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REDUCING THE ACADEMIC RISKS OF OVER-OPTIMISM: The Longitudinal Effects of Attributional Retraining on Cognition and Achievement

Tara L. Haynes,*,† Joelle C. Ruthig,* Raymond P. Perry,* Robert H. Stupnisky,* and Nathan C. Hall**

Although optimism is generally regarded as a positive dispositional characteristic, unmitigated optimism can be problematic. The adaptiveness of overly optimistic expectations in novel or unfamiliar settings is questionable because individuals have little relevant experience on which to base such expectations. In this four-phase longitudinal study we examined over-optimism in students when making the transition from a familiar academic setting (high school) to a novel academic setting (college). In particular, we focused on the efficacy of attributional retraining (AR), a control-enhancing intervention, to ameliorate the scholastic transition of overly optimistic students in terms of academic-related causal attributions and control perceptions, course grades, and overall GPAs. Results suggest that overly optimistic college students who did not receive the AR intervention increasingly endorsed maladaptive causal explanations for academic performance, and performed at the same level as students with extremely low optimism. Conversely, as expected, over-optimists who received the AR intervention significantly increased in their use of adaptive causal explanations and perceptions of control, in addition to academically outperforming the no-AR/over-optimists. These findings indicate that the potential risks associated with over-optimism may be reduced by pairing optimism with AR to induce adaptive cognitions, thereby facilitating achievement.

KEY WORDS: perceived control; attributions; college students; optimism; academic achievement.

INTRODUCTION

During difficult times, a positive outlook can often mean the difference between hope and despair. Indeed, in the face of hardship,

*Department of Psychology, The University of Manitoba, Winnipeg, Manitoba, Canada.
**University of California, Irvine, CA, USA.
†Address correspondence to: Tara L. Haynes, Department of Psychology, The University of Manitoba, Winnipeg, Manitoba, R3T 2N2, Canada. E-mail: umhaynes@cc.umanitoba.ca

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optimism can be an important determinant in the decision to either persist or to concede defeat (Peterson, 2000). Such optimism, however, may not always be desirable. Although ample research documents the benefits of positive expectations (Scheier, Carver, and Bridges, 2001), questions remain regarding the adaptiveness of optimistic expectations that do not correspond with objective reality. In a new or unfamiliar situation, for example, where expectations are not based on past experience, highly positive expectations may be illusory and thus, less likely to be achieved. As such, given unfamiliar circumstances, the adaptiveness of unmitigated positive expectations becomes questionable.

Consider a bright student who completed high school with minimal effort, encountered few serious academic challenges, and consequently, has high expectations for future academic success. Upon entering college, the student is faced with new and unfamiliar academic challenges (see Perry, Hladkyj, Pekrun, and Pelletier, 2001). In this setting, the adaptiveness of the student's highly optimistic expectations may largely depend on his or her accompanying cognitions, in particular, underlying causal attributions and perceptions of control. The current study examined the adaptiveness of optimism within the context of the "first year experience" as characterized by the transition from a familiar to a novel academic setting (i.e., high school to college).

Dispositional Optimism

Conceptualized as a stable individual difference, dispositional optimism is a general expectation that good things will happen (Scheier and Carver, 1987). This construct is grounded in common folk wisdom in which optimists are construed as individuals who view life through "rose-colored glasses" (Isaacowitz, 2005) and possess a "glass half full" mentality. Optimism has received widespread attention among social and health psychologists, and the voluminous literature connecting dispositional traits and quality of life indicates that optimism enhances both physical and psychological well-being (for a review see Scheier, Matthews, Owens, Magovern, Lebfevre, Abbott et al., 1989). Research has repeatedly demonstrated the association of optimism with positive outcomes such as enhanced self-esteem (Dunn, 1996), better physical health (Scheier and Carver, 1987), faster recovery from compromised health (Scheier et al., 1989), and reduced depression (Marshal and Lang, 1990).

In addition to enjoying better health and well-being, optimists tend to be highly confident in their capacity to succeed, and thus are typically quite persistent in striving to attain their desired goals (Peterson, 2000).

Optimism's associations with motivation and performance outcomes have been demonstrated in several achievement-related contexts such as athletic and academic domains (Chemers, Hu, and Garcia, 2001; Gould, Dieffenbach, and Moffett, 2002). As such, highly optimistic individuals tend to exhibit greater motivation and persistence, in addition to experiencing better health and well-being.

Although there are many benefits associated with an optimistic outlook, the literature also documents potential costs of optimism, particularly in situations where optimistic expectations do not correspond with objective reality. Gibson and Sanbonmatsu (2004), for example, demonstrated the negative effects of optimism within the context of gambling. Following a series of gambling losses, highly optimistic gamblers were more likely to maintain expectations of future success than were less optimistic gamblers. As a consequence, highly optimistic gamblers did not reduce their betting after poor gaming performance. Other research demonstrates the role of optimism as an inhibitor of adaptive actions. For example, Weinstein and Lyon (1999) showed that high optimism can act as a barrier to precautionary behaviors in a study of 1345 homeowners living in an area of high radon risk. Those homeowners with high optimism tended to underestimate their personal health risks, and consequently were less likely to purchase radon test kits. Thus, while optimism offers many potential advantages, situations exist in which its adaptiveness becomes questionable. In addition to the preceding examples, situations that are novel or unfamiliar represent a unique challenge in that highly optimistic expectations are not based on actual experience in the relevant domain.

Perry et al. (2001) suggest that the transition from high school into college is a situation in which students' expectations may not be based on relevant academic experience. In particular, the academic demands of college are vastly different from those of high school. Unanticipated challenges associated with the first year experience include unfamiliar academic tasks, heightened competition, a new physical environment, new social networks, and financial strain, all of which may contribute to unexpected academic failure (Perry, 2003). One striking difference between high school and college is the increased demand for student autonomy and personal responsibility. Perry et al. refer to this situation as a *paradox of failure* in which bright high school students have difficulty adjusting to the increased demand for autonomy in the college setting. As such, students who base their optimistic expectations on former high school experiences, believing that "college is just like high school" may be at-risk for unfulfilled expectations, unpreparedness, and subsequent academic failure.

Although students admitted to college are among the brightest high school graduates, approximately 27% will not complete the first year of college (Geraghty, 1996). Given their superior performance in high school, some college students come to expect high performance in all academic settings. As such, these students may not feel the need to study, seek instructors' help, take notes, or regularly attend class. These overly positive expectations during the first year of college can have serious repercussions for students' subsequent academic development, as shown in a recent study by Ruthig, Perry, Hall, and Hladkyj (2004). Highly optimistic first-year college students performed significantly worse than their low-optimistic counterparts in terms of cumulative grade point average (GPA) and course attrition. These findings suggest that optimism can be problematic for students in the transition from high school to college.

Reducing the Risk of Over-Optimism: Attributional Retraining

It is possible that college students can be overly optimistic if their academic expectations are based primarily on prior high school experience. College places new academic demands on students in a variety of ways, making the adaptiveness of such highly optimistic expectations among college students questionable when associated with certain patterns of cognitions. From the perspective of attribution theory (Weiner, 1985, 1995), optimism may be problematic if it is based on external factors that are beyond the control of the student, such as course difficulty or instructor quality. Consider the differential effect of basing optimistic academic expectations on instructor quality or course difficulty vs. an internal, controllable factor such as effort. Optimism based on the former external, uncontrollable factors are less likely to be fulfilled than the latter internal, controllable factor (Weiner, 1985, 1995). Students who attribute academic success to such things as "this teacher is an easy grader" or "this course is a breeze" are less likely to be motivated to engage in proactive learning behaviors such as regularly attending class, studying, or seeking instructor assistance. In comparison, college students who attribute success to their own effort, a key motivational factor in academic learning (Bures, Abrami, and Amundsen, 2000; Pascarella and Terenzini, 1991) are more likely to engage in such proactive behaviors. As such, optimistic expectations that are largely based on external, uncontrollable factors can be problematic in academic settings (Weiner, 1985, 1995), particularly during the first year experience which embodies the transition from high school to college.

Ruthig et al. (2004) attempted to address the potential negative effects of optimism among first-year college students by providing highly optimistic students with Attributional Retraining (AR). AR is a cognitive intervention based on Weiner's (1985, 1995) attribution theory and is designed to change maladaptive attributions for poor performance to more adaptive ones (Perry, Hall, and Ruthig, 2005). By encouraging students to attribute poor academic performance to controllable factors (such as effort and strategy) instead of external, uncontrollable factors (such as test difficulty or instructor quality), AR enhances achievement motivation which in turn improves academic performance (Hall, Perry, Ruthig, Hladkyj, and Chipperfield, in press (b); Perry, Hechter, Menec, and Weinberg, 1993). Ruthig et al.'s AR intervention produced an expected and consistent pattern of results across three indicators of academic performance. Specifically, highly optimistic first-year college students who received AR attained significantly higher GPAs, dropped fewer courses, and experienced less test anxiety compared to high optimists who did not receive AR. Ruthig et al. suggested that their results were due to increased use of internal, controllable attributions among high optimists who received AR, however these assumed attributional changes were not directly assessed.

Ample research empirically demonstrates that attributional retraining enhances college students' academic performance. Early work by Wilson and Linville (1982) showed that administering AR resulted in better GRE scores and GPAs among first-year college students. This classic study set the stage for additional AR research in which Van Overwalle and De Metsenaere (1990) and Van Overwalle, Segebarth, and Goldchstein (1989) administered AR to college students. Their AR treatment emphasized *controllable* achievement-striving behaviors as producing academic success and showed that AR students outperformed no-AR students on final exams. In several studies, Perry et al. demonstrated that college students who received AR performed better than a no-treatment group on achievement tests (Menec et al., 1994; Perry and Penner, 1990) and on final introductory psychology course grades (e.g., Hall, Hladkyj, Perry, and Ruthig, 2004; Hall, Perry, Chipperfield, Clifton, and Haynes, in press (a); Struthers and Perry, 1996). Aside from benefits within academic contexts, AR has also been found to be effective in health and aging (Weinberg, 2001), group counseling (Green-Emrich and Altmaier, 1991), athletic achievement (Miserandino, 1998), and job satisfaction (Curtis, 1992). Despite the widespread application of AR interventions, there has been limited documentation regarding the cognitive mechanisms of change underlying AR in terms of attributions and perceptions of control (for a review see Perry et al., 1993).

Examining the Effects of AR on Over-Optimists' Cognitions and Achievement

The first objective of the current study was to directly test the cognitive changes presumed to result from AR. Generally, AR is designed to: (a) decrease the use of uncontrollable attributions; (b) increase the use of controllable attributions; and/or (c) increase overall perceptions of control (Perry et al., 2005). In order to examine these potential cognitive changes, academic attributions and perceptions of control were measured at two separate points in the academic year: just prior to the AR intervention (early first semester) and three months following the AR intervention (second semester). This pre–post design enabled us to determine whether the AR intervention was associated with changes in cognitions (e.g., attributions and perceived control). Based on the premise that AR should be especially effective for over-optimists (Ruthig et al., 2004), we expected that AR would reduce over-optimists' emphasis on external, uncontrollable attributions (i.e., attributions concerning the academic environment), increase the emphasis on internal, controllable (effort) attributions. Conversely, no such cognitive changes were expected among over-optimists who did not receive AR.

Although the particular focus of the current study was the efficacy of AR among overly optimistic college students, low optimism students were included as a comparison group. Research demonstrates that low levels of optimism are associated with relatively poor academic outcomes (El-Anzi, 2005; Lee, Ashford, and Jamieson, 1993; Pajares, 2001). In addition, given the general tendency for low optimism to be detrimental to motivation (Peterson, 2000), we were interested in the performance of over-optimists relative to the performance of the low-optimism risk group. However, while AR was predicted to be effective for over-optimists in terms of cognition and achievement, we did not expect this finding to generalize to low-optimists. That is, due to the negative nature of extremely low optimism, we did not expect AR to be effective among low optimists.

The second objective of the current study was to replicate and extend Ruthig et al.'s (2004) pattern of findings concerning the interaction effects of AR and optimism on academic performance. We built upon Ruthig et al.'s Attributional Retraining (no-AR, AR) by Optimism (low, high) 2×2 ANCOVA design in two important ways. The first modification in the current study focused on the distinction between high optimism and *over*-optimism. In particular, we wanted to identify students whose high levels of optimism did not correspond to actual successful academic experience in college (i.e., *over*-optimists). Therefore, we first

assessed students' perceptions of academic success and focused our analysis on those students who had relatively low perceptions of success *in combination with* extremely high levels of optimism. Among low-perceived-success college students, high levels of optimism (i.e., expectations that good things will happen) are problematic because they are not based on past success.

Student perceptions of success are generally associated with various objective indicators of academic performance (Perry and Struthers, 1994). For example Hall et al. (in press (b)) found college students' perceptions of success and their final grades in Introductory Psychology to be highly correlated ($r = .78$), suggesting that students with relatively low perceived success indeed perform poorly in comparison to students with higher perceived success. As such, the adaptiveness of low perceptions of success combined with highly optimistic expectations may be questionable.

The second modification to Ruthig et al.'s (2004) design was the way in which college students were classified as low or high optimists. Specifically, Ruthig et al. used a simple median split procedure to separate low from high optimists. To more clearly differentiate these groups, we employed an extreme split procedure. That is, we first identified the low perceived success students, and then we distinguished between low and over-optimists by selecting only those students with extremely low optimism scores (i.e., the bottom third of the distribution) and extremely high optimism scores (i.e., the top third of the distribution; see Rationale for Analysis). Thus, for the purposes of our study, over-optimists were defined as students with the combination of low perceived success and extremely high optimism. In accordance with our first prediction regarding the cognitive benefits of AR among over-optimists, it was expected that these students would also academically outperform their no-AR counterparts in terms of achieving significantly higher final Introductory Psychology course grades and overall GPAs.

METHOD

Participants

The participants in our study were college students at a Research-1 Canadian university who were recruited from several sections of a two-semester Introductory Psychology course and who were taking part in a larger longitudinal study ($N = 1093$) of first-year students' college experiences. Only participants from the larger study who fit the following criteria, assessed early in the academic year, were selected for the

current study: students who scored seven or below ($n = 231$) on a perceived success measure (see below); and students who scored in either the bottom third ($n = 80$) or top third ($n = 82$) of the optimism scale (see Rationale for Analysis). Of the participants who fit this criterion ($n = 162$), 109 were female, 47 were male, and 6 did not indicate their gender.

Procedure

The current study consisted of four phases spanning the academic year 2001–2002. *Phase 1* involved the administration of a questionnaire about one month into the academic year, after students received feedback on their first Introductory Psychology test. The questionnaire, administered to groups of 15–60 students, contained measures of perceived success, dispositional optimism, perceived control, and academic attributions. In *Phase 2*, an AR intervention was administered to approximately half of the participants ($N = 70$) immediately following completion of the questionnaire. *Phase 3* took place near the end of the academic year and involved a second questionnaire that re-assessed students' perceptions of control and academic attributions. In *Phase 4*, at the end of the academic year, students' grades in their Introductory Psychology course were obtained directly from their instructors with consent and students' overall GPAs were provided by institutional records.

Independent Measures

Perceived Success

A single-item measure was used to assess students' perceptions of success: "How successful do you feel you are in your Introductory Psychology course so far this year?" with responses ranging from 1 (*very unsuccessful*) through 10 (*very successful*). For the purposes of the current study, only those students who rated themselves as 7 or below on the perceived success scale were retained for analysis (see Rationale for Analysis). Low perceived success: $n = 231$; $M = 4.05$, $SD = 2.15$, range 1–7; High perceived success: $n = 77$; $M = 8.57$, $SD = 0.80$, range = 8–10. Past research with this single perceived success item has demonstrated a high degree of construct validity in terms of a strong association between student ratings of perceived success and actual academic achievement (see Hall et al., in press (b); Perry and Struthers, 1994) suggesting that students with low perceived success ratings perform poorly relative to students with high perceived success ratings.

Dispositional Optimism

Participants completed Scheier and Carver's (1985) 8-item Life Orientation Test (LOT) which is a well-established and widely-used measure of dispositional optimism (e.g., Chang, 1998; Roysamb and Strype, 2002). Four of the items are positively phrased (e.g., "In uncertain times I usually expect the best") and four items are negatively phrased (e.g., "I hardly ever expect things to go my way"), with responses ranging from 1 (*strongly disagree*) through 5 (*strongly agree*). Responses to the negatively phrased items were reverse-coded and all item scores were summed to produce a total optimism score ($M = 26.00$, $SD = 5.60$). After selecting the low-perceived-success students our aim was to clearly distinguish between low and high optimists, only those participants who scored in the upper and lower thirds of the optimism distribution were included in subsequent analyses. Low-optimism group: $n = 80$, $M = 20.57$, $SD = 3.65$; over-optimism group: $n = 82$; $M = 32.01$, $SD = 2.75$; $t(160) = 22.52$, $p < .001$.

Attributional Retraining (AR)

Participants were assigned to either the AR ($n = 70$; low optimists: $n = 35$; over-optimists: $n = 35$) or no-AR condition ($n = 92$; low optimists: $n = 45$; over-optimists: $n = 47$). In the laboratory, the implementation of attributional retraining includes five sequential components. The first two components, consisting of *pre-testing* and *causal search activation*, are designed to prompt thoughts about academic performance and causal attributions for academic performance. In the current study these two components were captured in Phase 1 (see Procedure). The third and fourth components of AR, *induction* and *consolidation*, take place immediately following the causal search activation component and are considered to be the treatment portion of the intervention. In the current study, AR *induction* began with a handout containing two lists of possible attributions for poor academic performance. One list contained examples of external, uncontrollable, maladaptive attributions (e.g., "I failed the test because it was too difficult") and the other list contained examples of controllable, adaptive attributions (e.g., "I failed the test because I did not study enough"). The experimenter explained the handout to the participants and cited an example of changing an external, uncontrollable attribution (e.g., test difficulty or teacher quality) to an internal, controllable attribution (e.g., low effort).

AR induction was directly followed by the AR *consolidation* component designed to solidify the attributional information. In the consolidation phase of the current study, participants were asked to read the

handout carefully and complete a four-item written exercise that involved summarizing the main points of the handout, listing reasons why students perform poorly, and describing how information in the handout applies to their own academic experiences. Based on previous AR research (Perry and Penner, 1990; Perry and Struthers, 1994), no filler treatment session was given to the no-AR participants. The fifth and final component of AR consists of a self-report questionnaire designed to reassess academic attributions (in addition to several other academic perceptions). In the current study, this *follow-up* component was captured in Phase 3 (see Procedure).

High School Average Grade

Used as a covariate in the current analyses, high school graduating percentages were computed by averaging students' final percentages in each of the college entrance requirements (i.e., English, mathematics, chemistry, and physics) as recorded on their high school transcripts. This measure of students' actual high school average is a highly reliable and objective indication of students' past academic performance ($M = 74.90$, $SD = 9.31$; range = 52–97%) and was obtained from institutional records.

Dependent Measures

Perceived Control

Students' perceptions of control were assessed in Phases 1 and 3, based on their responses to seven items (e.g., "Much of what has happened in my life so far is my own doing") ranging from 1 (*strongly disagree*) through 5 (*strongly agree*). Four of the items were positively phrased, and the remaining three negatively phrased items were reverse-coded such that all items could be summed to produce an overall rating of perceived control with higher scores indicating greater perceived control (Phase 1: $M = 25.46$, $SD = 3.96$; Phase 3: $M = 25.44$, $SD = 4.04$). The internal consistency of the perceived control scale was calculated based on the full study sample ($N = 231$): Phase 1 Cronbach's $\alpha = .69$; Phase 3 Cronbach's $\alpha = .75$; test–retest reliability = .67.

Academic Attributions

Five different academic attributions were assessed in Phases 1 and 3. Students responded to the following item "When you perform POORLY

in your Introductory Psychology course, to what extent do the following contribute to your performance?" Because of our particular interest in over-optimist's external, uncontrollable attributions, we included attributions of *test difficulty* and *quality of teaching*. Conversely, *effort* was included to represent internal, controllable attributions. Finally, because first-year college students generate a variety of attributions for their performance (Van Overwalle, 1989), *natural ability* and *luck* were included to represent additional uncontrollable attributions. Responses were recorded on a scale ranging from 1 (*not at all*) through 10 (*very much so*), with higher scores indicating greater endorsement of that specific attribution as a cause of POOR academic performance.

Final Percentage

Final percentage refers to students' final course grade in Introductory Psychology which represents an aggregate of tests, assignments, essays, and exams as administered by course instructors. Final percentages were obtained with students' permission from course instructors at the end of the academic year and ranged from 33.61 to 98.90% ($M = 69.91$, $SD = 13.25$).

Grade Point Average (GPA)

With ethical permission, students' GPA was obtained directly from institutional records and represents an average of the final grades for all second semester courses in which students were enrolled. Thus, GPA represents an aggregate of students' academic achievement across all courses in the second term. The GPA scale is as follows: 4.5 = A+, 4.0 = A, 3.5 = B+, etc. For the present sample GPA ranged from 0.29 to 4.38 ($M = 2.58$, $SD = 0.91$).

RESULTS

Rationale for Analysis

The focus of the current study was on overly optimistic students who were defined as having relatively low perceived success accompanied with extremely high optimism. The low-perceived-success group was identified prior to the main analysis by selecting students who scored 7 or less on the 10-point perceived success measure. This cutoff of 7 on the perceived success measure was selected for two reasons. From a conceptual standpoint, within an academic context a rating of 7 on a

1-to-10 scale may be seen as roughly analogous to 70% in terms of academic performance and equivalent to a C+ at this institution. In addition, the average rating for this group ($M = 4.05$) converts to a 40.50% and a letter grade equivalent to F. Given that college students are typically among the top performing high school graduates, this rating of 7 may be considered a low level of success.

We tested this assumption by computing the correlation between students' perceived success and their first Introductory Psychology test scores. The strong association between perceived success and the first Introductory Psychology test performance ($r = .72$, $p < .001$) suggests that students who report feeling less successful are actually performing less well than students who rate themselves at the top end of the perceived success scale (i.e., 8–10). As such, students scoring 7 or below on the 1–10 perceived success scale were selected as "relatively-low-perceived-success" students. From a statistical standpoint, the cutoff score of 7 on the perceived success measure also allowed for the retention of a reasonable sample size ($N = 231$), which would have been significantly reduced had we instead selected a cutoff score of 6 ($N = 186$) or 5 ($N = 160$).

The next step in identifying overly optimistic students was to clearly distinguish low from high optimists among the pre-selected low-perceived-success students. We performed an extreme split based on the distribution of optimism scores and selected students who scored either in the bottom or top third of the distribution. Thus, all low-perceived-success students were divided into low optimists ($n = 80$, $M = 20.57$, $SD = 3.65$) and over-optimists ($n = 82$, $M = 32.01$, $SD = 2.75$). This extreme split procedure was used in order to clearly distinguish over-optimists, the group of interest in this study, from low optimists, an important comparison group for evaluating the relative risks associated with over-optimism.

As in previous research (e.g., Perry et al., 2001; Ruthig et al., 2004), students' overall high school average was included as a covariate in the main analyses to statistically control for potential differences in aptitude and possible confounding effects on the achievement-related dependent measures.

Preliminary Analyses

Correlations

See Table 1 for all bivariate correlations. As expected, perceived success was positively associated with high school average ($r = .25$, $p < .01$), final percentage ($r = .46$, $p < .01$), and GPA ($r = .37$, $p < .01$). These associations support our assertion that students with lower

TABLE 1. Correlations Among Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Optimism	–										
2. Perceived success	.23**	–									
3. High school average	.07	.25**	–								
4. Final percentage	.06	.46**	.51**	–							
5. GPA	.12*	.37**	.56**	.80**	–						
6. Test difficulty Att.	−.05	−.02	.18**	.20*	.25**	–					
7. Teaching quality Att.	−.08	−.04	.02	−.02	.01	.29**	–				
8. Ability Att.	−.17**	.05	−.01	.03	.02	.21**	.23**	–			
9. Luck Att.	−.25**	−.13*	−.08	−.08	−.12*	.15**	.07	.21**	–		
10. Effort Att.	.08	.18**	.12*	.06	−.01	.13*	.23**	−.01	−.11*	–	
11. Perceived control	.27**	.04	−.13*	−.03	−.03	−.09	.00	−.14**	−.23**	.12*	–

Note: Variables 7–11 as measured in Phase 1; Att = causal attribution.
*$p<.05$, **$p<.01$.

perceptions of success are objectively performing at lower levels relative to students with greater perceptions of success.

Baseline Comparisons

In order to ensure that pre-existing differences in attributions and perceptions of control did not confound the effects of attributional retraining, independent samples *t*-tests were initially conducted to compare over-optimists who received AR to over-optimists who did not receive AR prior to the treatment intervention. No significant differences were found on any of the initial (i.e., pre-AR) attributions or perceived control: ability, $t(80) = 1.62$, *ns*; luck $t(80) = 0.13$, *ns*; test difficulty $t(80) = 0.06$, *ns*; teacher quality $t(80) = 0.44$, *ns*; effort $t(80) = 0.86$, *ns*; and perceived control $t(79) = 0.41$, *ns*.

Main Analyses

AR Treatment Effects on Cognitions

Our first objective was to directly test the effects of AR on students' cognitions (attributions and perceptions of control). Paired-samples

t-tests were used to examine pre- to post-AR changes in uncontrollable attributions (test difficulty, teacher quality, luck, and ability), controllable attributions (effort), and overall perceptions of control. This design allowed for the examination of cognitive patterns among all students who received AR (low optimists and over-optimists), as well as those who did not receive AR.

As expected, for low optimists who did not receive AR, no cognitive changes were found between Phases 1 and 3: all attributions (uncontrollable and controllable) and overall perceived control remained stable (see Table 2). Among low optimists who *did* receive AR, the use of the controllable attribution (effort) increased following the AR intervention (Ms = 6.71 vs. 7.93, $t(28) = 2.73$, $p < .05$), but their level of overall perceived control was unaffected by AR (see Table 2). In addition, all uncontrollable attributions remained unchanged from Phases 1 to 3 for low optimists who received AR.

In accordance with our predictions, a notably different pattern of results emerged for over-optimists. Among over-optimists who *did not* receive AR, use of two external, uncontrollable attributions increased

TABLE 2. Pre- and Post-AR Comparisons of Over-Optimists' and Low Optimists' Cognitions

	No-AR Group			AR Group		
	Phase 1 *M*	Phase 3 *M*	*t*	Phase 1 *M*	Phase 3 *M*	*t*
Low optimists						
Attributions						
Test difficulty	6.28	6.45	0.42	6.32	6.36	0.10
Teaching quality	6.05	6.60	1.46	5.32	5.39	0.12
Ability	4.13	4.30	0.47	4.86	5.61	1.17
Luck	4.08	4.14	0.16	4.31	4.85	1.10
Effort	6.98	7.23	0.56	6.71	7.93	2.73*
Perceived control	23.77	22.82	1.73	24.34	24.15	0.27
Over-optimists						
Attributions						
Test difficulty	6.43	7.19	2.06*	6.32	5.65	1.67
Teaching quality	5.24	6.95	3.96**	4.90	4.29	1.22
Ability	3.62	4.16	1.29	4.13	3.97	0.35
Luck	3.16	3.49	0.83	3.10	2.68	1.16
Effort	7.00	7.51	1.24	6.65	8.10	2.90**
Perceived control	26.97	26.85	0.25	26.70	27.93	2.16*

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

from Phase 1 to 3 (see Table 2): test difficulty Ms = 6.43 vs. 7.19, $t(37) = 2.06$, $p < .05$; and teacher quality Ms = 5.24 vs. 6.95, $t(37) = 3.96$, $p < .001$. Such an increase would be counterproductive to students' motivation levels and could contribute to weaker achievement performance. In addition, use of the controllable attribution (effort) and overall perceptions of control remained unchanged from Phase 1 to 3 (Ms = 7.00 vs. 7.51; 26.97 vs. 26.85 respectively). Conversely, among over-optimists who *did* receive AR, use of the controllable attribution (effort) and overall perceptions of control significantly increased from Phase 1 to 3 following the AR intervention: effort attribution Ms = 6.65 vs. 8.10, $t(31) = 2.90$, $p < .01$; perceived control Ms = 26.70 vs. 27.93, $t(31) = 2.16$, $p < .05$. Moreover, use of all four uncontrollable attributions decreased from Phase 1 to 3 (see Table 2), though not significantly so.

These results provide support for the assumed cognitive changes resulting from AR, as evident in two findings: the increased endorsement of controllable attributions (effort) among *all* students who received AR (low and over-optimists), and the increased level of perceived control among over-optimists. Results also support our contention that over-optimism may operate as an academic risk factor in that over-optimists who *did not* receive AR increasingly attributed their academic performance to maladaptive (external, uncontrollable) factors. Indeed, this maladaptive pattern emerged only among over-optimists, suggesting that these students may be at an even greater academic risk than their low-optimism counterparts. However, results indicate that AR may ameliorate the potential academic risks associated with over-optimism as evident in the substantial cognitive changes among over-optimists following the AR intervention.

AR Treatment Effects on Achievement

To examine the impact of AR on students' academic achievement, separate Attributional Retraining (no-AR, AR) by Optimism (low optimism, over-optimism) 2×2 ANCOVAs (with high school average as the covariate) were computed for final Introductory Psychology percentage and second semester GPA (see Table 3).

A main effect was found for AR on final Introductory Psychology percentage: students who received AR had significantly higher final course percentages than students who did not receive AR (Ms = 74.33% vs. 67.47%), $F(1, 131) = 14.23$, $p < .001$, $\eta^2 = .10$. This 7% difference in final Introductory Psychology course percentage represents a substantial gain for students, translating into the difference between a B

TABLE 3. Main and Interaction Effects of Optimism and Attributional Retraining (AR) on Final Introductory Psychology Percentage and GPA

	Final Psychology Percentage				Grade Point Average (GPA)			
Variable	*df*[a]	*M*s	*F*	η^2	*df*[a]	*M*s	*F*	η^2
High school grade	131	7796.01	72.59**	.36	130	39.53	69.97**	.35
AR	131	1528.24	14.23**	.10	130	3.62	6.41*	.05
Optimism	131	250.23	2.33	.02	130	1.83	3.25	.02
AR × Optimism	131	442.82	4.12*	.03	130	2.48	4.39*	.03
Error	131	107.39			130	0.56		

Note: [a]Numerator $df = 1$ for all F tests.
*$p<.05$, **$p<.001$.

and a C+. Thus, the AR intervention had an impact on academic achievement that was both statistically and academically meaningful.

The AR main effect was qualified by a significant AR × Optimism interaction on final Introductory Psychology percentage: $F(1, 131) = 4.12$, $p<.05$, $\eta^2 = .03$. Subsequent t-tests revealed that over-optimists who received AR ($M = 77.56\%$) significantly outperformed the other three groups in their Psychology course performance: over-optimism/no-AR ($M = 67.01\%$), $t(68) = 3.32$, $p < .01$; low optimism/AR ($M = 71.10\%$), $t(54) = 1.92$, $p = .05$; low optimism/no-AR ($M = 67.94\%$), $t(66) = 3.42$, $p<.01$ (see Fig. 1). The 10% difference between over-optimists who received AR and those who did not receive AR is particularly compelling as it maps onto the observed cognitive changes and approximates the difference between a B and a C+ in final grades in the course. As expected, this disparity in grades was not observed among the low optimists: AR = 71.10%; no-AR = 67.94%. Of note is the finding that over-optimists who did not receive AR had comparable course grades to the low optimists (67.01%), thereby underscoring the inherent risk associated with over-optimism.

For GPA, a main effect was again found for AR: students who received AR achieved significantly higher GPAs than students who did not receive AR (*M*s = 2.73 vs. 2.39), $F(1, 130) = 6.41$, $p < .05$, $\eta^2 = .05$. Again, the AR treatment effect was both statistically and academically meaningful, and was further qualified by an interaction between AR and optimism: $F(1, 130) = 4.39$, $p < .05$, $\eta^2 = .03$. Subsequent t-tests revealed a pattern of results similar to those of final Introductory Psychology percentage above: Over-optimists who received AR ($M = 2.98$) had significantly higher GPAs than the other three groups: over-optimism/

no-AR ($M = 2.37$), $t(67) = 2.84$, $p < .01$; low optimism/AR ($M = 2.47$), $t(55) = 1.98$, $p = .05$; low optimism/no-AR ($M = 2.41$), $t(65) = 2.95$, $p < .01$ (see Fig. 2). Again, no differences were found between the low optimists who received AR and their no-AR counterparts. In addition the no-AR over-optimists' academic performance was statistically identical to that of the two low-optimism groups.

As expected, no systematic achievement differences were found between low-optimists who received AR and their no-AR counterparts. Moreover, over-optimists who *did not* receive AR performed at the same level as the low optimists (AR and no-AR), with all three groups receiving final Introductory Psychology percentages and GPAs approximately equivalent to C+. Meanwhile, the over-optimists who received AR outperformed all three groups, earning final Introductory Psychology percentages and GPAs that were approximately an entire letter grade higher (e.g., B). This overall pattern of achievement compliments the preceding cognitive effects of AR. That is, the (relatively) high performance of over-optimists who received AR is logical, given that they were the only group who experienced favourable increases in both effort attributions and control perceptions.

DISCUSSION

A perplexing debate that continues to intrigue researchers involves the benefits vs. the liabilities of optimism. Based on the premise that the adaptiveness of high optimism can be questionable in unfamiliar settings, the current study examined the transition from high school to college as a situation embodying adjustment to a novel academic setting. Our study supports this premise in that high levels of optimism *were* problematic in terms of academic-related cognitions and achievement. Fortunately, providing overly optimistic college students with an AR intervention enhanced their use of adaptive cognitions (effort attributions and perceptions of control), and positively affected their academic achievement (final Introductory Psychology percentages and overall GPAs). The positive impact of AR on overly optimistic college students' cognitions and achievement and its practical implications are subsequently discussed.

AR and Cognitive Changes

Consistent with the expectation that AR would enhance adaptive attributions and perceived control, all students who received the AR treatment (low and over-optimists alike) increasingly attributed

academic performance to a controllable cause (effort). The effects of AR were particularly pronounced among over-optimists who not only increased their use of effort attributions, but also increased in their overall perceived control. Moreover, over-optimists also decreased in their use of all four uncontrollable attributions (though not significantly so). These findings provide evidence that AR operates in the intended manner: by encouraging controllable attributions, increasing perceived control, and discouraging uncontrollable attributions.

Aside from empirically supporting the assumed underlying cognitive mechanisms of AR, our findings also support the premise that over-optimism may be an academic risk factor if it is not addressed early on. That is, overly optimistic college students who did not receive AR increasingly attributed their academic performance to causes *beyond their personal control*, placing them at greater risk of future low motivation, poor academic performance, and academic attrition (Perry et al., 2005; Ruthig et al., 2004). Notably, this maladaptive pattern of cognitive change (i.e., increased use of uncontrollable attributions) was not replicated among low optimists. Thus, given a novel academic setting, over-optimism could potentially be more detrimental than low optimism.

In conjunction with demonstrating the risks associated with over-optimism, the current findings offer a solution to the potential problem of over-optimism in the form of attributional retraining (AR). AR was particularly effective among overly optimistic college students in terms of emphasizing the controllable aspects of academic performance. That is, AR informs students that their own efforts and hard work are necessary to ensure their expectations become a reality.

AR and Achievement Outcomes

Not only did AR enhance adaptive cognitions among overly optimistic college students, it also facilitated academic achievement. Specifically, over-optimists who received AR significantly outperformed all other groups both in terms of final percentages in the Introductory Psychology course and in overall GPAs. It may be that the cognitive changes produced by AR (increases in effort attributions and perceptions of control) translated into actual achievement gains. That is, by emphasizing the controllable aspects of academic performance, AR promotes the idea that students are instrumental in ensuring that their optimistic expectations are fulfilled. As students begin to attribute academic performance to controllable causes they begin to feel more responsible for their academic outcomes (Weiner, 1985, 1995). In turn, students' behavior is modified such that they become more likely to attend class, take notes, study for

exams, etc. Students who develop and maintain these proactive academic behaviors are more likely to have successful academic outcomes than are students who do not develop these behaviors (Perry et al., 2005).

In contrast, over-optimists who did not receive AR performed no better than low optimists in terms of both final Introductory Psychology course percentages and overall GPAs (see Figs. 1 and 2). This finding is consistent with the maladaptive pattern of cognitive change among the no-AR/over-optimists. Recall that the no-AR/over-optimists increasingly attributed academic performance to external, uncontrollable academic attributions (e.g., "this is an easy course"). As students come to believe that academic performance is beyond their control they typically feel less personal responsibility for failure, suffer decreases in motivation, and may even begin to feel helpless (Abramson, Garber, and Seligman, 1980). As such, this cognitive pattern is not likely to be associated with proactive academic behaviors such as attending class, asking questions, and preparing for tests (Weiner, 1985, 1995). In turn, this lack of active engagement in the academic environment typically results in poor academic performance and/or program incompletion. Combined with the attributional patterns discussed above, the achievement-related results among the no-AR/over-optimists reinforce the premise that over-optimists may be at-risk in the transition from high school to college.

As expected, AR did not affect low optimists' academic achievement. This finding was not surprising given the characteristics of the low-optimism group in this particular study: all students in the current study

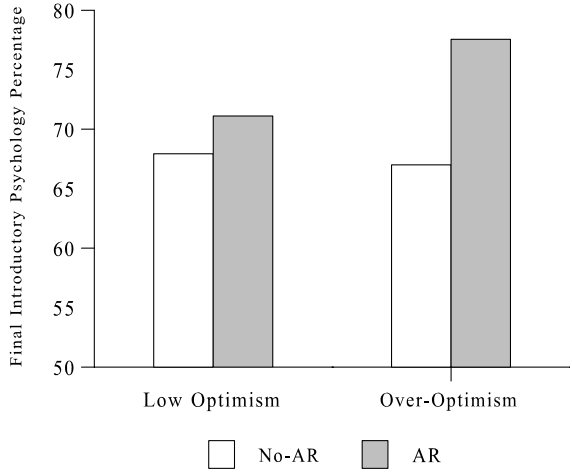

FIG. 1. Effects of optimism and AR on final Introductory Psychology percentage.

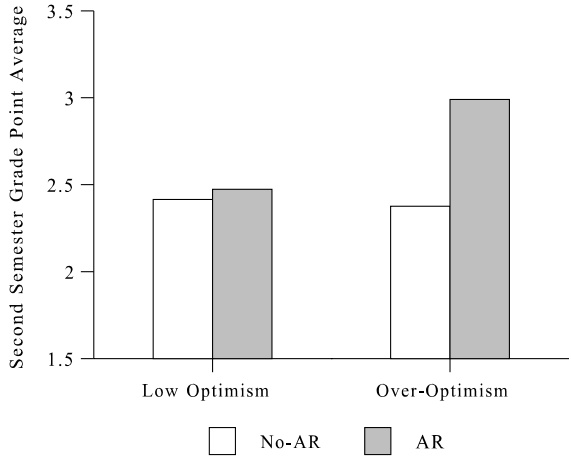

FIG. 2. Effects of optimism and attributional retraining on second semester grade point average (GPA).

were selected for participation based on their relatively low level of perceived success (see Rationale for Analyses). Thus, the low-optimism group constituted students having extremely low optimism *and* low perceived success. While AR did result in a significant increase in these students' effort attribution, the cognitive change did not translate into greater academic performance. It is feasible that this finding is due to a general lack of motivation among the extreme low optimists (Peterson, 2000), an assumption that future research may wish to investigate.

In sum, the current findings provide empirical support for the notion that overly optimistic expectations may be problematic in the transition from high school into college. This was evident in two findings: the increased use of maladaptive attributions among no-AR/over-optimists, and the academic performance of no-AR/over-optimists, which was equivalent to that of the extreme low optimists who are known to be academically at-risk. However, results indicate that pairing overly optimistic expectations with adaptive cognitions (i.e., controllable attributions and perceived control) via AR can protect against the potential negative effects of over-optimism and can facilitate academic achievement.

Strengths and Limitations

Several advancements of previous AR research were achieved with the present study, notably involving both longitudinal and experimental

procedures. Specifically, academic-related cognitions were assessed twice, several months apart, in order to examine changes as a result of an experimental manipulation (AR). This pre–post longitudinal design inspires a greater amount of confidence concerning the validity of our findings, as opposed to the same finding with a cross-sectional design. In addition to a strong design, the current study examined several objective indicators of academic performance: actual high school average grades; final percentage in a two-semester college course; and GPA across all second-semester courses. These outcome measures provide highly reliable estimates of students' academic performance.

Despite the methodological strengths of the present study, findings should be interpreted with the following limitations in mind. Our operational definition of over-optimism rested partly on the distinction between low and high perceptions of success which were assessed using a single-item measure. Although no assessment of internal consistency is available, empirical evidence suggests that our measure of perceived success has a relatively high degree of construct validity, as evident in strong associations with actual final Introductory Psychology percentages ($r = .46$, $p < .01$) and overall GPAs ($r = .37$, $p < .01$).

Another possible limitation concerns the unequal number of uncontrollable vs. controllable academic attributions in the current study. Specifically, we examined four uncontrollable attributions, but only a single controllable attribution. However, as the sole controllable attribution assessed, "effort" arguably represents the most salient controllable attribution among college students as their academic performance depends on studying, taking notes, attending class, seeking clarification, all of which rely on effort. Future research should consider other controllable attributions such as "strategy" in addition to "effort" to assess the generalizability of the present results to other similar controllable attributions.

Implications and Conclusions

This study contributes to the AR literature in terms of the validation of the underlying assumptions of AR as an educational treatment intervention. Specifically, AR was associated with increases in effort attributions and perceptions of control among overly optimistic college students, indicating that AR does work in the intended manner: through the modification of attributions and control perceptions. As such, by providing empirical evidence, this study extends research on the conceptual underpinnings and underlying cognitive mechanisms associated with AR interventions.

In addition to this conceptual contribution, the current study demonstrates the cognitive and achievement benefits associated with AR which have clear implications for college students, instructors, and administrators alike. That is, overly optimistic students who received AR obtained final Introductory Psychology percentages that were a full 10% higher than over-optimists who did not receive AR. This 10% difference corresponds to an *entire letter grade* (i.e., B vs. C+). The same pattern was replicated for GPA, a more global indicator of academic performance, with over-optimists who received AR attaining GPAs that were approximately one letter grade higher than their no-AR counterparts (i.e., B vs. C+).

As such, college students stand to gain substantial benefits from AR in terms of improved academic performance. In turn, instructors could expect to encounter more highly motivated students, in addition to having higher class attendance, and lower course attrition. Moreover, greater control perceptions among college students as a result of AR can maximize the benefits of effective college teaching (Feldman, 1998; Perry, Leventhal, and Abrami, 1979; Perry et al., 2005; Perry and Smart, 1997). Fewer failure-prone students translates into a reduction in overall institution attrition rates, a common concern among college administrators given the costs associated with course/program changes and lost tuition revenues. Finally, because AR treatments are inexpensive, relatively easy to administer to large groups, and effective, they would be a viable option for use in the college classroom.

In conclusion, the current findings demonstrate that overly optimistic college students left to their own devices increasingly attributed academic performance to causes beyond their control, putting them at risk of decreased motivation and compromised academic performance. Alternatively, when provided with AR, overly optimistic students increasingly attributed academic performance to controllable causes and subsequently outperformed the no-AR/over-optimists. Together, these findings underscore two important points. First, the adaptiveness of extremely optimistic expectations in novel settings is influenced by underlying cognitions such as attributions and perceptions of control. Second, AR can be of assistance to overly optimistic college students by encouraging adaptive cognitions thereby facilitating performance.

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