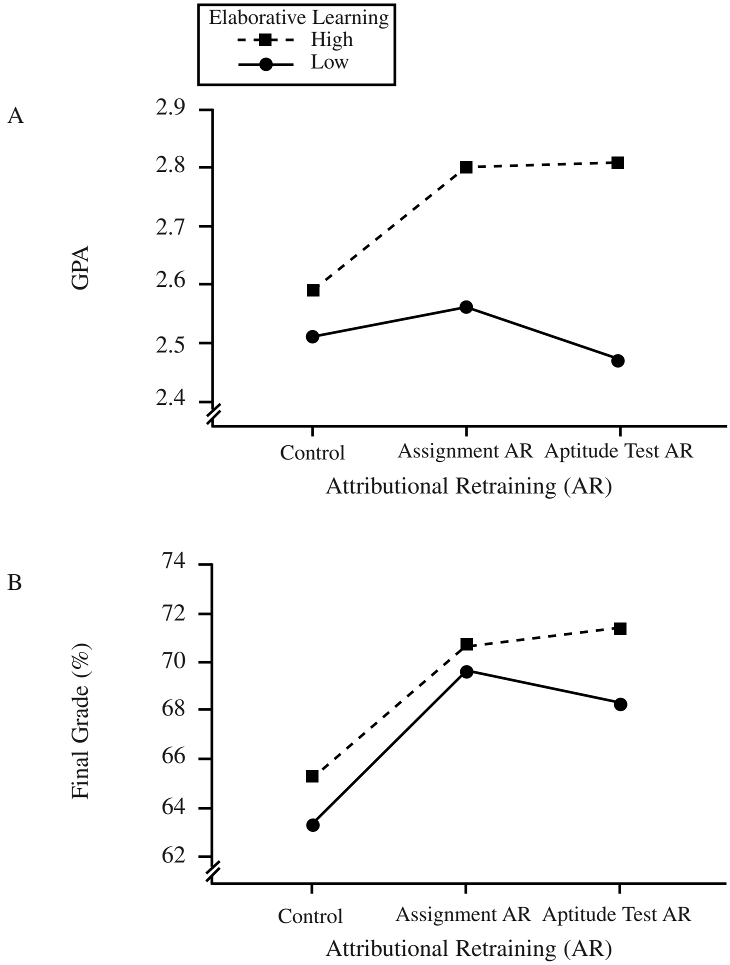

FIGURE 1. GPA (A) and final grade (B) as functions of attributional retraining and elaborative learning. GPA = grade point average.

Cumulative GPA. The elaborative learning main effect on end-of-year cumulative GPA was significant, $F(1, 166) = 4.84$, $p < .05$, $\eta_p^2 = .03$. Results showed that the cumulative GPAs for high elaborators ($M = 2.73$, $SD = .76$) were significantly higher than for low elaborators ($M = 2.51$, $SD = .82$). Although the main effect of AR and a priori contrasts for low elaborators were not significant, a priori comparisons revealed significant improvements in cumulative GPA for high elaborators in the Writing Assignment AR condition ($M = 2.80$, $SD = .80$), $t(114) = 1.33$,

TABLE 2. *F* Table of Main Effects and Interactions

Measure	*MSE*	*df*[a]	Elaborative learning (EL)		Attributional retraining (AR)		EL × AR	
			MS	*F*	*MS*	*F*	*MS*	*F*
P. control	18.46	136	83.50	4.53*	63.62	3.45*	39.34	2.13
P. success	54.43	137	512.54	9.45**	166.97	3.07*	10.50	0.19
Hope	3.12	139	31.89	10.24**	10.77	3.46*	1.87	0.60
Pride	3.75	129	9.32	2.48	2.71	0.72	0.01	0.02
Guilt	4.93	141	8.54	1.73	3.32	0.67	3.21	0.65
Shame	5.94	143	54.16	9.12**	36.17	6.09**	2.04	0.34
GPA	0.40	166	1.92	4.84*	0.25	0.62	0.24	0.59
Final grade	109.11	168	174.98	1.60	590.39	5.41**	15.11	0.14

Note. P. control = perceived control. P. success = perceived success.
[a]Numerator $df = 1$ for all F tests except those for AR and EL × AR (where $df = 2$).
$*p < .05$. $**p < .01$.

$p < .10$; and the Aptitude Test AR condition ($M = 2.81$, $SD = .73$), $t(112) = 1.35$, $p < .10$; relative to controls ($M = 2.59$, $SD = .77$).

Final course grades. The AR main effect on introductory-psychology final course grades was significant. Students in the Writing Assignment AR condition ($M = 70.18\%$, $SD = 13.17\%$) and the Aptitude Test AR condition ($M = 69.85\%$, $SD = 10.27\%$) scored approximately 5% higher than did students in the No AR condition ($M = 64.27\%$, $SD = 15.78\%$), $F(2, 168) = 5.41$, $p < .01$, $\eta_p^2 = .06$. A priori contrasts between the No AR condition and both the Writing Assignment AR condition, $t(115) = 3.05$, $p < .01$, and the Aptitude Test AR condition, $t(110) = 2.82$, $p < .01$, were significant. Parallel a priori contrasts for low and high elaborators separately were also significant at $p < .05$. Thus, both low and high elaborators experienced significant improvements in their final grades in introductory psychology relative to controls after either individualized AR technique. The elaborative learning main effect on final grades did not reach significance, although the results were in the predicted direction: low elaborators, $M = 67.06\%$ ($SD = 12.95\%$); high elaborators, $M = 69.13\%$ ($SD = 12.97\%$).

Perceived control. The AR main effect on end-of-year perceptions of control was significant, $F(2, 136) = 3.45$, $p < .05$, $\eta_p^2 = .05$, with students in both the Writing Assignment AR condition ($M = 63.42$; $SD = 6.76$) and the Aptitude Test AR condition ($M = 62.44$; $SD = 6.01$) reporting greater perceived control than did controls ($M = 61.02$; $SD = 6.96$). A priori contrasts showed that, although perceived control levels did not differ significantly between the two AR treatments, significant improvements relative to controls occurred for students in the Writing Assignment AR condition, $t(91) = 2.68$, $p < .01$. We found a significant elaborative learning main effect on perceived control, $F(1, 136) = 4.53$, $p < .05$, $\eta_p^2 = .03$, in which high elaborators ($M = 63.09$; $SD = 6.05$) reported greater levels of perceived control than did low elaborators ($M = 61.50$; $SD = 6.67$).

Perceived success. The main effect of AR on end-of-year perceived success was also significant, $F(2, 137) = 3.07$, $p = .05$, $\eta_p^2 = .04$, in that students in the Aptitude Test AR condition ($M = 32.89$, $SD = 8.09$) reported higher perceptions of academic success than controls ($M = 29.29$, $SD = 7.77$) and students in the Writing Assignment AR condition ($M = 29.98$, $SD = 7.82$). However, a priori contrasts showed significant improvements for students in the Aptitude Test AR condition relative to controls, $t(92) = 2.36$, $p < .05$, with students in this AR condition also reporting greater perceived success than those in the Writing Assignment AR condition, $t(101) = 2.00$, $p < .05$. A main effect of elaborative learning on perceived success was significant, with high elaborators ($M = 32.66$, $SD = 7.15$) reporting greater levels of success than did low elaborators ($M = 28.79$, $SD = 8.11$), $F(1, 137) = 9.42$, $p < .01$, $\eta_p^2 = .06$.

Academic emotions. Our results showed significant main effects of AR on the end-of-year feelings of hope, $F(2, 139) = 3.46$, $p < .05$, $\eta_p^2 = .05$; and shame, $F(2, 143) = 6.09$, $p < .01$, $\eta_p^2 = .08$. Students in the Writing Assignment AR condition reported greater hope ($M = 7.17$, $SD = 1.65$) and less shame ($M = 3.01$, $SD = 2.39$) than students in the control condition (hope: $M = 6.12$, $SD = 2.14$; shame: $M = 4.51$, $SD = 2.99$), as did students in the Aptitude Test AR condition (hope: $M = 6.92$, $SD = 1.71$; shame: $M = 2.89$, $SD = 2.11$). A priori contrasts showed these improvements relative to controls to be significant for students in the Writing Assignment AR condition for hope, $t(93) = 2.62$, $p < .01$, and shame, $t(95) = 2.26$, $p < .05$; and the Aptitude Test AR condition for hope, $t(89) = 1.91$, $p = .056$, and shame, $t(93) = 2.55$, $p < .05$ (contrasts for shame were based on tests assuming nonequal variance; Levene's test: $F(5, 143) = 3.66$, $p < .01$). Thus, both AR treatments produced effects on two emotions in accordance with Weiner's (1985, 1995) Attribution Theory. That is, AR participants reported greater hope and less shame relative to controls, corresponding to the unstable and controllable attributions encouraged by this intervention. We found no main effects of AR for the academic emotions of guilt or pride.

We also observed significant main effects of elaborative learning on the end-of-year academic emotions of hope, $F(1, 139) = 10.24$, $p < .01$, $\eta_p^2 = .07$; and shame, $F(1, 143) = 9.12$, $p < .01$, $\eta_p^2 = .06$. These results showed that high elaborators reported greater feelings of hope ($M = 7.25$, $SD = 1.64$) and less shame ($M = 2.86$, $SD = 2.40$) than did low elaborators (hope: $M = 6.29$, $SD = 1.94$; shame: $M = 4.08$, $SD = 2.62$). No elaborative learning main effects were found for the academic emotions of guilt and pride.

Discussion

General

An important development in the research literature on AR concerns the efficacy of this intervention in relation to cognitive and psychosocial differences between individuals (Perry et al., in press; Perry et al., 1993). Although the empirical evidence is somewhat mixed (e.g., Struthers & Perry, 1996), it is evident that the effectiveness of AR is moderated by both student characteristics and the manner in which the treatment is administered. Accordingly, recent research on AR has focused on finding appropriate treatment procedures for specific at-risk groups, including students who have experienced failure, have low perceptions of success, have an external locus of control, or have overly optimistic beliefs (Menec et al., 1994; Perry & Penner, 1990; Perry & Struthers, 1994; Ruthig et al., 2004). With investigators having identified a number of individual differences related to the efficacy of attributional retraining, a more basic question remains concerning the induction of the attributional information presented during the training sessions. In the present longitudinal study, we examined this issue in terms of one student difference variable, namely cognitive elaboration, and two AR procedures designed to enhance the consolidation of the videotape presentation.

The present study provides compelling evidence that after the AR presentation, consolidation activities in the form of either a writing assignment or an aptitude test enhance the academic motivation and performance of both high cognitive elaborators and—more important—low cognitive elaborators. Moreover, these results suggest that students may have benefited from the AR intervention by elaborating on the attributional presentation either intrinsically (high elaborators) or with the assistance of individually oriented consolidation exercises (low elaborators). That is, the results showed that individualized AR techniques were effective for both groups of students, leading to substantial improvements in performance (i.e., final course grades for both groups, cumulative GPA for high elaborators), motivation (i.e., perceived control, perceived success), and positive affect (i.e., hope, shame). Specifically, students reported feeling more hopeful, less ashamed, more successful, and more in control concerning their academic performance after the intervention. Especially noteworthy is that students who received AR also obtained significantly higher introductory psychology final course grades (Writing Assignment AR: M = 70.18%; Aptitude Test AR: M = 69.85%) than did those who did not receive AR (M = 64.27%) by approximately 5% or one full letter grade (i.e., from C to C+)!

Thus, the present four-phase study provides strong empirical support for the attributional changes largely assumed to be responsible for the success of AR in the college student population. Weiner (1985, 1995) has suggested that achievement change programs may be effective either through fostering shifts in expectancy (i.e., hope) or through guilt-motivated increases in achievement-striving behavior. The present study supports the former process in that significant theoretically relevant improvements in feelings of hope and shame were found after the AR intervention. According to Weiner's Attribution Theory, such emotion patterns should be expected as the result of increased ascriptions to unstable causes and decreased attributions to uncontrollable causes. Thus, by encouraging both unstable and controllable attributions for academic failure, the AR treatments that we used in the present study allow for improved expectancies for future academic success without increasing the negative affect that may accompany effort-based treatment strategies (Struthers & Perry, 1996; Van Overwalle et al., 1989; Wilson & Linville, 1982; see Perry et al., 1993, for a review of these issues).

The present study also extends the findings of previous AR research concerning the pervasive nature of student difference variables in academic development. We found that similar to students at risk of academic failure because of prior poor performance (Menec et al., 1994), low perceptions of success (Perry & Struthers, 1994), or an external locus of control (Menec et al.; Perry & Penner, 1990), students infrequently using elaborative learning strategies had a significantly less favorable academic profile than their advantaged counterparts.

Specifically, low elaborators reported lower levels of control, success, and hope and greater shame with respect to their academic performance than did high elaborators. Furthermore, although AR led to significantly higher introductory psychology course grades for low elaborators, similar improvements on cumulative GPA were not found for these students. These results suggest that although the AR consolidation exercises facilitated the application of attributional principles in the course from which students were initially recruited, only high-elaboration students successfully applied this information to their other courses.

However, the present study clearly illustrates that elaborative learning does not represent a typical student risk factor, as evidenced by the low correlations between elaboration and the academic achievement measures, the lack of treatment by student group interaction effects, and the significant improvements in motivation and course-specific performance experienced by both low- and high-elaboration students after AR. The finding that low elaborators were also less likely to benefit from the AR treatment in terms of their cumulative 1st-year performance is in direct contrast to previous AR research showing this intervention to be significantly more effective for at-risk students than for non-risk students. Rather, the present results indicate that this variable may best be understood as a salient indicator of which students do or do not require consolidation exercises that facilitate deep processing in order to benefit from the attributional information presented.

Accordingly, although high elaborators experience significant course-specific and overall improvements in performance after AR regardless of the intervention technique that is used, low elaborators respond just as positively—albeit at the course-specific level—to intervention formats that prevent distraction and foster meaningful reflection in either an abstract or concrete fashion (i.e., Writing Assignment AR or Aptitude Test AR, respectively). In this manner, the present findings support considering elaborative learning as an important consolidation process enhancing the integration of AR information for both high elaborators (intrinsically) and low elaborators (through consolidation exercises). Nonetheless, because we did not include a videotape-only AR condition in the present study, on the basis of earlier studies that had shown this treatment technique to be ineffective (Hunter & Perry, 1996; Perry & Struthers, 1994), these explanations should be considered speculative in nature.

Classroom Applications

In AR research investigating appropriate treatment techniques for use in the college classroom, particularly for students infrequently using elaborative learning strategies, consolidation activities that are individualized in nature show considerable promise. These activities allow students to elaborate on the AR message in a meaningful and personal manner and also help to minimize group dynamics such as social comparison (see Tesser & Campbell, 1983) that, in actual intact classrooms, may cause discussion consolidation techniques to be ineffective for some students (Hladkyj et al., 1998; Weiner, Graham, Taylor, & Meyer, 1984). Unlike laboratory settings (Perry & Struthers, 1994; Struthers & Perry, 1996), large college classrooms make it difficult for instructors to adequately monitor the content and direction of group discussions, ensure equal and motivated student participation, and minimize factors such as noise level, unequal group sizes, and gender-heterogeneity within groups (Slavin, 1996).

Thus, the results of the present study parallel the findings of small groups research that has consistently shown that fewer ideas, and ideas that are less unique in nature, are generated by interactive-brainstorming groups than by the same number of individuals working individually (see Paulus, Dugosh, Dzindolet, Coskun, & Putman, 2002, for review). In contrast to the AR format in which investigators attempt to externally regulate an unstructured classroom discussion, individually oriented consolidation techniques require much less instructor supervision, and allow for the attributional information to be sufficiently elaborated on by at-risk students in a structured and efficient manner. In addition, the present study highlights the potential applicability of elaboration training in the college classroom (see Stark et al., 2002, for review) in that, if elaboration is encouraged through explicit instruction, low-elaborating students may benefit from the AR treatment in terms of both course-specific and overall 1st-year performance. Therefore, although the AR induction occurred in a controlled simulated classroom environment, it is suggested that by using alternate consolidation tasks, such as an aptitude test or writing task, and providing pretreatment elaboration training, adverse reactions by low elaborators to this treatment can be prevented in an actual classroom setting.

In sum, the present longitudinal study clarifies previous research concerning the utility of AR for at-risk college students by demonstrating that individualized AR techniques improve students' end-of-year perceptions of control, success, emotions, and academic achievement. The present research also provides empirical support for the critical role played by the underlying processes of attributional change and cognitive elaboration in ensuring the effectiveness of this intervention. In addition, the present results highlight students' use of elaborative learning strategies as an important individual-difference variable in the context of AR research. Thus, the present study suggests that by elaborating on the personal relevance of controllable failure attributions, either intrinsically or through consolidation exercises, college students will feel more optimistic and in control of their performance and, in turn, will experience greater success in their academic career.

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