Attributional Retraining and Perceived Control:

Assisting College Students At Risk

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Thesis submitted to the Faculty of Graduate Studies in partial fulfilment of the requirements for the degree of Master of Arts

THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

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A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University of Manitoba in partial fulfillment of the requirements of the degree of

MASTER OF ARTS

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Acknowledgments

This thesis is due largely to the support I have received from many individuals to whom I am indebted. I first wish to express my sincerest appreciation to Dr. Raymond Perry whose guidance, encouragement, and most importantly, patience made this task both enjoyable and rewarding. I also want to thank my committee members, Dr. Judith Chipperfield and Dr. Rod Clifton, for their insight and consistent encouragement of my research efforts. Furthermore, the assistance of the Motivation and Academic Achievement (MAACH) Research Group was invaluable in the collection of the data. Finally, I would like to commend my family and friends for their patience, support, and constructive feedback during the completion of this project.

"Imagination is more important than knowledge" - Albert Einstein

Abstract

Attributional retraining (AR) is a psychotherapeutic intervention encouraging unstable and controllable attributions for academic failure which has been shown to result in modest increases in academic achievement and motivation. Recent research concerns not only comparing and improving AR methods of administration, but also the effective matching of AR with student risk factors associated with poor performance. Because unsuccessful students high in primary control (PC) and low in secondary control (SC) are at risk of academic failure, they may benefit from attributional retraining. College students' (N = 1093) perceptions of primary (academic) and secondary (interpretive) control were assessed at the beginning of the first academic term, after which half of these individuals received an AR intervention, including a writing task, with the other half acting as No AR controls. Dependent measures involving final grade, perceived success, positive expectations, affect, and attributions were assessed at the end of the academic year. Hypotheses were tested using both ANCOVA and structural equation modeling analyses employing an attributional retraining (No AR, AR) by perceived academic control (high-PC/low-SC, high-PC/high-SC) 2 x 2 factorial design. Academic control interacted with attributional retraining among unsuccessful students such that AR produced significant improvements in academic achievement for high-PC/low-SC students coupled with decreased motivation and increased negative affect for this high-risk group. These results underscore the importance of primary and secondary control in the academic development of college students, and also clarify the mechanisms for improvement following AR for both unsuccessful and successful students.

Attributional Retraining and Perceived Control:

Assisting College Students At Risk

Introduction

On entering university, students must contend with a number of factors predisposing them to academic failure. During this first year of university, students must deal with greater responsibility for their academic performance, requiring greater independence in terms of studying and completing course requirements on a largely individual basis. As such, intelligent and enthusiastic high school students often perform poorly during their first year at college, apparently unable to make this transition to increased self-reliance and autonomy. Consequently, a paradox of failure arises in which otherwise capable students either experience academic failure or leave the university setting, with over 40% of entrants withdrawing from their programs before obtaining a degree (Tinto, 1987).

Research in achievement motivation suggests that this pattern can be explained, in part, by maladaptive motivational approaches to academic performance adopted by students during their first year of university (Perry, 1991). Attribution theory describes how students' explanations of academic outcomes can significantly influence subsequent learning-related affect and achievement striving behaviours (Weiner, 1985, 1995). Furthermore, this research also shows that it is during this critical period of transition into an unfamiliar and demanding academic environment that students begin to understand the relation of their behaviour to academic outcomes. Thus, because the controllable aspects of course performance may not be immediately evident to first year college students,

many students can develop maladaptive attributions for academic failure (i.e., a lack of ability), and as a result, are less motivated and perform poorly.

Attributional retraining (AR) is a remedial intervention based directly on Weiner's attribution theory of motivation and performance which functions to assist students at risk of academic failure by encouraging controllable and unstable perceptions of academic failure (Forsterling, 1985; Perry, Hechter, Menec, & Weinberg, 1993; Perry & Penner, 1990). This technique has consistently produced modest increases in academic achievement motivation and performance in college students, and efforts to improve this intervention have been ongoing. Recent research has been directed primarily toward the assessment of attributional retraining methods of administration, as well as the identification and empirical validation of risk factors in college students associated with poor academic performance, since both are related to the effectiveness of the intervention (Hunter & Perry, 1996; Perry & Struthers, 1994). Specifically, ongoing research surrounding the implementation of attributional retraining techniques involves matching specific at-risk groups with appropriate intervention techniques in order to allow these students to recognize the controllable nature of academic failure (i.e., lack of effort) and to sustain the motivation required to effect change in their academic situation.

The present study continues this combined focus on identifying the factors which put students at risk for academic failure and on modifying attributional retraining procedures. In approaching student risk factors from a motivational standpoint, researchers not only gain a deeper appreciation of the numerous challenges faced by first year university students, but also a comprehensive conceptual framework within which

academic failure can be understood. Furthermore, as at-risk students come to understand this framework, improvements in course performance and decreased attrition rates result. As such, research on improving the efficacy of attributional retraining has largely been directed toward the elucidation of various risk factors predisposing students to low levels of motivation and subsequent academic failure.

At-Risk Students: A Motivational Perspective

Numerous studies have demonstrated that higher quality college instruction positively influences salient academic outcomes such as student achievement, emotions, expectations, and motivation (see Perry & Smart, 1997). However, this research also indicates that not all students take advantage of enriched learning environments in that a pattern of low perceived control, negative affect, and poor performance characteristic of failure-prone students does in fact persist despite the presence of high quality teaching. Thus, the paradox of failure emerges once again such that, even in the presence of effective classroom instruction, the academic prognosis for students having motivational deficits is still poor (see Perry, 1991 for a review). To compliment efforts to improve the quality of instruction in the college classroom, recent research in motivation has been directed toward the identification student dispositions and academic outcomes that account for these findings.

Defining at-risk students. Factors which predispose students to academic failure have for many years been of interest to motivational researchers. In an effort to identify those students most likely to benefit from remedial interventions (i.e., attributional retraining), a number of salient dispositional and situational risk factors have been

examined. Specifically concerning academic performance in college, poor academic performance in high school, and poor performance on course exams early in the first year of college have been shown to predict academic failure (Hunter & Perry, 1996; Van Overwalle & De Metsenaere, 1990; Wilson & Linville, 1985). In addition, students' scores on an aptitude-type exam have also been utilized to classify students as at risk of poor performance (Menec, Perry, Struthers, Schonwetter, Hechter, & Eichholz, 1994).

In addition to achievement-related predictors of poor academic motivation and performance, student beliefs have also been studied as risk factors including concern over academic outcomes (Wilson & Linville, 1982) and low levels of perceived control (Perry, 1991). Perry and Struthers (1994), for example, used a measure of perceived success in university to divide students into low and high success groups using a median split. These groups were found to correspond to students performing either poorly or adequately in their introductory psychology course. Similarly, Menec et al. (1994) identified low-achieving students having an external locus of control as at risk for academic failure in that failure experiences were assumed to be especially detrimental for students not feeling in control. More recently, research has suggested that the infrequent use of elaborative learning or deep processing strategies may also put students at risk for academic failure (Hladkyj, Hunter, Maw, & Perry, 1998).

Attribution theory. From a motivational perspective, factors internal and external to the student are presumed to impact academic performance through losses in student motivation. Academic motivation is widely recognized as one of the most salient dispositional factors influencing academic achievement (Aspinwall & Taylor, 1992) and

has been most comprehensively explained to date within the context of attribution theory (Weiner, 1985). Weiner's theory details a sequence of events in which distinct emotional and behavioural consequences follow from specific attributions assigned to a particular outcome or event. A causal search is typically prompted by an unexpected, important, and/or negative event, after which the individual attributes this outcome to a particular cause. Weiner proposes that causal ascriptions can be described in terms of three dimensions which determine specific emotional and behavioural consequences.

The three orthogonal dimensions outlined by Weiner are locus of causality (internal/external), stability (stable /unstable), and controllability (controllable /uncontrollable) that, when construed of as dichotomies, comprise a 2 x 2 x 2 matrix of causal dimensions. Locus of causality refers to whether the outcome was viewed as determined by factors within the individual or by something or someone other than the individual. Weiner's locus of causality dimension is conceptually derived from Rotter's (1975) theory of internal - external locus of control in which internality concerns whether or not an outcome is contingent upon an individual's behaviour. However, Weiner's model represents a more sophisticated analysis of causal attributions involving the orthogonal dimensions of temporal stability and controllability. Stability refers to how likely a cause is to continue over time, whereas controllability refers to whether or not the event could have been avoided. The inclusion of controllability allows for a greater degree of precision when classifying causal ascriptions because Rotter's model implies that internal events are primarily controllable, whereas Weiner's model allows for

attributions such as aptitude (internal and uncontrollable) to be more accurately described.

Caveats to attribution theory. When using Weiner's causal dimensions to predict specific consequences of an outcome, it is important to take the following issues into account. First, Weiner acknowledges that different people may ascribe the same causal attribution to different causal dimensions. For instance, luck can be understood as a stable and internal attribution (e.g., "I am a lucky person"), or as an unstable and external attribution (e.g., "This is my lucky day"). In addition, Weiner also emphasizes that causal dimensions are in fact continuous, although often referred to as dichotomous for the purpose of explanation. For instance, a particular causal ascription may be considered invariably uncontrollable by one individual, yet somewhat controllable by another (e.g., ability). However, the loss of variability or statistical error incurred as a result of discussing causal dimensions as dichotomies is justified in that a greater degree of polarization along these dimensions does correspond to a wider range of subsequent emotional and behavioural consequences.

Attributional Retraining

In view of the periodic ineffectual nature of enriched learning environments for students predisposed to poor academic performance (Perry, 1991), motivational researchers have attempted to develop therapeutic interventions which foster academic motivation and achievement. Attributional retraining (AR) is a remedial intervention based on Weiner's theory of motivation which attempts to redress students' maladaptive attributions for poor academic performance. According to attribution theory, attributions

for failure which 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, potentially resulting in decreased motivation, achievement striving, future test performance, and class attendance. In response, attributional retraining techniques encourage students to adopt controllable and unstable explanations for academic failure such as a lack of effort, thus providing students greater motivation to succeed resulting in increased effort and, in turn, improved performance.

Given the significant differences between university and high school settings with respect to appropriate study strategies, note-taking, time-management, etc., the extent to which academic success is controllable may not be evident to first year university students. In order to circumvent feelings of guilt resulting from internal and controllable attributions for having failed, these students may choose maladaptive reasons for failing, thereby absolving themselves of responsibility (i.e., attributions to luck, test difficulty, or the professor), rather than directly alleviating feelings of guilt by exercising control over their learning activities. Thus, first year students are particularly at risk for motivational deficits due to dysfunctional attribution patterns, and consequently are well-suited to benefit from attributional retraining techniques.

Forsterling (1985) classified attributional retraining methods in terms of informational approaches, operant methods, vicarious learning methods such as persuasion, and indirect communication. For the most part, however, only informational methods, typically involving staged videotaped interviews with upper-class students

and/or professors, have been employed in studies with college students. Furthermore, researchers utilizing such attributional retraining techniques have shown modest yet consistent improvements in academic motivation and the performance of college students (Perry et al., 1993). An early study by Wilson and Linville (1982) demonstrated an increase in GRE and GPA scores among college freshmen, namely males, as a result of videotaped interviews of senior students describing how low grades, being unstable in nature, often improve significantly after the first semester. Wilson and Linville (1985) presented failure as unstable, as opposed to controllable, arguing that attributing failure to a lack of effort may give rise to feelings of guilt which would inhibit future achievement striving. Weiner (1988) supports this approach, noting that encouraging students to adopt unstable attributions for poor performance should result in increases in expectancies of future success similar to the promotion of controllable attributions.

Block and Lanning (1984) undertook a secondary analysis of Wilson and Linville's data and found that the GPAs of students who withdrew from college were higher than those of remaining students. They also noted that the improvements resulting from the intervention could be explained by regression to the mean among other factors. However, Wilson and Linville (1985) replicated their initial findings after considering these arguments, effectively illustrating the benefits of attributional retraining. These results were also replicated by Van Overwalle et al. (1989) and Van Overwalle and De Metsenaere (1990) who used a videotape intervention to present academic success as a product of controllable achievement striving behaviours. The videotape consisted of students presenting reasons for their failure such as lack of peer cooperation, lack of

effort, or ineffective study strategy, and subsequently describing attempts to prevent failure in the future. Exposure to the intervention resulted in higher GPA scores at the end of the academic year.

In a review of attributional retraining techniques administered to college students, Perry et al. (1993) identify two studies showing that the inclusion of a written handout in addition to a videotape intervention is effective as well. Jesse and Gregory (1986-87) gave students attributional retraining in both handout and videotape formats, presenting GPA as an unstable phenomenon generally improving over time. Students exposed to the intervention maintained stable GPA scores throughout the academic year, whereas students who did not participate in the intervention experienced a decline in their second term GPA scores. Noel, Forsyth, and Kelly (1987) also successfully employed the combination of both videotape and written formats in attributional retraining. After viewing the videotape depicting poor performance as unstable and receiving a handout summarizing the main points of the videotape, students showed marked improvements in exam scores and final course grades. Thus, attributional retraining interventions in which failure is presented as either controllable or unstable have shown positive results.

Improving attributional retraining. Despite the generally effective nature of attributional retraining (AR) in the college classroom, efforts directed toward improving the effectiveness of the intervention have been ongoing. These initiatives have concerned the administration of attributional retraining to groups of students who are potentially at risk and thus are prime candidates to benefit from the intervention. Furthermore, recent

efforts have also consisted of manipulating various intervention techniques in order to find attributional retraining procedures which are best suited for specific at-risk groups.

Perry and Penner (1990) administered attributional retraining using a videotape presentation in which a male psychology professor presented ability as unstable and encouraged students to attribute poor performance to effort. Improvements in students' performance on a homework assignment and achievement test were noted following the administration of the intervention, however these benefits were observed only for students with an external locus of control. Contrary to Wilson and Linville (1985), these authors suggest that effort can, in fact, be perceived by externals as a salient explanation for performance following attributional retraining, thus allowing for increased confidence, motivation, and subsequent achievement striving (see Weiner, 1985). Of note, this study was one of the first to demonstrate the effectiveness of attributional retraining for at-risk students in particular, in this case as defined by an external locus of control.

Research conducted by Menec et al. (1994) addressed the potential for increased academic improvement as a result of multiple attributional retraining sessions. Their findings showed significant improvements on a lecture-based achievement test following the first attributional retraining session in which the videotaped intervention consisted of a student discussing how poor academic performance was the result of ineffective study strategies and a lack of effort. In keeping with Perry and Penner's (1990) focus on risk factors, they found that such improvements were evident only for students who had performed poorly on a pre-lecture GRE-type aptitude test, and for low-achieving

individuals having an external locus of control. However, no further increase in performance was found after the first session when two additional sessions of attributional retraining were given in which the videotaped presentations dealt with failure on a piano exam and in obtaining a scholarship, respectively.

The lack of improvement in performance beyond the single session may be explained by the fact that the achievement test was not difficult or was not taken seriously by students because it was administered in a laboratory setting. In addition, the intervention also focused on poor performance in different achievement-related tasks during each session (academic test, a piano test, and in obtaining a scholarship), with only one version of the videotape (academic test) being directly related to the dependent variable in question, namely performance on a lecture-based exam. As such, although the study showed the positive impact of attributional retraining for students presenting multiple risk factors, namely poor test performance and an external locus of control, further research is warranted to fully assess the potential benefits of multiple attributional retraining sessions.

Perry and Struthers (1994) compared several attributional retraining procedures in order to find the most effective intervention technique for the at-risk group under consideration, namely students reporting low levels of perceived success in college at the beginning of the academic year. Attributional retraining was administered in three formats: written handout only, videotape only, and videotape and small group discussion. The videotape depicted two graduate students discussing how adopting controllable explanations for poor performance following a difficult exam contributed to increased

motivation and performance on subsequent tests. Results indicated that only students low in perceived success reported improvements on in-class psychology tests and in psychology final grades at the end of the year, and only in the videotape and discussion condition. Struthers and Perry (1996) also showed this discussion AR treatment to be effective in improving final psychology course grades for students using uncontrollable and unstable attributions for academic failure. However, despite increases in motivation and hope after AR for at-risk students, namely students with a stable/uncontrollable attributional style, similar improvements in performance were not found for these individuals. As such, these findings indicate that students' academic performance can in fact be influenced by both the method of attributional retraining and student risk characteristics.

More recent research has also explored the manipulation of attributional retraining procedures for the benefit of specific at-risk groups. Hunter and Perry (1996) contrasted various attributional retraining techniques in attempting to find an appropriate intervention format for students having low reported high school grades. Compared were four attributional retraining procedures including videotape only, videotape and aptitude test, videotape and achievement test, as well as videotape and small group discussion. The results showed marked improvements in psychology final grades only for students with low reported high school grades following the videotape and aptitude test condition.

Research conducted by Pelletier, Hladkyj, Moszynski, and Perry (1999) followed up these attributional retraining studies to explore other student at-risk groups which could benefit from the intervention techniques developed. Previous research, for example,

has found that performance-oriented college students, namely students who do not enjoy learning for its own sake but study course material in order to achieve academic success and make ability attributions (see Atkinson & Feather, 1966; Covington, 1993), are at risk of academic failure. By employing an aptitude test following the attributional retraining videotape as recommended by Hunter and Perry (1996), Pelletier et al. were able to show that attributional retraining improved final grades in a full-year psychology course for this more complex classification of at-risk students involving academic goal-orientation.

Additional research has shown that infrequent use of elaborative learning strategies may also predispose college students to academic failure (Hladkyj et al., 1998). In response to these findings, Hall, Perry, Taylor, and Pelletier (2000) compared two attributional retraining procedures in an effort to establish an intervention technique most appropriate for this particular at-risk group. Specifically, they compared the effectiveness of the videotape and aptitude test condition successfully employed by Hunter and Perry (1996) with a videotape and related written assignment condition. Findings indicated that, for students who use elaborative learning strategies less often, both attributional retraining techniques were effective in improving psychology final grades.

Thus, research by Perry and Struthers (1994), Hunter and Perry (1996), and Hall, Perry, et al. (2000) has been primarily concerned with efforts to improve attributional retraining for specific at-risk students. In addition, studies such as Pelletier et al. (1999) demonstrate how such research initiatives not only contribute to the improvement of intervention procedures, but also to the elucidation of previously unexplored student risk factors. Regarding attributional retraining, the procedure employed typically consists of a

videotaped "treatment" followed by a consolidation exercise intended to facilitate the cognitive integration of the attributional principles presented in the videotape. Furthermore, research involving the explicit manipulation of attributional retraining consolidation activities has attempted to explain the processes presumed to underlie the effectiveness of such exercises.

Consolidation activities. When contrasting the findings of research conducted by Perry and Struthers (1994) and Hunter and Perry (1996) with Jesse and Gregory (1986-87), Menec et al. (1994), Van Overwalle and De Metsenaere (1990), Van Overwalle et al. (1989), and Wilson and Linville (1982, 1985), inconsistent results concerning the effectiveness of the videotape only attributional retraining condition are evident. The former studies indicate that videotape only attributional retraining does not lead to significant improvements in academic performance. However, neither Perry and Struthers nor Hunter and Perry required students to engage in any further activities following the attributional retraining videotape, whereas studies showing the videotape only technique to be effective do indicate that some form of consolidation exercise was included. An overview of these and other attributional retraining study methods and findings is presented in Table 1.

For instance, both Perry and Penner (1990) and Menec et al. (1994) note that following the videotape presentation, the completion of either an achievement or GRE-type exam was included to allow students to put the attributional information presented in the videotape into practice. Wilson and Linville (1982, 1985) also indicate that immediately following attributional retraining, students were required to complete both

Table 1

Overview of Methods and Outcomes in Attributional Retraining

Treatment	Consolidation exercise	Outcome[a,b]	Risk factor(s)
Hall, Chipperfield, et al. (2001)			
8 minute video	• Aptitude test • Written assignment	None Final grade ⇑	Low course exam scores, high primary control, & low secondary control
Hall, Perry, et al. (2000)			
8 minute video	• Aptitude test • Written assignment	Final grade ⇑ Final grade ⇑	Low elaboration
Hunter & Perry (1996)			
8 minute video	• None • Aptitude test • Achievement test • Group discussion	None Final grade ⇑ None None	Low high school grades
Jesse & Gregory (1986-87)			
GPA video	Written information on attributions	Stable GPA in second term	N/A
Menec et al. (1994)			
1. 1 or 2 video sessions	Achievement test	Achievement test ⇑	Low aptitude test scores
2. 1 or 2 video sessions	Achievement test	Achievement test ⇑	Low aptitude test scores & external locus of control
Noel et al. (1987)			
Video	Written summary	Test & final grade ⇑	N/A
Pelletier et al. (1999)			
8 minute video	Aptitude test	Final grade ⇑	Performance-orientation & failure-avoidance

Table 1 (continued)

Treatment	Consolidation exercise	Outcome	Risk factor(s)
Perry & Penner (1990)			
8 minute video	Aptitude test & achievement test	Achievement test ⇑	External locus of control
Perry & Struthers (1994)			
• Written handout • 8 minute video	None • None • Group discussion	None None Test & final grade ⇑	Low perceived success
Van Overwalle et al. (1989) Van Overwalle & De Metsenaere (1990)			
List performance attributions & video interviews	Written & verbal reports	Exam score ⇑	Low course exam scores
Wilson & Linville (1982, 1985)			
Written report & video	Aptitude test, anagram task, & reason analysis	GPA ⇑, GRE ⇑, & attrition ⇓	Concern over course performance; low course exam scores

[a] ⇑ = Increase
[b] ⇓ = Decrease

an anagram task and GRE-type exam. In addition, these authors also required half of the students to record as many reasons as possible for why grades improve following the first year of college. Similarly, the studies conducted by Van Overwalle et al. (1989) and Van Overwalle and De Metsenaere (1990) had participants describe in writing what they perceived to be the important aspects of the attributional retraining session and to relate their comments to the experimental group. Such written accounts are similar in nature to the small group discussions employed in both Perry and Struthers (1994) and Hunter and Perry (1996) in that both activities require students to reflect on the attributional process in a meaningful way.

From these studies, it seems apparent that the effectiveness of the attributional retraining intervention is reliant upon the inclusion of a consolidation activity in which students are given an opportunity to either reflect about or act upon the information presented. Perry and Struthers (1994) suggest that such activities augment the influence of the intervention by encouraging students to actively reflect on and consolidate the attributional information with their existing achievement-related perceptions. In an earlier study in which attributions for academic performance were manipulated, Perry and Magnusson (1989) also noted that a lack of significant findings on an aptitude test was most likely the result of not allowing students an opportunity for cognitive restructuring following the intervention.

Hall, Perry, et al. (2000) have suggested that consolidation activities facilitate the impact of attributional retraining by encouraging greater elaborative processing of the information presented. Similar to previously offered explanations such as cognitive

restructuring or consolidation (Perry & Magnusson, 1989; Perry & Struthers, 1994), elaborative learning involves the construction of meaningful cognitive interconnections between new and previously learned information, and is revealed in attempts to explain personal experience according to a new conceptual framework (Entwistle, 2000; Pintrich, Smith, & McKeachie, 1989). Therefore, consolidation activities appear to facilitate a greater understanding of the attributional process through elaborative mechanisms which allow students to relate their own life experiences to attributional theory through abstract thinking or more practical means.

Emotion Elaboration

Directly related to the inclusion of attribution elaboration in attributional retraining interventions, there exists a body of research demonstrating how a written emotional expression concerning stressful experiences (e.g., academic failure) results in significant improvements in psychological well-being (Smyth, 1998) and GPA (Pennebaker & Francis, 1996). This research also indicates that first year college students reporting high levels of hostility (e.g., "Type A" individuals; Glass & Carver, 1980) derive significantly greater benefit from writing than their less hostile counterparts (Christenson & Smith, 1993). With respect to the underlying mechanisms responsible for these effects, this research suggests that writing techniques allow the emotions surrounding a stressful event to be translated into an organized linguistic structure which facilitates a greater understanding of the event.

Pennebaker and Seagal (1999) posit that it is through this integration of thoughts and feelings that the individual can more easily construct a coherent narrative of the

experience, allowing the memory of the event to be summarized, stored, and forgotten more efficiently. In this manner, individuals with a high level of emotionality or hostility surrounding a traumatic experience may derive greater benefit from the intervention. These authors also encourage the use of written emotional expression tasks in combination with psychological treatments, with such consolidation activities potentially serving to reinforce progress concerning the change of maladaptive behaviours (Pennebaker, 1997; Pennebaker & Seagal, 1999). Furthermore, to the extent that a variety of emotions occur in the presence of academic failure (Covington, 1993; Pekrun, Titz, Perry, & Spangler, 2000; Weiner, 1985, 1995), this writing intervention should also be applicable to academic achievement settings as well.

As such, similar to previous explanations of how consolidation activities enhance attributional retraining (Hall, Perry, et al., 2000; Perry & Magnusson, 1989; Perry & Struthers, 1994), recent research on written emotional expression tasks underscores the significance of such activities in facilitating the impact of this intervention for at-risk students. These related bodies of research indicate that certain groups of individuals do in fact respond differently to such consolidation activities, with the identification and assistance of at-risk students being a salient aspect of ongoing research concerning the effectiveness of attributional retraining techniques.

The Present Research

Research conducted in this laboratory has been directed primarily toward the assessment of attributional retraining techniques, as well as the identification of student risk factors associated with poor academic performance, both of which have been shown

to moderate the effectiveness of attributional retraining (Hunter & Perry, 1996; Perry & Struthers, 1994). The present study contributes to this body of research by further exploring a specific risk factor predisposing students to profound academic failure in relation to an improved attributional retraining technique. It follows recent studies conducted by Hall, Hladkyj, Taylor, and Perry (2000) and Hall, Clifton, Ruthig, Hladkyj, and Perry (2001) concerning the empirical validation of this at-risk group involving perceived control and academic failure, as well as research conducted by Hall, Chipperfield, Perry, Pekrun, and Schonwetter (2001) in which the potential utility of attributional retraining involving a writing exercise was assessed. The following sections describe these recent research initiatives from which the focus of the present research is derived.

Defining At-Risk Students

Exploratory research conducted by Hall, Hladkyj, et al. (2000) and Hall, Clifton, et al. (2001) has resulted in the identification of a previously unexamined combination of risk characteristics predisposing first year college students to profound academic failure. Research concerning the manner in which specific student risk factors combine is not new to attributional retraining researchers. For instance, in a study by Menec et al. (study 2, 1994), at-risk students were classified as such due not only to poor performance on a GRE-type exam, but also to having reported an external locus of control. Likewise, in Pelletier et al. (1999), students were defined as at risk not only according to their goal orientation, but also in terms of failure-avoidance (i.e., performance-avoid individuals). In a similar manner, Hall, Hladkyj, et al. describe a specific combination of risk factors

concerning perceived control and academic failure which correspond to notable deficits in course performance, findings later replicated on more long-term and comprehensive measures of academic success (Hall, Clifton, et al., 2001).

Research in achievement motivation has repeatedly confirmed the importance of perceived control in academic development (Perry & Dickens, 1984; Perry & Magnusson, 1989; Perry, Hladkyj, Pekrun, & Pelletier, 2001; Perry, Schonwetter, Magnusson, & Struthers, 1994), a construct which, until recently, was based primarily on the premise of one's perceived ability to influence the environment (see Perry, 1991 for review). However, Rothbaum, Weisz, and Snyder (1982) theorize that some behaviours ordinarily understood as reflecting a loss of control or helplessness may in fact serve to maintain perceptions of personal control. Likewise, these authors have proposed a dual-process model in which perceived control is fostered by attempts to change either the environment (primary control), or oneself to conform to the environment (secondary control), the latter consisting of four distinct processes including prediction, illusory correlation, vicarious alignment, and interpretation.

Prediction allows for the avoidance of disappointment which is typically characterized by attributions to limited ability, whereas construing luck as a personal attribute, similar to ability, can provide an illusory sense of control. Similarly, while attributions to and identification with powerful others permit vicarious control, interpretive control may be gained through deriving meaning from and subsequently accepting one's situational limitations. As such, in contrast to primary control strategies such as persistence, exertion of effort, and attributions to effort, secondary control

strategies may include the downgrading of expectations or task importance, accepting limitations, or perceiving benefits from an otherwise adverse experience (Chipperfield, Perry, & Menec, 1999).

Secondary control beliefs appear to be especially adaptive when the individual is faced with an objectively uncontrollable aversive situation, or when a successful outcome is not expected. This finding has been demonstrated repeatedly in research involving homesickness in children (Thurber & Weisz, 1997), age-related declines in ability and physical appearance (Chipperfield et al., 1999; Thompson, Thomas, Rickabaugh, Tantamjarik, Otsuki, Pan, Garcia, & Sinar, 1998), and patients coping with HIV (Thompson, Nanni, & Levine, 1994), leukemia (Weisz, McCabe, & Dennig, 1994) and with diabetes (Band & Weisz, 1990). Recent research by Chipperfield, Perry, and Hladkyj (2000) addressed both primary and secondary control beliefs in older adults, with results showing lower use of health care resources among men endorsing mainly primary control beliefs and women relying on secondary control beliefs. Concerning the impact of secondary control strategies in an academic environment, Taylor, Hladkyj, Perry, and Pekrun (1999) found that a combination of both primary and secondary control was optimal for students. That is, knowing both when to try harder and when to cut one's losses appeared to best facilitate a consistent level of perceived control and motivation in students.

The findings of Taylor et al. (1999) were subsequently replicated by Hall, Hladkyj, et al. (2000) who found that for academically unsuccessful students in particular, both primary and secondary control beliefs corresponded with higher levels of perceived

success, positive expectations, and learning-related enjoyment (particularly in comparison with students reporting mainly secondary control beliefs). Significantly higher levels on these measures were found for successful students high in primary control regardless of secondary control levels. Students were classified as successful (80% or higher) or unsuccessful (60% or lower) according to their performance on their first introductory psychology course exam.

However, these authors also noted an intriguing pattern of results concerning unsuccessful students reporting mainly primary control beliefs. Although successful students high in primary control and low in secondary control beliefs were among the highest achievers, it was found that unsuccessful students favouring primary over secondary control had significantly worse introductory psychology final grades than their counterparts relying on secondary control alone, both control beliefs, or neither (see Figure 1). This finding was later replicated by Hall, Clifton, et al. (2001) on a different cohort of students on longitudinal measures involving first year cumulative grade point average (GPA) as well as second year cumulative GPA.

According to Rothbaum et al. (1982), these results are to be expected in that, "perceived uncontrollability, ironically, is especially likely to occur in persons who typically rely on primary control," or "Type A" people, since these individuals' "unsuccessful attempts at primary control are intense and long-lasting and also because they lack the time and energy necessary for mustering secondary control attempts" (p. 28). These authors also suggest that favouring primary over secondary control beliefs is a

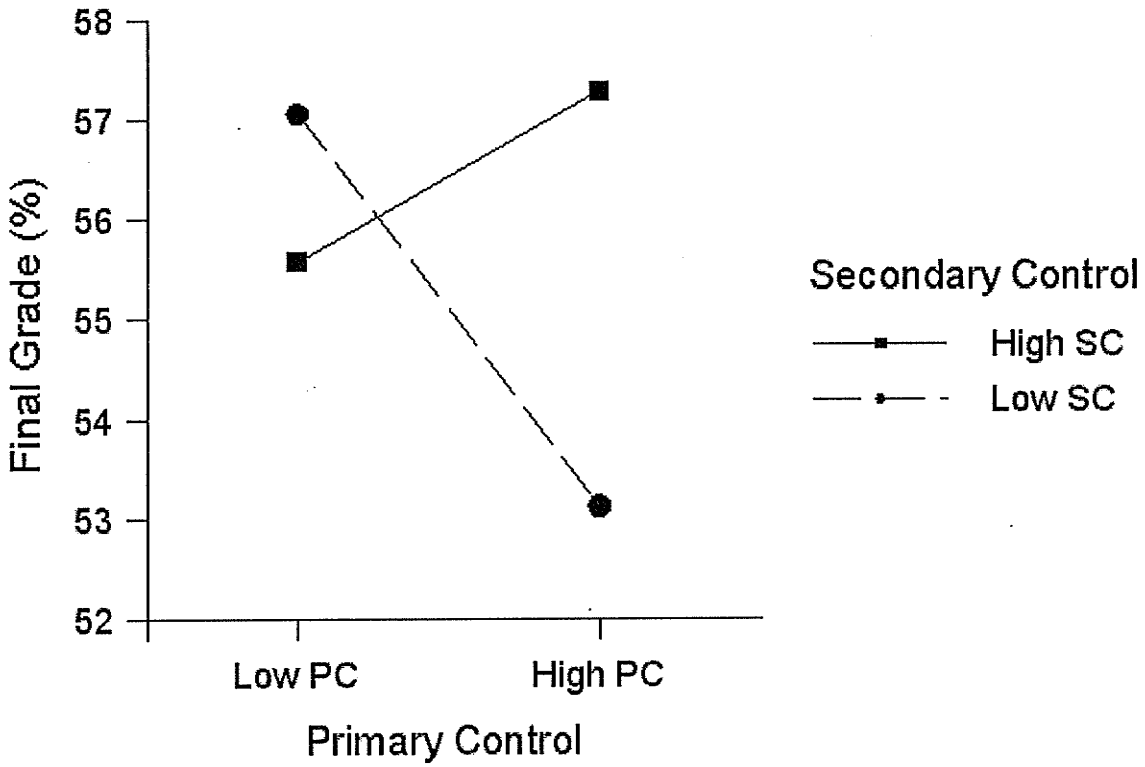

Figure 1. Primary Control by Secondary Control on Final Grade for Unsuccessful Students (Hall, Hladkyj, et al., 2000).

luxury solely for successful students, and that students relying only on primary control are "prime candidates for perceived uncontrollability when they are finally tested and fail" (p. 29). Although persistence in spite of academic failure may be a generally adaptive course of action, when success is not expected or is perceived of as unattainable, such an approach may be especially detrimental to unsuccessful students unfamiliar with alternate responses to poor performance (i.e., secondary control beliefs).

Taken together, the results of these two exploratory studies indicate that unsuccessful students high in primary and low in secondary control beliefs are at risk of serious academic failure. Furthermore, not only are these particular students at risk of performing poorly in a specific course, but also on cumulative measures of overall academic performance one and two years following the initial administration of the perceived control measures. Therefore, upon considering the empirical evidence demonstrating the potential for further academic declines in unsuccessful students favouring primary control at the expense of secondary control, it follows that these students be considered an at-risk group for whom attributional retraining techniques may be beneficial. However, there remains a need for further research elucidating the potential impact of this intervention for these students.

Attributional Retraining: Preliminary Research

Preliminary research concerning the potential utility of attributional retraining techniques for unsuccessful students favouring primary over secondary control beliefs has shown promising results. Research conducted by Hall, Chipperfield, et al. (2001) on a small sample of unsuccessful undergraduates ($N = 62$, average cell size $n = 6$) suggests

that attributional retraining, which included a consolidation procedure encouraging students to elaborate on the attributional information in a written manner, allowed these at-risk students to improve their academic performance. As in Hall, Perry, et al. (2000), the authors contrasted the relative effectiveness of two consolidation activities, an aptitude test and a written assignment, noting no significant improvements when an aptitude test was included immediately following the videotape presentation (see Table 1).

In the videotape and written assignment condition, however, unsuccessful students relying mainly on primary control had substantial improvements in introductory psychology final grades (Figure 2). In addition, this improvement was accompanied by peculiar declines in learning-related enjoyment and optimism for this at-risk group. As such, these results also raise an interesting question as to why unsuccessful students already high in primary control benefited from an intervention specifically encouraging effort attributions for failure. Thus, although preliminary results provide evidence in support of the potential effectiveness and drawbacks of attributional retraining for these individuals, further large-scale, longitudinal research is required to more fully address these encouraging findings.

The present 8-month study represents an in-depth analysis of the relation between perceived control and attributional retraining (AR) in terms of academic achievement, motivation, affect, and attributions, using both ANCOVA and structural equation modelling (SEM) techniques. Given the hypotheses of Rothbaum et al. (1982) for at-risk and optimal combinations of primary and secondary control, analyses included only

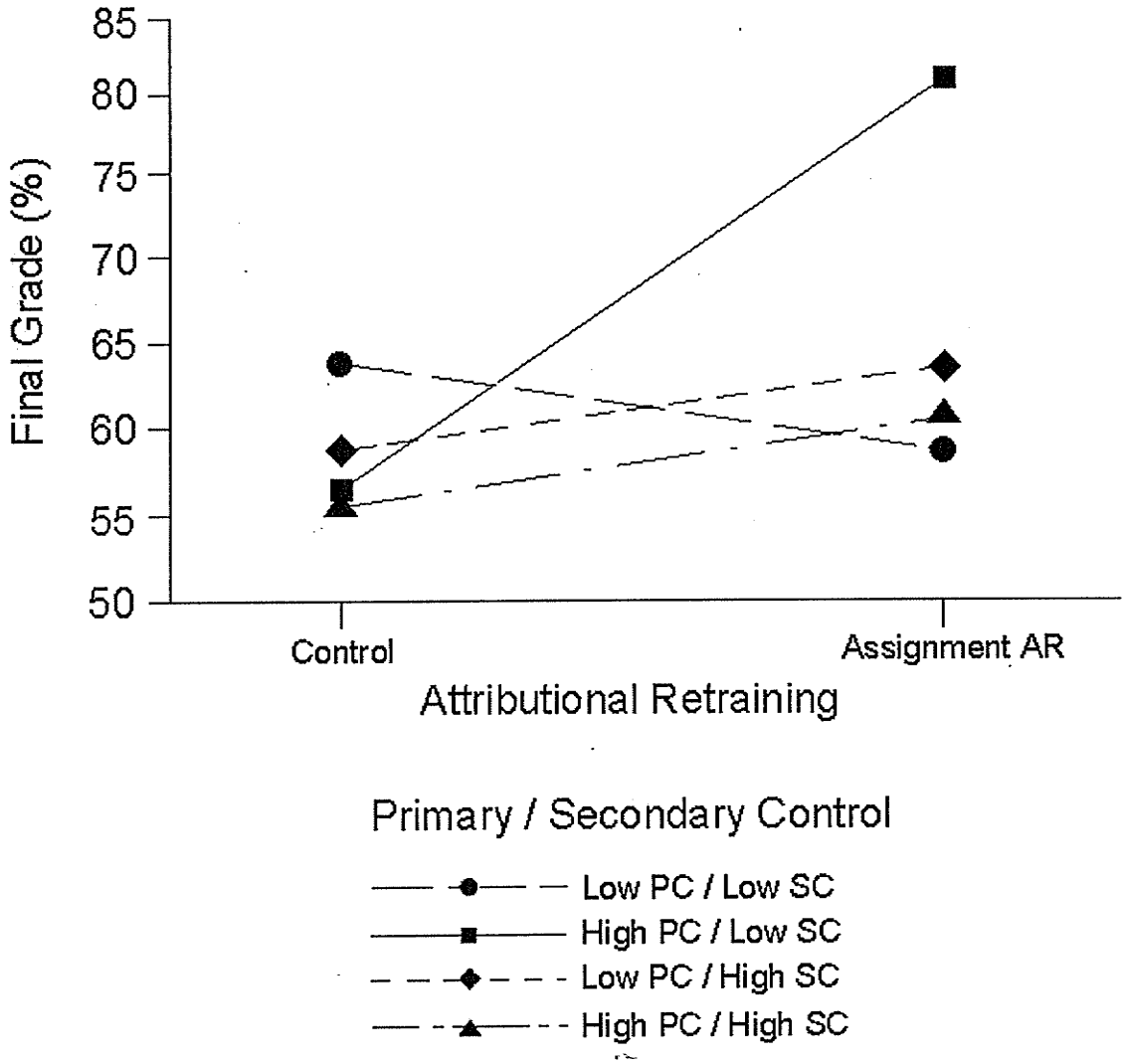

Figure 2. Attributional Retraining by Primary/Secondary Control for Unsuccessful Students (Hall, Chipperfield, et al., 2001).

students classified as high in academic primary control (i.e., high-PC/low-SC; high-PC/high-SC). Further, the ANCOVA analyses were conducted separately for students experiencing academic success/failure at the beginning of the academic year. As such, unsuccessful, at–risk students (high-PC/low-SC) in the No AR condition were expected to perform more poorly, feel less successful, and report less positive (and more negative) learning-related affect than their unsuccessful high-PC/high-SC counterparts.

Significant differences were not hypothesized among unsuccessful students between the two perceived control, No AR groups on attributions, attribution-dependent emotions (i.e., hope, pride, guilt, shame), or on positive expectations, as both groups were expected to feel hopeful and in control concerning their academic performance due to high levels of primary control, and report low levels of guilt and shame believing their grades could be improved. AR effects on pride were not anticipated, as unsuccessful students were expected to report low levels of pride, and the attributions encouraged by AR may be either internal (controllable; i.e., lack of effort) or external in nature (unstable; i.e., poor study strategy). By contrast, an AR treatment effect was anticipated on uncontrollable attributions for unsuccessful students, as decreased reliance on these attributions was explicitly endorsed by the intervention.

Main effects of attributional retraining and perceived control were not anticipated for successful students, nor for unsuccessful students (except for AR on uncontrollable attributions). Nonetheless, improvements in academic performance were expected for unsuccessful high-PC/low-SC students following the AR treatment, whereas no treatment effects were expected for unsuccessful high-PC/high-SC students on any of the dependent

measures. Further, unsuccessful high-PC/low-SC students were expected to report poorer motivation and affect following AR, with the AR likely providing a reality check for these overly optimistic yet unsuccessful students who assume they have the luxury of neglecting secondary control beliefs.

Research on written emotional expression tasks also indicate that despite long-term decreases in anxiety resulting from such exercises, a short-term increase in stress is typical after the writing task (Pennebaker, 1997; Pennebaker & Seagal, 1999; Smyth, 1998). These authors suggest that such increases are evidence of the cognitively engaging nature of the task. Consequently, an overall increase in perceived stress was expected immediately following AR, to demonstrate concurrent validity between these writing tasks and that used in the present research. However, this short-term increase in stress was not expected to be dramatic as poor performance on a course exam is not nearly as traumatic an issue as typically addressed in written emotional expression research (e.g., illness, unemployment).

To determine whether unsuccessful high-PC/low-SC students may benefit from an intervention encouraging mainly primary control beliefs, changes in primary and secondary control levels following the AR intervention were assessed for unsuccessful students. As the writing exercise explicitly encouraged students to consider learning from or reinterpreting academic failure in a positive way, this exercise was thought to foster a greater consideration of interpretive secondary control beliefs than other consolidation exercises (i.e., an Aptitude Test; see Hall, Chipperfield, et al., 2001). A significant increase after AR in interpretive secondary control was also expected among unsuccessful

high-PC/low-SC students lacking in these beliefs. No additional changes in primary or secondary control were anticipated.

In sum, the present research seeks to replicate Hall, Chipperfield, et al.'s (2001) preliminary findings by demonstrating the effectiveness of attributional retraining involving a writing exercise for unsuccessful students high in primary control beliefs and low in complementary secondary control beliefs. In addition, the current study seeks to not only further refine the combination of risk factors in question by using more specific subscales of both primary and secondary control beliefs as in Hall, Clifton, et al. (2001), but also to improve the content and implementation of the writing exercise upon consideration of recent research concerning written emotional expression (Pennebaker, 1997; Pennebaker & Seagal, 1999; Smyth, 1998). In this manner, this study will contribute to an ongoing research initiative in which at-risk students are more clearly identified, attributional retraining procedures are made more effective, and conceptual links between specific at-risk groups and appropriate intervention techniques are supported empirically.

Method

Participants

The participants (N = 1093) were recruited from 12 sections of a two-semester introductory psychology course at the University of Manitoba for a study assessing students' attitudes towards their university experience. As noted, first year students are of interest because they are particularly likely to develop maladaptive patterns of causal attributions and suffer motivational and performance deficits during this transition from

high school to college. All students were required to complete a battery of questionnaires at the beginning (Phase 1) and near the end (Phase 3) of the academic year concerning their university experiences (see Procedure section below). The Phase 1 sample consisted of 674 females and 391 males (28 students did not indicate their gender), most between the ages of 17 and 22 (90%), whose average self-reported high school grade was 77%. The Phase 3 sample was reduced by 22% ($\underline{n}$ = 853) due to a number of reasons including students having already completed their experimental credit requirements, having withdrawn from the course, illness, etc.

Only students having experienced success or failure early in the academic year were of interest in the present longitudinal study (see Rationale for Analyses). Participants scoring in the bottom 25% (below 60%; $\underline{n}$ = 234) and top 25% (above 80%; $\underline{n}$ = 256) of the distribution based on the first exam in introductory psychology were included in the main ANCOVA analyses. Furthermore, because students high in primary control (PC) and either low or high in secondary control (SC) were of specific theoretical relevance (Rothbaum et al., 1982), only high-PC/low-SC (at-risk) and high-PC/high-SC (optimal) students were assessed using the ANCOVA technique (see Independent Measures). Likewise, the adjusted total sample size for the ANCOVA analyses was reduced to 255 (unsuccessful $\underline{n}$ = 78; successful $\underline{n}$ = 177). Structural equation modelling (SEM) analyses included all, and only, unsuccessful students ($\underline{n}$ = 234), using interaction terms based on the continuous perceived control measures to assess at-risk and optimal trends.

Independent Measures

Test performance. Students' grades on their first introductory psychology course exam were obtained from the instructors upon completion of the course (n = 998, M = 69.83%, SD = 14.23, Range = 24-100%). Only students categorized as having had either an academic failure, the bottom 25% and below 60% (n = 234, M = 50.44%, SD = 7.02), or success experience, the top 25% and above 80% (n = 256, M = 87.24%, SD = 4.99), based on their performance on this exam were included in the ANCOVA analyses (SEM analyses assessed only bottom 25%). This extreme-groups classification is consistent with students' subjective perceptions of success in introductory psychology early in the academic year, with students classified as unsuccessful reporting significantly lower scores than their successful counterparts on a single-item, 10-point measure of perceived success in the course administered in Phase 1: unsuccessful M = 2.94, SD = 1.93; successful M = 7.95, SD = 1.83; $t(479) = 29.15$, $p < .001$. This indicator of first-semester performance has been used successfully in previous research conducted in this laboratory (Struthers & Perry, 1996).

Academic primary control. A 10-item measure assessing academic primary control was used in Phase 1 (Cronbach's alpha = .78) and Phase 3 (Cronbach's alpha = .74), with 8 items adapted from Perry et al's (2001) Academic Control Scale (see Table 2 and Appendix A). Students indicated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) the extent to which they agreed with statements such as "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." See Table 2 for the overall scale

Table 2

Summary of the Variables

Measures	No. of items	Anchor	Alpha	M	SD	Actual Range
Primary control[a]	10	1 = strongly disagree 5 = strongly agree	.78	42.36	4.67	15-50
Secondary control[a]	7	See Method	.67	25.89	5.36	9-41
Perceived success[b]	1	1 = not at all successful 10 = totally successful		6.20	2.00	1-10
Expectations[b]	3	See Method	.85	15.83	4.34	3-24
Perceived stress[b]	7	1 = never, 5 = often	.85	22.13	5.24	10-35
Course anxiety[b]	6	1 = not at all true 5 = completely true	.81	15.00	4.91	6-29
Course boredom[b]	6	Same	.90	20.73	2.21	12-28
Course enjoyment[b]	6	Same	.75	19.81	4.10	6-30
Guilt[b]	1	1 = not at all 10 = very much so		3.62	2.35	1-10
Shame[b]	1	Same		2.90	2.34	1-10
Hope[b]	1	Same		6.97	2.06	1-10
Pride[b]	1	Same		5.59	2.35	1-10

Table 2 (continued)

Measures	No. of items	Anchor	Alpha	M	SD	Actual Range
Cont. attributions[b]	2	1 = not at all 10 = very much so	.65	14.31	3.67	2-20
Uncont. attributions[b]	4	Same	.63	19.32	6.59	4-40
Final course grade[c]	1	Percentage		70.56	13.23	16.28-99.50
High school grade[a]	1	1 = 50% or less 10 = 92-100%		7.28	1.75	2-10

Note. Cont. = controllable; Uncont. = uncontrollable.

[a]Phase 1 measure. [b]Phase 3 measure. [c]Phase 4 measure.

mean, standard deviation, and range. A 5-month test-retest reliability estimate revealed acceptable stability between Phases 1 and 3, $r(821) = .58$, $p < .001$.

Students were defined as either low or high in academic primary control using a median split: Low PC: $M = 38.42$, $SD = 3.66$, Range = 15-42; High PC: $M = 45.73$, $SD = 2.08$, Range = 43-50; $t(1058) = 40.64$, $p < .001$. A more extreme split (i.e., dropped median) was not employed on the perceived control measures due to the reduced number of participants resulting from the extreme-groups procedure used for test performance. The academic primary control measure was also negatively skewed (Skewness = -.99; see also Perry et al., 2001), with many low-PC students scoring above the midpoint of 30 (i.e., $M = 38.42$). However, as truly low-control individuals are not likely to enter college in the first place (Perry, 1991; Rotter, 1975; Stipek & Weisz, 1981), the low/high distinction on academic primary control in the ANCOVA analyses applies specifically to the college student population.

This academic primary control subscale has been successfully used in previous research assessing primary control in combination with other student risk factors including secondary control and action control (Taylor et al., 1999; Perry et al., 2001). This subscale typically has a high degree of internal consistency as found in Perry et al. (2001), Hall, Perry, et al. (2000), Pelletier et al. (1999), and Hladkyj et al. (1998): Cronbach's alphas = .80, .80, .88, .89, respectively. Recent research has also shown increased academic primary control to correspond with lower learning-related anxiety and boredom, and higher intrinsic motivation, self-monitoring, and psychology final grades (Perry et al., 2001).

Interpretive secondary control. A 7-item measure of interpretive secondary academic control measure was administered in Phase 1 (Cronbach's alpha = .67) and Phase 3 (Cronbach's alpha = .74; see Table 2 and Appendix A) which included four 5-point items (1 = strongly disagree, 5 = strongly agree) and three 7-point items (1 = not at all true of me, 7 = very true of me). The scale consisted of items such as "No matter how well I do on a test or in a course, I try to 'see beyond' my grades to how my experience at university helps me to learn about myself," and "When bad things happen to me, I make an intentional effort to understand how they fit into the rest of my life." Scale items were not re-coded to have the same metric (i.e., converting 5-point to 7-point items) due to the nearly identical correlation between the revised and original measures, $r(1062) = .99$, $p < .001$, nor were the items weighted according to their factor loadings as two of the highest loading items were 7-point items. See Table 2 for the overall scale mean, standard deviation, and range. A 5-month test-retest reliability estimate indicated acceptable stability between Phases 1 and 3, $r(821) = .62$, $p < .001$. Students were defined as either low or high in secondary control using a median split: Low SC: $M = 21.88$, $SD = 3.42$, Range = 9-26; High SC: $M = 30.47$, $SD = 2.96$, Range = 27-41; $t(1060) = 43.45$, $p < .001$.

The interpretive form of secondary control was employed based on previous research showing this factor to be most highly associated with good psychological adjustment (see Thompson et al., 1994 for review). Further, recent research conducted by Hladkyj, Perry, Pelletier, & Taylor (2000) effectively illustrates how desirable outcomes such as higher grades, positive emotions, and increased metacognition and motivation

were not associated with passive secondary control (i.e., vicarious, illusory, and predictive-avoidant) but with an engaged (i.e., interpretive) form of secondary control. This subscale is reported by Hladkyj et al. (2000) to have an acceptable degree of internal reliability (Cronbach's alpha = .70).

Writing Assignment AR treatment. AR was presented to students in one of two formats, namely via either a one-page informational handout or a videotape, followed in both conditions by a 15-minute writing assignment. The one-page handout (Appendix C) summarized the benefits of changing dysfunctional causal attributions (e.g., ability) to functional attributions (e.g., effort) and offered suggestions as to more adaptive ways of thinking about negative academic experiences. For instance, it advocated that "rather than thinking a test was too difficult, try thinking in terms of tests appearing difficult when one is not well enough prepared," thereby implying that increased studying may improve future performance.

The 8-minute videotape presentation was identical to that previously used in this laboratory (Menec et al, 1994; Struthers & Perry, 1996), depicting two graduate students in psychology discussing how adopting controllable explanations (causal attributions) for poor performance on an exam in introductory psychology contributed to a subsequent increase in motivation and academic achievement. The main points of the videotaped conversation are reiterated by a male professor who both introduces and summarizes the discussion presented, emphasizing that the manner in which people interpret events in their college experience can influence future performance. The professor also notes that

by perceiving failure as unstable students can take control over how they respond to these events and that this is how successful academic outcomes are ultimately achieved.

The written exercise included as part of the AR intervention was an improved version of that previously described in Hall, Perry, et al. (2000) and Hall, Chipperfield, et al. (2001). The written assignment (Appendix B) consisted of a one-page handout addressing four discussion topics. Three topics were based explicitly upon the three tenets of elaborative processing described by Entwistle (2000), consisting 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, students were first requested to summarize the main points of the videotape, and then to list a number of important reasons for why first year students may not perform as well as they could in their courses. However, in accordance with Weiner's attribution theory (1985), the second topic in the present written assignment was revised to also request that students focus mainly on controllable factors when brainstorming for possible failure attributions. The third topic required students to construct personally relevant examples of how the main points of the videotape could be applied to the way they currently approach their own college courses.

The fourth discussion topic of the written assignment was derived from the written emotional expression task described in Pennebaker (1997), Pennebaker and Seagal (1999), and Smyth (1998). Specifically, students were asked to describe in detail a recent instance in which they performed poorly on an academic exam or assignment, and to freely disclose the emotional impact of this event. In addition, because the

effectiveness of the written assignment may be due to allowing these at-risk students to consider secondary control beliefs, students were also be requested to explain how they were able to learn from this event, or how they were able to reinterpret the event in a positive manner if possible. Furthermore, as suggested by Smyth as well as Pennebaker and Seagal, this topic section also explicitly informed students that their written responses would be considered confidential. Thus, the writing consolidation exercise was based not only on research concerning cognitive elaboration, but also attribution theory and recent written emotional expression research.

No AR treatment. Participants in the No AR treatment condition did not participate in any aspect of attributional retraining. The present design did not require the completion of a filler task by students in the No AR group, in light of a review by Perry et al. (1993) which noted no significant differences between No AR participants who performed a filler task and those who did not.

Dependent Measures (see Table 2 and Appendix A)

Dependent measures involving achievement, motivation, affect, and cognitions were obtained in order to fully assess the influence of perceived control and AR on the overall academic development of college students. Final course grades represent an objective measure of academic achievement, whereas self-reported perceptions of current and future academic success were used to measure students' motivation to succeed. Learning-related emotions of anxiety, boredom, and enjoyment (Pekrun et al., 2000) were also assessed, as were attribution-dependent academic emotions (i.e., guilt, shame, hope, pride; Weiner, 1985), and overall perceptions of stress. Finally, cognitive attributions

were measured in terms of both controllable (i.e., effort, strategy) and uncontrollable ascriptions for academic failure (i.e., ability, luck, instructor, test difficulty).

Perceived success. A single-item measure was used in Phase 3 to assess students' perceptions of academic success on a 10-point Likert scale (1 = very unsuccessful, 10 = very successful; M = 6.20, SD = 2.00), asking students how successful they felt they were in introductory psychology to date. This item was also included in Phase 1 (M = 5.24, SD = 2.61) and was used as a covariate in analyses of the Phase 3 measure.

Positive expectations. Expectations for future academic success were assessed using a 3-item measure in Phase 2 (Cronbach's alpha = .81) and Phase 3 (Cronbach's alpha = .85). Included were two 7-point items from a larger scale used in Hall, Hladkyj, et al. (2000; Cronbach's alpha = .88) and Hladkyj et al. (1998; Cronbach's alpha = .80) which required students to indicate the extent to which they agreed with statements of positive expectations for success in introductory psychology and university in general (1 = not at all true of me, 7 = very true of me). The third item used repeatedly in previous research conducted by this laboratory (Hunter & Perry, 1996; Menec et al., 1994; Perry & Struthers, 1994) required students to select the actual percentage they expect to obtain in introductory psychology using a 10-point scale (1 = 50% or less, 10 = 91-100%). Positive expectations were also assessed in Phase 1 using the above items (Cronbach's alpha = .80) and used as a covariate in analyses on the Phase 3 measure.

Perceived stress. A 7-item measure adapted from Cohen, Kamarck, and Mermelstein (1983) was used in Phase 3 to assess general perceptions of stress over the past month on a 5-category scale (1 = never, 2 = infrequently, 3 = sometimes, 4 =

frequently, 5 = often; Cronbach's alpha = .85), e.g., "How often have you felt nervous and 'stressed'"; "How often have you found that you could not cope with all the things that you had to do?" This scale was included in Phase 1 (Cronbach's alpha = .84) and used as a covariate in analyses on the Phase 3 measure. Perceived stress was also assessed in Phase 2 using a 10-pt version of the above measure constructed for this study (Cronbach's alpha = .85) which assessed how stressed students felt at that moment, e.g., "I feel nervous and 'stressed'." Scores on this scale were divided by 2 (Range = 0-5) in order to align it with the 5-point Phase 1 measure for supplementary analyses (see Rationale for Analyses).

Negative academic emotions. Learning-related anxiety and boredom were measured using 6-item 5-point Likert scales developed by Pekrun et al. (2000) on which students indicated the extent to which each statement reflected their experience in introductory psychology (1 = not at all true, 5 = completely true). Pekrun's anxiety scale (Cronbach's alpha = .81) included items such as "When I have problems learning the material in this course, I get anxious." Cronbach's alphas reported by Hall, Chipperfield, et al. (2001), Pekrun, Titz, Molfenter, and Ingrisch, (1999), and Perry et al. (2001) were .80, .89, and .81, respectively. Learning-related boredom (Cronbach's alpha = .90) was assessed using items such as "The things I have to do for this course are often boring" (Cronbach's alpha = .90, Perry et al., 2001; Cronbach's alpha = .93, Pekrun et al., 1999).

Pekrun's anxiety and boredom measures were also assessed in Phase 1 using these scales (Cronbach's alpha = .79, Cronbach's alpha = .88, respectively) and were used as a covariates in the analyses on anxiety and boredom in Phase 3. Negative

attribution-dependent emotions were also assessed in Phase 3 (Weiner, 1985) using a 10-point, single-item measure of guilt ($M = 3.62$, $SD = 2.35$) and shame ($M = 2.90$, $SD = 2.34$) concerning students' performance in introductory psychology (1 = not at all, 10 = very much so). No Phase 1 correlates were available for inclusion as covariates on these Phase 3 measures.

Positive academic emotions. Learning-related enjoyment was assessed in Phase 3 using a 6-item, 5-point Likert measure of learning-related enjoyment (Cronbach's alpha = .75; 1 = not at all true, 5 = completely true) developed by Pekrun et al. (2000). This course-specific enjoyment scale asked students to indicate the extent to which statements such as "Some topics are so fascinating that I am very motivated to continue studying them" were true of themselves (Cronbach's alpha = .72, Hall, Hladkyj, et al., 2000; Cronbach's alpha = .91, Pekrun et al., 1999). Enjoyment was also assessed in Phase 1 using this scale (Cronbach's alpha = .72) and was used as a covariate in analyses on the Phase 3 measure.

Ten-point, single-item measures of both hope ($M = 6.97$, $SD = 2.06$) and pride ($M = 5.59$, $SD = 2.35$) derived from Weiner's attribution theory (1985) were also assessed in Phase 3. Students are asked to rate themselves as feeling each emotion as it pertained to their performance in introductory psychology (1 = not at all, 10 = very much so). No Phase 1 correlates were available for inclusion as covariates on these Phase 3 measures.

Attributions. Ascriptions for poor performance in introductory psychology were measured on a 10-point scale (1 = not at all, 10 = very much so), with students asked to

respond to the following item: "When you do poorly in your introductory psychology course, to what extent do each of the following explain your performance?" Controllable attributions were assessed in Phase 2 (Cronbach's alpha = .66) and Phase 3 (Cronbach's alpha = .65) using a 2-item measure assessing attributions to both effort and strategy. This measure was included in Phase 1 (Cronbach's alpha = .63) and used as a covariate in analyses on the Phase 3 correlate. Uncontrollable attributions for academic failure were also measured in Phase 2 (Cronbach's alpha = .69) and Phase 3 (Cronbach's alpha = .63) using a 4-item scale summing together attributions for poor performance to ability, luck, course professor, and test difficulty. This scale was also assessed in Phase 1 (Cronbach's alpha = .61) and used as a covariate in analyses on the Phase 3 measure.

High school grades. An estimate of students' high school grades was obtained in Phase 1 by asking students to indicate their overall average percentage in their last year of high school ($M = 7.28$, $SD = 1.75$; 1 = 50% or less, 10 = 92-100%). High school grade was correlated with final course grades, $r(964) = .39$, $p < .001$, in keeping with Perry et al. (2001), $r(507) = .51$, $p < .01$, and was used as a covariate when analysing final grades.

Final course grades. In order to assess the impact of attributional retraining on actual academic achievement for this particular at-risk group, final course grade percentages in introductory psychology and performance on course-related tests and assignments were obtained from professors for students who consented. Final grades are comprised of grades received on exams, assignments, essays, etc. administered throughout the academic year ($M = 70.56\%$, $SD = 13.23$, Range = 16.28-99.50%). Similar to performance measures involving lecture-based achievement test results, final

grades in introductory psychology have been used repeatedly in previous research conducted by this laboratory (see Table 1). This measure is an objective indicator of academic achievement on which the impact of dispositional and situational factors, as well as attributional retraining techniques are most accurately assessed.

Procedure

The study consisted of four phases in which students assigned to the experimental condition participated in the first three phases of the study and students assigned to the No AR condition participated in only the first and third phases of the study (Table 3). Students were assigned to experimental conditions based on which section of the introductory psychology course they were enrolled. Phase 4 of the study which involved the obtaining of final course grades was not referred to during either recruitment period as student participation in this phase was not required. In addition, Phase 2 was also not mentioned during recruitment as students in the No AR condition did not participate in this phase, and to prevent students in the experimental condition from knowingly volunteering for an intervention shown to improve academic performance.

Phase 1. Phase 1 of the study occurred in a classroom setting, six weeks after the regular academic session began (October). Phase 1 was timed intentionally to ensure that all students had written and received feedback on at least one introductory psychology exam and had some indication of how they were performing in their college courses, giving them a basis upon which to respond to the questionnaire. Each participant received two 2-page handouts, the first comprised of a consent form describing the focus of the study on students' attitudes towards their university experience as well as an introductory

Table 3

Overview of Phases and Measures for the Control and Experimental Procedures

PHASE	PROCEDURE	PARTICIPANTS	MEASURES OBTAINED
Phase 1:	Screening Questionnaire	Control & Experimental (No AR, AR)	Primary Control Secondary Control
Phase 2:	Attributional Retraining & Post-AR Questionnaire	Experimental (AR) only	AR vs No AR Expectations Attributions Stress
Phase 3:	Follow-up Questionnaire	Control & Experimental (No AR, AR)	Perceived Success Expectations Emotions & Stress Attributions Perceived Control
Phase 4:	Achievement Measures	Control & Experimental (No AR, AR)	Test Scores Final Grades

psychology grade release form. The second handout consisted of a copy of the consent form and a voluntary study withdrawal form to be kept in their possession.

Participants in the No AR condition were given versions of the handouts with no mention of attributional retraining, whereas participants in the experimental condition received the AR version of the handouts in which the intervention was explicitly described. Participants then completed an initial questionnaire including the academic primary control and interpretative secondary control measures (Appendix A), Phase 1 correlates of the dependent measures (used as pre-AR covariates), in addition to various demographic and background items (e.g., high school grade average, psychology course instructor). Upon completing the questionnaire, participants in the experimental condition were asked to remain in their seats, whereas students in the No AR condition were dismissed.

Phase 2. This phase of the study consisted of the administration of attributional retraining to participants recruited into the experimental condition. This phase occurred immediately following Phase 1 and conducted in the same classroom setting. Students in the handout and writing AR condition (n = 140) first received a brief explanation of the AR handout by the experimenter (Appendix C), and were then allowed to study the handout for a few minutes before starting the writing assignment. Participants in the videotape and writing AR condition (n = 388) were first shown the 8-minute attributional retraining videotape, after which the written assignment was completed (Appendix B). As per the recommendations of Smyth (1998) and Pennebaker and Seagal (1999), students were instructed to write continuously for a period of approximately 15 minutes.

Upon the completion of the written assignment, participants were required to complete a brief post-intervention questionnaire which included measures of positive expectations, perceived stress, and attributions. All participants in the AR treatment were then provided an AR handout to keep in their possession after the writing assignment was complete and they were subsequently dismissed. The present design did not require the completion of a filler task by students in the No AR group (n = 565), in keeping with of a review by Perry et al. (1993) which showed no significant differences between No AR participants who performed a filler task and those who did not.

Phase 3. All participants were then expected to attend Phase 3, which for most students was conducted two months into the second academic term (February) in the same classroom setting used in Phase 1 (n = 305). However, due to time restrictions some students were required to complete Phase 3 in sessions conducted one month previously (n = 117). During all Phase 3 sessions, participants completed a follow-up questionnaire that included the dependent measures of perceived success, positive expectations, perceived stress, academic emotions, attributions, and perceived control. After the questionnaire was completed, debriefing forms were distributed and participants were dismissed.

Phase 4. Phase 4 of the study (May) occurred two months following the final Phase 3 session, and involved the experimenter obtaining introductory psychology exam scores and final grades from course instructors for consenting students.

ANCOVA Results

Rationale for Analyses

The analytic model was based on students' perceptions of academic primary control (PC) and interpretive academic secondary control (SC) being used to create either "low" or "high" groupings on these measures with a median split (see Method) following Perry et al. (2001). A median-split approach was chosen as the analytic approach since the focus of this study was to examine more distinct categories of low or high primary and secondary control as representing prototypic groups of students found in college classrooms. Further, as only students relying on primary control solely or both primary and secondary control in combination are of theoretical and empirical significance according to Rothbaum et al. (1982) and recent research on college students (Hall, Chipperfield, et al., 2001; Hall, Clifton, et al., 2001; Hall, Hladkyj, et al., 2000), only high-PC students were assessed in the ANOVA analyses. Table 4 shows the means and standard deviations for the unsuccessful and successful high-PC/low-SC (at-risk) and high-PC/high-SC (optimal) students, and Table 5 displays this information for excluded students in the low-PC/low-SC and low-PC/high-SC groups.

Students were classified as having had either an academic failure (below 60%) or success experience (above 80%) early in the academic year based on how they performed on their first test in introductory psychology. An extreme separation of the student groups into non-overlapping distributions was employed in order to ensure that students scoring below average perceived themselves as less successful than their higher scoring counterparts, $t(479) = 29.15$, $p < .001$. Analyses were conducted separately for

Table 4

Adjusted Means and Standard Deviations for High-PC Students[a]

	Unsuccessful				Successful			
	High-PC/Low-SC		High-PC/High-SC		High-PC/Low-SC		High-PC/High-SC	
	No AR	AR	No AR	AR	No AR	AR	No AR	AR
				Perceived success[b]				
M	4.58	3.38	4.60	5.56	7.58	7.86	8.18	8.21
SD	1.98	1.65	1.93	1.09	1.37	1.45	1.18	0.81
(n)	14	10	12	14	48	38	29	40
				Positive expectations[c]				
M	13.35	11.52	11.60	13.88	18.77	20.52	20.25	19.66
SD	3.99	2.32	3.75	2.87	2.99	2.48	2.74	3.04
(n)	14	10	11	14	49	38	29	37
				Perceived stress				
M	20.64	26.59	22.84	20.63	21.52	21.16	21.81	20.48
SD	3.83	6.46	5.23	5.23	4.72	5.40	5.79	4.92
(n)	14	10	11	14	47	37	30	41
				Course anxiety				
M	14.70	19.54	15.16	14.59	13.43	12.76	12.49	11.30
SD	4.47	4.58	3.80	4.28	5.22	4.76	4.77	4.02
(n)	12	10	12	14	47	38	30	41
				Course boredom				
M	20.10	21.69	20.76	20.59	20.51	20.70	21.55	20.80
SD	1.47	1.87	2.44	2.16	2.11	1.66	2.12	1.43
(n)	11	10	12	15	48	37	30	41
				Guilt				
M	4.07	5.70	3.92	3.36	2.49	3.13	2.40	2.65
SD	2.20	2.67	2.64	1.98	1.98	2.47	1.99	2.19
(n)	14	10	12	14	49	38	30	40
				Shame[c]				
M	3.48	5.90	4.29	3.12	1.78	1.67	1.73	1.23
SD	2.41	3.67	3.08	2.06	1.45	1.21	1.60	0.58
(n)	14	9	12	14	48	38	30	41

Table 4 (Continued)

	Unsuccessful				Successful			
	High-PC/Low-SC		High-PC/High-SC		High-PC/Low-SC		High-PC/High-SC	
	No AR	AR	No AR	AR	No AR	AR	No AR	AR
				Course enjoyment				
M	20.12	19.29	19.84	21.61	20.62	19.92	21.62	20.80
SD	4.27	2.70	4.84	3.89	3.97	3.78	3.45	3.77
(n)	14	9	12	14	47	38	29	40
				Hope				
M	7.21	6.80	6.58	6.14	7.53	7.34	8.50	7.90
SD	2.04	2.35	2.11	2.41	1.94	1.95	1.55	1.61
(n)	14	10	12	14	49	38	30	40
				Pride				
M	4.77	3.80	3.92	4.86	6.84	6.74	7.10	7.42
SD	2.31	3.08	2.31	1.75	2.00	2.27	2.35	1.76
(n)	13	10	12	14	49	38	30	41
				Controllable attributions				
M	14.13	13.89	15.34	15.44	15.73	14.56	15.80	15.23
SD	3.18	5.92	4.11	2.97	2.73	3.59	4.36	3.76
(n)	14	10	11	15	48	38	29	41
				Uncontrollable attributions				
M	18.95	14.94	18.46	14.45	19.60	16.31	20.52	15.78
SD	6.02	4.89	6.22	7.52	6.66	6.11	7.99	6.20
(n)	14	10	11	14	47	38	29	41
				Final course grade[d]				
M	51.33	61.43	57.86	55.48	84.06	84.06	84.70	83.16
SD	15.75	4.86	12.65	9.48	7.60	6.95	7.88	7.21
(n)	22	12	19	18	51	40	32	50

Note. AR = attributional retraining; PC = primary control; SC = secondary control.

[a]Cell sizes differ as a function of the point in time measures were obtained. [b]All measures except Weiner's emotions evaluated with Phase 1 correlates as covariates. [c]Evaluated with Phase 3 session time as covariate. [d]All measures except Final Grade (Phase 4) were assessed in Phase 3.

Table 5

Adjusted Means and Standard Deviations for Low-PC Students (Excluded)[a]

	Unsuccessful				Successful			
	Low-PC/Low-SC		Low-PC/High-SC		Low-PC/Low-SC		Low-PC/High-SC	
	No AR	AR	No AR	AR	No AR	AR	No AR	AR
				Perceived success[b]				
M	4.22	5.05	5.15	4.31	7.70	7.15	7.70	7.66
SD	1.61	1.47	2.04	1.75	1.49	1.48	1.34	0.89
(n)	38	21	18	25	21	20	16	8
				Positive expectations[c]				
M	11.44	12.83	13.11	11.74	18.91	18.14	18.67	19.27
SD	3.44	4.41	3.43	4.08	2.81	3.32	3.24	1.83
(n)	36	20	18	24	19	20	16	8
				Perceived stress				
M	23.26	22.46	21.49	23.83	22.80	22.82	22.93	22.59
SD	4.91	4.94	5.23	5.21	4.71	4.77	4.64	4.93
(n)	35	21	17	24	21	20	15	8
				Course anxiety				
M	17.62	16.05	17.17	17.27	14.15	14.81	15.71	14.77
SD	4.17	3.68	4.31	5.08	4.63	3.86	3.74	3.81
(n)	38	21	16	25	21	20	16	8
				Course boredom				
M	20.70	20.47	21.24	20.98	20.40	19.71	20.38	19.58
SD	1.99	1.83	2.43	2.14	2.25	2.01	1.54	2.64
(n)	37	21	17	26	21	19	16	7
				Guilt				
M	4.16	4.57	4.56	4.92	3.29	3.80	2.44	3.38
SD	1.84	2.06	1.82	2.48	2.31	2.69	1.50	2.00
(n)	38	21	18	26	21	20	16	8
				Shame[c]				
M	4.25	4.68	3.66	4.56	2.83	2.25	2.13	1.58
SD	2.50	2.62	2.52	3.11	2.37	2.16	1.34	0.71
(n)	37	21	18	26	21	20	16	8

Table 5 (Continued)

	Unsuccessful				Successful			
	Low-PC/Low-SC		Low-PC/High-SC		Low-PC/Low-SC		Low-PC/High-SC	
	No AR	AR	No AR	AR	No AR	AR	No AR	AR
				Course enjoyment				
M	18.28	17.85	19.96	19.84	18.60	19.05	18.53	19.24
SD	3.63	3.41	3.75	4.85	3.52	4.43	3.72	5.34
(n)	38	21	16	24	20	20	15	8
				Hope				
M	5.58	5.86	7.22	6.42	6.43	6.85	7.44	7.75
SD	2.02	2.15	1.48	2.48	1.91	1.90	1.59	2.87
(n)	38	21	18	26	21	20	16	8
				Pride				
M	4.34	4.71	5.44	4.85	5.67	5.65	5.81	6.75
SD	2.26	2.43	2.18	2.87	2.13	2.35	2.23	1.58
(n)	38	21	18	26	21	20	16	8
				Controllable attributions				
M	12.77	13.86	12.98	13.30	13.24	13.73	14.10	15.03
SD	3.54	3.93	3.09	3.57	2.69	4.56	3.44	1.58
(n)	36	21	17	25	19	20	16	8
				Uncontrollable attributions				
M	22.50	19.01	22.00	19.55	20.03	21.03	22.63	17.90
SD	7.00	5.59	4.57	5.57	5.61	6.81	5.65	6.92
(n)	37	18	15	24	21	20	15	8
				Final course grade[d]				
M	58.40	57.94	58.05	58.70	82.96	78.75	82.48	82.45
SD	9.82	11.92	11.21	10.58	5.94	7.73	5.67	5.56
(n)	49	25	25	30	25	19	16	9

Note. AR = attributional retraining; PC = primary control; SC = secondary control.

[a]Cell sizes differ as a function of the point in time measures were obtained. [b]All measures except Weiner's emotions evaluated with Phase 1 correlates as covariates. [c]Evaluated with Phase 3 session time as covariate. [d]All measures except Final Grade (Phase 4) were assessed in Phase 3.

unsuccessful and successful students because according to Rothbaum et al. (1982), as high-PC/low-SC students are expected to outperform high-PC/low-SC students only following an academic failure experience.

As such, the main analyses consisted of perceived control (high-PC/low-SC, high-PC/high-SC) by attributional retraining (AR vs. No AR) 2 x 2 analyses of covariance (ANCOVAs) using end-of-year attributions, motivation, emotion, and achievement measures as dependent variables (see Table 4 for means and standard deviations). To control for initial differences on the dependent variables between the treatment conditions (i.e., high school grades: $F(1, 1072) = 2.75$, $p < .10$; enjoyment: $F(1, 1073) = 15.74$, $p < .001$; boredom: $F(1, 1076) = 9.84$, $p < .01$; uncontrollable attributions: $F(1, 1065) = 14.91$, $p < .001$), corresponding Phase 1 measures were included as covariates in the analyses for successful and unsuccessful students where available (see Method). Furthermore, the Phase 3 session time (i.e., January vs. February) was also entered as a covariate for analyses on positive expectations and shame in order to control for the marginally significant differences found on these measures between these two groups (see Preliminary Analyses).

Based on proposed directional hypotheses, one-tailed t-tests were used to compare at-risk (high-PC/low-SC) and optimal (high-PC/high-SC) students in the No AR condition on final grades, perceived success, perceived stress, and Pekrun's academic emotions, with at-risk students expected to be worse off on these measures (see Hall, Hladkyj, et al., 2000). One-tailed t-tests were also used to compare the AR and No AR groups for unsuccessful high-PC/low-SC students on achievement, perceived stress,

Pekrun's emotions, and positive expectations (see Hall, Chipperfield, et al., 2001). As such, these students were expected to obtain better grades, but also experience decreases in motivation and positive affect (and increased negative affect) following AR, due to initially unrealistic expectations of future academic success. One-tailed t-tests were also used to compare the AR and No AR conditions for unsuccessful high-PC/low-SC and high-PC/high-SC students on uncontrollable attributions, and unsuccessful high-PC/low-SC students on interpretive secondary control (see Supplementary Analyses).

However, two-tailed t-tests were used to assess a number of proposed non-directional hypotheses, as follows: 1) for successful students within each level of perceived control and AR (i.e., high-PC/low-SC: AR vs. No AR; high-PC/high-SC: AR vs. No AR, etc.); 2) between the AR and No AR groups for unsuccessful high-PC/high-SC students (except on uncontrollable attributions); 3) between the AR conditions for unsuccessful at-risk students on attributions and Weiner's emotions (i.e., high-PC/low-SC: AR vs. No AR); and 4) between the optimal and at-risk students for the unsuccessful No AR group on these two dependent measures and positive expectations. Two-tailed t-tests were also used for unsuccessful students in the AR treatment condition.

Supplementary ANCOVA analyses were conducted on measures of primary and secondary control in Phase 3 to assess potential AR-related increases in secondary control for unsuccessful high-PC/low-SC students. Phase 1 primary and secondary measures were also included as covariates in analyses on their respective Phase 3 correlates. To assess hypothesized increases in perceived stress, controllable attributions, and

expectations immediately following the AR treatment, supplementary repeated measures ANOVAs were also conducted on Phase 1 and 2 levels of these measures.

Preliminary Analyses

AR treatment conditions. Preliminary two-tailed t-tests revealed no significant differences between the two AR treatments (handout and writing, videotape and writing) on any of the dependent variables. Specifically, these AR formats did not differ significantly on final grades (handout AR: $M = 71.83$, videotape AR: $M = 71.71$), $t(451) = .09$, ns; nor did they differ on controllable attributions (handout AR: $M = 14.46$; videotape AR: $M = 14.45$), $t(418) = .02$, ns. Similarly, these conditions did not differ significantly on emotions such as perceived stress (handout AR: $M = 22.37$; videotape AR: $M = 22.34$), $t(413) = .05$, ns; and hope (handout AR: $M = 7.10$; videotape AR: $M = 7.11$), $t(417) = .05$, ns. As such, both groups were combined into one AR condition which was compared with the No AR treatment (control) condition.

Phase 3 sessions. To assess potential differences on the dependent measures due to Phase 3 being conducted one month apart in the second academic term (i.e., January vs. February), two-tailed t-tests were conducted comparing these two groups. Significant differences were found on only two measures, namely positive expectations (January: $M = 16.26$; February: $M = 15.63$), $t(845) = 1.97$, $p < .05$; and shame (January: $M = 2.66$; February: $M = 3.01$), $t(845) = 2.00$, $p < .05$. Likewise, Phase 3 session time (i.e., January vs. February) was used as a covariate for analyses on these two measures.

Group proportions. One-way chi-square analyses were used to compare the proportion of unsuccessful and successful students in high-PC/low-SC and high-PC/high-

SC groups. Significant differences were found between the four groups, χ^2 (1, 3) = 36.88, $p < .001$, such that a much greater proportion of successful students (69%) were classified as high in academic primary control than unsuccessful students (31%). Chi-square analyses showed significant differences in group size between the unsuccessful and successful groups for high-PC/low-SC students, $\chi^2 = 23.82$, $p < .001$, and high-PC/high-SC students alike, $\chi^2 = 12.90$, $p < .001$. As such, these differences suggest that initially more unsuccessful students perceived their academic environment as less controllable than successful students.

Further analyses revealed no significant differences between the perceived control groups for unsuccessful students, $\chi^2 = .46$, ns, and successful students, $\chi^2 = .47$, ns. It is of interest to note however, that although the high-PC/low-SC group was the smaller of the unsuccessful groups (46%), the majority of successful students in fact belonged to this group (53%). According to Rothbaum et al. (1982), these proportions are not surprising considering the highly aversive nature of unmitigated persistence in response to failure, and that neglecting secondary control beliefs is in fact a luxury afforded by academic success.

Attrition. One-way chi-square analyses were also computed to test whether sample attrition was disproportionate in the four experimental (PC x AR) groups for successful and unsuccessful students, respectively, using two measures: attendance in Phase 3 and introductory psychology course completion (final grades). The two measures convey different dynamics in that attendance in Phase 3 (follow-up questionnaire) was affected by the number of experimental credits a student had prior to Phase 3, time pressure,

illness, and so forth, whereas the Phase 4 final grades measure is less affected by these factors. For instance, among students for whom grades information was obtained, 84% of those who did not attend Phase 3 did complete the course, whereas about 2% of students who completed Phase 3 subsequently withdrew from the course (i.e., did not receive a final grade) or did not complete the final or last few course exams.

For unsuccessful students, no significant differences were found between the four groups on Phase 3 attendance, $\chi^2(1, 3) = 2.31$, $p > .05$, or final grades, $\chi^2(1, 3) = 1.00$, $p > .05$. Among successful students, significant group differences were found for Phase 3 attendance, $\chi^2(1, 3) = 8.50$, $p < .05$, with most students who withdrew from the study being high-PC/high-SC students in the No AR condition ($n = 9$; 18% of high-PC/high-SC students). However, considering that 37% of unsuccessful students on average withdrew from the study, and that no successful students in this study withdrew from the course, this finding is of little concern. The proportion of students who attended Phase 3 and who completed the course was the same for all other experimental groups (i.e., PC x AR 4 groups) for successful and unsuccessful students.

Test performance effects. To assess the overall differences between unsuccessful ($n = 234$) and successful students ($n = 256$), one-tailed t-tests on all Phase 3 dependent measures were conducted, with successful students expected to show optimal levels on all measures. As anticipated, significant differences were found on all measures in favor of successful students, except on learning-related boredom and uncontrollable attributions. Specifically, successful students surpassed their unsuccessful counterparts in terms of final grades (Ms = 83.32%, 57.48%, respectively), $t(474) = 29.20$, $p < .001$;

motivation (i.e., positive expectations: Ms = 19.38, 12.25, respectively), t(389) = 20.33, p < .001; perceived stress (Ms = 21.65, 22.73, respectively), t(384) = 2.04, p < .05; positive affect (i.e., learning-related enjoyment: Ms = 20.11, 19.22, respectively), t(386) = 2.12, p < .05; and controllable attributions (Ms = 14.89, 13.64, respectively), t(391) = 3.36, p < .01.

Correlations. Preliminary analyses revealed a number of significant correlations between variables, as would be expected considering the academic nature of these measures (see Table 6). For instance, a pattern of logically consistent correlations were found for the final grade measure, an objective measure of academic performance, which was significantly correlated in the expected direction with high school grades, primary control, and Phase 3 measures of motivation, negative affect, positive affect, and controllable attributions. Of particular interest is that, although primary academic control was correlated with all variables except guilt, secondary control was not significantly correlated with negative affect, uncontrollable attributions, nor academic achievement.

An intriguing pattern of correlations was also found for learning-related boredom, which was not correlated with motivation or achievement, but positively correlated with all other dependent measures including positive and negative affect. These correlations may indicate that boredom may serve as a defensive "disengaging" mechanism for students who experience high anxiety, contributing to a sense of relief and fostering greater positive affect and perceptions of control for these students concerning their courses (Ruthig, Perry, Hladkyj, Hall, Pekrun, & Chipperfield, 2002). This is counter to the view that boredom results from lack of challenge in the classroom (e.g., Larson &

Table 6

Zero-Order Correlations Among Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Primary control[a]	—															
2. Secondary control[a]	.11*	—														
3. Perceived success[b]	.26*	.07*	—													
4. Expectations[b]	.27*	.10*	.74*	—												
5. Perceived stress[b]	-.21*	-.00	-.21*	-.19*	—											
6. Course anxiety[b]	-.24*	-.02	-.33*	-.31*	.45*	—										
7. Course boredom[b]	.07*	.14*	.05	-.00	.14*	.10*	—									
8. Guilt[b]	-.05	-.02	-.39*	-.40*	.23*	.33*	.10*	—								
9. Shame[b]	-.21*	-.05	-.46*	-.45*	.32*	.39*	.13*	.58*	—							
10. Course enjoyment[b]	.17*	.26*	.22*	.25*	.03	-.04	.20*	-.07†	-.12*	—						
11. Hope[b]	.18*	.19*	.32*	.35*	-.05	-.08*	.18*	-.11*	-.20*	.27*	—					

Table 6 (Continued)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
12. Pride[b]	.18*	.15*	.56*	.52*	-.18*	-.23*	.09*	-.35*	-.43*	.33*	.44*	—				
13. Cont. attributions[b]	.22*	.06†	.16*	.15*	.03	-.06†	.14*	.08*	-.02	.07*	.20*	.12*	—			
14. Uncont. attributions[b]	-.24*	-.01	-.09*	-.09*	.20*	.26*	.01	.10*	.14*	-.07*	.02	-.06†	.12*	—		
15. Final course grade[c]	.18*	.01	.69*	.69*	-.10*	-.27*	-.01	-.32*	-.39*	.09*	.32*	.42*	.15*	-.02	—	
16. High school grade[a]	.09*	.03	.29*	.34*	.01	-.08*	-.01	-.15*	-.14*	-.03	.13*	.16*	.11*	.04	.39*	—
M	42.36	25.89	6.20	15.83	22.13	15.00	20.73	3.62	2.90	19.81	6.97	5.59	14.31	19.32	70.56	7.28
SD	4.67	5.36	2.00	4.34	5.24	4.91	2.21	2.35	2.34	4.10	2.06	2.35	3.67	6.59	13.23	1.75

Note. Cont. = controllable; Uncont. = uncontrollable.

[a]Phase 1 measure. [b]Phase 3 measure. [c]Phase 4 measure.

†$p < .10$. *$p < .05$.

Richards, 1991), which would be indicated by negative correlations between boredom and measures of negative affect.

Unsuccessful Students

See Table 7 for the F-table of ANCOVA main and interaction effects for unsuccessful students, and Table 8 for a summary of AR effects on the end-of-year dependent measures.

Academic Achievement

Introductory psychology final grades. A significant 2-way interaction on end-of-year final course grades (see Figure 3), $F(1, 66) = 4.35$, $p < .05$, indicated that high-PC/low-SC students in the Writing Assignment AR condition ($M = 51.33\%$) scored approximately 10 percent higher than their counterparts in the No AR condition ($M = 61.43\%$). A priori contrasts found a significant treatment effect for high-PC/low-SC students, $t(39) = 1.71$, $p < .05$, and also showed high-PC/high-SC students ($M = 57.86\%$)outperforming their high-PC/low-SC counterparts by 6.5% in the No AR condition, $t(32) = 2.31$, $p = .01$.

Academic Motivation

Perceived success. A significant main effect of perceived control on end-of-year perceptions of academic success was observed, $F(1, 45) = 4.78$, $p < .05$, with high-PC/low-SC students ($M = 3.98$) reporting lower perceived success than high-PC/high-SC students ($M = 5.08$). However, this effect was noticeably due to a significant 2-way interaction, $F(1, 45) = 4.67$, $p < .05$, with high-PC/low-SC and high-PC/high-SC students showing opposite motivational reactions to the AR treatment. A priori contrasts found

Table 7

F-Table of Main Effects and Interactions for Unsuccessful Students

			Perceived control (PC)[b]		Attributional retraining (AR)		PC x AR	
Measure	MSE	df[a]	MS	F	MS	F	MS	F
Perceived success	2.91	45	13.89	4.78*	0.19	0.07	13.57	4.68*
Expectations	10.61	43	1.03	0.10	0.59	0.06	49.20	4.64*
Perceived stress	19.91	44	41.74	2.10	41.22	2.07	196.89	9.89**
Course anxiety	15.85	43	56.78	3.58†	53.75	3.39†	84.98	5.36*
Course boredom	3.85	43	0.56	0.15	5.75	1.49	8.98	2.33
Guilt	5.55	46	19.12	3.45†	3.50	0.63	14.68	2.65
Shame	7.74	44	10.87	1.41	4.57	0.59	37.87	4.89*
Course enjoyment	13.12	44	12.31	0.94	2.54	0.19	20.10	1.53
Hope	4.97	46	5.09	1.02	2.24	0.45	0.00	0.00
Pride	5.52	45	0.13	0.02	0.00	0.00	11.00	1.99
Cont. attributions	15.54	45	22.54	1.45	0.06	0.00	0.35	0.02
Uncont. attributions	27.30	44	2.77	0.10	193.08	7.07*	0.00	0.00
Final course grade	148.17	66	1.36	0.01	242.02	1.63	644.06	4.35*

Note. Cont. = controllable; Uncont. = uncontrollable.

[a]Numerator df = 1 for all F-tests. [b]Perceived control: High primary/low secondary, high primary/high secondary.

†$p < .10$. *$p < .05$. **$p < .01$.

Table 8

Overview of AR Effects on the Phase 3 Variables

	Unsuccessful students		Successful students	
	At-Risk	Optimal	At-Risk	Optimal
Academic achievement				
Final grades	Increase	None	None	None
Academic motivation				
Perceived success	Decrease	None	None	None
Positive expectations	None	None	Increase	None
Negative affect				
Stress (overall)	Increase	None	None	None
Anxiety (academic)	Increase	None	None	None
Boredom	Increase	None	None	None
Guilt	None	None	None	None
Shame	Increase	None	None	None
Attributions				
Controllable	None	None	None	None
Uncontrollable	Decrease	Decrease	Decrease	Decrease

Note. At-risk = high primary/low secondary control; Optimal = high primary/high secondary control.

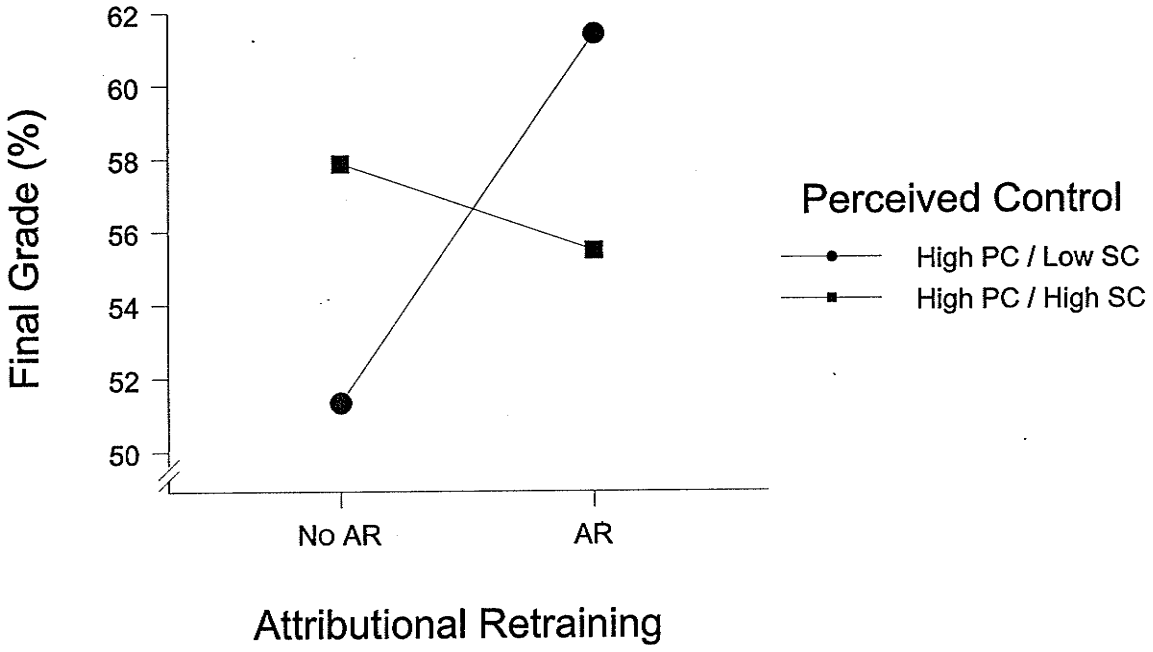

Figure 3. Attributional Retraining (AR) by Perceived Control on Final Course Grade (%) for Unsuccessful Students.

high-PC/low-SC students students reporting significantly lower perceived success than high-PC/high-SC students only in the AR treatment condition (Ms = 3.38, 5.56, respectively), t(22) = 3.09, p < .01. As expected, a priori contrasts also demonstrated significant lower perceptions of success among high-PC/low-SC students in the Writing Assignment AR condition (M = 3.38) relative to high-PC/low-SC controls (M = 4.58), t(22) = 1.71, p < .05. The same a priori comparison for high-PC/high-SC students did not reach significance, t(24) = 1.42, p = .15.

Positive expectations. A significant 2-way interaction was found on academic expectations in Phase 3, F(1, 43) = 4.64, p < .05, again showing opposite end-of-year motivational consequences for high-PC/low-SC and high-PC/high-SC students following AR (see Figure 4). However, a priori contrasts between high-PC/low-SC and high-PC/high-SC students only in the Writing Assignment AR condition (Ms = 11.52, 13.88, respectively) were not significant, t(22) = 1.74, p = .082. A priori contrasts between the AR and No AR conditions for high-PC/low-SC students (No AR: M = 13.35) and high-PC/high-SC students (No AR: M = 11.60) were also not significant (t(22) = 1.35, p = .089, t(23) = 1.73, p = .084, respectively).

In order to assess the accuracy of unsuccessful students' expectations for future academic success, anticipated introductory psychology final grades at Phase 3 controlling for Phase 1 levels (1 = 50% or less, 10 = 91-100%) were contrasted with the actual final course grades obtained. On average, high-PC/low-SC students in the No AR condition and high-PC/high-SC students in general were overly optimistic, expecting final grades in the range of 66-70% but actually receiving much lower grades (high-PC/low-SC - No

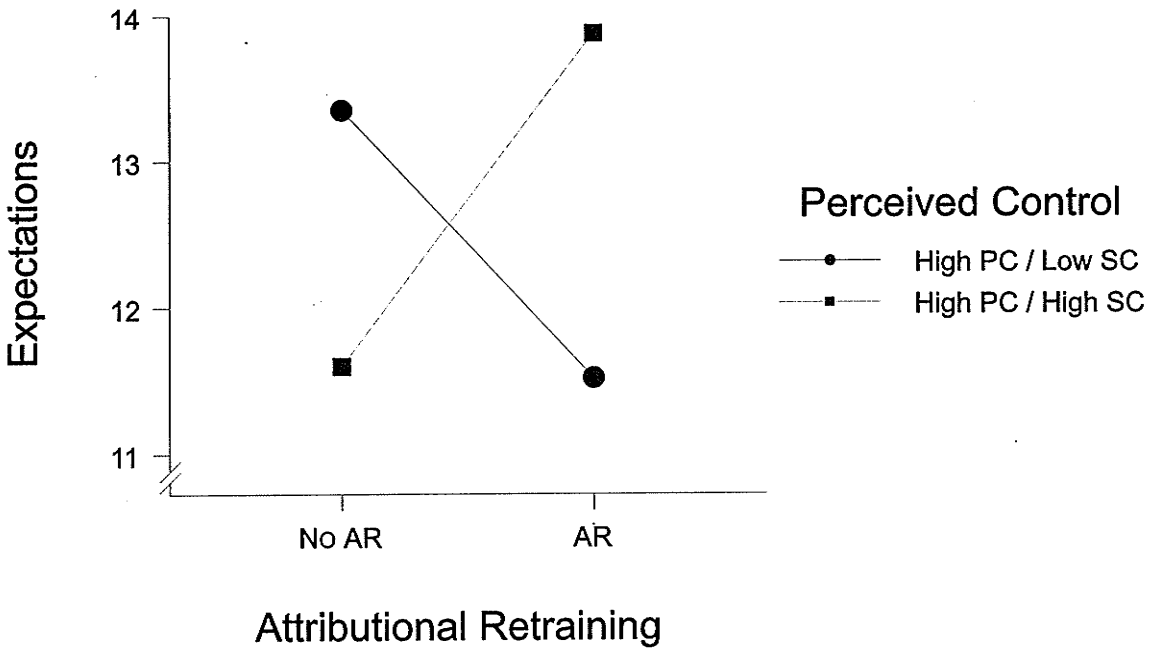

Figure 4. Attributional Retraining (AR) by Perceived Control on Academic Expectations for Unsuccessful Students.

AR: M = 51.33%; high-PC/high-SC - all: M = 56.67%). However, as expected, the lower positive expectations of high-PC/low-SC students in the Writing Assignment AR condition in fact reflected a more realistic estimation of end-of-year performance (expected range: M = 61-65%; final grade: M = 61.43%).

Emotions

Perceived stress. A significant 2-way interaction was found on end-of-year perceived stress, $F(1, 44) = 9.89$, $p < .01$, with high-PC/low-SC students in the AR treatment condition (M = 26.59) reporting higher levels of stress than other unsuccessful students. As predicted, a priori contrasts on stress were significant between the AR conditions for high-PC/low-SC students (No AR: M = 20.64), $t(22) = 3.22$, $p < .001$, with a significant contrast also found in the AR treatment condition between the two perceived control groups (M = 20.63), $t(22) = 3.23$, $p < .001$.

Negative academic emotions. A significant 2-way interaction was found on end-of-year learning-related anxiety, $F(1, 43) = 5.36$, $p < .05$, in which high-PC/low-SC students in the Writing Assignment AR condition (M = 19.54) reported higher levels of course-specific anxiety relative to other unsuccessful students (see Figure 5). As expected, a priori contrasts on anxiety showed a significant treatment effect for high-PC/low-SC students (No AR: M = 14.70), $t(20) = 2.84$, $p < .01$, with a significant contrast also found for AR participants between the perceived control groups (M = 14.59), $t(22) = 3.01$, $p < .01$. Although the anticipated pattern of results was found on learning-related boredom, the interaction effect was not significant, $F(1, 48) = 2.33$, $p = .13$. However, a priori contrasts did show significantly higher levels of boredom for high-

PC/low-SC students in the AR treatment condition (M = 21.69) relative to their No AR counterparts (M = 20.10), $t(19) = 1.89$, $p < .05$.

No significant main or interaction effects were found on course-specific feelings of guilt. Although high-PC/low-SC students in the Writing Assignment AR condition (M = 5.70) did report more guilt than all other groups, the interaction effect was not significant, $F(1, 46) = 2.65$, $p = .11$. Similarly, two-tailed a priori contrasts assessing the AR treatment effect for high-PC/low-SC students (No AR: M = 4.07) was also not significant, $t(22) = 1.67$, $p = .095$. However, a significant contrast was found in the AR treatment condition between the perceived control groups (M = 3.36), $t(22) = 2.40$, $p < .05$.

A similar pattern of results was found on feelings of shame, as shown by a significant 2-way interaction on this measure, $F(1, 44) = 4.89$, $p < .03$. A priori contrasts revealed significant differences between the high-PC/low-SC and high-PC/high-SC students who received AR (Ms = 5.90, 3.12, respectively), $t(21) = 2.34$, $p < .05$, and for high-PC/low-SC students between the AR and No AR conditions (No AR: M = 3.48), $t(21) = 2.04$, $p < .05$. Contrary to expectations, high-PC/low-SC students reported greater negative affect than their peers following the Writing Assignment AR on not only Pekrun's but also Weiner's measures of negative affect. However, as anticipated, low levels on both guilt and shame were found for high-PC/low-SC students (Ms = 4.89, 4.69, respectively) and high-PC/high-SC students overall (Ms = 3.64, 3.71, respectively).

Positive academic emotions. No significant main effects, interaction effects, or a priori contrasts were found on learning-related enjoyment, or feelings of hope and pride

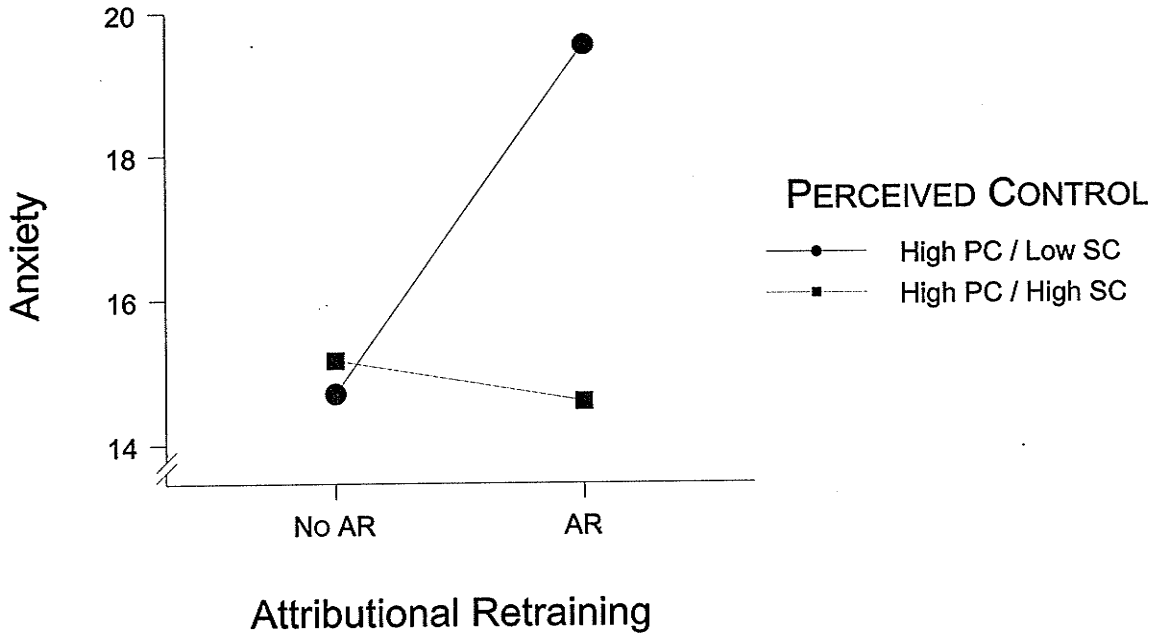

Figure 5. Attributional Retraining (AR) by Perceived Control on Learning-Related Anxiety for Unsuccessful Students.

(as expected for the attribution-dependent emotions). However, a similar trend to that found on academic motivation was observed on these measures, with slightly increased enjoyment and pride found for high-PC/high-SC students following AR, and the reverse found on these measures for high-PC/low-SC students. As expected, high levels of hope and low levels of pride were found for both high-PC/low-SC (Ms = 7.01, 4.29, respectively) and high-PC/high-SC students (Ms = 6.36, 4.39, respectively).

Cognitions

Controllable attributions. None of the main effects, interaction effects, or a priori contrasts on controllable attributions in Phase 3 reached significance. Nonetheless, as anticipated, both perceived control groups continued to report high end-of-year levels of controllable attributions (Ms = 14.01, 15.39, respectively).

Uncontrollable attributions. As expected, a significant attributional retraining main effect observed on end-of-year uncontrollable attributions (AR: M = 14.69; No AR: M = 18.71), $F(1, 44) = 7.07$, $p < .05$. A priori contrasts found this treatment effect to be significant for both high-PC/low-SC, $t(22) = 1.88$, $p < .05$, and high-PC/high-SC students, $t(23) = 1.91$, $p < .05$.

Supplementary Analyses

Perceived control. Potential increases in end-of-year interpretive secondary control beliefs following the Writing Assignment AR treatment for unsuccessful high-PC/low-SC students lacking in these beliefs were also assessed. Although the 2-way interaction effect on secondary control did not reach significance, a priori contrasts did reveal a significant increase in interpretive secondary control following AR only for high-

PC/low-SC students (AR: $M = 26.41$; No AR: $M = 23.23$), $t(22) = 1.90$, $p < .05$. Moreover, the a priori contrast between the perceived control groups in the AR condition, $t(23) = .81$, $p = .42$, and analyses on Phase 3 academic primary control did not produce significant results.

Phase 2 measures. Repeated measures ANOVAs were conducted on Phase 1 and 2 measures to assess changes in perceived stress, attributions, and expectations immediately following the AR treatment. Contrary to expectations, a significant decrease in overall perceptions of stress was found (Phase 1: $M = 23.02$; Phase 2: $M = 15.71$), $F(1, 33) = 62.24$, $p < .001$. This suggests that students did find the failure-oriented AR treatment cognitively engaging, evidenced by a significant decrease rather than an increase in negative affect (i.e., Pennebaker & Seagal, 1999). No significant changes in uncontrollable attributions were found. However, significant increases in controllable attributions (Phase 1: $M = 14.94$; Phase 2: $M = 16.42$), $F(1, 32) = 7.74$, $p < .01$, and positive expectations (Phase 1: $M = 15.83$; Phase 2: $M = 17.47$), $F(1, 23) = 21.18$, $p < .001$, were observed immediately following AR.

Successful Students

See Table 4 for the means and standard deviations of the study variables, and Table 9 for the F-table of ANCOVA main and interaction effects for successful students. See also Table 8 for an overview of AR improvements on the end-of-year dependent measures.

Table 9

F-Table of Main Effects and Interactions for Successful Students

			Perceived control (PC)[b]		Attributional retraining (AR)		PC x AR	
Measure	MSE	df[a]	MS	F	MS	F	MS	F
Perceived success	1.38	150	8.44	6.12*	0.87	0.63	0.57	0.42
Expectations	6.30	147	3.48	0.55	10.10	1.60	47.67	7.57**
Perceived stress	17.74	150	1.42	0.08	26.47	1.49	8.72	0.49
Course anxiety	13.43	151	54.75	4.08*	32.55	2.42	2.57	0.19
Course boredom	2.44	151	12.30	5.05*	2.97	1.22	8.32	3.42†
Guilt	4.69	153	3.11	0.66	7.57	1.62	1.46	0.31
Shame	1.58	152	2.26	1.43	2.99	1.89	1.47	0.93
Course enjoyment	9.87	149	31.78	3.22†	21.41	2.17	0.12	0.01
Hope	3.22	153	22.20	6.91**	5.92	1.84	1.61	0.50
Pride	4.32	154	8.48	1.95	0.44	0.10	1.65	0.38
Cont. attributions	10.77	151	5.23	0.49	28.27	2.63	3.29	0.31
Uncont. attributions	26.55	150	1.49	0.06	603.09	22.71**	19.08	0.72
Final course grade	47.73	168	0.69	0.01	23.64	0.50	24.81	0.52

Note. Cont. = controllable; Uncont. = uncontrollable.

[a]Numerator df = 1 for all F-tests. [b]Perceived control: High primary/low secondary, high primary/high secondary.

†$p < .10$. *$p < .05$. **$p < .01$.

Academic Achievement

Introductory psychology final grades. Although slightly lower introductory psychology final course grades were observed for high-PC/high-SC students in the Writing Assignment AR condition (M = 83.16%), relative to their counterparts in the No AR condition (M = 84.70%), no significant main effects, interaction effects, or a priori contrasts were found on end-of-year academic final grades for successful students.

Academic Motivation

Perceived success. A significant main effect of perceived control on end-of-year perceptions of academic success was found, $F(1, 150) = 6.12$, $p < .05$, with high-PC/low-SC students (M = 7.72) reporting lower perceived success than high-PC/high-SC students (M = 8.20). However, a priori contrasts were significant only between the perceived control groups in the No AR condition (Ms = 7.58, 8.18, respectively), $t(75) = 2.18$, $p < .05$.

Positive expectations. A significant 2-way interaction was found on end-of-year expectations for future academic success, $F(1, 147) = 7.57$, $p < .001$, such that high-PC/low-SC students in the Writing Assignment AR condition (M = 20.52) reported higher positive expectations than their counterparts in the No AR condition (M = 18.77). As such, although a priori contrasts showed significant differences among controls between the two perceived control groups (M = 20.25), $t(76) = 2.51$, $p < .05$, the most significant contrast was the treatment effect for high-PC/low-SC students, $t(86) = 3.30$, $p < .001$.

Emotions

Perceived stress. No significant main effects, interaction effects, or a priori contrasts found on end-of-year overall perceptions of stress. Although, slightly lower stress levels were found in Phase 3 for high-PC/high-SC students in the AR condition (M = 20.48) relative to their peers in the No AR condition (M = 21.81).

Negative academic emotions. A significant main effect of perceived control on end-of-year learning-related anxiety was observed, $F(1, 151) = 4.08$, $p < .05$, with high-PC/low-SC students (M = 13.10) reporting greater anxiety than high-PC/high-SC students (M = 11.89). However, a priori contrasts for anxiety were not significant.

The perceived control main effect on learning-related boredom was significant, $F(1, 151) = 5.05$, $p < .05$, with high-PC/low-SC students (M = 20.61) reporting less boredom than high-PC/high-SC students (M = 21.18). Moreover, the PC x AR interaction was marginally significant, $F(1, 151) = 3.42$, $p = .067$, with high-PC/high-SC students reporting less boredom following AR. However, a priori contrasts were significant only in the No AR condition between high-PC/low-SC (M = 20.51) and high-PC/high-SC students (M = 21.55), $t(76) = 2.86$, $p < .01$. None of the main effects, interaction effects, or a priori contrasts were significant on course-specific feelings of guilt nor shame.

Positive academic emotions. No significant main or interaction effects, nor a priori contrasts were found for end-of-year learning-related enjoyment or feelings of course-related pride. A significant perceived control main effect was observed on feelings of hope, $F(1, 153) = 6.91$, $p < .01$, due to high-PC/low-SC students (M = 7.44) reporting lower levels of hope than high-PC/high-SC students (M = 8.20). However, a significant a

priori contrast was found only in the No AR condition between the high-PC/low-SC (M = 7.53) and high-PC/high-SC groups (M = 8.50), $t(77) = 2.33$, $p < .05$.

Cognitions

Controllable attributions. No significant main effects, interaction effects, or a priori contrasts found on controllable attributions in Phase 3.

Uncontrollable attributions. A significant attributional retraining main effect was observed on end-of-year uncontrollable attributions, $F(1, 150) = 22.71$, $p < .001$, such that students in the Writing Assignment AR condition (M = 16.05) reported lower levels of uncontrollable attributions than students in the No AR condition (M = 20.06). A priori contrasts between the AR and No AR groups were significant for both high-PC/low-SC students (AR: M = 16.31; No AR: M = 19.60), $t(83) = 2.93$, $p < .01$, and high-PC/high-SC students (AR: M = 15.78; No AR: M = 20.52), $t(68) = 3.79$, $p < .001$.

Supplementary Analyses

Phase 2 measures. As found for unsuccessful students, repeated measures ANOVAs revealed a significant decrease in overall perceptions of stress was found immediately following AR (Phase 1: M = 22.22; Phase 2: M = 15.25), $F(1, 86) = 176.28$, $p < .001$. No significant changes in uncontrollable attributions were found. Significant short-term increases were also found on controllable attributions (Phase 1: M = 14.86; Phase 2: M = 15.45), $F(1, 82) = 3.68$, $p = .058$, and positive expectations (Phase 1: M = 20.26; Phase 2: M = 21.11), $F(1, 64) = 22.15$, $p < .001$. However, post hoc two-tailed paired-samples t-tests found significant improvements in Phase 2 controllable attributions only for high-PC/low-SC students, $t(37) = 2.29$, $p < .05$.

Structural Equation Modelling

Rationale for Analyses

In addition to ANCOVA analyses, structural equation modeling (SEM) was also conducted to further explore the interaction between academic primary control (PC), interpretive academic secondary control (SC), and the Writing Assignment AR on academic achievement. First, as interaction effects were expected between these variables only for unsuccessful students, the SEM analyses included only students scoring below 60% on their first test in introductory psychology ($n = 234$). Second, as in the ANCOVA analyses, both AR treatment techniques (handout and writing, videotape and writing) were combined into one AR condition that was compared with the No AR condition. However, as dividing continuous variables into dichotomous measures results in lost variance and often unequal cell sizes (see Group Proportions section above), the main (linear) and interaction effects of the continuous primary and secondary control measures and AR were assessed in the SEM analyses. Furthermore, a number of background variables in addition to high school grades, the only covariate used in ANCOVA analyses on final course grades, were included in these analyses.

The theoretical model underlying these analyses is presented in Figure 6. The model posits that students' academic background (i.e., number of courses enrolled in, introductory psychology course instructor) is the context variable, perceived control and attributional retraining (main effects, 2-way, and 3-way interaction effects) are the independent variables, and academic achievement (i.e., final course grades) is the dependent variable. A number of additional academic and psychosocial background

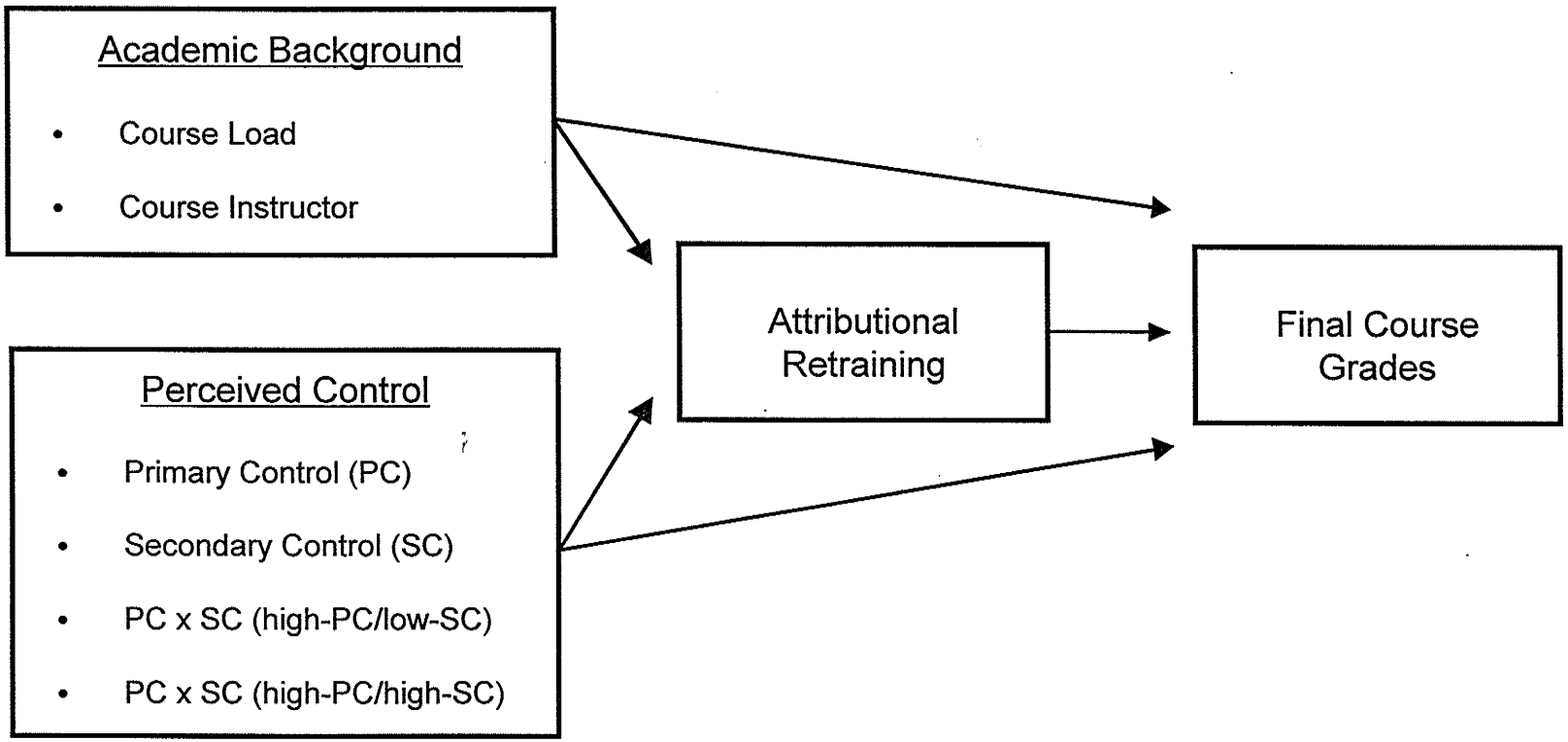

Figure 6. Theoretical Model of Perceived Control and Attributional Retraining Effects on Achievement.

variables obtained in Phase 1 including high school grades, age (1 = 17-18, 2 = 19-20, 3 = 21 and older), gender (1 = male, 2 = female), and English as a second language (1 = no, 2 = yes) were also included in the model.

However, initial correlations revealed significant correlations only between final grades and two single-item background variables (see Table 10 for correlations), the first assessing course load in terms of the number of credit hours enrolled in (1 = 3, 10 = 30 or more; 3 credit hours = 1-semester course), $r(216) = .24$, $p < .001$. The second measure classified introductory psychology course instructors according to the time of day at which their section was taught (1 = afternoon, 2 = morning). Instructors with earlier class times tended to have the higher performing students, possibly due higher motivation levels among these instructors and/or their students, $r(221) = .24$, $p < .001$.

These two background variables were entered in Step 1 of the model, with Step 2 including the linear effects for the independent measures of primary control, secondary control, attributional retraining (1 = No AR, 2 = AR). Steps 3 and 4 then introduced the 2-way perceived control interaction terms to the model (i.e., high-PC/low-SC term: PC x 1/SC; high-PC/high-SC term: PC x SC), albeit independently, as their combined analyses could not be conducted using the SPSS program due to the high multicollinearity between these two interaction terms (see Table 10). Finally, Steps 5 and 6 added in the 3-way interaction terms to Steps 3 and 4, respectively (i.e., PC x 1/SC x AR, PC x SC x AR). The linear variables were centered to represent deviations from their respective means before the construction of the interaction terms. According to Aiken and West (1991), the main advantages of this transformation are that: 1) it reduces multicollinearity between

Table 10

Zero-Order Correlations Among SEM Variables for Unsuccessful Students[a]

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Primary control	—													
2. Secondary control	.13*	—												
3. Writing AR	.09	.15*	—											
4. PC x SC[b]	-.03	-.01	-.01	—										
5. PC x 1/SC	-.47*	-.06	-.03	-.87*	—									
6. PC x SC x AR	.05	.17*	.13†	-.21*	.16*	—								
7. PC x 1/SC x AR	-.03	.15*	-.13†	.17*	-.13†	-.87*	—							
8. Course load	-.02	.02	-.02	.07	-.05	.10	-.11	—						
9. Course instructor	-.10	-.01	.20*	-.17*	.20*	.03	.00	.02	—					
10. High school grade	.07	.03	.12†	-.04	-.00	.02	-.03	.07	-.01	—				

Table 10 (continued)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
11. Age	-.00	.10	.07	.08	-.07	-.08	.08	-.30*	-.12†	-.08	—			
12. Gender	.07	.05	-.00	.04	-.07	-.01	.02	.07	-.04	.18*	-.01	—		
13. English language	.07	-.10	-.09	-.02	-.02	-.02	-.01	.17*	.07	-.12†	-.24*	.00	—	
14. Final course grade	-.13†	.01	.00	.07	-.00	-.04	-.01	.24*	.24*	.06	-.10	.04	.06	—
M	40.45	25.52	1.45	3.40	-3.63	-0.17	-0.47	8.26	1.51	6.60	1.71	1.61	1.88	57.48
SD	4.71	5.35	0.50	25.92	29.31	12.73	14.50	2.07	0.50	1.62	0.79	0.49	0.33	11.35

[a]All measures except Final Grade (Phase 4) were assessed in Phase 1. [b]All interactions were constructed from centered variables.

†$p < .10$. *$p < .05$.

the linear predictors and the corresponding 2-way interaction term, and 2) it allows more meaningful interpretations of the regression coefficients for the main and 2-way interaction variables.

The standardized regression coefficients, $\underline{R}^2$s, and $\underline{F}$ values for change in $\underline{R}^2$ for Steps 1 through 6 are presented in Table 11. However, as multicollinearity between the 2-way and 3-way interaction terms was still evident after centering (see Table 10), the standardized regression coefficients for the 3-way interaction terms in Steps 5 and 6 are not interpretable. Based on the ANCOVA analyses, it was hypothesized that both 2-way interaction terms would increase the proportion of variance in final course grades explained by the model, with the high-PC/low-SC and high-PC/high-SC interaction variables having negative and positive standardized regression coefficients, respectively. Further, a significant increase in $\underline{R}^2$ was anticipated for Step 5 including the PC x 1/SC x AR 3-way interaction, similar to that observed for unsuccessful students on achievement in the ANCOVA analyses. In light of the exploratory nature of the SEM analyses, a liberal significance level of $\underline{p} = .10$ was adopted in order to reduce the likelihood of a Type II error.

Main Analyses

Academic achievement among unsuccessful students was most highly predicted by the academic background variables included in Step 1, with students having a greater course load and in course sections taught by instructors earlier in the day showing significantly higher final course grades. The introduction of primary control, secondary control, and AR in Step 2 did not produce a significant change in $\underline{R}^2$. However, the 2-way

Table 11

Standardized Regression Coefficients and R^2s for Final Course Grades

Variables	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
Course load	.212**	.209**	.202**	.202**	.203**	.207**
Instructor	.265**	.264**	.286**	.286**	.285**	.283**
Primary control		-.110	-.170*	-.102	-.169*	-.099
Secondary control		.034	.039	.039	.041	.049
Writing AR		-.020	-.025	-.025	-.024	-.022
PC x 1/SC			-.137†		-.134†	
PC x SC				.123†		.110
PC x 1/SC x AR					.011[a]	
PC x SC x AR						-.045[a]
R^2	.116	.129	.144	.144	.144	.145
F Change[b]		0.98	3.27†	3.27†	0.02	0.38

[a]Regression coefficients for the 3-way interaction terms are not interpretable due to high mulitcollinearity with the 2-way interactions. [b]Steps 4, 5, and 6 were added only to Steps 2, 3, and 4, respectively, due to multicollinearity.

†$p < .10$. *$p < .05$. **$p < .01$.

interaction effects entered in Steps 3 and 4 did result in a significant increase in $\underline{R}^2$ when independently compared to Step 2, with the high-PC/low-SC interaction acting as a suppressor variable on the primary control main effect which became more significant in Step 3 ($\underline{\beta}$ = -.170) than in Step 2 ($\underline{\beta}$ = -.110). As expected, the high-PC/low-SC interaction (PC x 1/SC) was negatively related to achievement ($\underline{\beta}$ = -.137, Step 3), whereas increased levels of primary and secondary control (PC x SC) resulted in higher end-of-year final grades ($\underline{\beta}$ = .123, Step 4). Although the regression coefficients were not interpretable for the 3-way interactions involving AR included in Step 5 (PC x 1/SC x AR) and Step 6 (PC x SC x AR), no significant increase in $\underline{R}^2$ was observed when compared to Step 3 (PC x 1/SC) and Step 4 (PC x SC), respectively. In sum, the background variables strongly predicted achievement in each step, with only the 2-way perceived control interactions significantly contributing to the variance explained in final course grades.

Supplementary SEM Analyses

In order to more accurately address the proposed 3-way interaction between high-PC/low-SC students and attributional retraining, additional SEM analyses were conducted separately for No AR ($\underline{n}$ = 129) and AR participants ($\underline{n}$ = 105) for unsuccessful students (i.e., first course test below 60%). Although significant PC x SC interactions were anticipated in both AR conditions, the PC x 1/SC (high-PC/low-SC) interaction was expected to be significant only in the No AR condition due to improvements in achievement found for unsuccessful high-PC/low-SC students in the ANCOVA analyses. As in the main SEM analyses, course load and introductory psychology class time (i.e.,

course instructor) were included as background variables in Step 1. However, only primary and secondary control were added in Step 2, with the high-PC/low-SC and high-PC/high-SC interaction terms introduced in Steps 3 and 4, respectively. Once again, the linear measures were centered before the construction of the interaction variables so as to provide interpretable regression coefficients for all variables (Aiken & West, 1991).

Tables 12 and 13 outline the standardized regression coefficients, $\underline{R}^2$s, and $\underline{F}$ values for change in $\underline{R}^2$ for Steps 1 through 4 for No AR and AR participants, respectively. In both the No AR and AR treatment conditions, the background variables in Step 1 were once again important predictors of final grades, with the addition of primary and secondary control in Step 2 producing no significant change in $\underline{R}^2$. Of particular interest is that twice as much of the variance in final grades was explained by the academic background variables among AR participants than in the No AR condition ($\underline{R}^2$s = .180, .092, respectively). As expected, the inclusion of the high-PC/low-SC interaction term in Step 3 resulted in a significant increase in $\underline{R}^2$ only in the No AR condition ($\underline{\beta}$ = -.171, Step 1). The addition of the high-PC/high-SC interaction in Step 4 produced the same results (No AR: $\underline{\beta}$ = .159), no doubt due to multicollinearity between these 2-way interaction variables (see Table 10 for correlations).

Discussion

Research on achievement motivation and performance has repeatedly demonstrated modest yet consistent improvements from attributional retraining for at-risk college students. Important developments in the research literature on attributional retraining have concerned not only the identification of cognitive and psychosocial

Table 12

Standardized Regression Coefficients and R^2s on Final Grades for Unsuccessful No AR Students

Variables	Step 1	Step 2	Step 3	Step 4
Course load	.234*	.227*	.233**	.233**
Instructor	.196*	.186*	.205*	.205*
Primary control		-.159†	-.227*	-.142
Secondary control		.076	.110	.110
PC x 1/SC			-.171†	
PC x SC				.159†
R^2	.092	.120	.144	.144
F Change[a]		1.77	2.97†	2.97†

[a]Step 4 was added only to Step 2 due to multicollinearity.

†$p < .10$. *$p < .05$. **$p < .01$.

Table 13

Standardized Regression Coefficients and R^2s on Final Grades for Unsuccessful AR Students

Variables	Step 1	Step 2	Step 3	Step 4
Course load	.171†	.173†	.153	.153
Instructor	.380**	.378**	.401**	.401**
Primary control		-.010	-.077	-.013
Secondary control		-.009	-.033	-.033
PC x 1/SC			-.131	
PC x SC				.109
R^2	.180	.181	.191	.191
F Change[a]		0.01	1.00	1.00

[a]Step 4 was added only to Step 2 due to multicollinearity.

†$p < .10$. *$p < .05$. **$p < .01$.

individual differences which predispose students to poor performance (Perry et al., 1993), but also the assessment and improvement of intervention techniques. Although the empirical evidence is somewhat mixed (e.g., Struthers & Perry, 1996), we now know that AR can be particularly effective for students at risk academically. Specifically, students who have experienced failure, have low perceptions of success, infrequently use elaborative learning strategies, are performance-oriented, or have an external locus of control have been found to benefit from the AR treatment (Hall, Perry, et al., 2000; Hunter & Perry, 1996; Menec et al., 1994; Pelletier et al., 1999; Perry & Penner, 1990; Perry & Struthers, 1994).

The results of present longitudinal study highlight the academic and psychological importance of primary and secondary control among college students (Rothbaum et al., 1982), as well as the benefits and drawbacks of providing AR to unsuccessful students favoring primary over secondary control. The findings are first discussed in terms of the academic consequences of at-risk and optimal perceptions of control for students who did not receive AR, as well as overall treatment effects. The interaction effects on end-of-year dependent measures (Phase 3) occurring as a function of the improved Writing Assignment AR treatment and perceived control classification are then discussed, particularly with respect to the two-way interactions found for unsuccessful students. The results of supplementary analyses are also addressed in terms of the changes in attributions and perceived control, as well as the mediating influence of course instructors following the AR intervention. Finally, limitations and implications for future research on attributional retraining among college students are considered.

Primary and Secondary Control

Recent research indicates that unsuccessful students relying on primary control beliefs at the expense of secondary control beliefs report poorer levels of perceived academic success and emotions than students utilizing both control beliefs, and are at risk of serious academic failure on longitudinal achievement measures (Hall, Hladkyj, et al., 2000; Hall, Clifton, et al., 2001). The results of the present study provide further empirical support for the salience of this at-risk group, namely in terms of academic performance. Specifically, ANCOVA analyses among initially unsuccessful students in the No AR condition revealed significant differences between the perceived control groups on final course grades, with high-PC/low-SC students scoring 6.5% lower than their high-PC/high-SC counterparts. These results were also found for unsuccessful students using SEM techniques, with the PC x SC and PC x 1/SC (high-PC/low-SC) interactions corresponding to higher (β = .123) and lower (β = -.137) final course grades, respectively. Furthermore, these interaction terms in the SEM framework added significantly to the variance in achievement in unsuccessful students explained by perceived control and AR main effects and academic background variables (i.e., course load and instructor).

As anticipated, ANCOVA analyses found no significant differences between unsuccessful high-PC/low-SC and high-PC/high-SC students in the No AR condition on expectations, attributions, and attribution-dependent emotions. Contrary to expectations, these two groups also did not differ significantly on perceived success and learning-related emotions. Despite low levels of pride and perceived success, both unsuccessful

groups reported feeling in control, hopeful, and low in guilt and shame concerning their grades (i.e., relative to scale midpoints) which were expected to improve. However, further analyses revealed the expectations of students low in secondary control to be overly optimistic, with these students obtaining final course grades (May) approximately 17% lower than expected two months previous. These results suggest that high-PC/low-SC students are in fact ill-equipped to deal with academic failure, having high expectations for future success (i.e., failure is not an option), yet substantially lower end-of-year performance levels when compared to their unsuccessful high-PC/high-SC counterparts.

As predicted, significant differences between optimal and at-risk No AR successful participants were not observed on most measures. Nonetheless, unanticipated differences in favor of optimal students were found for motivation, course anxiety, and hope with a similar pattern found on learning-related enjoyment for successful students. Contrary to expectations, successful high-PC/high-SC No AR students also reported greater boredom in their introductory psychology course. Although boredom was positively correlated with both negative and positive affect overall, correlational analyses on successful students alone found boredom to correlate only with positive emotions (i.e., enjoyment: $r(223) = .23$, $p < .001$; hope: $r(225) = .17$, $p < .01$; pride: $r(226) = .18$, $p < .01$). As such, these results suggest that, although at-risk and optimal students who are initially successful do not differ in end-of-year achievement, the psychological benefits of relying on both primary and secondary control are evident among students experiencing academic success. That is, successful high-PC/high-SC students reported higher levels of

present and future academic success, hope, enjoyment, and lower learning-related anxiety than their high-PC/low-SC counterparts.

Attributional Retraining

As predicted, the main effect of attributional retraining was significant for uncontrollable attributions to poor academic performance (i.e., ability, luck, instructor, test difficulty) in both unsuccessful and successful students. As explicitly advocated by the AR intervention, a decrease in the endorsement of uncontrollable attributions was also found following the Writing Assignment AR treatment for both high-PC/low-SC and high-PC/high-SC students, regardless of initial academic performance (i.e., success/failure on first course exam). Consequently, these results suggest that for first-year college students high in primary control who are already making controllable attributions, decreases in uncontrollable attributions may be a more appropriate indicator of attributional change following the AR treatment.

Attributional Retraining and Perceived Control

A preliminary study conducted by Hall, Chipperfield, et al. (2001) found a videotape and writing AR treatment to be particularly effective in improving the academic achievement of high-PC/low-SC students experiencing academic difficulty, relative to unsuccessful students relying solely on one or neither perceived control approach. The present results replicate these initial findings, with the Writing Assignment AR treatment proving effective primarily for high-PC/low-SC students. Specifically, ANCOVA analyses found that unsuccessful high-PC/low-SC students who received attributional retraining ($\underline{M}$ = 61.43%) obtained significantly higher final course grades

than their No AR counterparts (M = 51.33%); a difference of approximately 10% or one full letter grade (i.e., D to C). The results from SEM analyses provide indirect support for these findings in that, although the typical PC x 1/SC interaction was found for unsuccessful students in the No AR condition (β = -.171), this interaction effect did not significantly predict academic achievement when only AR participants were assessed (β = -.131).

A significant and unexpected improvement in academic expectations was also observed for successful high-PC/low-SC students on academic expectations, with these students reporting expectation levels similar to optimal successful students only after receiving AR. Although similar unanticipated improvements were noted on positive and negative affect for successful high-PC/high-SC students, and on motivation and positive academic emotions for their unsuccessful counterparts, these effects did not reach significance. However, as hypothesized, this study did find notable declines in motivation and increased negative affect for unsuccessful high-PC/low-SC students following the AR treatment.

Specifically, ANCOVA analyses revealed significantly poorer perceptions of academic success, overall and course-specific anxiety, boredom, and shame for unsuccessful high-PC/low-SC students who received AR relative to those in the No AR condition. This trend was also evident for unsuccessful high-PC/low-SC students on academic expectations and guilt, as well as positive course-related affect (i.e., enjoyment and pride). Again however, these effects did not reach significance. Unsuccessful high-

PC/low-SC students' feelings of hope concerning their course performance were unaffected by the AR treatment.

Although somewhat disconcerting, these atypical results appear to be an unfortunate by-product of the unusually dramatic improvements in achievement experienced by these at-risk students, and may in fact shed some light on the causes of poor performance for these individuals. First, it is important to note that such an improvement presupposes that these students have the ability to succeed, and that the majority of successful students in this study do disregard secondary control beliefs. Thus, it follows that high-PC/low-SC students most likely experienced academic failure due a lack of effort, attention, or some other controllable cause of success, motivated by their unmitigated perceptions of primary control (i.e., overconfidence). As such, in the No AR condition, these students continue to believe throughout the academic year that they can still significantly improve their performance, but apparently do not invest the effort required to meet their expectations.

This explanation would also account for why unsuccessful high-PC/low-SC students in the No AR condition did not demonstrate perceived uncontrollability as hypothesized by Rothbaum et al. (1982). These authors suggested that such students may "lack the time and energy necessary for mustering secondary control attempts" due to their "intense and long-lasting... unsuccessful attempts at primary control"(p. 28). Rather, these results suggest that at-risk high-PC/low-SC students in fact feel invulnerable to failure, placing little importance on secondary control and failing to act upon their primary control beliefs.

Consequently, the findings of this study suggest that attributional retraining prompts unsuccessful high-PC/low-SC students to act on their perceptions of primary control, resulting in a substantial increase effort and feeling of guilt for these capable and motivated students. However, the corresponding increases found on multiple measures of negative affect also indicate how difficult it is to overcome a serious academic setback, particularly for students neglecting secondary control beliefs which effectively buffer the emotional impact of such aversive circumstances. Furthermore, negative affect may result from these students' becoming increasingly aware that their overly ambitious goals will most likely not be met (Carver & Sheier, 1990), due to the limited controllability over their end-of-year final grades afforded by their initial academic setback (i.e., shame; Weiner, 1985). As these at-risk students encounter resistence to their primary control efforts, they in turn adopt more realistic expectations ostensibly in an effort to reduce anxiety and feel greater perceived control over their academic situation (i.e., secondary control; see Heckhausen & Schulz, 1995, 1998).

Supplementary Analyses

Change in perceived control. As anticipated, analyses of Phase 3 measures of perceived control demonstrated that greater reliance on interpretive secondary control beliefs did in fact occur for unsuccessful high-PC/low-SC students following the Writing Assignment AR treatment. Moreover, these results indicated that among students in the AR condition, high-PC/low-SC students did not significantly differ from high-PC/high-SC students on the perceived control measures on which the initial perceived control classifications were based. Such an improvement may be explained by the inclusion of

the writing consolidation exercise which explicitly encouraged students to consider reinterpreting academic failure in a positive manner.

However, as the writing AR administered in preliminary research did not directly endorse perceptions of secondary control, it is possible that the nature of the writing exercise itself contributed to this improvement. As the writing assignment encourages students to personally elaborate on how to incorporate perceptions of controllability into their current approach to college, students receiving the Writing Assignment AR treatment presumably reflected on the controllability of not only academic outcomes (i.e., primary control) but also on their perceptions of these events (i.e., secondary control). In this manner, unsuccessful students already high in primary control may have found secondary control beliefs most applicable (i.e., lowering expectations).

Finally, the attributional retraining intervention as a whole may have fostered an increase in secondary control for these at-risk students. As such, unsuccessful high-PC/low-SC students presumably realized the maladaptive nature of their overly optimistic perceptions of academic success following AR, in turn, acknowledging that their grades were in fact suffering and would not improve without considerable effort. Thus, as secondary control is fostered mainly by unsuccessful attempts at primary control (Heckhausen & Schultz, 1995, 1998), these students no doubt learned valuable secondary control strategies (i.e., lowering expectations) in the ensuing uphill struggle to improve their grades.

Phase 2 measures. Although significant increases in controllable attributions and positive expectations were found for both unsuccessful and successful students

immediately following the AR treatment, these short-term effects did not translate into long-term improvements on these measures. However, these results are not surprising considering that both high-PC/low-SC and high-PC/high-SC students already strongly endorse controllable attributions and, at worst, have realistic expectations of future academic success. Rather, these results serve to confirm that, as intended, perceptions of controllability and corresponding expectations for future academic success are induced, albeit temporarily, by the Writing Assignment AR treatment.

Contrary to the initial hypothesis based on written emotional expression research (i.e., Pennebaker & Seagal, 1999), an increase in perceived stress was not observed following the AR treatment used in the present study. Moreover, a significant decrease in overall perceptions of stress was found for both initially unsuccessful and successful students. Again, this finding suggests that students did not find the failure-oriented AR treatment anxiety provoking, perhaps due to the helpful nature of the attributional information presented prior to the completion of the writing exercise. As such, for the college student sample under investigation, the cognitively engaging Writing Assignment AR intervention resulted in a significant decrease rather than an increase in negative affect.

SEM analyses. As anticipated, the 2-way perceived control interactions (Steps 3 and 4) significantly added to the variance explained in final course grades by academic background variables alone for No AR students (from 9% to 14%; see Table 12). However, only students' introductory psychology course instructor (morning, afternoon) accounted for a significant proportion of end-of-year performance for students in the AR

condition (18%, Step 1; see Table 13). These findings are consistent with those of Menec et al. (1994), who found quality of course instruction to be an especially important determinant of academic achievement for at-risk students receiving attributional retraining. Specifically, these authors showed that increased performance for low control students (i.e., having an external locus) following the AR treatment was entirely contingent upon instructor effectiveness (i.e., physical movement, eye contact, humour, etc.).

As such, it is possible that high-PC/low-SC students in the AR treatment condition were in fact enrolled in earlier classes, likely taught by more motivated and effective instructors. Consequently, an additional ANCOVA on final course grades (perceived control x AR) for unsuccessful students (i.e., below 60% on first course test) controlling for high school grades as well as course load and instructor was conducted. This analysis once again found a significant 2-way interaction effect, $F(1, 62) = 3.85$, $p = .05$, with high-PC/low-SC students receiving AR scoring approximately 6% higher than their No AR counterparts, $t(32) = 1.50$, $p = .067$. Thus, after controlling for the time/quality of course instruction, itself accounting for a sizable proportion of unsuccessful students' final grades (ANCOVA: $F(1, 62) = 10.00$, $p < .01$; SEM: $\beta = .233$, Step 4), improvements in achievement for high-PC/low-SC students following the AR treatment were still evident.

Limitations and Implications

The main limitations of this study are as follows. First, the possibility also exists that the ANCOVA findings may have resulted from the artificial dichotomies imposed on

the continuous perceived control measures. In addition, the decreased cell sizes in the ANCOVA analyses for unsuccessful high-PC/low-SC and high-PC/high-SC students due to using median splits raise concerns as to the reliability of the results obtained for these individuals. However, these results were replicated in part using SEM analyses including all unsuccessful students, suggesting that potentially important, yet nonsignificant, treatment effects may have been significant on a larger sample (i.e., improvements after AR for unsuccessful high-PC/high-SC students on motivation and positive affect).

Second, due to multicollinearity between the 2-way and 3-way interaction terms in the SEM analyses, the AR treatment effect on high-PC/low-SC, compared to high-PC/high-SC students, could not be disentangled. As such, further SEM analyses examining the nature of the interaction effects between primary and secondary control (i.e., additive, multiplicative, logarithmic, etc.) and attributional retraining are encouraged. Third, because of reduced attendance in Phase 3, particularly among unsuccessful students, mediational SEM analyses including end-of-year measures such as negative affect, motivation, and perceived control on final course grades could not be effectively conducted. Consequently, future research assessing the relative importance of these potential long-term mechanisms/byproducts of academic improvement for high-PC/low-SC students following the AR treatment is warranted.

Fourth, as the dependent measures in this study were assessed two months prior to course completion, the full impact of academic failure on initially unsuccessful high-PC/low-SC students could not be assessed. Upon receiving very low final course grades, the salience and uncontrollability of this academic failure would no longer afford

unsuccessful high-PC/low-SC students the luxury of high expectations and overconfidence. Only at this point may these at-risk students experience considerable declines in motivation and affect, possibly leading to guilt-motivated increases in effort in future courses (i.e., similar to the failure-oriented AR treatment), or feelings of helplessness and increased likelihood of continued poor performance and attrition for these individuals. Thus, future longitudinal research should address how high-PC/low-SC students respond to more serious and indisputable experiences of academic failure.

Nonetheless, the present study contributes to the research literature in college students perceptions of control, as well as the assessment and improvement of attributional retraining techniques through the use of both ANCOVA and SEM analyses. First, these findings further refine our understanding as to the specific types of primary and secondary control which predispose students to academic failure. Specifically, this study utilized academic-oriented measures of primary control (Perry et al., 2001) and secondary control in order to provide a more accurate domain-specific assessment college student's perceptions of control.

Secondly, a measure of interpretive academic secondary control was also constructed and successfully employed. Consistent with a review by Thompson et al. (1994), this form of secondary control was directly related to optimal psychological adjustment and achievement among unsuccessful students high in primary control. Third, these results also suggest that although self-report measures may accurately reflect students' perceptions of primary control, such measures cannot be assumed to reflect actual achievement striving behaviours for some at-risk students (i.e., high-PC/low-SC).

Finally, this study also improves upon previous research in term of the content, implementation, and mechanisms underlying the effectiveness of the AR techniques administered (i.e., Hall, Chipperfield, et al., 2001). The present AR treatment incorporated varied areas of research including cognitive elaboration (i.e., Entwistle, 2000; Pintrich et al., 1989), attribution theory (i.e., Weiner, 1985, 1995), and written emotional expression (i.e., Pennebaker, 1997; Pennebaker & Seagal, 1999; Smyth, 1998). Specifically, significant results were demonstrated concerning the attributional change presumed to occur following attributional retraining on controllable and uncontrollable attributions immediately and in the months following the intervention, respectively. Furthermore, significant changes observed in perceived control after AR indicate that both primary and secondary perceptions of academic control are encouraged by the Writing Assignment AR technique, accounting for the dramatic improvements in achievement found for at-risk students in this study.

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Appendixes

Appendix A

Phase 1, 2, & 3 questionnaire items.

Appendix B

AR writing assignment.

Appendix C

AR handout.

APPENDIX A

Academic Primary Control

Strongly Disagree				Strongly Agree
1	2	3	4	5

1. I have a great deal of control over my academic performance in my psychology course.
2. The more effort I put into my courses, the better I do in them.
3. I have little interest in determining how well I do in my psychology course.
4. No matter what I do, I can't seem to do well in my courses.
5. I see myself as largely responsible for my performance throughout my college career.
6. How well I do in my courses is often the "luck of the draw."
7. Giving your best in your courses makes little difference in the grand scheme of things.
8. There is little I can do about my performance in university.
9. When I do poorly in my psychology course, it's usually because I haven't given it my best effort.
10. My grades are basically determined by things beyond my control and there is little I can do to change that.

Interpretive Academic Secondary Control

Strongly Disagree				Strongly Agree
1	2	3	4	5

1. My academic performance and experience has given me a deeper understanding of my life than could be achieved without this experience.

2. Regardless of what my grades are, I try to appreciate how my university experience can make me a "stronger person" overall.

3. Whenever I have a bad experience at university, I try to see how I can "turn it around" and benefit from it.

4. I try to make friends with other students who are "in the same boat" as I am.

Not at all true of me						Very true of me
1	2	3	4	5	6	7

5. When bad things happen to me, I make an intentional effort to understand how they fit into the rest of my life.

6. Random events and chance happenings often seem to me to be like "hints" or "clues" for me to use to understand both who I am and my life as a whole.

7. Based on my experience, negative events in my life, or events that I would not have chosen for myself, in the end have made me a better person.

Pekrun's Academic Emotions

1. **Course Enjoyment (items 1, 4, 7, 10, 13, 16)**
2. **Boredom with the course (items 3, 6, 9, 12, 15, 18)**
3. **Anxiety concerning the course (2, 5, 8, 11, 14, 17)**

Not at all true	A little true	Moderately true	Largely true	Completely true
1	2	3	4	5

WITH REGARD TO MY INTRODUCTORY PSYCHOLOGY COURSE:

1. I enjoy learning new things.
2. Before I start studying material in this course, I feel tense and anxious.
3. When studying for this course, I feel bored.
4. Some topics are so enjoyable that I look forward to studying them.
5. I feel queasy when I think of having to study and to do all the work for this course.
6. The things I have to do for this course are often boring.
7. After I finish studying, I feel satisfied that I know more than before.
8. When studying for this course, I worry that I won't be able to master all the material.
9. The content of this course is so boring that I often find myself daydreaming.
10. After studying for this course, I feel relaxed and worry-free.
11. When studying the material in this course, my heart rate increases because I get anxious.
12. When studying, my thoughts are everywhere else, except on the course material.
13. Some topics are so fascinating that I am very motivated to continue studying them.
14. While I am studying, I sometimes look for distractions to reduce my anxiety.
15. The material in this course is so boring that it makes me exhausted even to think about it.
16. Because this course is fun for me, I study the material more extensively than is necessary.
17. When I have problems with learning the material in this course, I get anxious.
18. I am not motivated to invest effort in this boring course.

Perceived Stress - Phase 3

Never	Infrequently	Sometimes	Frequently	Very Often
1	2	3	4	5

DURING THE LAST MONTH:

1. How often have you been upset because of something that happened unexpectedly?
2. How often have you felt that you were unable to control the important things in your life?
3. How often have you felt nervous and "stressed"?
4. How often have you found that you could not cope with all the things that you had to do?
5. How often have you been angered because of things that happened that were outside of your control?
6. How often have you found yourself thinking about things that you would have to accomplish?
7. How often have you felt difficulties were piling up so high that you could not overcome them?

Perceived Stress - Phase 2

The items below concern your thoughts and feelings AT THIS MOMENT. Please indicate how much you agree with each statement listed below.

Not at all									Very much so
1	2	3	4	5	6	7	8	9	10

1. I feel I am unable to control the important things in my life.
2. I feel nervous and "stressed."
3. I find I cannot cope with all the things I have to do.
4. I find myself getting angry about things that happened that are outside of my control.
5. I find myself thinking about things I have to accomplish.
6. I feel like difficulties are piling up so high that I can't overcome them.
7. I find myself being upset about because of things that happen unexpectedly.

Attributions for Poor Performance

When you do poorly in your introductory psychology course, to what extent do each of the following explain your performance?

		Not at all									Very much so
1.	your natural ability	1	2	3	4	5	6	7	8	9	10
2.	your effort	1	2	3	4	5	6	7	8	9	10
3.	your strategy	1	2	3	4	5	6	7	8	9	10
4.	your luck	1	2	3	4	5	6	7	8	9	10
5.	the professor's quality of teaching	1	2	3	4	5	6	7	8	9	10
6.	the difficulty of the tests	1	2	3	4	5	6	7	8	9	10

Weiner's Emotions

Please indicate the extent to which each of the following emotions describe how you feel about <u>your performance</u> in your introductory psychology course to date:

		Not at all									Very much so
1.	I am HOPEFUL.	1	2	3	4	5	6	7	8	9	10
2.	I feel GUILTY.	1	2	3	4	5	6	7	8	9	10
3.	I am PROUD.	1	2	3	4	5	6	7	8	9	10
4.	I feel ASHAMED.	1	2	3	4	5	6	7	8	9	10

Academic Expectations

Not at all true of me						Very true of me
1	2	3	4	5	6	7

1. I expect to do very well in my Introductory Psychology course this year.

2. I expect to do very well overall at university this year.

3. What percentage (%) do you expect to obtain in your **Introductory Psychology Course** at the end of the year?

(1)	50% or less	(6)	71 - 75%
(2)	51 - 55%	(7)	76 - 80%
(3)	56 - 60%	(8)	81 - 85%
(4)	61 - 65%	(9)	86 - 90%
(5)	66 - 70%	(10)	91 - 100%

Perceived Success

1. How **successful** do you feel you are in your **Introductory Psychology Course** so far this year?

Very unsuccessful **Very successful**

1 2 3 4 5 6 7 8 9 10

Demographic Variables

1. What was your average (%) in your last year of **high school?**

(1)	50% or less	(6)	71 - 75%
(2)	51 - 55%	(7)	76 - 80%
(3)	56 - 60%	(8)	81 - 85%
(4)	61 - 65%	(9)	86 - 90%
(5)	66 - 70%	(10)	91 - 100%

2. What is your gender?

(1) female
(2) male

3. What is your age in years?

(1)	17 – 18	(6)	27 – 30
(2)	19 – 20	(7)	31 – 35
(3)	21 – 22	(8)	36 – 40
(4)	23 – 24	(9)	41 – 45
(5)	25 – 26	(10)	older than 45

4. How many credit hours are you taking this year?
(Note: half courses = 3 credit hours, full courses = 6 credit hours)

(1)	3	(6)	18
(2)	6	(7)	21
(3)	9	(8)	24
(4)	12	(9)	27
(5)	15	(10)	30 or more

5. Do you consider English to be your first language?

(1) yes
(2) no

APPENDIX B

Discussion Questions

1. Discuss and summarize the main points of the video* in your own words.

2. Discuss and describe several **important and controllable** reasons for why university students may not perform as well as they could in their courses, and provide an example of each.

3. Try to recall a recent instance where you performed poorly, or didn't perform as well as expected, on an important course exam or assignment. Discuss as openly and honestly as you can **how the event made you feel**. If possible, also explain how you were able to **learn** from this event, or how you were able to **reinterpret** the event in a positive way. All your writing is completely confidential.

4. Discuss and describe several examples of how **you** could apply the main points of the video* to the way you currently approach your university courses.

* "Video" replaced with "handout" for Handout & Writing AR condition.

APPENDIX C

Didn't do as well on a test as you wanted? Feeling frustrated, depressed, angry?

Here are some suggestions as to how you can change the way you *think* about negative experiences in your life:

Rather than thinking...	Instead...
• I'm stupid.	• Everybody can succeed - you just have to work at it. Here are some examples as to how you can study more effectively: – read chapters several times – review notes several times – use your study guide – study with someone *Note: Counseling Services offers various study skills courses*
• The test was too difficult.	• Tests can appear difficult when you're not well enough prepared. Study more for the next test.
• My professor is lousy.	• If you are having problems with a professor, talk to him or her about your difficulties. If that doesn't help, you may have to work extra hard to do well in the course.
• I had a bad day.	• We all have bad days once in a while, but make sure that you study enough for the next test to improve your grade.
• I panicked.	• If you have a problem with test anxiety, try to relax under stress (see your psychology text for relaxation methods or check the Counseling Services for courses on stress management).

The next time you don't do as well on a test or assignment as you wanted, remember that most reasons for doing poorly are under your control and can be changed.