Promoting Adaptive Attributional Thinking for Vulnerable Individuals in Novel and Highly Competitive Learning Environments

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Abstract

Life course transitions are marked by novelty and uncertainty, as when attending a new school, starting a career, or retiring (Heckhausen et al., 2010). Within this perspective, the high school-to-university transition is significant because it involves unfamiliar learning conditions, more competition, unstable social networks, and difficult career choices. This transition can be exacerbated for competitive student athletes who encounter multiple stressors in their pursuit for mastery in both academic and sport domains (Chyi et al., 2018; Papanikolaou et al., 2003).

Little research has (a) examined achievement motivation applying person-centered approaches based on an attribution-based theoretical perspective, or (b) assessed at-risk-student athletes who could benefit from a motivation-enhancing intervention. Attributional Retraining (AR) interventions have been shown to remediate motivation and performance deficits for at-risk students (Perry et al., 2017). This dissertation focuses on the examination of student motivation profiles and the effects of AR for vulnerable student athletes.

In *Study 1*, motivation profiles for student athletes (*n* = 207) and non-athletes (*n* = 534) were identified based on theoretically-informed cognitions and emotions. Latent profile analysis (LPA) yielded three best-suited profiles for student athletes: *control-focused* (56%), *control-disengaged* (29%), and *control-relinquished* (15%); and four best suited profiles for non-athletes: *control-focused* (27%), *control-ambivalent* (25%), *control-disengaged* (30%), and *control-relinquished* (18%). Comparisons between athlete and non-athlete motivation profiles are discussed and these profiles are validated with a course-based test.

Study 2 utilized an eight-month, randomized treatment design to examine whether AR (vs. no-AR) increased perceived course success, final grades, and course retention for at-risk student athletes. AR (vs. no-AR) boosted at-risk competitive athletes' academic achievement and lowered course withdrawal rates (12% vs. 27%).

Study 3 assessed whether AR effects on final grades were mediated by theory-based cognitive and affective processes for at-risk student athletes in a blended learning environment. A path analysis revealed AR increased perceived academic control, which increased positive and negative emotions, and these emotions predicted final grades in expected directions, but only for high-stress athletes. The results build upon existing literature by exploring unexamined motivation profiles and by testing the moderating and mediating effects of AR for student athletes navigating school-to-university transitions.

Keywords: academic transitions, attribution theory, motivation, perceived control, perceived stress, academic achievement, competitive student athletes

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1. Parker, P. C., Perry, R. P., Hamm, J. M., Chipperfield, J. G., & Hladkyj, S. (2016). Enhancing the academic success of competitive student athletes using a motivation treatment intervention (attributional retraining). *Psychology of Sport and Exercise*, *26*, 113-122. doi:10.1016/j.psychsport.2016.06.008
2. Parker, P. C., Perry, R. P., Hamm, J. M., Chipperfield, J. G. Hladkyj, S., & Leboe-McGowan, L. (2018). Attribution-based motivation treatment efficacy in high-stress student athletes: A moderated-mediation analysis of cognitive, affective, and achievement processes. *Psychology of Sport and Exercise*, *35*, 189-197. doi:10.1016/j.psychsport.2017.12.002

The above publications appear as Chapters 3 and 4 in this dissertation. Copyright permissions have been obtained from all co-authors, and the publisher, Elsevier, allows the right to include these publications in a thesis or dissertation without special permission. As primary author, I was responsible for the conception of the studies, literature searches, conducting of all analyses, interpreting of all findings, and writing of the complete dissertation.

CHAPTER 1

Throughout the lifespan, humans encounter important, negative, and novel events that often cause them to think about *why* certain events happened. Negative events such as job loss, a failed relationship, poor exam performance, or a tough loss in sport can lead individuals to assign a cause (or an attribution) to explain why such events happened. Ascribing a cause to negative events helps individuals make sense of the outcomes and guide their subsequent behaviours to avoid having these negative events happen again (Weiner, 1985, 1986, 2006, 2012, 2018). According to Weiner's attribution theory of motivation and emotion, there are countless ascriptions (causes) that people use to explain events in their lives.

The present dissertation considers the impact causal attributions have for students who are adjusting to the challenges of the transition from high school to university. This critical adjustment period can represent a low-control learning environment fraught with novel and unpredictable experiences that can bring about unexpected failure outcomes. In addition, some students in these learning environments may exhibit academic risk factors (e.g., low perceived control beliefs, or high stress) or encounter contextual constraints (e.g., academic program requirements, financial pressures, competitive sports demands) that may add pressure to their learning environment. In this context, the dissertation examines the relevance of attribution theory in low control learning environments for students who are academically vulnerable, as defined by student athletes with specific academic risk factors.

Attribution Theory

The ways in which people attempt to make sense of human behaviour is an integral component of attribution theory. Early on, Heider (1958) theorized that individuals ascribe causes to behaviour that are either internal or external to the individual. Weiner (1972, 1985) advanced this idea by proposing a theoretical paradigm that begins with an individual's causal analysis, referred to as *causal search*, to explain important, negative, or unexpected outcomes and ultimately to facilitate successful outcomes (or reduce failure) in the future. According to the theory, the nature of ascribing causal attributions to various outcomes can impact subsequent cognitions, emotions, motivation, and behaviour.

Weiner's theory posits causal attributions can be classified along three dimensions that provide a rich representation guiding cognitive, emotional, and motivational consequences. The three causal dimensions comprise: *locus of causality* (internal vs. external), *stability* (stable vs. unstable), and *controllability* (controllable vs. uncontrollable), which help to inform future cognitions (e.g., expectations, responsibility judgments, etc.), emotions (e.g., pride, hope, guilt, regret), and behaviours (e.g., persistence; Weiner, 1972, 1985, 2012, 2018). Achievement settings have been an optimal area to apply Weiner's theoretical paradigm since failure and success experiences commonly occur here. For example, a student who performs poorly on an exam and explains the outcome as being due to their low ability (an internal, stable, and uncontrollable cause) is likely to be unmotivated for a future exam knowing their low ability is an internal flaw and will not change. In contrast, a student who explains their poor exam performance as a result of using a bad strategy (an internal, unstable, and controllable cause) will likely remain motivated for a future exam since they perceive the strategy as personally modifiable.

Consistent evidence reveals that using internal, stable, and uncontrollable attributions (e.g., low ability) to explain negative outcomes (e.g., failure, dissatisfaction) in challenging learning environments (e.g., school-to-university transitions) can be maladaptive for goal striving and performance (Perry, Stupnisky, Daniels, & Haynes, 2008; Stupnisky, Stewart, Daniels, &

Perry, 2011; Wong & Weiner, 1981). Numerous studies have examined the impact of attribution-based treatment interventions (AR) that are designed to encourage controllable (e.g., lack of effort) versus uncontrollable (e.g., low ability) attributions for achievement. Consistent findings reveal that students in certain settings (e.g., low control learning environments) and exhibiting academic risk factors (e.g., low academic control) are ideal candidates to receive attribution-based treatment interventions.

Low Control Learning Environments

Students making the transition from high school to university can often find themselves in a low control learning environment with increased academic competition, challenging course loads, and new learning requirements. Such environments can involve elevated competition, more frequent failure, higher levels of expected autonomy, unstable social networks, and pressures to make important career decisions (Perry, 2003; Perry, Hladkyj, Pekrun, & Chipperfield, 2005; Perry, Hall, & Ruthig, 2005). Educational settings where students feel low personal control can have harmful effects on their cognitions, emotions, performance (Daniels et al., 2009; Stewart et al., 2011), and health (Ruthig, Haynes, Stupnisky, & Perry, 2009).

For example, university dropout rates for students in their first year of university range from 20-30% (Feldman, 2005, Tinto, 2010), underscoring how difficult this transition experience can be for some individuals. Further proof is detailed in a report by the National Center for Education Statistics (2016) where approximately only 56% of first-year students at 4-year degree universities graduated in six years. These statistics point to the negative impact of low control learning environments on students during the high school-to-university transition period. Moreover, students encountering these challenging learning environments can also possess attributes which can render them even more at risk of failure.

Student Academic Risk Factors

Several student academic risk factors have been examined in achievement settings. One critical factor that impacts college students' achievement is perceived academic control (PAC), which is an individual’s subjective belief about their capacity to influence and predict achievement outcomes (Perry, 1991; 2003; Perry, Hladkyj, Pekrun, & Pelletier, 2001). Evidence reveals students’ PAC can have a major impact on performance and persistence in the classroom (Perry et al., 2001; Perry et al., 2005a, 2005b; Respondek, Seufert, Hamm, & Nett, in press). For example, students’ perceived control beliefs measured in the 10^{th} grade were associated with academic achievement (Math and English grades) two years later (Ross & Broh, 2000). In addition, Robbins et al. (2004) found control-related constructs (academic self-efficacy) predicted GPA (r = .50) and retention (r = .36) in their meta-analysis exploring relationships between academic predictors and outcomes.

In other domain specific contexts, perceived control-related beliefs (e.g., self-efficacy) were strongly associated with college grade point average (GPA). These correlations with achievement are found to be even higher than other factors including standardized achievement measures (e.g., SATs), high school GPA, or socio-economic status (Richardson, Abraham, & Bond, 2012; Schneider & Preckel, 2017). Relatedly, Perry and colleagues (2008) discovered a good proportion of students (40%) exhibited maladaptive mindsets characterized by using uncontrollable causes (e.g., low ability, poor teaching) to explain poor achievement performance, rather than controllable causes (e.g., effort, strategy). Notably, students with these maladaptive mindsets had lower achievement outcomes in terms of final grades and GPAs.

PAC-related beliefs have been tied to other forms of achievement outcomes such as motivation (intrinsic), emotions (academic enjoyment, hope, pride, hopelessness, boredom, anger), and retention in courses (Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011; Perry et al., 2001; Respondek, Seufert, & Nett, 2019; Ruthig et al., 2008). In addition, PAC-related beliefs have received some attention in research examining causal attributions *(*Anderson, 1983; Anderson & Riger, 1991; Parker, Perry, Chipperfield, Hamm, & Pekrun, 2018; Perry, Stupnisky, Hall, Chipperfield, & Weiner, 2010). The relevance of PAC from an attributional perspective is important since the theory posits individuals' attributions for success and failure events can impact their perceived control over future events (Weiner, 1985, 2006, 2012, 2018).

Another prominent academic risk factor commonly reported in college learning environments, particularly among university and college athletes, is perceived stress (Kimball & Freysinger, 2003; Papanikolaou, Nikolaidis, Patsiaouras, & Alexopoulos, 2003; Yow, Bowden, & Humphrey, 2000). Perceived stress is defined by Cohen and colleagues (1983) as the level or extent to which a person deems events in life to be stressful. Notably, it is "not the actual feeling and symptoms of stress itself, but rather how one identifies with the stressful event" (Stoliker & Lafreniere, 2015, p. 148). Perceived stress can be measured using Cohen et al.'s (1983) perceived stress scale that has shown adequate validity and reliability in student samples. Stoliker and Lafreniere (2015) found perceived stress negatively predicted academic performance in undergraduate students.

In the context of education and sport, researchers have focused on various experiences encountered by athletes that can increase stress. For example, athletes often struggle to deal with competition and class schedule conflicts, novel training environments, physical and mental exhaustion, and pressures to excel at elite levels (Papanikolaou et al., 2003; Scott, Paskus, Miranda, Petr, & McArdle, 2008). These unique stressors, among others, can negatively impact the academic achievement of student athletes (Comeaux, 2011, De Knop, Wylleman, Van

Houcke, & Bollaert, 1999; McKay, Niven, Lavallee, and White, 2008; Papanikolaou et al., 2003; Simons, Van Rheenan, & Covington, 1999; Veena & Shastri, 2016).

In light of these obstacles, questions arise concerning how to promote motivation and academic success for these at-risk student athletes. Attribution-based intervention studies reveal promising motivation and performance benefits for students characterized by psychosocial risk factors (Hamm, Perry, Clifton, Chipperfield, & Boese, 2014; Perry et al., 2010). Notably, encouraging the use of more adaptive attributions becomes critical for students who face various obstacles and setbacks in their learning environment. Thus, attribution-based treatments are offered as a solution to help improve academic outcomes and persistence for these vulnerable students.

Attributional Retraining

Attributional retraining (AR) treatments have been designed to encourage the use of internal and controllable attributions (e.g., bad strategy) versus uncontrollable attributions (e.g., low ability) for negative performance outcomes. Changing one’s attributions for outcomes can be linked to subsequent motivation and performance. These AR treatment interventions, which are grounded in social psychological theory, have been tailored and delivered in a wide range of achievement settings. They typically “involve multicomponent treatment protocols that entail empirically supported theoretical propositions, presentation of context-relevant attribution information, structured delivery formats, and evidence-based consolidation procedures” (Perry & Hamm, 2017, p. 71).

Common AR protocol procedures include an activation stage where causal search is prompted in participants before treatment delivery. Causal search activation can be initiated in several ways: By asking the participants to think about a past test performance outcome or providing participants fictitious feedback on an academic task. Following the causal search activation, treatment-based content is presented to AR recipients using various delivery methods (e.g., paper handouts, in vivo social exchanges, lectures, video format). After participants are presented the treatment content, they are provided a consolidation task that encourages them to summarize the information and reflect on how it applies to their lives (e.g., in a writing assignment or social exchange with peers).

Many studies have delivered AR in laboratory and field (classroom) settings and have produced effective results in promoting academic-related outcomes. More recently, innovative methods of delivering AR treatments have tested AR’s efficacy in scalable and cost-effective ways by administering the treatment via online platforms. See Perry, Chipperfield, Hladkyj, Pekrun, and Hamm (2014) and Perry and Hamm (2017) for reviews. Encouragingly, findings reveal these treatments boost academic motivation and performance for at-risk students (e.g., low elaborators, failure avoiders, highly bored) relative to their no-treatment counterparts (Hamm et al., 2014; Hamm et al., 2017; Parker et al., 2018). Although there is some research to suggest AR is effective for students experiencing single risk factors, more research is needed on whether such treatments would benefit student athletes based on multiple risk factors.

The Student Athlete Context

Though research on causal attributions in achievement settings has received considerable attention, few studies have examined the attributions of students who must contend with being enrolled in both competitive sport and academic programs. Student athletes are constantly receiving performance feedback and are typically expected to meet the “challenge of maintaining a desired level of performance in both sport and academic contexts” (Dubuc-Charbonneau & Durand-Bush, 2015, p. 136). With an increased level of pressure and potential for negative performance outcomes, students who use maladaptive (vs. adaptive) attributions to explain significant outcomes may be academically at-risk. Other elements can also contribute to athletes being at-risk in school. For example, participating in a competitive sport often involves time and sacrifices that can result in athletes feeling overwhelmed, de-motivated, and even burned out (Gould & Whitley, 2009).

Sport-related demands and career goals are also tied to student athletes' struggle to balance both academic and athletic tasks (see Adler & Adler, 1991; O'Neill, Allen, & Calder, 2013; Simons et al., 1999; Yukhymenko-Lescroart, 2018). Athletes report less academic motivation to perform well compared to non-athletes (Lucas & Lovaglia, 2002), which supports a national study of college athletes indicating that sport participation was associated with lower standardized test scores (i.e., GREs, LSATs; Astin, 1993). Athletes also report poor coaching style as an additional issue that is linked to lowered motivation and self-efficacy beliefs (Gearity & Murray, 2011). Furthermore, Cosh and Tully (2014) found a recurrent theme whereby student athletes believed "all they had to do was pass", a mindset conveying that student athletes felt they only needed to do enough to get by. These findings suggest a closer look into the cognitive, emotional, and motivational experiences of these student athletes is needed.

Person-centered methodological approaches, such as latent profile analysis (LPA), allow for the assessment of important relationships among variables at the level of the individual and the identification of unique groups of students who could benefit from motivation treatment interventions (Roeser, Eccles, & Sameroff, 1998). However, studies are sparse that examine students' attribution-based motivation profiles using person-centered approaches. In addition, little research examines promoting academic motivation and encouraging adaptive attributional thinking for vulnerable individuals who are competing in sport. This paucity of research highlights the need to systematically document the psychological structures of students' motivation profiles. Hence, this dissertation explores motivation profiles of competitive student athletes and examines whether encouraging adaptive attributions for performance via attributional-based motivation treatments (AR) is beneficial for vulnerable student athletes.

This dissertation is presented in a “sandwich format” where three studies follow this introduction. *Study 1* involves a descriptive study that uses LPA methods to identify latent motivation profiles of competitive student athletes in an introductory university course based on reports of their attributions for poor performance (bad strategy, low ability), perceived academic control (PAC), achievement-related hope and helplessness, and perceived stress. Non-athlete latent motivation profiles are also identified based on these same motivation-related variables. Motivation profile differences in test performance are then discussed. *Study 2* examines competitive student athletes struggling to adjust to the first year college transition (i.e., low PAC) who receive an attribution-based motivation treatment intervention (i.e., AR). The study demonstrates the utility of AR (vs. no-AR) for these at-risk student athletes in terms of perceived course success, achievement performance, and persistence in an online course. *Study 3* investigates how the AR treatment → performance linkage path sequence is mediated by both cognitive and affective processes. Since competitive athletes must balance rigorous academic and athletic schedules, Study 3 also tests how perceived stress, an emotional risk variable, moderates the treatment efficacy. Finally, the importance of these findings, implications, and future research directions will be addressed in the general discussion.

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CHAPTER 2

Study 1: Exploring Motivation Profiles of Competitive Student Athletes and Non-Athletes in a Challenging Learning Environment

Student athletes involved in competitive college sports are expected to be actively engaged in both sports and academic programs of study. However, this balance can be highly stressful (Burden, Tremayne, & Marsh, 2004; Chyi, Lu, Wang, Hsu, & Chang, 2018; Papanikolaou, Nikolaidis, Patsiaouras & Alexopoulos, 2003) and can result in sacrificing success in one domain (e.g., academic) to prioritize success in another (e.g., sport; Cosh & Tully, 2014; McGillivray, Fearn & McIntosch, 2005). Student athletes in competitive programs are unique because they face disparate demands that many other students do not face, such as competition-class overlap, training and competition-related exhaustion, and in some cases, injury. They often deal with academic-sport identity concerns and are expected to adjust to new training regimens that interfere with their academic motivation and performance (Bengtsson & Johnson, 2012; MacNamara & Collins, 2010; Scott, Paskus, Miranda, Petr, & McArdle, 2008).

This combination of challenging athletic and academic programs can also augment motivational demands for student athletes who are transitioning from high school to college. This educational shift can include novel and adverse learning experiences (Harvey, Drew, & Smith, 2006; Kift, 2015; Perry, 2003; Sax, Bryant, & Gilmartin, 2004). In a retrospective analysis of university students in Canada, da Silva and colleagues (2017) note “rates of underperformance are rising, and student dropout is common, with most attrition occurring in the first year of studies” (p. 545). Unfortunately, most of these students who drop out are unlikely to enroll again (Shaienks, Gluszynski, & Bayard, 2008). The present study examines the motivational tendencies of both student athletes and non-athletes within a college learning environment from the perspective of Weiner's attribution theory of motivation and emotion.

Why Use Attribution Theory to Study Motivation?

Weiner's (1985, 1986, 2006, 2012, 2018) attribution theory provides a rich conceptual platform upon which to explore students' achievement motivation as they adjust to university for several reasons. First, attribution theory asserts that individuals desire to know why certain events occur and to establish causation. Weiner posits that important, negative, and unexpected outcomes lead individuals to engage in a causal search process in order to identify explanations for the outcome. For student athletes who typically perform in two very different competitive achievement settings, many diverse outcomes are likely to elicit causal search and to impact achievement motivation.

Second, although there are hypothetically countless perceived causes for outcomes, there are certain ascriptions for success and failure (e.g., strategy, ability) that are more salient than others (Weiner, 2018). As noted in Chapter 1, these perceived causes (attributions) share dimensional properties (locus of causality, stability, and controllability) and play a key role in determining future motivation and behaviour. For example, students who perceive a poor exam performance as being due to bad strategy (internal, unstable, controllable cause) are expected to have higher motivation because they can change future performance outcomes since strategy is seen as personally modifiable. Students who perceive their poor exam performance as due to low ability (internal, stable, uncontrollable cause) are expected to be less motivated to alter future performance outcomes if ability is considered personally unmodifiable. These kinds of attributions are salient in achievement settings and allow for a measurable investigation of the impact of students' appraisals in a natural occurring environment.

Third, Weiner (1985, 2012, 2018) posits an attribution-linked sequence, involving cognitions and emotions, that is strongly tied to motivation, asserting that “the most basic assumption of an attribution view of emotion is that feelings are determined by thoughts, and specifically by beliefs about causality” (Weiner, 2014, p. 355). Understanding the dimensions that classify attributions (locus of causality, stability, controllability) help to make sense of cognitions and emotions that can arise depending on the individual’s perception of the cause. For example, if a person ascribes an *internal* cause to a success outcome (e.g., high ability), this results in a specific emotion, namely pride, whereas an *external* cause (e.g., luck) would not. How stable or unstable a cause is perceived to be can influence expectations about future success and failure outcomes since stable causes are more likely to occur again. Thus, causes for failure outcomes that are seen as *stable* (e.g., low ability) can lower expectations for success and produce feelings of hopelessness. Finally, the controllability dimension of a cause can influence how responsible a person feels for an outcome, as well as can produce emotions like shame or guilt. For example, causes for failure outcomes that are viewed as *uncontrollable* should lower feelings of responsibility to change future outcomes and elicit shame. In sum, these causal dimensions help link attributions with attribution-based cognitions and emotions that can impact motivation.

Omissions in Achievement Motivation Literature

Student athlete motivation has been well studied over the last few decades (e.g., Bullard, 2016; Gaston-Gayles, 2005; Simons, Van Rheenan, & Covington, 1999). For example, recently student motivation in physical education settings was studied looking at the relationships between several theory-based achievement cognitions and emotions using structural equation modeling (Simonton, Solomon, & Garn, 2019). However, a critical omission in the research literature concerns the advancement of theory-based research that examines student motivation using person-centered approaches. Person-centered approaches such as latent profile analysis (LPA) have been used to examine motivation profiles of students in educational contexts (e.g., Grunschel, Patrzek, & Fries, 2013; Marsh, Lüdtke, Trautwein, & Morin, 2009; Ning & Downing, 2015; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009; Wang & Biddle, 2001). Some studies have employed person-centered approaches to assess motivation in student athletes. For example, Haerens et al. (2018) examined elite athletes and physical education students employing a cluster analysis. Their findings revealed adolescents who perceived their coaches or teachers as having a high autonomy-supportive motivating style, with a low controlling motivating style, appeared better off in terms of motivation and well-being.

In addition, Wang, Morin, Ryan, and Liu (2016) used LPA to assess motivation types of Singapore students in physical education classes. They found motivation profiles using measures of behavioural regulation (Goudas et al., 1994) in a physical education setting provided a more meaningful description of the student responses relative to using two higher-order factors (autonomous, controlled). They also assessed how these profiles were associated with perceived competence and intentions to exercise. This is important research because students with differing motivation profiles (meaningful within-profile variability) were validated using motivational (self-report) outcomes and applied to a specific social psychological theory.

As mentioned previously, attribution theory is an empirically-supported theory of motivation that could help to advance and provide an enriched understanding of the motivational components that influence student motivation. Notably, a paucity of research has considered using latent profile analysis based on this perspective. Thus, the following dissertation opted to use an attribution framework as the basis for student athletes' motivation profiles, and ultimately, address an omission in the sport and education literature.

A second omission in the literature concerns the comparison of motivation profiles between students involved in competitive sport and those who are not. To date, findings have been inconsistent in confirming whether participating in sport plays a role in students' motivation and achievement striving. Several studies indicate student athletes suffer declines in their academic performance relative to non-athletes (Hauser & Leuptow, 1978; Maloney & McCormick, 1993; Purdy, Eitzen, & Hufnagel, 1982). Other research suggests athletes perform equal to, or better than, non-athletes (Georgakis, Wilson, & Ferguson, 2014; Richards & Aries, 1999; Sellers, Chauvous, & Brown, 2002).

These mixed findings may be due, in part, to the limited research on academic motivation factors (e.g., cognitive, affective, and behavioural) that affect achievement striving in student athletes and non-athletes. Furthermore, the majority of these findings are based on studies conducted several decades ago, and thus, contemporary methodologies are needed to investigate the experiences of current student athletes. As such, Study 1 used a person-centered approach (i.e., LPA) to examine the nature of student athletes' and non-athletes' motivation tendencies based on a theory-derived motivational sequence involving achievement-related cognitions, emotions, and performance. The motivation factors selected for this examination align with Weiner's (1985) attribution theory.

Motivation Factors in Attribution Theory

According to Weiner's attribution theory of motivation and emotion (Weiner, 1985, 1996, 2006, 2012, 2018), appraisals made in achievement settings prompt a motivational sequence. For example, when a student performs poorly on a test, the student can attribute the outcome to a multitude of causes. Two commonly studied performance attributions found to predict achievement motivation are *strategy* and *ability* attributions. Simply put, individuals who ascribe a bad strategy to their poor test performance will perceive the outcome as modifiable because a better strategy may be available. This in turn will promote greater perceived control in their academic setting since they feel they can control the outcome (by changing their strategy). This means they will exhibit certain attribution-related emotions (i.e., elevated *hope*), when thinking about future academic performance since a bad strategy can be changed to a better one.

In another scenario, a student who routinely explains their poor performance as due to low ability is likely to have lower levels of perceived control in relation to their learning environment. They may perceive the negative outcome as unchanging (stable) or unmodifiable (uncontrollable) because low ability is stable and uncontrollable, thereby prompting less hope about future successful performance. Hence, attribution theory posits that hope increases when internal, unstable, and controllable attributions for poor performance are used. In contrast, helplessness, a less pernicious variant of hopelessness, is triggered following the ascription of internal, stable, uncontrollable attributions to poor performance (Weiner, 2014; Weiner & Litman-Adizes, 1980). Both hope and helplessness are theorized to promote or hinder, respectively, future motivation to perform.

As defined in the introduction (Chapter 1), perceived academic control (PAC) is an individual’s subjective belief about their capacity to influence and predict achievement outcomes. PAC is an important construct that has been strongly tied to attributions (Perry, Hladkyj, Pekrun, & Pelletier, 2001). For example, students who explain poor performance outcomes using controllable attributions should have higher PAC than students ascribing uncontrollable attributions (Perry, Hladkyj, Pekrun, Clifton, & Chipperfield, 2005). Not surprisingly, domain-specific PAC is strongly related to GPA, other standardized test scores, and high school GPA across several meta-analytic reviews (Richardson, Abraham, & Bond, 2012; Schneider & Preckel, 2017). A recent study suggests that low PAC has negative implications for university grades, and also indirectly predicts university drop-out (Respondek, Seufert, Hamm, & Nett, in press). Consequently, these studies underscore PAC as an important motivational construct that predicts academic success.

Up to this point, all motivation factors discussed (strategy and ability attributions, PAC, and emotions) are critical variables in Weiner's (1985) theoretical framework. However, although not discussed in Weiner's theory, stress is an important factor to consider since it is a ubiquitous emotional experience among college athletes (Kimball & Freysinger, 2003; Papanikolaou et al., 2003; Yow, Bowden, & Humphrey, 2000). As noted in Chapter 1, the addition of multiple commitments (e.g., academic and sport) can bring about further stress that may have a critical impact on motivational tendencies. For many student athletes, stress can be a risk factor since encountering increased stressors negatively impacts academic motivation (Felsten & Wilcox, 1992; Papanikolaou et al., 2003). In sum, common attributions for poor performance that are internal, unstable, controllable (strategy) and internal, stable, and uncontrollable (ability), PAC, attribution-based emotions (hope, helplessness), and stress were selected as pivotal motivation factors to identify motivation profiles in this study.

Examining Student Motivation Profiles

Latent profile analysis (LPA) is a strategic statistical tool with which to study student motivation since it allows for the determination of multifaceted psychosocial profiles. Motivation variables do not exist in isolation, but as part of a broader psychological reality. It is therefore useful to examine how these interrelated variables function simultaneously for students in achievement settings and how they provide a better contextual interpretation of the patterns of academic motivation. Although it is improbable that all student athletes have the same academic experiences, it is likely that some students will exhibit similar motivational tendencies. In addition, identifying motivation profiles for individuals who share maladaptive levels of variables could help to target individuals who may benefit from motivation interventions.

From an attribution perspective, it is posited that students enrolled in a course who are highly motivated would exhibit a profile that is psychologically adaptive. They should have higher levels of PAC and hope, similar tendencies to use controllable attributions for performance, and exhibit lower helplessness and perceived stress. In other words, this motivated group would be characterized as being in control of their academic environment. Another group of students with maladaptive levels of these same motivation variables would reflect individuals who have relinquished control.[1] Thus, the objective of this study was to identify similar groups of student athletes with specific motivation profiles based on theory-derived cognitions and emotions experienced in an academic setting.

Study 1 had three objectives: (a) to identify latent motivation profiles of student athletes and non-athletes based on their causal attributions for poor performance (low ability, bad strategy), perceived academic control (PAC), helplessness, hope, and perceived stress; (b) to examine differences between the student athlete and non-athlete motivation profiles (e.g., number and type of latent profiles); and (c) to validate profile differences using a course-based, classroom achievement test.

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[1] The term "relinquished control" is adapted from Perry, Stupnisky, Daniels, and Haynes' (2008) study of perceived academic control in competitive achievement settings which reflects an attributional combination that is dysfunctional for motivation according to Weiner's theory (1985). Thus, for this study, a group of students that comprise maladaptive levels of the attribution-based motivation variables (specifically high levels of uncontrollable attributions, and low levels of controllable attributions and PAC) would reflect students with a relinquished control profile.

For the latter objective, student profiles with adaptive levels of the motivation variables (cognitions and emotions) based on an attributional perspective were hypothesized to attain the highest scores on the course-based test. In contrast, student profiles with maladaptive levels of the motivation variables were hypothesized to attain the lowest test scores. Finally, profiles with varying levels of these motivation variables were hypothesized to attain test scores that fall between the most adaptive and maladaptive groups. These predictions were made for both student athlete and non-athletes.

Method

Participants and Procedures

Participants enrolled in multiple sections of a two-semester, online introductory psychology course at a Midwestern Canadian university were categorized into two groups: student athletes (n = 207, 53% female); non-athletes (n = 534, 74% female). Student athletes were defined as those who participated in a "competitive sport" and were currently engaged in a competitive sport *five times or more* per week. Competitive sport was deemed any competition above the intramural (played within the same university/organization) or recreational (a hobby) level. The participation frequency criterion ensured that the student athletes were involved in their respective sport(s) each week and juggling busy sport schedules.

Non-athletes were those who reported they had not participated in a competitive sport within the last three years. The study procedure involved students completing an online survey in October which comprised demographic (e.g., age, sex), cognitive (PAC, performance attributions), and affective (achievement-related emotions, perceived stress) measures using a secure survey website. A pre-survey course-based classroom test was administered earlier in October and students' test scores were gathered from the course instructor.

Covariates

Age. Students' self-reported age was assessed using a 10-point scale (1 = *17-18*, 2 = *19-20*, 3 = *21-22*, 4 = *23-24*, 5 = *25-26*, 6 = *27-30*, 7 = *31-35*, 8 = *36-40*, 9 = *41-45*, 10 = *older than 45*).

Sex. Sex was self-reported at Time 1 and treated as a dummy-coded variable (1 = *female*; 2 = *male*).

High school grade. Students' self-reported high school grades were assessed using a 10-point scale (1 = *50% or less*, 10 = *91-100%*). Self-reported high school grades can be considered a proxy for actual high school achievement since they share a strong relationship (r = .84; Perry et al., 2005). Past research reveals self-reported high school grades are strong correlates of post-secondary achievement (e.g., final course grades, r = .40-.54; grade point averages, r = .51-.54; Hamm, Perry, Clifton, Chipperfield, & Boese, 2014; Perry et al., 2001, 2005; Perry, Stupnisky, Hall, Chipperfield, & Weiner, 2010). In a meta-analysis by Richardson et al. (2012), high school grades were strongly associated with university GPAs (r = .40).

Measures

Attributions for poor performance. In response to the question "When you do poorly in your introductory psychology course, to what extent do the following factors contribute to your performance?", students rated the influence of "ability" and "strategy" on a 10-point scale (1 = *not at all*, 10 = *very much so*). "Ability" and "strategy" were selected because these attributions are key contributors to performance outcomes in achievement settings. They are common attributions used to explain academic performance in the classroom in uncontrollable or controllable ways (ability represents an internal, stable, and uncontrollable attribution; strategy represents an internal, unstable, and controllable attribution; Perry et al., 2008, 2010). The perceived controllability of these attributions can vary according to the phenomenology of the individual, but are most commonly characterized as described above (Weiner, 1985; Perry et al., 2008).

Perceived academic control (PAC). Students' perceived control over course performance outcomes was assessed using Perry et al.'s (2001) eight-item Perceived Academic Control (PAC) measure, e.g., "I have a great deal of control over my academic performance in my psychology course" (1 = *strongly disagree*, 5 = *strongly agree*). Four items were negatively worded and reverse coded so that when the ratings were summed, high scores indicated high PAC (Cronbach α = .80; see Appendix A).

Past research shows that the PAC measure has respectable psychometric properties: Cronbach αs = .77 to .80 (Hall, Perry, Chipperfield, Clifton, & Haynes, 2006; Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010; Perry et al., 2001; Ruthig et al., 2008; Stupnisky, Renaud, Daniels, Haynes, & Perry, 2008) and test-retest reliability: $r(227) = .59$ (Perry et al., 2005); $r(227) = .66$ (Stupnisky et al., 2008).

Achievement-related helplessness and hope. Achievement emotions were assessed using a 10-point scale in which students indicated the extent to which they experienced "helplessness" and "hope" with respect to their performance in introductory psychology (1 = *not at all*, 10 = *very much so*). Helplessness is the result of an internal, stable, uncontrollable attribution that reflects a lesser variant of hopelessness (Weiner, 2014; Weiner & Litman-Adizes, 1980). According to Weiner (2018), hope is an attribution-based emotion that is likely to result when internal, unstable, and controllable attributions for performance are used.

Perceived stress. Seven items from Cohen, Kamarck, and Mermelstein's (1983) Perceived Stress Scale were used to assess students' perceived stress, e.g., "During the last month, how often have you found yourself thinking about things that you would have to accomplish" (1 = *never*, 5 = *very often*). Items were summed so higher scores reflected greater perceived stress (Cronbach α = .88). In past studies, this perceived stress measure has been shown to have satisfactory psychometric properties: Cronbach αs = .83 to .87 (Hall et al., 2006; Ruthig, Haynes, Stupnisky, & Perry, 2009). The original 10-item scale was reduced to seven items as part of an effort to reduce the length of the survey for participants. However, internal reliability of this shortened seven-item measure is similar to the full version (α =.84-.86; Cohen et al., 1983).

Course-based test. Participants were administered a test based on course content at the beginning of the course roughly two weeks prior to the online survey. This test was administered in October.

Results

Rationale for the Analyses

A person-centered analytical approach was employed to identify individuals with similar patterns of motivation based on multiple (continuous) indicator variables. Two separate latent profile analyses (LPA) were conducted to identify student athlete and non-athlete profiles based on the following motivation-related variables: causal attributions for performance (strategy, ability), PAC, and achievement emotions (hope, helplessness, perceived stress) using M*plus* version 7 (Muthén & Muthén, 1998-2016). LPA models were estimated that comprised a range from two to six motivation profile numbers based on recommendations by Marsh et al. (2009). Models with 500 random starts with 50 optimizations were chosen to ensure model convergence issues were avoided from local maxima (see Kam, Morin, Meyer, & Topolnytsky, 2016).

The best fitting models were selected based on Weiner's attribution theory (1985, 2012, 2018), fit statistics, classification quality, and size of profiles (Infurna & Grimm, 2017; Marsh et al., 2009). As recommended, several fit statistics were considered, including the Bayesian Information Criterion (BIC), Aikake information criteria (AIC), the sample-size adjusted BIC (SABIC), the Lo-Mendell-Rubin Test (LMRT), and the bootstrapped likelihood ratio test (BLRT) to select the best fitting class solution for student athletes and non-athletes, separately. The BIC, AIC, and SABIC tests that yield lower values indicate better fitting models. In addition, significant values generated by the LMRT and BLRT support the tested model over a model with one fewer profiles (i.e., *k* profile vs. *k-1* profile; Lo, Mendell, & Rubin, 2001).

Classification quality was determined using Entropy values, where values approaching 1.00 are considered best and convey clear separation of individuals into profiles (recommended values ≥ .80; Infurna & Grimm, 2017; Nylund-Gibson, Grimm, Quirk, & Furlong, 2014; Zhao & Karvpis, 2004). Model solutions that are ideal are those that are parsimonious in terms of having the fewest latent profiles, while still effectively addressing the complex nature of the data, and have few profiles that comprise less than 5% of the total sample (DiStefano & Kamphaus, 2006; Jung & Wickrama, 2008). Finally, the LPAs controlled for age and sex since both demographic variables correlate with key academic variables involved in the formation of the profiles.

LPA motivation profiles and performance-based validation. Following the specification of the LPA motivation profiles for student-athletes and non-athletes, the profile comparisons were assessed based on a performance outcome (course-based test) using Mplus's Auxiliary (BCH) function (Asparouhov & Muthén, 2014; Vermunt, 2010). The Auxiliary (BCH) function estimates the relationships between the latent profiles and the continuous outcome (achievement test) in the model and does not allow these relationships to change the profiles (Marsh et al., 2009; Morin & Wang, 2016; Wang et al., 2016).

Student Athletes' Latent Profile Analysis

Student athletes' zero-order correlations. Table 1 presents the zero-order correlations for all of the unadjusted relationships between the study variables for student athletes. Poor performance attributed to (bad) strategy was positively related to hope (r = .20) but did not predict lower levels of helplessness (r = .06). As expected, attributing poor performance to (low ability was positively related to perceived stress and helplessness (rs = .27, .33, respectively). These correlations convey the negative affective repercussions of ascribing one's performance to uncontrollable (vs. controllable) attributions (Weiner, 1985, 2018). In accordance with past research, student athletes' PAC was associated with adaptive emotions: hope (r = .42), helplessness (r = -.55), and perceived stress (r = -.31), and achievement: test performance (r = .21; all ps < .01; Parker et al., 2018; Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010; Perry et al., 2001; Stupnisky et al., 2008).

Student athletes latent profile analysis (LPA). The LPA revealed BIC, AIC, and SABIC values were lowest for the 3-profile and 4-profile solutions (see Table 2). The LMRT test showed the 3-profile solution was a better suited model (p = .007) compared to other models (e.g., 4-profile solution, p = .164; 5-profile solution, p = .691). The 2-profile, 3-profile, and 4-profile solutions comprised profiles that were not less than 5% of the total sample. This means that for the 5-profile and 6-profile solutions, at least one of these profiles had fewer than 10 participants out of the 207 student athletes. Additionally, the entropy value for the 3-profile (.89) was highest. Thus, based on all of these criteria, the 3-profile solution was chosen because it had

Table 1

Zero-Order Correlation Matrix for Student Athletes

	1	2	3	4	5	6	7	8	9	10
1. Age	–									
2. HSG	-.20*	–								
3. Sex	.02	-.16	–							
4. Strategy	-.10	.02	-.06	–						
5. Ability	-.05	-.07	-.11	.13	–					
6. PAC	.07	.04	.27*	.17	-.20*	–				
7. Hope	-.05	.02	.07	.20*	.01	.42*	–			
8. Helplessness	-.09	-.08	-.27*	.06	.33*	-.55*	-.42*	–		
9. Perceived stress	-.16	<.01	-.40*	.11	.27*	-.31*	-.19*	.37*	–	
10. Course-based test	-.06	.35*	.11	-.16	-.13	.21*	.28*	-.36*	-.12	–
M/%	1.61	7.76	53%	7.31	5.51	32.10	7.36	3.61	22.51	64.94
SD	.96	1.63	–	2.17	2.62	5.31	2.00	2.61	5.96	15.63

Note. HSG = high school grade. PAC = perceived academic control. Sex was dummy-coded where 1 = *female* and 2 = *male*.

[*] $p \leq .01$ (two-tailed tests).

Table 2

Criteria Values for Latent Profile Analysis in Student Athletes

No. of profiles	LL	Free par.	AIC	BIC	SABIC	LMRT	BLRT	Entropy
2	-3038.449	21	6118.898	6188.885	6122.348	0.0001	0.000	0.831
3	**-3002.322**	**30**	**6064.643**	**6164.625**	**6069.572**	**0.007**	**0.000**	**0.894**
4	-2977.232	39	6032.464	6162.440	6038.871	0.164	0.000	0.886
5	-2959.786	48	6015.571	6175.542	6023.456	0.691	0.000	0.885
6	-2942.835	57	5999.671	6189.636	6009.035	0.447	0.000	0.857
Interpretation	*Lower* values better	*Lower* values better	*Lower* values better	*Lower* values better	*Lower* values better	values significant at $p < .05$	values significant at $p < .05$	*Higher* values better

Note. Criteria values of the latent profile analysis when random starts = 500 50. LL = Log likelihood. AIC = Aikake information criterion; BIC = Bayesian information criterion; SABIC = sample-size adjusted BIC; LMRT = Lo-Mendell-Rubin Test and BLRT = bootstrapped likelihood ratio test (values significant at $p < .05$). Analyses controlled for age and sex. Values for 5- and 6-profiles indicated the model was not trustworthy due to local maxima. For 5-profiles, the sample variance of sex in class 5 was 0 and for 6-profiles, the sample variance of sex in class 6 was 0.

the lowest value according to the BIC indices, the LMRT and BLRT tests were significant, no profiles were less than 5% of the sample, and entropy was highest. Mean scores for the cognitive and emotion variables were standardized to facilitate motivation profile interpretation (see Table 3).

Three motivation profiles involving cognitions and emotions were identified based on standardized scores as follows: *control-focused* (*n* = 115; 56%), *control-disengaged* (*n* = 61; 29%), and *control-relinquished* (*n* = 31; 15%). Profile variable levels were interpreted as moderate if they fell between the range of -0.5 to +0.5 *SD*; and extreme if they fell outside this moderate range (see Figure 1). Figure 1 provides a visual representation of these latent profiles for student athletes. Although the motivation-related measures were assessed in a single LPA analysis, they are separated into cognitions and emotions to facilitate ease of interpretability. Control-focused students moderately endorsed (bad) strategy and disavowed (low) ability as causes for poor performance, had high PAC, moderate hope, stress, and low helplessness. Control-disengaged students moderately endorsed (bad) strategy and (low) ability as causes for poor performance, had moderate PAC, hope, stress, and high helplessness. Finally, control-relinquished students moderately endorsed (bad) strategy and (low) ability as contributing to their performance, had low PAC and hope, high stress, and very high helplessness.

These profiles provide some theoretical distinctions between student athletes' LPA motivational tendencies in which control-focused athletes appear to be highly motivated and control-relinquished athletes appear not motivated. The control-disengaged athletes present a less definitive motivation profile that deserves further theoretical and empirical analysis.

Student athlete LPA differences and test performance. Latent profile differences on test performance are displayed in Table 4. Control-focused students who had the most adaptive

Table 3

Standardized Motivation Variable Scores of Student Athlete and Non-Athlete Profiles

Athlete Profiles	Strategy	Ability	PAC	Hope	Perceived stress	Helpless
Control-focused	-0.01	-0.31	0.46	0.32	-0.31	-0.76
Control-disengaged	-0.10	0.35	-0.32	-0.13	0.18	0.52
Control-relinquished	0.20	0.40	-1.05	-0.94	0.80	1.77

Non-athlete Profiles	Strategy	Ability	PAC	Hope	Perceived stress	Helpless
Control-focused	-0.37	-1.09	0.55	0.48	-0.44	-0.78
Control-ambivalent	0.42	0.79	0.51	0.34	-0.31	-0.78
Control-disengaged	-0.02	0.09	-0.31	-0.21	0.25	0.41
Control-relinquished	-0.06	0.33	-1.06	-0.88	0.69	1.64

Note. Standardized scores for the motivation-based variables are presented for each profile (separately for competitive athletes and non-athletes).

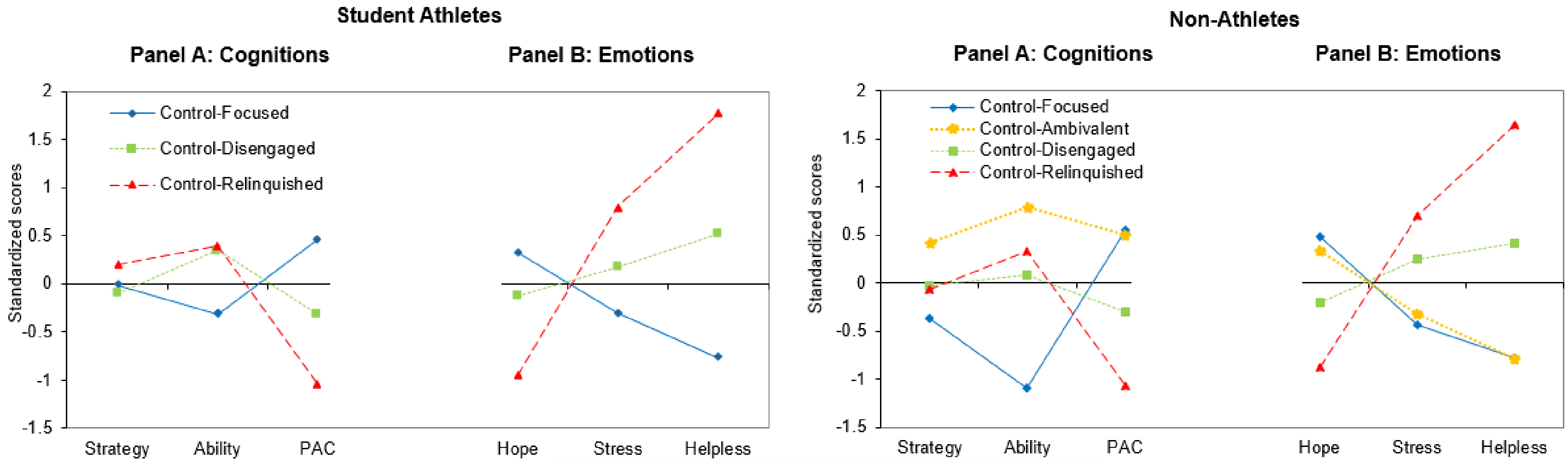

Figure 1. Latent motivation profiles are displayed based on standardized scores of student athletes' and non-athletes' attributions for unsatisfactory performance (strategy, ability), perceived academic control (PAC), hope, perceived stress, and helplessness. A latent profile analysis is conducted for student athletes and non-athletes separately using motivation-related measures which are separated into cognitions (Panel A) and emotions (Panel B) for explication.

Table 4

Mean Differences Across Motivation Profiles on Test Performance

Athlete Profiles	*M*	*SE*
Profile 1: Control-focused	69.68	1.57
Profile 2: Control-disengaged	58.50	1.91
Profile 3: Control-relinquished	58.25	3.63
Differences Between Profiles	1>2=3	

Non-athlete Profiles	*M*	*SE*
Profile 1: Control-focused	74.45	1.42
Profile 2: Control-ambivalent	70.56	1.42
Profile 3: Control-disengaged	64.03	1.61
Profile 4: Control-relinquished	55.06	1.68
Differences Between Profiles	1=2>3>1	

Note. Means and standard errors for test performance are reported for each profile (separately for athletes and non-athletes).

motivation profiles from an attribution theory perspective had higher test scores than the control-disengaged students [χ^2 (1, *n* = 176) = 19.11, *p* < .001] and control-relinquished students [χ^2 (1, *n* = 146) = 8.39, *p* = .004]. The control-disengaged and control-relinquished students had equivalent test scores [χ^2 (1, *n* = 92) = .003, *p* = .953]. For student athletes, all test performance results remained significant after controlling for high school grades. Furthermore, Levene's test of equality variances was non-significant (*p* = .195) indicating the error variance of test performance was equal across the profiles.

These test results provide notable insights into the LPA motivation profiles in showing that the control-focused athletes outperformed the control-relinquished athletes by over 11% on the classroom test. In so doing, they highlight the motivation-performance linkages associated with these two student groups. The fact that the performance of the control-disengaged students was no better than the control-relinquished students provides some further empirical clarity into the motivational disadvantages of such a psychosocial profile.

Student Non-Athletes' Latent Profile Analysis

Student non-athletes' zero-order correlations. Table 5 presents the zero-order correlations for all of the unadjusted relationships between the study variables for the non-athletes. Similar to the pattern of correlations for student athletes, attributing poor performance to (low) ability was positively associated with helplessness and perceived stress (*r*s = .19, .17, respectively). The correlation between attributing poor performance to (bad) strategy and hope was verging on significance which reflect a similar pattern to the athletes (*r* = .09). Again, these results support the premise that the controllability of attributions can be tied to emotions (Weiner, 2014). Like the student athletes, non-athletes' PAC was linked to emotions in expected

Table 5

Zero-Order Correlation Matrix for Non-Athletes

	1	2	3	4	5	6	7	8	9	10
1. Age	–									
2. HSG	-.20*	–								
3. Sex	.06	-.14*	–							
4. Strategy	.09	.03	.04	–						
5. Ability	.05	-.11	-.11	.32*	–					
6. PAC	.09	.16*	.09	.11*	-.17*	–				
7. Hope	.01	.20*	.08	.09	-.12*	.44*	–			
8. Helplessness	-.03	-.18*	-.15*	-.01	.19*	-.58*	-.45*	–		
9. Perceived stress	-.09	-.01	-.20*	.15*	.17*	-.31*	-.18*	.41*	–	
10. Course-based test	.02	.39*	.07	.08	-.14*	.37*	.32*	-.40*	-.08	–
M/%	2.04	7.70	74%	7.16	5.58	32.11	7.14	3.77	24.21	67.30
SD	1.51	1.72	–	2.27	2.76	5.17	2.25	2.62	5.62	15.55

Note. HSG = high school grade. PAC = perceived academic control. Sex was dummy-coded where 1 = *female* and 2 = *male*.

* $p \leq .01$ (two-tailed tests).

directions: hope (*r*s = .44), helplessness (*r*s = -.58), and perceived stress (*r*s = -.31), and achievement: test performance (*r* = .37; all *p*s < .01).

Student non-athletes' latent profile analysis (LPA). For the non-athletes, the LPA indicated the AIC, BIC, and SABIC values for the 5-profile and 6-profile solutions were lowest (see Table 6). The LMRT revealed the 4-profile (*p* = .001) and 5-profile (*p* = .002) solutions were the best suited, whereas the 6-profile (*p* = .078) solution was not better suited. Profile solutions ranging from 2 to 5 did not comprise less than 5% of the total sample. Finally, the entropy values were highest for the 3-profile and 4-profile solutions (.855 and .806, respectively). In considering these criteria, the 4-profile solution was selected since it was the most parsimonious option, with the lowest value according to the BIC, significant LMRT and BLRT tests, no profiles were less than 5% of the sample, and entropy was adequate. The mean scores for performance attributions, PAC, hope, helplessness, and perceived stress were standardized to facilitate profile interpretation (see Table 3).

The LPA variables for student non-athletes were separated into motivation-related cognitions and emotions for ease of interpretation (see Figure 1, Non-Athletes). Four psychosocial motivation profiles were identified based on standardized scores as follows: *control-focused* (*n* =144; 27%), *control-ambivalent* (*n* = 136; 25%), *control-disengaged* (*n* = 160; 30%), and *control-relinquished* (*n* = 94; 18%). The control-focused students moderately disavowed (bad) strategy and strongly disavowed (low) ability as causes for poor performance, had high PAC and hope, moderate stress, and low helplessness. Control-ambivalent students moderately endorsed (bad) strategy and strongly endorsed (low) ability in accounting for poor performance, but had high PAC, moderate hope, stress, and low helplessness. The control-disengaged students moderately endorsed (bad) strategy and (low) ability as causes for poor

Table 6

Criteria Values for Latent Profile Analysis in Non-Athletes

No. of profiles	LL	Free par.	AIC	BIC	SABIC	LMRT	BLRT	Entropy
2	-7940.370	21	15922.740	16012.628	15945.968	0.000	0.000	0.802
3	-7867.532	30	15795.065	15923.477	15828.247	0.000	0.000	0.855
4	**-7814.050**	**39**	**15706.100**	**15873.036**	**15749.237**	**0.001**	**0.000**	**0.806**
5	-7777.552	48	15651.104	15856.563	15704.196	0.044	0.000	0.782
6	-7746.210	57	15607.640	15851.622	15670.686	0.079	0.000	0.796
Interpretation	*Lower* values better	*Lower* values better	*Lower* values better	*Lower* values better	*Lower* values better	values significant at $p < .05$	values significant at $p < .05$	*Higher* values better

Note. Criteria values of the latent profile analysis when random starts = 500 50. LL = Log likelihood. AIC = Aikake information criterion; BIC = Bayesian information criterion; SABIC = sample-size adjusted BIC; LMRT = Lo-Mendell-Rubin Test and BLRT = bootstrapped likelihood ratio test (values significant at $p < .05$) Analyses controlled for age and sex.

performance, and had moderate PAC, hope, helplessness, and stress. Finally, control-relinquished students moderately endorsed (bad) strategy and (low) ability as causes, had low PAC and hope, and high helplessness and stress.

The non-athlete profiles suggest theoretical distinctions with the control-focused individuals having high motivation and control-relinquished athletes having low motivation. However, the control-ambivalent and control-disengaged individuals fall somewhere in the middle with the control-ambivalent group indicating more motivation than the control-disengaged group. Such profile nuances will be addressed in the discussion section.

Non-athlete profile differences on test performance. Results of non-athlete profile differences on test performance are displayed in Table 4. Much like the student athletes the control-focused students attained the highest test scores and the control-relinquished students attained the lowest test scores. Control-focused students had higher test scores than control-disengaged students [χ^2 (1, n = 304) = 21.96, $p < .001$] and control-relinquished students [χ^2 (1, n = 238) = 78.28, $p < .001$], but not control-ambivalent students [χ^2 (1, n = 280) = 3.22, p = .073]. The control-ambivalent students also had higher test scores than both control-disengaged [χ^2 (1, n = 296) = 8.58, p = .003] and control-relinquished students [χ^2 (1, n = 230) = 49.99, $p <$ .001]. Although control-disengaged students had lower test scores than control-focused and control-ambivalent students, they had higher test scores than the control-relinquished students [χ^2 (1, n = 254) = 13.12, $p < .001$]. Not surprisingly, control-relinquished individuals had the lowest test scores compared to all of the other profiles. For non-athletes, all test performance results remained significant after controlling for high school grades. Of note, Levene's test of equality variances was non-significant (p = .219) meaning the error variance of the dependent variable was equal across the profiles.

Similar to the student athletes, control-focused non-athletes achieved higher test scores than the control-relinquished non-athletes by over 19%. The control-focused and control-ambivalent profiles did not differ in terms of test performance, suggesting they may comprise similar motivational tendencies that are tied to academic achievement. These two profiles also outperformed the control-disengaged and control-relinquished non-athletes, which indicates there may be nuances that exist between these two profiles that contribute to their performance and require further empirical investigation.

Discussion

The present study examined motivation profiles of student athletes and non-athletes upon entering university based on Weiner's (1985, 2018) attribution theory. Latent profile analyses (LPA) revealed expected profile patterns for both student groups based on motivation-related cognitions and emotions; however, distinct differences also occurred in the number and structures of the profiles. LPA of the cognitive (PAC, performance attributions) and affective (attribution-related hope, helplessness, and perceived stress) variables revealed three motivation profiles of student athletes and four motivation profiles of non-athletes.

Control-focused student athletes comprised 56% of the sample and had the most adaptive motivation profile in relation to the challenges arising from school-to-college transitions. They moderately endorsed (bad) strategy and disavowed (low) ability as causes of poor performance and had high PAC scores. This causal attribution combination is characteristic of an adaptive motivation perspective. Longitudinal field studies of college transitions show that PAC is positively associated with intrinsic motivation, exerting more effort, higher GPAs, and fewer course withdrawals (Perry et al., 2001, 2005). These motivated learners also reported moderate levels of hope and stress, and low helplessness. They also achieved the highest average (70%) on a course-based test relative to the control-disengaged and control-relinquished profiles. In sum, these control-focused students appeared to take an adaptive, mastery-oriented approach to their learning environment. They believed they had control over their academic tasks and demands, perhaps due in part to attributing their poor performance to controllable causes (i.e., bad strategy) and not uncontrollable causes (i.e., low ability), and were emotionally positive in their academic setting.

Student athletes who exhibited a *control-relinquished* LPA profile accounted for 15% of the sample and moderately endorsed (bad) strategy *and* (low) ability as causes of poor performance. Although their attributions for (low) ability were just above average, these were still the highest observed among the LPA profiles which illustrates the tendency to ascribe uncontrollable causes to performance. These students had little control over their academic environment, indicated by low PAC which has been empirically demonstrated to be a critical academic risk factor (Perry, 1991; Perry, 2003; Perry et al., 2001). They also had a surfeit of negative emotions as reflected in having little hope, and excessive helplessness and stress in their learning experiences. Such an emotional profile suggests that they may be more prone to experience burnout, characterized by helpless-like symptoms of amotivation and fatigue (Cresswell & Eklund, 2006, 2007; Dubuc-Charbonneau, Durand-Bush, & Forneris, 2014). In addition, these students performed much lower than their control-focused counterparts on a course test (70% vs. 58%). In sum, control-relinquished individuals had the most maladaptive LPA motivation profile for dealing with competitive learning environments.

Student athletes characterized by a *control-disengaged* LPA profile (29% of sample) indicated seemingly average levels across the cognitive (attributions, PAC) and affective (hope, helplessness, stress) measures. The findings indicate these students do not have high levels of control or emotion in their academic environment, suggesting they may be relatively disengaged from their learning environment. Of note, control-disengaged student athletes did not perform any better on the performance test (59%) than the control-relinquished student athletes, and so, although they exhibit a relatively neutral motivation profile, they still appear to experience serious motivation challenges.

The student athlete profiles identified can be viewed within Weiner's attribution theory perspective. Weiner (1985, 2018) posits that uncontrollable attributions for negative outcomes that are internal and stable (e.g., low ability) are tied to a lowered expectancy of success, since they are viewed as unmodifiable, and to reduced hope and greater helplessness regarding academic success. He asserts this mix of cognitions and emotions results in an unmotivated individual who will struggle to achieve success. As evidenced by the student athlete profiles, those profiles void of high levels of control, and endorsing moderate levels of uncontrollable attributions (control-disengaged, control-relinquished) had the lowest performance (<60%) relative to the control-focused students. Thus, these profiles align well with Weiner's theory.

For the non-athletes, four LPA motivation profiles were identified based on the same cognitive and affective variables. Non-athletes who had a *control-focused* profile accounted for 27% of the non-athlete sample. Their profile closely resembled that of the control-focused student athletes whereby they disavowed (low) ability as a cause of poor performance and had high PAC and hope, low helplessness, and moderate stress. In addition, they attained the highest average test performance (74%) relative to students in the other non-athlete profiles which helps to convey the control they have over their learning environment.

The *control-relinquished* non-athletes (18% of sample) shared similar motivation aspects as the control-relinquished student athletes. These non-athlete students were characterized by their low levels of PAC and hope, and high helplessness and stress. Unfortunately, the pernicious blend of low PAC and maladaptive emotions can be deleterious to academic motivation and achievement (Parker et al., 2018; see Perry, Chipperfield, Hladkyj, Pekrun, & Hamm, 2014) and may explain the low test performance for this group (55%). In sum, the control-relinquished students had the most maladaptive motivation profile among non-athletes.

Non-athletes in the *control-ambivalent* profile accounted for 25% of the sample. These individuals had a motivation profile that was unlike any of the student athlete profiles. They moderately endorsed (bad) strategy *and* strongly endorsed (low) ability as causes for poor performance, and had high PAC. They also had a more positive emotion mix (hope, low helplessness, moderate stress) which suggests some engagement in their learning environment. Of note, these control-ambivalent students appear to be an anomaly since their emotion scores are nearly identical to the motivated learners (see Figure 1, Non-Athletes Panel B), yet their cognitive attribution scores are discordant from these motivated learners (see Figure 1, Non-athletes Panel A). Unlike the other non-athlete LPA profiles, control-ambivalent students endorsed both controllable and uncontrollable attributions, conveying ambivalence toward the causes ascribed to poor performance outcomes. Notably, these individuals still achieved high test performance (71%), akin to the control-focused non-athletes and athletes.

Finally, non-athletes in the control-disengaged profile comprised 30% of the non-athlete sample. Comparable to the control-disengaged student athletes, this group shared average levels of cognitions (performance attributions, PAC) and emotions (hope, helplessness, and stress). They also had relatively average test performance (64%) falling between the most adaptive and least adaptive profiles. In sum, the control-disengaged non-athletes convey a relatively neutral motivation profile.

When considering the profile results for non-athletes, it can be interpreted once again that the findings align well with attribution theory. As was seen with the student athletes, non-athlete profiles that had lower levels of control and dysfunctional attributional emotions (i.e., control-disengaged and control-relinquished) performed the worst on the course-based test (<65%) relative to the more adaptive non-athlete profiles (i.e., control-focused and control-ambivalent). In order to understand the control-ambivalent students better, further empirical research could test whether they sustain motivation and attain high achievement over time or if these positive outcomes eventually decline.

Athletes and Non-Athletes: Relationships Among Study Variables

The zero-order correlations between the motivation variables for each sample (student athletes and non-athletes) were analogous in a number of ways. For both samples, PAC positively related to theory-based, adaptive psychosocial measures (bad strategy attributions for poor performance, hope), and negatively to maladaptive psychosocial measures (low ability attributions for poor performance, helplessness, perceived stress). These relationships support Weiner's theory (1985) since, for example, a student making internal and controllable attributions for poor performance (e.g., strategy) is likely to view future performance on a task as dependent on personal action which should boost PAC and adaptive emotions (i.e., hope), as well as reduce negative emotions (i.e., helplessness). In addition, test performance was associated with other achievement-related variables (high school grades, PAC, and emotions) for both samples which is consistent with past research (Hamm, Perry, Chipperfield, Murayama, & Weiner, 2017; Hamm et al., 2014; Perry et al., 2001, 2005, 2010; Ruthig et al., 2008; Stupnisky et al., 2008).

However, some differences emerged. Student athletes' attributions of (low) ability to poor performance were more strongly linked to helplessness (*r* = .33) than non-athletes (*r* = .19), suggesting that low ability attributions for poor performance are especially high for student athletes feeling helpless. One explanation offered is that student athletes who strongly view failure performances as being due to low ability may perceive ability as a more stable cause, which would be linked to higher feelings of helplessness. Another plausible explanation is student athletes ascribing low ability to negative performances may feel greater helplessness because they are experiencing additional and external stressors that impact their academic environment (e.g., pressure to excel in sport).

Finally, the findings reveal male student athletes had higher PAC (*r* = .27) and lower perceived stress (*r* = -.40) than the female student athletes. For non-athletes, males and females did not differ in PAC, and while males were associated with lower perceived stress (*r* = -.20), this relationship was not as prominent compared to the male athletes. Although assessing sex differences between athletes and non-athletes was not a study focus, these findings do support other student athlete studies. For example, some research shows that female athletes experience more role conflict (e.g., difficulty managing academic and athletic expectations) than male athletes (Lance, 2004), which could contribute to increased stress and feeling less academic control. Furthermore, De Brandt, Wylleman, Torregrossa, Defruyt, and Van Rossem (2017) found that in the context of pursuing both education and sport, female athletes felt a stronger need for mental toughness—a measure that comprised items assessing one's competency to control and cope effectively with adversity, as well as manage stress. Thus, there is some evidence supporting the sex differences found in this study; however, for a better understanding, studies intended to test these differences should be conducted.

LPA Motivation Profiles

When comparing LPA models, both athletes and non-athletes appear to have three motivation profiles in common. Each sample had a profile that was adaptive (control-focused), neutral (control-disengaged), and maladaptive (control-relinquished) across the motivation variables. This is conveyed in Figure 1 where the three profiles labelled control-focused, control-disengaged, and control-relinquished have similar patterns of variable scores for both athletes and non-athletes (e.g., control-focused athletes are similar to control-focused non-athletes). In other words, the attribution-based motivation profiles of student athletes and non-athletes are fairly alike. This is notable considering that past research has been inconclusive when comparing academic motivation in athletes and non-athletes (Hood, Craig, & Ferguson, 1992; Pascarella et al., 1999; Shulman & Bowen, 2001; Wolniak, Pierson, & Pascarella, 2001). Thus, the findings in Study 1 suggest that exaggerating motivational differences between student athletes and non-athletes in academic settings may be misleading.

Another similarity between the two samples is reflected in their ratings of academic helplessness and test performance. Student athletes who were control-disengaged or control-relinquished had scores on helplessness that were greater than +0.5 *SD* above the mean. Non-athletes who were control-relinquished also indicated helplessness ratings greater than +1.5 *SD*. All three of these profiles who had high helplessness ratings also obtained the lowest test scores (55-59%). This is not surprising since there is evidence supporting the deleterious effects of helplessness on a number of outcomes in achievement settings (Daniels et al., 2009; Diener & Dweck, 1978; Krejtz & Nezlek, 2016).

Despite these similarities, several differences were also identified between the athlete and non-athlete profiles. For instance, the number of LPA profiles identified differed; four unique latent profiles emerged for the non-athletes compared to only three latent profiles for the student athletes. One interpretation of this could be that academic program selection factors contribute to student athletes being a more homogenous group than non-athletes. Although there is limited research investigating differences in motivation profiles for athlete and non-athletes, it could be posited student athletes experience similar selection processes that foster the development of shared motivational experiences (e.g., being selected for competitive sport teams, meeting required GPA guideline for enrollment or athletic scholarships, etc.) and interests (e.g., pursuing sport-related academic programs).

In addition, the control-ambivalent non-athletes had a profile unlike any of the other non-athlete or student athlete profiles. As previously mentioned, the control-ambivalent non-athletes' emotions were adaptive and synchronous with the control-focused non-athletes. However, they indicated incongruent causal mindsets by endorsing both controllable and uncontrollable attributions. This finding is also puzzling since these students are endorsing maladaptive attributions but are still performing well. One possible explanation is that the positive impact of using controllable attributions and having high PAC outweighs the potential negative impact of making an uncontrollable attribution. Another speculation is these particular students may perceive ability to be somewhat unstable or modifiable. Evidently, future research is required to further understand these individuals and to test such assumptions.

Despite commonalities between student athlete and non-athlete LPA motivation profiles, it is apparent that more student athletes are performing worse academically. For example, control-disengaged student athletes attained comparable test scores (59%) to students comprising control-relinquished profiles (55-58%). In contrast, control-disengaged non-athletes outperformed the control-relinquished non-athletes by approximately 9%. These findings highlight that control-disengaged athletes and non-athletes share similar motivation profiles, yet non-athletes are performing better.

Generally speaking, the similarities and differences observed help to identify the parallel nature of student athlete and non-athlete motivation profiles in keeping with attribution theory (Weiner, 1985, 2018). Expected associations between the most adaptive and maladaptive motivation profiles and test performance are apparent. There are differences in the number of profiles that emerge between athletes and non-athletes, as well as profile differences detected across test performance. These observations help address omissions in the literature by assessing student athletes and non-athletes using a person-centered approach and examining their motivation using an attribution-based framework. They also highlight the need to conduct more research in this area. For example, are these profiles replicable, are they enduring over the academic year, and do they apply to other contexts?

Study Strengths, Limitations, and Future Directions

Study 1 has several strengths and limitations. One strength involves the use of a person-centered analytic approach to assess student athlete and non-athlete LPA motivation profiles and their impact on performance (based on attribution theory). In addition, this study identified motivation profiles for athletes and non-athletes to help provide a better snapshot of their academic learning experiences in their transition to university. The generalizability of the findings was a limitation since the athlete and non-athlete samples were limited to students enrolled in an introductory psychology course. In addition, the delivery method of the course was a blended learning format—involving a mix of face-to-face instruction and online learning—which is not typical in all classroom settings.

Since a large proportion of student athletes (56%) were motivated (i.e., control-focused), this finding supports studies where student athletes were found to perform just as well as, if not better than, non-athletes in their academic pursuits (Georgakis et al., 2014; Richards & Aries, 1999). However, this is not the case for all student athletes. This study suggests that 44% of student athletes may be facing some academic challenges at the start of their first-year course, which is evidenced by their low initial test scores that are just above a passing grade. This fits with evidence that finds student athletes often enter with lower high school grades, attain lower GPAs, report lower academic motivation to perform well, and have lower graduation rates relative to non-athletes (Cosh & Tully, 2014; Lucas & Lovaglia, 2002; Purdy et al., 1982). Thus, another future research direction could involve delivering motivation treatments for student athletes who may be susceptible to poor academic performance.

Attribution-based treatments aim to encourage the use of internal and controllable attributions (e.g., bad strategy) versus uncontrollable attributions (e.g., low ability) for negative performance outcomes. These treatments have been found to boost achievement striving and performance for students with various risk profiles (e.g., low elaborators, failure avoiders, highly bored; Hamm et al., 2014; Parker et al., 2018). Future research could explore whether attribution-based treatments would benefit student athletes characterized by at-risk profiles using person-centered analytic approaches.

Motivation treatments that are geared to modify specific psychological processes are growing in popularity in the achievement literature. A number of these treatments are based on a range of psychological theories: utility-value (Harackiewicz, Rozek, Hulleman, & Hyde, 2012; Hulleman, Godes, Hendricks, & Harackiewicz, 2010), social belongingness (Hausmann, Ye, Schofield, & Woods, 2001; Walton, & Cohen, 2011), and growth mindsets (see Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013; Yeager & Dweck, 2012) to name a few. Similar to AR, some of these treatments are effective in enhancing achievement motivation for individuals with certain academic risk factors (e.g., low expectancies of success: Hulleman & Harackiewicz, 2009; social belongingness threat: Walton & Cohen, 2011). In light of this, research using AR or other psychological interventions could be strengthened by implementing person-centered approaches first to help identify what psychological processes need ameliorating (e.g., sense of belonging, retraining maladaptive performance attributions). This step would ensure that a focus on the appropriate motivational resources and the specific context is considered.

In summary, Study 1 helps to provide a clearer picture of the cognitive and affective variables that comprise LPA motivation profiles of student athletes and non-athletes. For students entering a Midwestern Canadian university, Study 1 findings suggest student athletes shared many motivation tendencies with non-athletes. However, the student athletes in this study had fewer motivation profiles and were potentially more at-risk than non-athletes when validated with a performance test. Study 1 sets the stage for Studies 2 and 3 to explore the potential impact of a theory-based motivation treatment for student athletes exhibiting theory-driven, psychosocial risk factors.

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Appendix A

Perceived Academic 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. No matter what I do, I can’t seem to do well in my courses.

4. I see myself as largely responsible for my performance throughout my academic career.

5. How well I do in my courses is often the “luck of the draw”.

6. There is little I can do about my performance in university.

7. When I do poorly in a course, it is usually because I haven’t given it my best effort.

8. My grades are basically determined by things beyond my control and there is little I can do to change that.

CHAPTER 3

Study 2: Enhancing the Academic Success of Competitive Student Athletes Using a Motivation Treatment Intervention (Attributional Retraining)

For many students entering higher education institutions, the transition from high school can be a markedly adverse learning experience. Approximately 30% of first-year students drop out of university within the first 12 months, and on average, only 59% of undergraduates enrolled in four-year institutions graduate within six years (Snyder & Dillow, 2012). Students making this transition often face various obstacles (e.g., elevated work demands, responsibility, more frequent failures, etc.) that can undermine their perceived control beliefs over academic demands and hinder their academic performance (e.g., test scores, grade point averages) and persistence to remain in their courses (Perry, 2003; Perry, Chipperfield, Hladkyj, Pekrun, & Hamm, 2014; Perry, Hall, & Ruthig, 2005; Stewart et al., 2011). Students involved in competitive sports may be at an even greater risk of dropping out of school due to additional athletic demands (Johnson, Wessel, & Pierce, 2013). Competitive student athletes must learn to adapt to two distinct learning environments (i.e., academic and sport) and hence, Study 2 will investigate the impact of a motivation treatment intervention on vulnerable competitive athletes' academic persistence and performance.

Adding sport demands to an already demanding academic environment may compound the pressures faced by students who are involved in athletics. Competitive student athletes are also likely to encounter other challenges that include physical fatigue, training requirements, competitions that overlap with class schedules, injuries, higher rest and recovery demands, student-sport identity issues, and novel training environments. These additional stressors can serve to impede their academic learning and motivation (De Knop, Wylleman, Van Houcke, &

Bollaert, 1999; MacNamara & Collins, 2010; Simons, Van Rheenen, & Covington, 1999). As such, students face the difficulty of having to balance a full-time academic schedule with a competitive sport that can include inflexible practice and competition schedules (Bengtsson & Johnson, 2012; Scott, Paskus, Miranda, Petr & McArdle, 2008).

A considerable number of these studies have focused on college or university sport teams, with a lesser focus on the broad range of student athletes who might frequently participate in alternate sport activities (e.g., external programs and club teams). Furthermore, an athlete's perceived competitiveness and investment in their sport may impact and often hinder their commitment to, and focus on, academic achievement (Intrator & Siegel, 2008; Richards & Aries, 1999). Comeaux and Harrison (2011) discuss student athletes as part of a "non-traditional" group who deal with both athletic and academic demands. They propose that athletes' success in college is determined by several factors including pre-college experiences, different types and levels of personal commitments, and social and academic integration (i.e., in-class and extra-curricular). Their research fills existing gaps by providing a conceptual model that more comprehensively addresses the ongoing demands that impact athletes' college success. However, they recommend that more research be conducted to explain individual differences (e.g., cognitive variables like perceived control beliefs), as well as the academic climate (e.g., competitive learning conditions) that might affect academic success.

Perceived Control Beliefs and Competitive Learning Conditions

Extensive research examining the transition to competitive learning environments (e.g., high school to university) shows that students' perceived control beliefs play an instrumental role in their motivation, performance, and persistence (Perry, Hladkyj, Pekrun, Clifton, & Chipperfield, 2005; Perry, Hladkyj, Pekrun, & Pelletier, 2001). Perceived control beliefs are generally defined as the subjective capacity to influence and predict life events (Perry, 2003). Perry, Stupnisky, Daniels, and Haynes (2008) examined students' control beliefs in highly competitive, novel learning conditions. They found that more than 40% of students had maladaptive mindsets where they endorsed uncontrollable causes for performance (e.g., low ability, bad luck, poor teaching) compared to endorsing controllable causes (e.g., effort, strategy). These maladaptive mindsets negatively predicted students' final grades and GPAs.

In achievement settings, perceived control over outcomes can play a role in influencing academic failures and successes (Skinner & Pitzer, 2012; Ross & Broh, 2000). In a meta-analysis examining the relationship between psychosocial variables and academic outcomes, Robbins et al. (2004) reported a control-related construct—described as academic self-efficacy—strongly predicted grade point average and retention (duration of time participants stayed enrolled at their institution; *r*s = .50, .36, respectively). Perceived control beliefs have also been associated with various achievement-related outcomes including intrinsic motivation, effortful behaviours, learning-related enjoyment, hope, pride, anger, hopelessness, boredom, and academic performance (Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011; Perry et al., 2001; Ruthig et al., 2008). In addition, students with low perceived control beliefs have an increased risk of withdrawing from their courses (Perry, Hladkyj et al., 2005).

Perceived control over future events (e.g., failure and success outcomes) has been assessed in the context of attribution research in both academic and sport domains (Anderson, 1983; Anderson & Riger, 1991; Biddle, 1993; Coffee, Rees, & Haslam, 2009; Rees, Ingledew, & Hardy, 2005). According to Weiner's (1985, 2006, 2012) attribution theory, individuals' explanations of failure and success outcomes can influence their perceptions (beliefs) of control over future outcomes. In a sport setting, Coffee and Rees (2009) found that, following unsuccessful performances at multiple time points (i.e., one day following the performance and four days later), controllable attributions predicted higher self-efficacy, particularly when causes were seen as stable. Other studies in achievement settings indicate that encouraging at-risk students to make controllable attributions for failure outcomes can lead to better academic performance, improved expectations for success, greater adaptive emotions, and more persistence (Hall et al., 2007; Perry, 2003; Perry & Penner, 1990).

These results generate questions concerning whether an attribution-based treatment may enhance perceived control beliefs, performance, and persistence in novel and low-control learning conditions. They also underscore the scarcity of research on student athletes' perceived control beliefs in academic settings. Thus, Study 2 focuses on a group of athletes with low perceived control beliefs who engage in competitive sports.

Attributional Retraining Treatment Interventions

Attributional Retraining (AR) is a control-enhancing treatment intervention based on Weiner's (1972, 1985, 2012) attribution theory of motivation and emotion. Weiner's theory asserts that it can be maladaptive for an individual to attribute negative events to causes that are internal, stable, and uncontrollable (e.g., failing an exam because of low intelligence) in terms of motivation, goal striving, and performance (Perry et al., 2014). The dimensions of causal attributions, locus (internal vs. external), stability (stable vs. unstable), and controllability (controllable vs. uncontrollable), relate to individuals' cognitions and emotions that, in turn, impact their motivation and behaviour. In achievement settings (e.g., academic or athletic), these dimensional properties influence a person's expectations regarding desirable (e.g., success) or undesirable (e.g., failure) outcomes. For example, attributing failure to causes that are internal, stable, and uncontrollable (e.g., lack of ability) can result in shame and hopelessness because the cause of failure is seen as internal to that person, likely to occur again (stable), and not controllable. In contrast, internal, unstable, and controllable attributions for failure (e.g., more effort required) result in taking responsibility for the failure, little shame, and motivation to change the outcome in the future.

In the context of Weiner's attribution theory, AR is designed to encourage individuals to use more controllable and unstable causes for negative experiences such as attributing an exam failure to poor study strategy. AR treatments have typically been implemented in achievement settings and have been particularly successful in facilitating academic attainment for at-risk students (e.g., Boese, Stewart, Perry, & Hamm, 2013; Perry, Stupnisky, Hall, Chipperfield, & Weiner, 2010). Past research demonstrates that AR effectively increases students' perceived control beliefs, achievement striving, and decreases course withdrawal rates (see Perry et al., 2005, 2014; Perry & Hamm, 2017 for reviews of the literature). For example, Perry and colleagues (2010) showed that AR produced moderate to large effect sizes for performance outcomes for AR recipients who achieved increases of nearly one standard deviation on a post-treatment test (d = .92) and one-half standard deviation on their overall year-1 GPAs (d = .51) compared to their no-AR counterparts.

When considering AR in sport settings, studies have examined athletes' attributions and their relationship with athletic motivation and performance. AR research reveals that having a more controllable attribution mindset is related to greater persistence in a golf-putting task (Le Foll, Rascle, & Higgins, 2006). Moreover, AR treatments that encourage more adaptive attributions for failure performance (i.e., controllable/unstable) helped novice golfers increase expectations for future success and persistence in a putting task (Le Foll, Rascle, & Higgins, 2008). AR treatments have also improved the shooting performances of collegiate basketball players (Orbach, Singer, & Murphey, 1997; Miserando, 1998), as well as increased expectations for success and positive emotions in tennis players (Orbach, Singer, & Price, 1999). In line with these findings, Rascle et al. (2015) showed that following a failure performance in a golf-putting task, participants who received attributional feedback (i.e., controllable/unstable causes) increased their expectancy of success four weeks later and across contexts (i.e., from a putting-task to a dart-throwing task). They also showed greater persistence over time as measured by the number of attempts made in the putting or dart-throwing task.

AR Treatments and Student Athletes

There is a constellation of risk factors that students may face in their undergraduate development, two of which will be addressed in this study involving low perceived control beliefs and a competitive athlete status. Both are influential factors that can hinder academic learning and performance to the extent that student athletes must deal with the pressures of juggling both academic- and athletic-related demands and schedules. In examining both of these factors conjointly, Study 2 will focus on a unique group of vulnerable students navigating both academic and athletic endeavours.

Study 2 explores whether an AR treatment can assist competitive student athletes when administered in a blended learning environment. AR protocols have received little attention in the context of blended learning conditions, though studies evaluating course delivery methods report similar achievement outcomes for courses administered either online or face-to-face (Campbell, Gibson, Hall, Richards, & Callery, 2008; Johnson, Aragon, Shaik, & Pama-Rivas, 2000). Previous AR studies have administered treatments largely in laboratory settings (Menec et al., 1994; Perry & Magnusson, 1989; Perry & Penner, 1990), and field settings (Struthers & Perry, 1996; Wilson & Linville, 1982, 1985; Van Overwalle & De Metsenaere, 1990).

This eight-month, randomized treatment field study will assess whether an online AR (vs. no-AR) treatment promotes academic persistence and attainment for a unique group of competitive student athletes who regularly compete in their sport, but differ in perceived control beliefs during a two semester, introductory blended learning course. AR (vs. no-AR) will be administered to a non-athlete student population for comparison purposes to assess whether treatment effects occur in both groups independently. Based on recent AR studies (Hamm et al., 2014; Perry et al., 2010), it is expected that, for competitive athletes with low perceived academic control, AR (vs. no-AR) will increase post-treatment in-class test performance, final course grades, and end-of-term perceived course success and perceived general control, as well as lower voluntary course withdrawals (VW rates). Non-athletes will also be observed to determine whether AR (vs. no-AR) can facilitate changes in academic performance, perceived course success, perceived general control, and VW rates. For non-athletes with low perceived academic control, AR (vs. no-AR) effects are expected to be less pronounced since AR recipients are not facing a unique combination of academic and athletic challenges. No treatment differences are expected for competitive athletes or non-athletes with high perceived academic control.

Method

Participants and Procedures

Participants were drawn from a cohort of first-year university students enrolled in multiple sections of a two-semester, blended learning introductory course at a Midwestern, Research-1 university. Two participant groups were selected from the full sample to allow the competitive athletes and non-athletes to be examined separately. Similar to Study 1, the athletes were defined as competitive if they participated in a competitive sport within the last three years and were currently training for or playing their most competitive sport five or more times a week. Again, competitive sport as defined as sport or competitions above the level of intramurals (e.g., sports played within the same university or organization) or simple recreation (e.g., hobbies or daily exercise) and a 3-year time span was specified to ensure adequate sample size. The participation frequency criterion ensured that the competitive athletes were involved in their respective sport(s) each week and juggling busy sport and-academic schedules. The non-athlete students were considered non-athletes if they did not participate in a competitive sport within the last three years.

The study involved procedures occurring at five time points over a two-semester blended learning introductory psychology course (see Figure 1). Data collection began after the students wrote their first introductory psychology test (Time 1) and received test feedback. In October (Time 2), the non-athlete and competitive athlete groups completed an omnibus questionnaire using a secure survey website that measured psychosocial and demographic information (i.e., perceived control beliefs, perceived course success, age, sex, etc.).

Directly following the questionnaire (Time 2), both non-athlete and competitive athlete participants were provided access to a secure survey website which randomly assigned them to one of two experimental conditions, AR or no-AR. At Time 3, students wrote a post-treatment test two weeks following the Time 2 questionnaire and treatment administration. All consenting students' test scores were obtained from course instructors at the end of the semester. In March (Time 4), participants in both AR and no-AR treatment conditions completed a follow-up questionnaire similar to the Time 2 questionnaire. Finally, in May (Time 5), all consenting participants' final introductory psychology grades and course withdrawal data were obtained from course instructors.

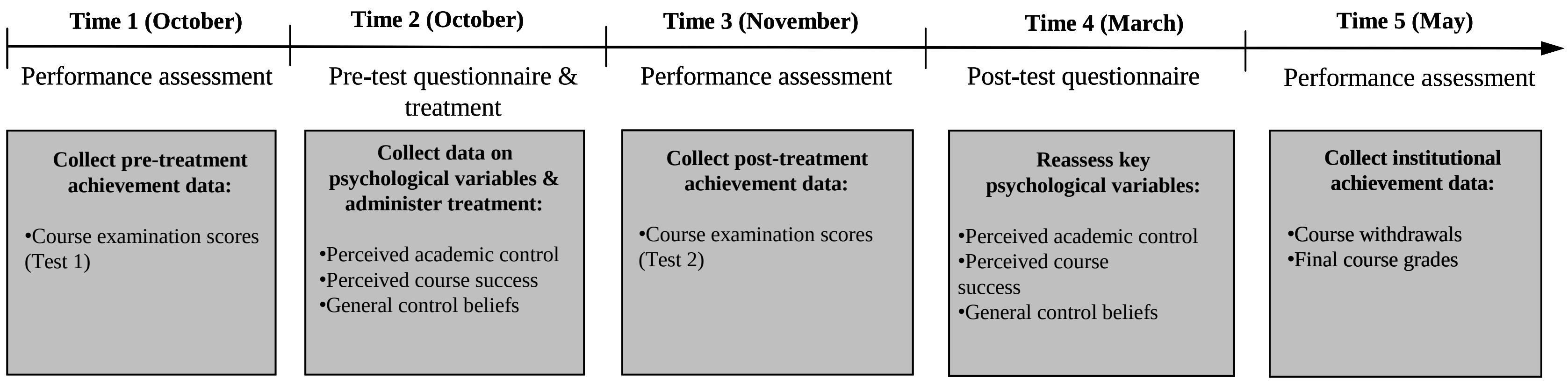

Figure 1. Treatment protocol.

Study Variables

Perceived academic control (PAC; Time 2). Perry et al.'s (2001) eight-item Perceived Academic Control (PAC) scale assessed the participants' domain specific perceived academic control at Time 2 (1 = *strongly disagree*, 5 = *strongly agree*; e.g., "I have a great deal of control over my academic performance in my psychology course"). The four negative items (e.g., "No matter what I do I can't seem to do well in my courses") were reverse coded so when summed, high scores indicated high control beliefs. The PAC scale is designed to assess achievement-related perceived control beliefs and previous research demonstrates that it is psychometrically reliable: Cronbach's $\alpha = .77$ to .80 (Hall, Perry, Chipperfield, Clifton, & Haynes, 2006; Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010; Perry et al., 2001; Ruthig, Haynes, Stupnisky, & Perry, 2009; Stupnisky, Renaud, Daniels, Haynes, & Perry, 2008) and five-month test-retest reliability: $r = .59$-.66 (Perry, Hladky et al., 2005; Stupnisky et al., 2008).

Attributional retraining (AR) treatment (Time 2). The AR treatment protocol comprised three stages (causal search, attribution content induction, and attribution content consolidation) and was administered in a one-hour session occurring approximately one week after participants receive performance feedback on their first introductory psychology test (see Perry et al., 2010, 2014 for details). In Stage 1 (causal search activation), AR recipients were asked to rate the extent to which specified causes contributed to poor academic performance (e.g., not putting enough time into their studies, social distractions, course demands are too difficult, job/financial pressure, etc.). This causal search procedure and the AR protocol was only administered after participants received their grades on a pre-treatment in-class test to give them time to reflect on recent performance feedback. The rationale for causal search activation is grounded in Weiner's attribution theory (1985, 2012) and empirical evidence that causal search often follows a performance outcome (See Perry et al., 2014; Stupnisky, Stewart, Daniels, & Perry, 2011; Wong & Weiner, 1981).[2]

All AR recipients (competitive athletes and non-athletes) viewed a narrated online video in Stage 2 (attribution induction) that encourages them to ascribe poor performance to internal, unstable, and controllable attributions (e.g., low effort, ineffective studying strategies) which can facilitate future academic success according to Weiner's attribution theory (1985, 2012). The video describes how attributions can be depicted using two dimensions: locus of causality (internal/external) and controllability (controllable/uncontrollable), which is represented visually in a four-cell attribution matrix. Based on previous research, participants were informed that university students have improved their learning and performance when they ascribe attributions that fit into the internal/controllable cell (Hamm et al., 2014; Perry et al., 2010).[3]

During the attribution consolidation process (Stage 3), participants were encouraged to deeply process the AR information by engaging in a cognitive elaboration writing activity (see Haynes, Perry, Stupnisky, & Daniels, 2009). This activity prompted students to summarize the main points of the AR treatment video (i.e., attribution content) and to describe how the content could be applied to their own lives. Students in the no-AR condition completed the Time 2 questionnaire, but did not participate in the AR induction or attribution consolidation stages and did not view the video (see Perry et al., 2014).

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[2] "Performance feedback" refers to the students receiving their (actual) introductory psychology Test 1 scores via their personalized university student accounts.

[3] Other studies have considered the importance of stability and controllability as important attributional dimensions for enhancing self-efficacy, (Coffee et al., 2009; Coffee & Rees, 2009), expectations of success, persistence (Le Foll et al., 2008; Rascle, Le Foll, & Higgins, 2008), and performance (Coffee et al., 2009; Orbach et al., 1997) in sport settings. Weiner's attribution theory (1985) is used to inform this study and encompasses all three dimensions (stability, controllability, and locus of causality), however only two dimensions (internal and controllable attributions) are used in the AR video to help students retain the treatment content.

Pre-treatment course-based Test 1 (Time 1). A pre-treatment, in-class introductory psychology test (Test 1) occurred at the end of September prior to the administration of the AR treatment.

Post-treatment course-based Test 2 (Time 3). A post-treatment in-class test of material in the students' introductory psychology course (Test 2) occurred approximately two weeks after the AR treatment. Test 2 scores were obtained from course instructors at the conclusion of the second semester.

Perceived general control (Time 4). Five months post-treatment, student's perceived general control was assessed in Semester 2 using an adapted (four-item) version of Chipperfield et al.'s (2012) Sense of Control scale. This adapted version was used to examine students' influence over general life events which was an important focus of the AR video material. General control is also less interfering with respect to the AR content and shares a positive relationship with PAC (r = .44; Perry et al., 2001). The perceived general control scale required students to rate statements pertaining to their experience in university more generally (1 = *strongly disagree*; 7 = *strongly agree*; "All things considered, I am generally able to keep things in control").

Perceived course success (Time 4). Students were asked to report how successful they felt in their introductory psychology course with a one-item scale (1 = *very unsuccessful*, 10 = *very successful*). Past studies have found a strong relationship between students' perceived success and actual achievement such as final grades and GPAs (e.g., r = .67, Daniels, et al., 2008; r = .78, Hall et al., 2006; r = .70, Ruthig, Haynes, Perry, & Chipperfield, 2007).

Final course grade (Time 5). Consenting students' final course grades in the blended learning psychology course were obtained from instructors at the conclusion of the second semester.

Course withdrawal (Time 5). Introductory psychology course withdrawal data was obtained from instructors with students' permission at the end of the second semester (0 = *completed course*, 1 = *withdrew from course*).

Results

Rationale for the Analyses

Study 2 involved a two-step hierarchical regression procedure that assessed the conditional effects of Attributional Retraining (AR) on academic performance, perceived course success, perceived general control, and voluntary course withdrawals (VW rates). In Step 1, AR and perceived academic control (PAC) were entered as predictor variables. In Step 2, an AR x PAC interaction term was entered to assess whether PAC moderated AR's effects. The same two-step hierarchical approach was used for the logistic regression analyses that assessed likelihood of course withdrawal. A priori one-tailed tests were used to assess the AR x PAC interaction effect based on the directional hypothesis that AR (vs. no-AR) effects would become stronger as PAC decreased (e.g., AR would improve academic performance for students reporting lower levels of PAC). See Table 1 for a summary of the main effect (Step 1) and interaction effect models (Step 2). Since the focus of Study 2 was on AR effects for students who vary in PAC, only interaction effects and simple slope analyses are presented below.[4]

Simple slope analyses (see Hayes, 2013) were conducted to probe the AR x PAC

[4] A p value of $< .05$ was employed as the standard probability for novel hypothesis testing (i.e., for low PAC competitive athletes), but a less conservative $p < .10$ for low PAC non-athletes because of previously replicated AR findings where AR (vs. no-AR) benefits students characterized by a risk variable (see Hall et al., 2004; Perry, 2003).

Table 1

Two-Stage Hierarchical Regression Analyses for Competitive Athletes

	Outcome				
Predictor	Perceived general control	Perceived course success	Test 2 grades	Final course grades	Course withdrawals[a]
Step 1					
AR	.03	.08	.25	.20	0.42*
PAC	.27**	.36**	.28**	.23**	0.65*
R^2	.07	.12	.08	.05	.07
Step 2					
AR x PAC	.01	-.33*	-.48**	-.29*	1.20
ΔR^2	.00	.03*	.05**	.02*	.00
R^2	.07	.15	.13	.07	.07

Note. In Step 1, partially standardized regression coefficients for AR and fully standardized regression coefficients for PAC are provided for all outcome variables (see Hayes, 2013). In Step 2, partially standardized regression coefficients for AR x PAC interactions are provided. Regression coefficients are for the step in which they were first entered. AR = attributional retraining. PAC = perceived academic control.

[a]Nagelkerke's R^2 values and odds ratios are presented for the dichotomous course withdrawal outcome measure.

**p* < .05, ***p* < .01 (one-tailed).

interaction and to examine whether AR benefited students with low (-1 *SD*) or high (+1 *SD*) PAC. The directional hypotheses were tested using 90% bias corrected confidence intervals (CIs; Hayes, 2013; Preacher & Hayes, 2008). Because the AR treatment variable is dichotomous, it has been left in its original metric (0 = *no-AR*, 1 = *AR*) for ease of interpretation (Hayes, 2013). AR effects are reported using both partially standardized and unstandardized regression weights. The latter provides the AR vs. no-AR mean difference on the outcome variables in raw units (e.g., percent difference), whereas the former provides the mean difference in standard deviation units (e.g., the standard deviation difference between the treatment conditions in academic performance). Note that partially standardized regression weights are conceptually equivalent to Cohen's *d*. Competitive athletes and non-athletes were considered in separate analyses.[5]

Preliminary Analyses

Random assignment to treatment groups. The random assignment of competitive athletes and non-athletes to treatment conditions (AR vs. no-AR) was accomplished using a secure survey website. To rule out pre-existing differences between the two treatment conditions that may exist despite random assignment, pre-treatment Test 1 performance and pre-treatment PAC scores were examined (Shadish, Cook, & Campbell, 2002). Independent sample *t*-tests showed students in the AR and no-AR conditions did not differ in Test 1 performance or PAC for either competitive athletes [$t(152) = -1.11$, and $t(183) = 1.40$, respectively] or for non-athletes [$t(226) < 1.00$, and $t(279) < 1.00$, respectively].

[5] For the athlete and non-athlete samples, multicollinearity between predictor variables was tested using variance inflation factor (VIF) and correlation coefficients. VIF coefficients (all < 2.31) and the correlation coefficients between predictors and outcomes (all < .36) revealed multicollinearity values that did not merit further investigation (Neter, Kutner, Nachtsheim, & Wasserman, 1996; Tabachnick & Fidell, 2007). Analyses were based on all available data.

Zero-order correlations. Competitive athletes' PAC was correlated positively with second semester perceived general control and perceived course success in keeping with previous research ($r = .27$, $p < .01$; $r = .35$, $p < .001$, respectively). In addition, PAC was positively related to achievement performance on Test 2 ($r = .26$, $p = .002$) and to final grades ($r = .21$, $p = .009$), underscoring the high academic risk profile of students with low PAC. In addition, achievement-related variables Test 2 and final grades correlated positively with perceived general control ($r = .25$, $p = .004$; $r = .24$, $p = .006$, respectively), perceived course success ($r = .62$, $p < .001$; $r = .70$, $p < .001$, respectively), and with one another ($r = .83$, $p < .001$). Results for non-athletes yielded a similar pattern of significant correlations.

Main Analyses

AR (vs. no-AR) treatment effects for competitive athletes. See Table 1 for a summary of the results. For *post-treatment Test 2*, an AR x PAC interaction was found for performance two-weeks post-treatment in Semester 1 [partially standardized $\beta = -.48$, $t(147) = -2.96$, $p = .002$, CIs = -.75 to -.21, $b = -1.59$]. The interaction was probed to assess whether AR (vs. no-AR) treatment effects occurred at low and high levels of PAC. Simple slope analyses revealed that, for low PAC athletes, AR (vs. no-AR) improved Test 2 performance two weeks post-treatment by nearly 12% [partially standardized $\beta = .73$, $p = .001$, CI = .36 to 1.10, $b = 11.68$; see Figure 2 for unstandardized estimates]. This 12% performance gain translates into almost a two letter-grade difference (i.e., B+ vs. C+). As expected, AR (vs. no-AR) had no effect for high PAC athletes [partially standardized $\beta = -.21$, $p = .350$, CI = -.58 to .16, $b = -3.37$].[6]

For *perceived course success*, an AR x PAC interaction was found five months post-

[6] Supplementary analyses probed the AR x PAC interactions by examining treatment effects within subgroups of students who reported low or high PAC. Subgroups retained athletes with scores in the top and bottom 40% of the PAC distribution to provide adequate separation between the low and high PAC groups and retain a sufficient sample size to test the effects (see Table 2 for group means and *SD*s).

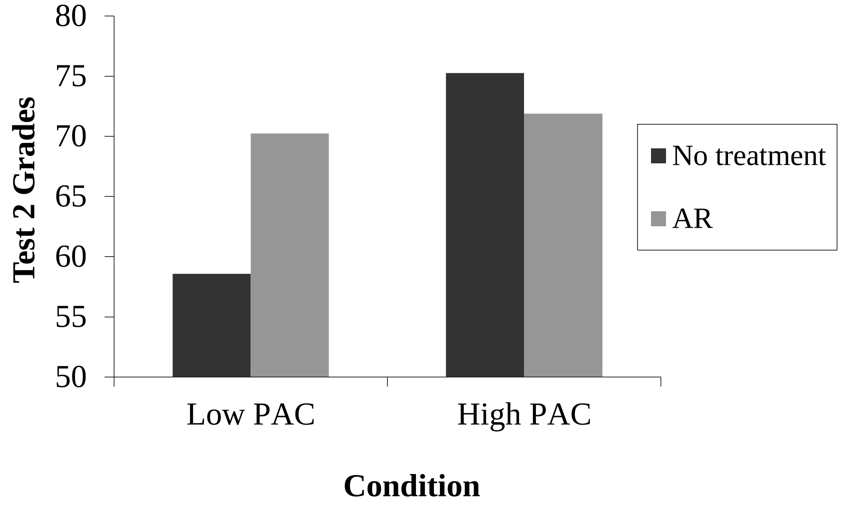

Figure 2. Treatment x PAC interaction on post-treatment test scores for competitive athletes. Attributional Retraining effects (vs. no-treatment) are given at low (-1 *SD*) and high (+1 *SD*) levels of PAC. PAC = perceived academic control.

Table 2

Subgroup Analysis for Competitive Athletes Varying in Perceived Academic Control

	Low PAC		High PAC	
Dependent Measure	No-AR	AR	No-AR	AR
Perceived general control				
M (*SD*)	19.17 (3.84)	18.72 (3.62)	21.60 (3.79)	20.88 (4.16)
N	18	29	25	26
Perceived course success				
M (*SD*)	4.28 (1.74)	4.87 (1.70)	6.68 (2.32)	6.50 (1.63)
N	18	30	25	26
Test 2 grades				
M (*SD*)	54.95 (15.06)	67.35 (13.36)	72.07 (19.27)	73.87 (13.26)
N	22	29	31	27
Final course grades				
M (*SD*)	61.23 (11.70)	69.05 (11.47)	71.94 (15.89)	74.54 (12.49)
N	22	30	32	27
Course withdrawals[a]				
%	30%	3%	14%	3%
N	33	36	37	28

Note. Subgroup analyses were conducted where group splits were created based on removing the middle 20% of students' PAC scores (low PAC = bottom 40%; high PAC = top 40%). See Footnote 3 for rationale.

[a]Observed frequencies for voluntary course withdrawals.

treatment in Semester 2 [partially standardized β = -.33, *t*(134) = -2.03, *p* = .022, CI = -0.59 to -.06, *b* = -.14]. Simple slope analyses indicated that AR (vs. no-AR) facilitated perceived course success for low PAC athletes [partially standardized β = .41, *p* = .038, CI = .03 to .79, *b* = .84], but not for high PAC athletes [partially standardized β = -.24, *p* = .278, CI = -.62 to .13, *b* = -.51]. For *perceived general control*, the AR x PAC interaction was not significant.

For *final course grades*, an AR x PAC interaction was observed [partially standardized β = -.29, *t*(150) = -1.77, *p* = .040, CI = -.61 to -.02, *b* = -.77]. Simple slope analyses indicated that low PAC athletes who received AR outperformed their no-AR counterparts by over 6% in final course grades [partially standardized β = .53, *p* = .017, CI = .12 to .95, *b* = 6.32; see Figure 3] which is equivalent to a full letter grade in introductory psychology. As expected, AR (vs. no-AR) had no effect on high PAC athletes [partially standardized β = -.09, *p* = .716, CI = -.51 to .32, *b* = -1.08]. The AR x PAC interaction was not significant for *voluntary course withdrawals*, however an AR main effect emerged [Wald = 3.62, *p* = .029, *OR* = 0.42, CI = -.17 to 1.03, *b* = -.88]. An odds ratio (*OR*) of 0.42 indicates that athletes in the AR condition were 58% less likely to drop the online course than their counterparts who did not receive AR.

Though the omnibus interaction was not significant for course withdrawals, simple slope analyses were conducted to explore the effects of AR for the high-risk group of interest (low PAC athletes). Results indicated AR (vs. no-AR) reduced the likelihood of voluntary withdrawals for these high-risk athletes [Wald = 3.34, *p* = .034, *OR* = 0.37, CI = -1.89 to -.10, *b* = -1.00; see Figure 4]. An odds ratio of 0.37 indicates that low PAC athletes who received AR were 63% less likely than their no-AR peers to withdraw from their introductory psychology course (12% vs. 27%). For high PAC students, no AR treatment effect occurred on course withdrawals [Wald = 0.75, *p* = .388, *OR* = 0.47, CI = -1.84 to .57, *b* = -.63].

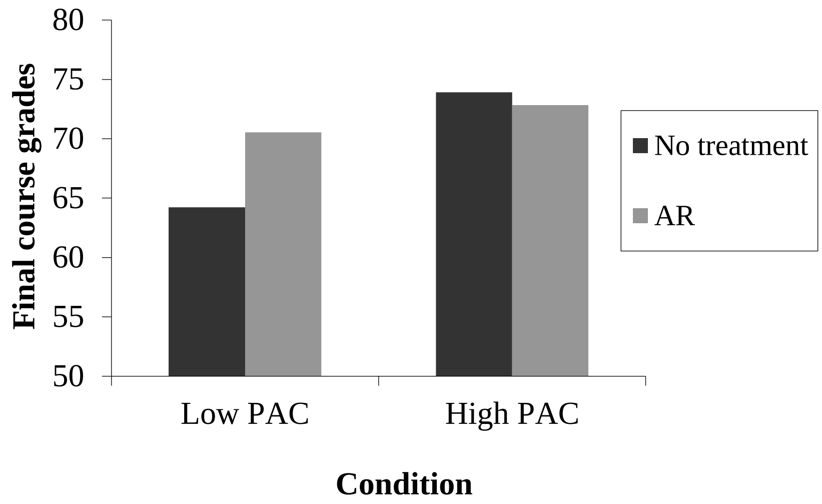

Figure 3. Treatment x PAC interaction on final course grades for competitive athletes. Attributional Retraining effects (vs. no-treatment) are given at low (-1 *SD*) and high (+1 *SD*) levels of PAC. PAC = perceived academic control.

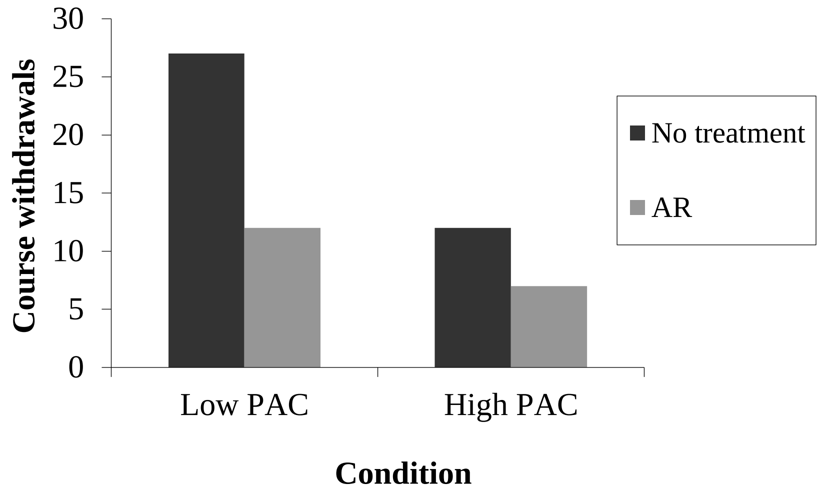

Figure 4. Treatment x PAC interaction on course withdrawals for competitive athletes. Attributional Retraining effects (vs. no-treatment) are given at low (-1 *SD*) and high (+1 *SD*) levels of PAC. PAC = perceived academic control.

In sum, AR x PAC interaction effects for athletes were significant for perceived success, Test 2 scores, and final course grades. Simple slopes analyses revealed that, for low PAC athletes, significant AR treatment effects occurred for all outcome variables except perceived general control. For high PAC athletes, AR treatment effects were not found for any of the outcome measures.[7]

AR (vs. no-AR) treatment effects for non-athlete students. No AR x PAC interaction effects were observed for non-athletes. However, planned simple slope analyses revealed two AR treatment effects for low PAC non-athletes. First, AR (vs. no-AR) increased *post-treatment Test 2* performance by nearly 5% [partially standardized $\beta = .28$, $p = .066$, CI = -.03 to .59, $b = 4.96$]. Second, AR (vs. no-AR) boosted *perceived general control* at the end of Semester 2 [partially standardized $\beta = .40$, $p = .018$, CI = .09 to .71, $b = 1.96$].

Supplementary analyses. A combined sample ($N = 669$) of non-athletes, competitive student athletes, and *less competitive* athletes (i.e., those competing in or practicing their sport less than 4 times per week) was used to increase statistical power. Simple slope analyses showed that low PAC students benefitted from AR (vs. no-AR) in terms of perceived general control [$b = 1.60$, $p = .002$], Test 2 scores ($b = 5.93$, $p = .001$), final grades ($b = 3.44$, $p = .012$), and voluntary withdrawals (Wald = 5.38, $p = .010$, $OR = 0.52$), but not perceived course success ($b = -.01$, $p = .484$). For the most part, these findings complement and support past studies that have examined AR-achievement linkages for low PAC students (see Perry et al., 2014).

Discussion

[7] Results for low PAC athletes remained significant when controlling for English as a first language, sex, and high school grade which have been shown to influence academic success for student athletes (Comeaux & Harrison, 2011).

Competitive student athletes entering university can face unique and demanding pressures that impinge upon their academic learning, motivation, and performance (De Knop et al., 1999; MacNamara & Collins, 2010; Simons et al., 1999). These competitive athletes are required to keep up in their respective sport and accommodate demanding academic schedules while navigating the challenging school-to-university transition. Not surprisingly, these individuals are more prone to attain poorer grades and quit college (Bengtsson & Johnson, 2012). Since students' perceived control beliefs over their academic performance can affect their educational development (Perry et al., 2005, 2014; Perry & Hamm, 2016), the current study focused on whether an attributional retraining (AR) treatment intervention could benefit competitive student athletes who have limited PAC.

This study revealed AR (vs. no-AR) improved low PAC competitive athletes' performance on an in-class course test (Test 2) and on final course grades. Low PAC competitive athletes who received the AR treatment in Semester 1 outperformed their no-AR counterparts by nearly 12% on a subsequent psychology test that occurred two weeks post-treatment. Furthermore, this same treatment group achieved 6% higher final grades overall than their no-treatment peers in the online, two-semester course. Notably, the final grade difference represents approximately a letter grade increase in their course grading system at a Canadian university.

These results also highlight the long-term treatment effects of AR and align with research by Rascle et al. (2015) that found enduring effects of expectations for success and task persistence in a sport setting. Other AR research shows that students academically at risk (i.e., low incoming high school grades) who received AR in their first year of college had higher course completion rates and were two times more likely to graduate five-years later (Perry et al., 2014). Adopting a different persistence measure (i.e., withdrawing from a course) and a unique student sample, Study 2 supports these findings by showing that academically at-risk students (competitive athletes with low PAC) who received AR had lower course withdrawal rates compared to their no-AR peers (12% vs. 27%).

These findings have important implications when considering the type of student who is at-risk in terms of performance and persistence in a college setting. Competitive student athletes with low PAC who are arguably most in need of interventions that facilitate academic success seem to be most receptive to an attribution-based treatment (e.g., compared to high PAC athletes or non-athletes). Thus, the findings contribute to the AR literature by featuring competitive athletes who have not systematically been examined apart from the larger postsecondary student population. Further, these findings potentially have strategic utility for athletic programs, directors, and coaches who value the retention of athletes struggling with the transition to novel university and athletic programs.

An additional finding of import arose for the competitive athletes when examining perceived success. Low PAC athletes in the no-AR group indicated noticeably lower levels of perceived course success compared to their AR counterparts (M = 4.28 and 4.87, respectively) and compared to both experimental groups with high PAC (M = 6.68 and 6.50, respectively). Furthermore, AR did not appear to impact non-athletes' perceived course success. Assuming that competitive athletes experience frequent success and failure experiences when competing in their selected sport, it may be that these athletes have a heightened sensitivity to the concept of "success", even when used in an academic context. Thus, the AR treatment may have assisted the low PAC athletes to recognize the factors (causes) that contribute to success outcomes in their academic endeavors, whereas the no-AR, low PAC athletes did not. Future research could look at examining attributional thinking for these high-risk athletes pre- and post-treatment, or whether such reasoning moderates AR's effects for these specific individuals.

For non-athletes, AR produced expected effects on post-treatment test performance and year-end perceived general control. Non-athletes with low PAC who received AR outperformed their no-AR peers by 6% in their course tests two weeks after the treatment which may be attributed to AR's immediate impact of boosting perceived controllability in course achievement. This is supported in past research where attributing poor performance to controllable factors enhanced perceptions of control (Hall et al., 2004; Hamm et al., 2014).

In the supplementary analyses, AR's effects were consistent with past studies when non-athletes, competitive athletes, and less competitive athletes were examined collectively. Specifically, AR (vs. no-AR) promoted higher perceived general control, achievement performance (Test 2 scores, final grades) and resulted in fewer course withdrawals (VW rates) for low PAC students. Although these treatment effects are not as prominent for the combined sample as for the competitive athletes separately (e.g., Test 2 scores: 12% versus 6%), they are consistent with past AR study findings (see Perry et al., 2014).

Limitations and Future Directions

Although this study extends AR research by examining treatment effects for a novel, high-risk group of college students that have previously been ignored, it has some limitations that require the findings be treated with caution. First, the two participant groups under investigation (i.e., competitive athletes and non-athletes) were self-identified. These self-defined groups may vary according to the students' perception of what constitutes a "competitive athlete." However, in defining competitive athletes as those who participate in their sport five or more per week, an attempt was made to limit the subjective variability by identifying individuals who were highly committed to their sport.

Second, this study did not stipulate the precise number of times the athletes participated in their sport each week. For example, some athletes may practice or play their sport two times a day each week (e.g., 14 times per week), whereas others may only play and practice five times each week. This is worth considering since physical demands, time pressures, and other stressors will differ depending on the frequency of participation, and may impact the degree of challenge experienced by the athletes. In addition, some athletes may have coaches who mandate their participation, whereas others may choose to freely engage as a result of intrinsic motivation or passion for their sport. Participating in practice due to obligation would presumably create a more low-control environment compared to settings where athletes' participation is voluntary. Understanding these differences may help to further illuminate the types of athletes who require motivational assistance.

Another limitation involves the lack of information and control for this study concerning the coaches' instructions being delivered to the athletes. It is possible some athletes were receiving additional training that would support, or possibly hinder, the AR treatment in the present study. In this regard, if the athletes received coaching instruction that comprised attributional content, this would be one potential confound affecting the results that could be considered in future analyses. Finally, another limitation in this study was the online implementation of the treatment conditions. There was limited experimental control since the students could receive the treatment at any place or time that was convenient for them. This made possible delivering the AR treatment to a large number of introductory psychology students involved in the study, but controlled laboratory conditions would contribute to an optimal research design.

In summary, the eight-month, quasi-experimental randomized treatment study highlights the benefits of administering attributional retraining to high-risk student athletes who are juggling both academic and athletic schedules and who have low PAC. This study suggests the utility of AR for improving competitive athletes' academic performance and persistence. AR may prove useful for athletic and university programs striving to keep their athletes off academic probation and successful in their university development.

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CHAPTER 4

Study 3: An Attribution-based Motivation Treatment to Assist High Stress Student Athletes in a Blended Learning Environment

Life course transitions can be challenging and stressful throughout the lifespan as when starting kindergarten, going into college, beginning a new job, getting married, or retiring (Heckhausen & Schulz, 1995; Heckhausen, Wrosch, & Schulz, 2010). As previously outlined, a critical transition that is often imbued with adversity and uncertainty is the shift students make from high school to university. This transition period involves novel learning environments, frequent academic failure, and unstable social networks that can undermine students' emotional well-being and academic performance (Darling, McWey, Howard, & Olmstead, 2007; Könings, Brand-Gruwel, van Merriënboer, & Broers, 2008; Perry, 2003; Perry, Hall, & Ruthig, 2005). A recent study of over 28,000 college students found 51% of students reported high anxiety, and 84% felt overwhelmed by commitments (American College Health Association [ACHA], 2013). These challenges coupled with other commitments and contextual factors can cause students significant levels of stress within the first and second year of the adjustment period (Bewick, Koutsopoulou, Miles, Slaa, & Barkham, 2010; Chemers, Hu, & Garcia, 2001; Perry, Hladkyj, Pekrun, & Pelletier, 2001).

Generally, stress can be defined as both an objective (e.g., physiological) and a subjective (e.g., psychological) experience. Cohen, Kamarck, and Mermelstein (1983) assert stress is experienced when a person subjectively assesses a circumstance as taxing or challenging and believes they do not possess the necessary coping strategies to manage the circumstance. Stress is defined as the experience of when a person perceives they cannot deal with demands placed on them or a response to pressures or demands of the environment that are inescapable (Lazarus, 1966; Stein & Cutler, 2002). In addition, a considerable amount of research has looked at stress in academic settings, such as the elevated levels of stress experienced by students who transition to college or university (Gall, Evans, & Bellerose, 2000; Perry et al., 2001).

Friedlander, Reid, Cribbie, and Shupak (2007) found students reported higher levels of stress at the start of the academic year relative to what they reported 10 weeks later (*M*s = 1.81 vs. 1.63). They also showed that, over the 10-week span, reduced levels of perceived stress predicted better adaptation in terms of emotional ($\beta = -.66$), academic ($\beta = -.27$), social ($\beta = -.25$), and overall adjustment ($\beta = -.55$). Similarly, Clinciu (2013) reported that student life-stress was negatively related to these same adjustment outcomes (Student Adaption to College Questionnaire, Baker & Siryk, 1999). Related research found that college students' stress levels were greatest in the first semester compared to pre-college levels (Bewick et al., 2010), and stress, reflected by anxiety and depression ratings, was negatively related to academic performance in medical school (*r*s = -.20 to -.29; Stewart, Lam, Betson, Wong, & Wong, 1999).

Stress Experienced by Student Athletes

As discussed in Study 1, stress is reported as a ubiquitous experience among university and college athletes during their academic development (Yow, Bowden, & Humphrey, 2000; Kimball & Freysinger, 2003; Papanikolaou, Nikolaidis, Patsiaouras, & Alexopoulos, 2003). Studies focusing on student athletes highlight the demanding practice schedules, missed classes, and other factors (e.g., novel training environments, fatigue, injuries, financial pressures) that can contribute to increased stress (Maloney & McCormick, 1993; Scott, Paskus, Miranda, Petr, & McArdle, 2008). Stress may be amplified for college and university (student) athletes whose academic demands are compounded by demands in another domain (sport). Student athletes face unique stressors that include physical fatigue, practice and competition scheduling conflicts, novel coaching and training environments, pressure to perform at high levels, injuries, student-sport identity issues, and negative perceptions from faculty and peers, all of which can hinder academic motivation and performance (Akgun & Ciarrochi, 2003; Comeaux, 2011, De Knop, Wylleman, Van Houcke, & Bollaert, 1999; Felsten & Wilcox, 1992; McKay, Niven, Lavallee, and White, 2008; Papanikolaou et al., 2003; Perry et al., 2001; Simons, Van Rheenan, & Covington, 1999; Veena & Shastri, 2016).

Attribution Theory and Motivation Treatments

As noted in the introduction, attribution theory (Weiner, 1972, 1985, 2006, 2012) posits that individuals seek to explain negative, unexpected, or important events by determining the causes of these experiences. Causal attributions ascribed to such events are phenomenological (subjective) in nature and initiate cognitive, affective, and motivational states that subsequently influence behaviour. The dimensions of these attributions consist of *locus of causality* (i.e., whether the cause is internal or external to the individual), *stability* (i.e., whether the cause is transitory or lasting), and *controllability* (i.e., whether the cause can be changed by oneself or another person). These dimensions combine to form a controllability (controllable/uncontrollable) by locus (internal/external) by stability (unstable/stable) 2 x 2 x 2 taxonomy.

In achievement settings, attributions made for success outcomes that are *internal* (e.g., high aptitude) elicit achievement-related emotions such as pride, whereas *external* attributions do not. *Stable* attributions for poor performance (e.g., low ability) elicit feelings of hopelessness since the cause will not change, however *unstable* attributions result in feelings of hopefulness. The stability dimension plays a role in individuals' expectations for future success or failure. Attributions for poor performance that are *controllable* (e.g., more effort required; better strategy) trigger achievement-related emotions such as of guilt/shame, as well as responsibility for the outcome, and motivation to change behaviour. Conversely, *uncontrollable* attributions can dampen personal responsibility and motivation to change an outcome. Together, locus of causality, stability, and controllability dimensions of causal attributions play a critical role in achievement motivation and subsequent achievement behaviours.

Research on attribution-based motivation treatments (attributional retraining: AR) has focused on encouraging students to attribute failure to unstable and controllable causes. A growing body of literature demonstrates the salutary benefits of AR for students' achievement motivation and performance, particularly for those with academic risk profiles: external locus of control, poor initial performance, failure-avoiders, and highly bored/low academic control, (Boese, Stewart, Perry, & Hamm, 2013; Hamm et al., 2014; Menec et al., 1994; Parker et al., 2018; Perry & Hamm, 2017; Perry, Stupnisky, Hall, Chipperfield, & Weiner, 2010).

Study 2 extends the AR treatment literature by examining the moderating role of perceived control on AR effects for competitive athletes' achievement striving in a blended learning environment. The study objective is based on the premise that competitive athletes may be academically at-risk because of low-control circumstances (e.g., juggling stressful academic and sport schedules). However, some of these athletes may struggle to cope with elevated stress which can result in detrimental physical and psychological outcomes (Baghurst & Kelly, 2014; Kelly, 2007). Thus, stress may reflect a central moderator of AR treatment effects for student athletes in competitive achievement settings, but this has yet to be examined in the literature.

Research is also needed to consider the mediators of AR on performance outcomes. Attention has largely focused on performance benefits of AR treatments with little emphasis on cognitive and emotional processes that may mediate the relationship. According to Weiner's theory (1985, 2006, 2012), causal attributions made for performance outcomes should trigger cognitions (e.g., perceived academic control) and emotions (e.g., achievement-related emotions) that, in turn, boost motivation for achievement academic performance (e.g., grades). For example, AR treatments that encourage controllable attributions (effort/strategy) rather than uncontrollable attributions (ability/course difficulty) for poor performance, should increase student perceptions of academic control, facilitate emotional wellbeing (e.g., increase hope), and thereby improve future performance.

Attribution-based treatment protocols delivered in online learning environments are relatively new and require replication since they have important implications for large-scale treatment administration. Furthermore, online and blended learning instruction is growing in popularity and increasingly implemented into university courses (Sener, 2004; Symonds, 2001; Welker & Berardino, 2005). Although these types of courses offer some appeal to students such as flexibility and schedule convenience (Garrison & Kanuka, 2004), they also have limitations such as increased distractions (e.g., television, social media) and unstructured, potentially isolated learning conditions. Such limitations could impede student engagement (Moore & Kearsley, 2011; Hara & Kling, 2001) and create additional stress for students learning to adjust to these unstructured settings. Thus, evidence is lacking on AR treatment efficacy in blended learning settings where students have control over the time and location of treatment delivery.

Attribution-based Motivation Treatment Efficacy and High-Stress Student Athletes

Study 3 builds on Study 2 by (a) assessing whether AR facilitates performance for high stress student athletes and (b) examining theory-based mechanisms that mediate AR → performance linkages. To examine these issues, a novel delivery of AR embedded within a blended learning university course was used. Based on Weiner's attribution theory (1985, 2012), it was expected that for high stress athletes, the AR → performance relationship would be mediated by theory-derived psychological process variables sequentially whereby AR would (a) increase perceived academic control, (b) which would increase positive emotions and decrease negative emotions, (c) which in turn, would predict final course grades (e.g., AR → perceived academic control → achievement-related emotions → performance).

Method

Participants and Procedures

Competitive athletes who speak English as a first language in a first year university course were sampled. Athletes were recruited if they reported they had played a competitive sport within the last three years. The sport was specified as "competitive" if it was considered above an intramural level or simple recreation (e.g., daily exercise). Consistent with Study 2, the timeframe of three years was selected to allow for a sufficient number of participants.

Quasi-experimental, randomized treatment study data was collected at four time points during a two-semester blended learning course spanning eight months. At Time 1a (October), approximately one week after the introductory psychology students received feedback on a first in-class test (pre-treatment), they completed a secure online questionnaire for credit as part of a course assignment. Time 1b followed immediately after participants finished the online questionnaire. Participants were randomly assigned to one of two treatment conditions via automated software: Students in the AR treatment condition received the online AR treatment whereas those in the comparison (no-AR) condition completed a filler-task. Students wrote an in-class test in the course several months post-treatment at Time 2 (December). At Time 3 (March), participants completed a second online questionnaire similar to the first questionnaire. At Time 4 (May), consenting students' final course grades were obtained from instructors.

Covariates and Pre-treatment Variables

Age (Time 1a: October). Participants' self-reported age will be assessed using a 10-point scale (1 = *17-18*, 10 = *older than 45*).

High school grade (Time 1a: October). Participants' self-reported high school grades were assessed using a 10-point scale (1 = *50% or less*, 10 = *91-100%*). The self-reported high school grades were considered a proxy for actual achievement since they share a strong relationship (r = .84; Perry, Hladkyj et al., 2005). Past studies reveal self-reported high school grades reliably achievement in post-secondary education settings (e.g., final course grades, r = .40-.54; grade point averages, r = .52-.54; Perry et al., 2001, 2010; Perry, Hladkyj et al., 2005). In addition, high school grades are the main admission component for Canadian universities compared to standardized tests (e.g., SATs, ACTs).

Independent Variables

Stress (Time 1a: October). Seven items from Cohen et al.'s (1983) Perceived Stress scale assessed stress at Time 1a (e.g., "During the last month, how often have you found yourself thinking about things that you would have to accomplish"; 1 = *never*, 5 = *very often*). Items were be summed so that higher scores reflected greater perceived stress.

Attribution-based treatment (AR) protocol (Time 1b: October). Identical to Study 2, the AR treatment for Study 3 involved three stages: causal search, attribution induction, and attribution consolidation and was delivered as a one-hour session one week after students received feedback on their first course test (see Study 2 Method section for a detailed explanation on the treatment protocol). The AR treatment content (i.e., message encouraging internal and controllable attributions) is based on lecture and textbook material from the course, which was incorporated as a course assignment. The treatment was accessible online (to be completed at home or on campus) in the same setting used to access other blended learning course content.

Dependent Variables

State perceived academic control (Time 3: March). State academic control beliefs were measured using four items from Perry et al. (2001) Perceived Academic Control (PAC) scale (e.g., "I have a great deal of control over my academic performance in my psychology course"; 1 = *strongly disagree*, 5 = *strongly agree*). Two negatively framed items were reverse-coded, so that when summed, high scores reflected high control beliefs. This shortened PAC measure has similar internal reliability to past studies (α = .77-.80; Hall, Perry, Chipperfield, Clifton, & Haynes, 2006; Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010; Perry et al., 2001; Respondek, Seufert, Stupnisky, & Nett, 2017; Stupnisky, Renaud, Daniels, Haynes, & Perry, 2008). Baseline levels of state PAC (Time 1a) were measured prior to the AR treatment.

Achievement-related emotions (Time 3: March). Achievement-related emotions were assessed using a 10-point scale where students indicated the extent to which they experience hope, pride, helplessness, and shame with respect to their performance in introductory psychology (1 = *not at all*, 10 = *very much so*). Similar to Study 1, hope is an attribution-based emotion that can result when internal, unstable, and controllable attributions for performance are used (Weiner, 2018). Helplessness represents a negative achievement emotion experienced in academic settings. Separate measures of positive and negative emotions were created by summing hope and pride, and helplessness and shame, respectively. Baseline levels of positive and negative emotions (Time 1a) were measured prior to the AR treatment.

Post-treatment class test (Time 2: December). An in-class test was administered approximately two-months post-treatment and was based on students' introductory psychology course material. Test scores were obtained from course instructors at the conclusion of the second semester.

Final grades (Time 4: May). Students' final course grades reflect their performance in the two-semester introductory psychology course. The measure as adjusted to reflect only post-treatment scores by omitting pre-treatment class test scores. Grades were collected from instructors at the end of the second semester.

Results

Rationale for the Analyses

To test whether AR x Perceived Stress-performance effects were mediated by a hypothesized sequence based on Weiner's theory (1985, 2006, 2012), a path analysis was conducted (see Figure 1). All variables were standardized with the exception of the dichotomous treatment variable which was left in its original metric (0 = *no-AR*, 1 = *AR*; see Hayes, 2013). The independent variables (AR, perceived stress) in the interaction were mean-centered for ease of interpreting the omnibus effects (Hayes, 2015). AR x Perceived Stress interactions were probed with one-tailed simple slope tests that assessed the a priori directional prediction that AR (vs. no-AR) would facilitate academic attainment for high-stress athletes only. AR effects are reported using partially standardized regression betas that are conceptually equivalent to Cohen's *d* and reflect the difference between treatment conditions on the dependent measures in standard deviation units. High school grade and age were included as covariates to control for extraneous scholastic or demographic factors from influencing students' PAC, achievement-related emotions, and performance outcomes (see Comeaux & Harrison, 2011; Richardson et al., 2012).

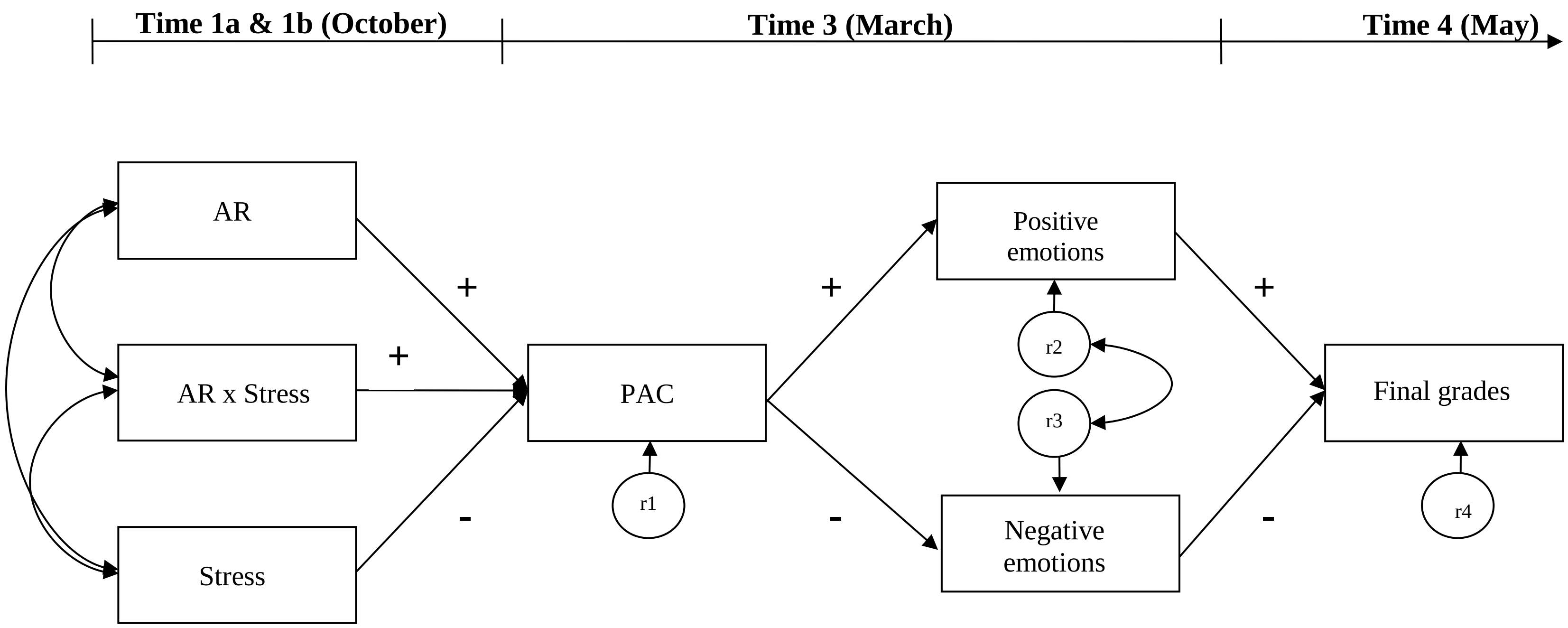

Figure 1. Predicted path analytic model for all specified paths. All effects controlled for age and high school grade. AR = Attributional Retraining. PAC = course-based perceived academic control. AR x Stress = Attributional Retraining x Perceived Stress interaction. r = residual.

Preliminary analyses. In accordance with quasi-experimental, randomized treatment procedures (e.g., Shadish, Cook, & Campbell, 2002), the student athletes were randomly assigned to treatment conditions (AR vs. no-AR) via an online automated software program. Before testing the study hypotheses, independent sample *t*-tests were used to assess whether the treatment conditions differed (AR vs. no-AR) in terms of pre-treatment demographic (age), psychosocial (course-related PAC, positive and negative emotions, perceived stress) and pre-treatment test performance variables. No differences between the AR and no-AR conditions were found for: age, $t(183) = -0.27$; Time 1a course-based PAC ratings, $t(183) = -0.18$; Time 1a positive emotions, $t(183) = 1.04$; Time 1a negative emotions, $t(183) = -0.18$; Time 1a perceived stress, $t(183) = -0.48$; and pre-treatment class test scores, $t(174) = 1.28$ (all *p*s > 0.05).

Zero-order correlations. Perceived stress was associated with course-based PAC ($r = -.19$) and positive and negative emotions ($r = -.18, .28$, respectively). Course-based PAC was related to positive emotions ($r = .31$), negative emotions ($r = -.41$), post-treatment class tests ($r = .25$), and final course grades ($r = .21$). Positive and negative emotions were related to the post-treatment test ($r = .35, -.41$, respectively) and final course grades ($r = .38, -.44$, respectively) in theoretically consistent directions. As expected, correlations between the post-treatment tests and final course grades were strong and positive ($r = .86$). In addition, high school grade was related to age ($r = -.22$), and positive and negative emotions ($r = .20, -.22$, respectively; all ps $\leq .05$). See Table 1 for a summary of zero-order correlations.

AR effects on short-term post-treatment class test. AR x Perceived Stress regression analyses assessed whether AR facilitated performance on a class test two months post-treatment for high-stress student athletes. This prediction is based on past studies that show AR improves performance for at-risk college students (Hamm et al., 2017; Parker et al., 2018). As

Table 1

Zero-Order Correlation Matrix and Summary of Main Study Variables

	M	*SD*	Actual range	α/*r*	1	2	3	4	5	6	7	8	9
1. Age[a]	1.13	.34	1-2	–	–								
2. High school grade[a]	8.00	1.54	4-10	–	-.22*	–							
3. Perceived stress[a]	23.25	5.17	10-35	.87	-.18*	.03	–						
4. Course-based PAC[c]	16.19	3.12	5-20	.79	.09	.08	-.19*	–					
5. Achievement-related positive emotions[c]	12.26	3.98	2-20	.70	.10	.20*	-.18*	.31*	–				
6. Achievement-related negative emotions[c]	7.07	4.19	2-20	.72	-.15	-.22*	.28*	-.41*	-.55*	–			
7. Pre-treatment class test[†]	63.21	15.69	26.5-95.5	–	<.01	.26*	-.11	.26*	.40*	-.44*	–		
8. Post-treatment class test[b]	73.49	12.72	40-97.5	–	.03	.42*	-.10	.25*	.35*	-.41*	.67*	–	
9. Final course grade[d]	73.84	11.19	47-95	–	.03	.54*	-.08	.21*	.38*	-.44*	.75*	.86*	–

Note. *N* = 185. [a]Time 1 measure. [b]Time 2 measure. [c]Time 3 measure. [d]Time 4 measure. PAC = course-based perceived academic control. [†]The pre-treatment class test was administered prior to students completing the Time 1 questionnaire.

*$p \leq .05$ (two-tailed tests).

expected, the AR x Perceived Stress interaction was significant for the post-treatment class test [partially standardized β = .28, *t*(173) = 2.01, *p* = .046]. This interaction was probed via simple slope analyses that tested AR (vs. no-AR) treatment effects at low (-1 *SD*) and high levels of perceived stress (+1 *SD*) using Hayes (2013) PROCESS macro. Simple slope regression analyses showed high-stress athletes who received AR outperformed their no-AR peers by over 6% on the class test (76.24% vs. 70.05%; partially standardized β = .49, *t*(173) = 2.48, *p* = .007). AR treatment effects were not significant for low-stress athletes (*p* = .724; see Figure 2).

Main Path Analysis for High-Stress Athletes

The main path model assessed AR effects on final course grades at the end of two semesters as mediated by a theory-based sequence of cognitive and affective mediators (Weiner, 1985, 2006, 2012). *Mplus* (Muthén & Muthén, 1998-2016) was used to conduct the path analysis and to assess effects of predictor variables and determine model fit using Chi-square (χ^2), the comparison fit index (CFI), and the root mean square error of approximation (RMSEA) as suggested by Byrne (2010). These tests revealed the model and data had good fit: χ^2 (10) = 13.49, *p* = .198; CFI = .982; RMSEA = .043 (see Figure 3).

Individual path estimates (regression weights) indicated the AR x Perceived Stress interaction (partially standardized β = .37, *p* = .010, CIs [0.089, 0.658]) predicted course-based PAC (see Table 2). This interaction was probed using simple slope regressions to assess AR (vs. no-AR) effects on student athletes with low (-1 *SD*) and high (+1 *SD*) perceived stress. As predicted, AR (vs. no-AR) promoted course-based PAC for only high-stress athletes (partially standardized β = .49, *p* = .015, CIs [0.120, 0.867]). AR treatment effects were not found for low-stress athletes (*p* =.174). Perceived stress also predicted course-based PAC, which indicates that the high-stress athletes reported lower levels of PAC (β = -.18, *p* = .018, CIs [-0.330, -0.031]).

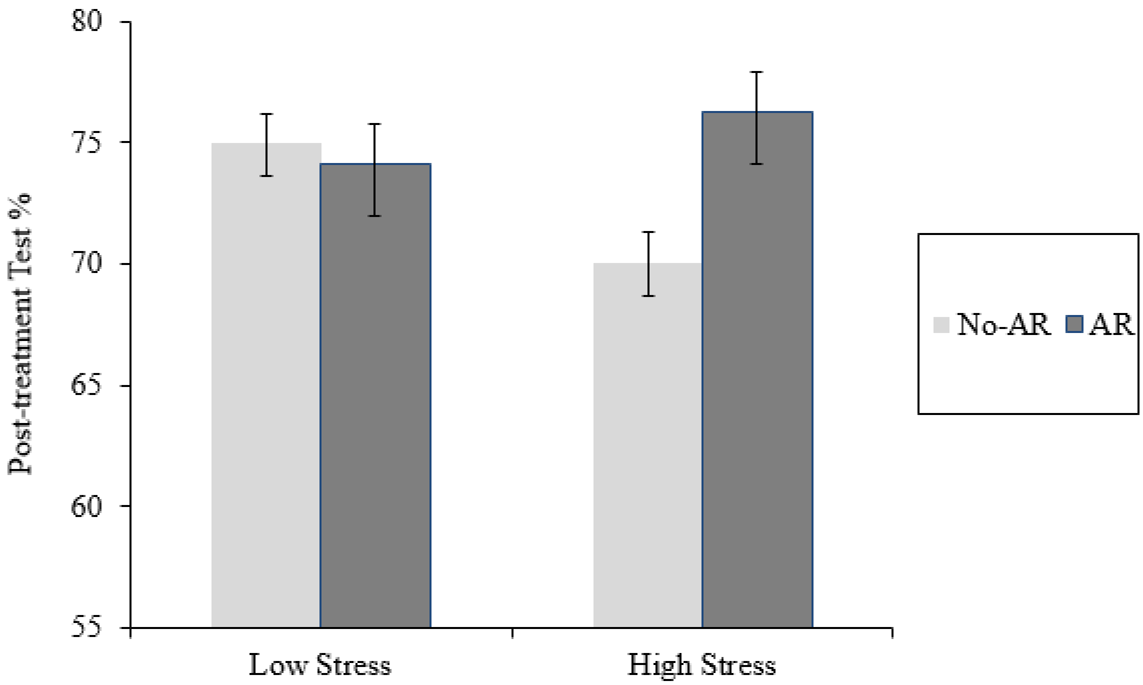

Figure 2. AR treatment effects on a course-based class test (two months post-treatment) are displayed for student athletes at low (-1 *SD*) and high (+1 *SD*) perceived stress. Analyses controlled for age and high school grade. AR = Attributional Retraining.

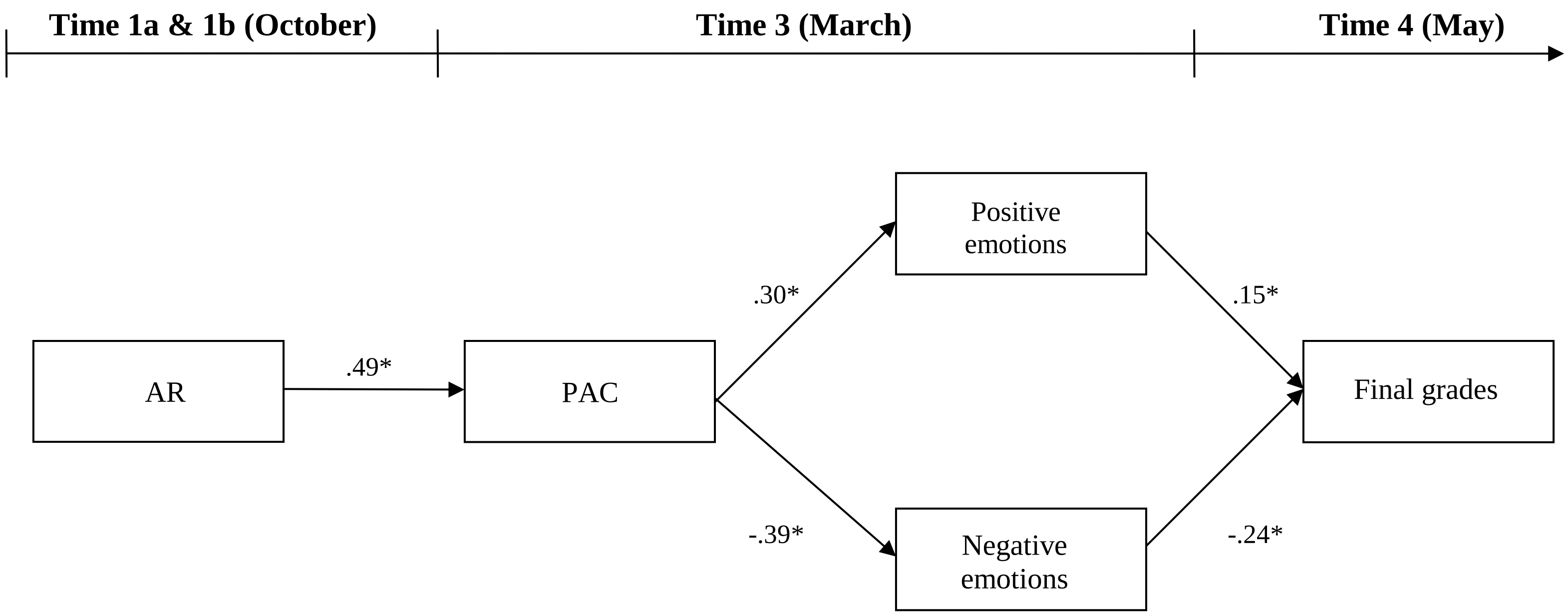

Figure 3. Indirect effects of Attributional Retraining (AR) treatment on final course grades for *high-stress* athletes are displayed via significant paths in the predicted path model. PAC = course-based perceived academic control. All effects control for high school grade and age. Residuals and βs < .10 are not shown.

Table 2

AR x Perceived Stress Interaction: Summary of Individual Path Estimates (Regression Weights)

	Outcome variables			
Predictor variables[a]	Course-based PAC	Achievement-related positive emotions[b]	Achievement-related negative emotions[c]	Final course grades
AR x Perceived Stress				
AR at low stress	-.25	–	–	–
AR at high stress	.49*	–	–	–
Perceived stress	-.18*	–	–	–
Course-based PAC		.30*	-.39*	–
Positive emotions				.15
Negative emotions				-.24*
R^2	.09	.14	.24	.42

Note. AR = Attributional Retraining. PAC = course-based perceived academic control. Path estimates in the table reflect those in the predicted path model (see Figure 2) and a dash (–) represents the non-specified paths. All paths control for age and high school grade.

[a]Since the AR treatment variable (0 = *no-AR*, 1 = *AR*) is dichotomous, it is left in its original metric to facilitate interpretation (Hayes, 2013). All other regression paths are standardized.

[b]Pride and hope summed. [c]Shame and helplessness summed.

*$p \leq .05$ (two-tailed tests).

In turn, course-based PAC was a significant predictor of both positive and negative emotions for high-stress athletes which supports the proposed model (Figure 3). Increases in PAC predicted positive emotions (β = .30, $p < .001$, CIs [0.178, 0.413]) and negative emotions (β = -.39, $p < .001$, CIs [-0.518, -0.263]). Since AR increased course-based PAC for high-stress athletes, which in turn predicted positive and negative emotions, AR's conditional indirect effects on emotions via PAC were assessed. In line with the predictions of Study 3, AR indirectly influenced positive emotions (partially standardized β = .15, $p = .047$, CIs [0.010, 1.146]) and negative emotions (partially standardized β = -.19, $p = .022$, CIs [-1.460, -0.152]) through course-based PAC for high-stress athletes only. Hence, AR increased high-stress athletes' self-reports of positive emotions by 15% of a standard deviation and decreased self-reports of negative emotions by 19% of a standard deviation by boosting course-based PAC. See Table 3 for a summary of indirect (mediated) effects.

Finally, positive emotions (β = .15, $p = .029$, CIs = [0.020, 0.273]) predicted higher final course grades and negative emotions predicted lower final course grades (β = -.24, $p < .001$, CIs [-0.366, -0.114]).[8] The total indirect effect of AR on final course grades was significant for high-stress athletes (β = .07, $p = .042$, CIs = [0.036, 1.473]) but not for low-stress athletes.[9]

Discussion

Students who advance from high school to college often report elevated levels of stress which can undermine their overall academic development (Pascarella & Terenzini, 2005;

[8] Residuals between the positive and negative emotions were correlated in the path model to account for the interrelationship for these variables (cf. Daniels et al., 2009; Hamm et al., 2017).

[9] A supplemental hierarchical regression test was employed to determine the change in R^2 for the model predictors of final grades. For Step 1, $R^2 = .32$ when covariates (high school grade and age) were entered into the model. At Step two, $R^2 = .42$ when the specified model predictors (covariates and positive and negative emotions) were entered into the model. As a result, a 10% difference in R^2 variance reflects the final grade variance explained by the positive and negative emotions.

Table 3

AR x Perceived Stress Interaction: Tests of Indirect (Mediated) Effects

Predictor variable	Mediating variable(s)	Outcome variable	Partially standardized indirect effect[a]	Unstandardized bias-corrected CIs (lower, upper)[b]
AR x Perceived Stress				
AR at low stress	Course-based PAC	Positive emotions[c]	-.08	-0.735, 0.139
AR at low stress	Course-based PAC	Negative emotions[d]	.10	-0.194, 1.025
AR at high stress	Course-based PAC	Positive emotions[c]	.15*	0.010, 1.146
AR at high stress	Course-based PAC	Negative emotions[d]	-.19*	-1.460, -0.152
Course-based PAC	Emotions	Final course grades	.05*	0.233, 0.744

Note. AR = Attributional Retraining. PAC = course-based perceived academic control.

[a]Partially standardized indirect effects are reported since AR is dichotomous and has been left in its original metric (0 = no-AR, 1 = AR; Hayes, 2013). All effects control for age and high school grade. [b]Confidence intervals (CI) are 90% for high-stress athletes (1-tailed tests based on directional predictions for at-risk students) and 95% for low stress athletes (2-tailed tests due to no predictions for this group). [c]Pride and hope summed. [d]Shame and helplessness summed.

*$p \leq .05$ based on 5,000 samples of the unstandardized bias-corrected CIs.

Wintre & Yaffe, 2000). School-to-college transitions can be even more challenging for competitive student athletes who balance a unique combination of academic and athletic commitments, leaving those highly stressed feeling like they are unable to effectively manage their responsibilities (Papanikolaou et al., 2003). A primary focus of the study was to examine whether AR's effects on final course grades for high-stress athletes were mediated by a theory-based sequence of cognitive and affective mediators. In addition, AR's short-term (moderated) and long term (moderated and mediated) effects on academic performance for high-stress athletes were tested, since AR studies with stress as a moderator are limited.

Findings support the hypothesized path model of psychological mediators based on Weiner's attribution theory of motivation and emotion (1985, 2006, 2012). For high-stress athletes, the path analysis revealed (a) AR increased course-based PAC, (b) the increase in PAC influenced ratings of positive and negative achievement-related emotions in expected directions, (c) and these emotions predicted final course grades in expected directions. These results advance the research literature and provide initial support for the role of Weiner's theory-based process variables (i.e., course-related PAC, achievement-related emotions) in mediating AR-performance linkages. These findings also show the high-stress AR recipients reported positive emotions that were 15% of a standard deviation higher and negative emotions that were 19% of a standard deviation lower than their no-AR counterparts as a result of AR's impact on PAC (see Table 3). In other words, the positive influence of AR on the high-stress athletes' course-based PAC had enduring benefits for their emotional well-being (see Figure 3).

The present study suggests that AR assists high-stress student athletes in several ways. AR is designed to encourage students to use more controllable and fewer uncontrollable attributions for poor academic performance based on previous research (e.g., Parker et al., 2018;

Perry et al., 2010). By encouraging this shift in attributions, high-stress student athletes are likely to feel more control when faced with stressful circumstances, which should subsequently influence how they feel in the course (i.e., emotions), and motivate them to perform better. This attributional shift to augment control may reflect a coping strategy for high-stress students in this study. It could also reflect a coping strategy for the students with low PAC in Study 1 who may have had elevated stress, although this cannot be confirmed since stress was not examined in that study.

AR effects were not found for students with low levels of stress in the path model which is consistent with the test of AR's short-term effect on a class test two-months post-treatment in Study 1. Perceived stress moderated AR's effects on short-term test class performance whereby high-stress athletes who received AR outperformed their no-AR counterparts by 6% (76.24 vs. 70.05). In practical terms, the 6% AR treatment effect translates into a one-letter grade difference based on the actual course grading distribution. These findings help establish the boundary conditions of AR for helping those who encounter adverse learning conditions (e.g., high stress in high school-to-college transition).

Study 3 findings are consistent with AR studies that examine the moderation of AR effects in laboratory and field settings (Boese et al., 2013; Hamm et al., 2017 Parker et al., 2018; Perry & Magnusson, 1989; Perry, Schonwetter, Magnusson, & Struthers, 1994; Perry et al., 2010; Wilson & Linville, 1982). These studies reveal AR's effects are moderated by several different psychosocial risk variables (e.g., low PAC, over-optimism, low elaborators); however, the findings extend the literature by examining a unique circumstance: student athletes who experience two stressful competitive environments (i.e., sport and academic). Furthermore, although there is support for the AR-performance linkage mediated by psychosocial factors

(Haynes et al., 2009; Perry et al., 2014; Perry & Hamm, 2017), little research has empirically assessed a moderation-mediation linkage and, thus, these findings advance AR research by establishing some important boundary conditions (cf. Hamm et al., 2017).

There are also practical AR benefits for students who face highly competitive admissions criteria when entering professional or graduate schools. The treatment was based on course material, was grounded in a university course, and had an impact on actual achievement which supports the ecological validity of the intervention. In addition, the findings point to the scalability of AR treatment interventions in online learning environments that are increasingly central to students' educational experiences (Sener, 2004; Symonds, 2001). For student athletes, Internet-delivered AR motivation treatments are especially promising because they are readily accessible for those who face conflicting competition and course schedules. Thus, it is more feasible for student athletes to access the treatment online (vs. in a classroom setting) when competition commitments cause them to miss classes.

Strengths, Limitations, and Future Directions

Several omissions in past AR research were addressed in this study. First, the mediating path sequence for high-stress athletes was examined based on Weiner's attribution theory (1985, 2006, 2012) in the following model: AR-PAC-achievement emotions-performance. Second, the AR treatment was embedded in an online context to determine the viability of delivering online motivation treatments. Some evidence suggests online courses can impede motivation and performance (Parker, 1999), and thus, implementing AR in an online setting is useful for student athletes transitioning to college who face challenging and potentially stressful environments. Third, the online AR administration is a unique feature since it is readily accessible for student athletes who have unpredictable competition and practice schedules, and who frequently travel for competitions. Finally, previous research supports the AR-performance linkage found in Study 3 (see Perry et al., 2014, Perry & Hamm, 2017); however, this study contributes to the literature by demonstrating that stress uniquely moderates the linkage in student athletes.

One limitation concerns the specification of the present sample of “competitive athletes” which was based on self-report data. This may have yielded different interpretations of what types of athletes, and what levels of competition, were being examined. However, the primary focus for the present study was to assess treatment outcomes based on the perceived level of stress experienced by the student athletes, with less focus on whether athletes differed in type of sport (e.g., golf vs. football; team vs. individual) or level of competition (e.g., club vs. college sport). Future research should consider these issues more fully, since such factors may play a role in influencing the stressors faced by athletes.

This study did not control for type of instruction or coaching provided to the athletes (if any) which could introduce a confound because some athletes may have received feedback that had an attributional component. However, it was assumed random assignment to treatment conditions (AR vs. no-AR) would help to address this. Finally, we did not take into account whether stress was stable over time. For many students, perceived stress may subside after the initial transition period to some extent (e.g., Bewick et al., 2010; Friedlander et al., 2007). Although, this may not hold true for student athletes with initial high-stress levels, at least to the same degree, since high-stress student athletes likely experience greater levels during the year, given their additional commitments in multiple domains.

A future avenue for research could consist of developing domain-specific AR treatments to administer to sports teams. For example, most attribution-based treatment content involves academic-achievement scenarios (cf. Perry et al., 2014; Perry & Hamm, 2017) which could be more relevant to athletes if modified to include athletic-achievement scenarios (e.g., free throw performance for basketball players). Some studies support AR treatment efficacy in athletic-achievement settings whereby adaptive attribution-based feedback (e.g., internal, unstable, controllable) provided to novice golfers improved cognitive, affective, and persistence outcomes following failure (Le Foll, Rascle, and Higgins, 2008). Furthermore, inducing stable and uncontrollable beliefs led to lower self-efficacy and poorer task performance (Coffee & Rees, 2011; Coffee, Rees, & Haslam, 2009). Relatedly, future research could determine whether such sport targeted treatments would facilitate performance across achievement domains (e.g., from academic to athletic or vice versa). This type of AR intervention research would be instrumental for athletic administration programs, coaches, and directors who share a common interest to assist athletes in both academic and sport performance.

In summary, Study 3 employed an eight-month, quasi-experimental, randomized treatment design in an online learning environment where cognitive, emotional, and performance measures were examined at four different time points throughout a two-semester course. Grounded in Weiner’s (1985, 2006, 2012) attribution theory of motivation and emotion, this study explored a critical issue regarding how AR benefits vulnerable individuals in achievement settings who report high levels of perceived stress. In so doing, Study 3 addressed a unique group of high-stress student athletes who have to deal with two distinct learning environments: academic and athletic. Findings advance the literature in showing that an attribution-based, motivation-enhancing AR treatment benefited high-stress student athletes by increasing their perceived academic control, which predicted emotions, and in turn these emotions influenced final course grades.

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CHAPTER 5

General Discussion

In general, individuals encountering life course transitions must learn to adapt to adverse and novel challenges that can impede motivation in various domains including education, health, career, family, and even sport (Heckhausen & Shulz, 1995; Heckhausen, Wrosch, & Shulz, 2010; Perry, 2003). This dissertation examines motivation in educational transitions, namely the shift from high school to university that can be characterized as a low control learning environment (Perry, Hall, & Ruthig, 2005). These transitions typically involve multiple stressors (e.g., greater risk of failure, increased autonomy, financial strain) and accompany critical decisions in relation to degree programs, living arrangements, career plans, among others. In this context, students involved in competitive sport are expected to handle all of the regular challenges in the school-to-university transition, as well as additional stressors such as meeting expectations from both coaches and instructors, the overlap of sport competitions and classes, and physical and mental burnout. Undoubtedly, competitive student athletes must juggle challenging academic and sport demands during an already difficult educational transition (Scott, Paskus, Miranda, Petr, & McArdle, 2008; Simons, Van Rheenen, & Covington, 1999).

Accordingly, it is important to recognize the unique academic learning environments many of these student athletes experience in university. In this dissertation, student athletes were competing in their respective sport in addition to maintaining a first-year academic program of studies. They were enrolled in a course with a blended learning format that mixes online and face-to-face instruction. These blended learning courses can be appealing for student athletes due to their flexibility and schedule convenience (Garrison & Kanuka, 2004; Welker & Berardino, 2005); however, they also pose a motivational threat since they can involve unstructured settings that require considerable personal autonomy and initiative and come with increased distractions (e.g., access to Facebook, television, texting), self-regulation challenges, and lower engagement (Moore & Kearsley, 2011; Hara & Kling, 2001). Finally, it is important to note that many student athletes also face other unpredictable stressors such as student-identity issues, injuries from training, physical fatigue, and/or burnout. Although this dissertation does not test for these stressors explicitly, they are worth thinking about when considering the many factors that play a role in hindering achievement motivation for competitive student athletes.

For this dissertation, theoretically relevant motivational factors that impact student athletes in a first-year introductory course were investigated. Specifically, the explanations (or attributions) student athletes use to account for their unsatisfactory performances play a major role in influencing the cognitions and emotions that ensue, and subsequent motivation and achievement striving. This dissertation included three studies that examined the motivation profiles of student athletes upon entering university and the moderators and mediators that govern attribution-based motivation treatments (attributional retraining: AR) designed to promote adaptive thinking.

Study 1 examined several psychosocial motivation variables in order to identify motivation profiles for athletes and non-athletes in a two-semester introductory blended learning course. These profiles were compared in relation to performance on a first-semester course-based test. Study 2 extended Study 1 by focusing on AR’s efficacy to promote academic achievement outcomes involving perceived course success, course grades, and course persistence for competitive student athletes with an academic risk factor (perceived academic control; PAC). The study assessed PAC as a moderator and found AR was beneficial for students with low PAC. Finally, Study 3 examined a theoretically-derived attribution sequence whereby the AR treatment effects were mediated by cognitive and affective variables in the blended learning introductory psychology course. Building on the previous two studies, this study tested the treatment efficacy for student athletes with high perceived stress.

Competitive Athlete Motivation Profiles

As previously discussed, person-centered methodological approaches for studying motivation in educational settings are growing in popularity (Grunschel, Patrzek, & Fries, 2013; Marsh, Lüdtke, Trautwein, & Morin, 2009; Ning & Downing, 2015; von der Embse, Mata, Segool, & Scott, 2014). An advantage of these methods is they help to identify individuals with similar patterns of theory-based (continuous) indicator variables. In this study, LPA is a useful tool to study student motivation since it is informed by various psychosocial variables that do not exist in isolation. LPA allows for the examination of what patterns emerge involving these interrelated variables (cognitions and emotions) providing a more contextual understanding of student motivation.

Omissions in the education literature involve the (a) identifying of motivation profiles with person-centered approaches based on an attribution-based framework; and (b) comparing these profiles of student athletes and non-athletes in a university setting. To address these omissions, Study 1 examined several theory-related factors that predict achievement motivation based upon Weiner's attribution theory. Perceived stress was also included as a factor since stress is an emotion commonly experienced by competitive student athletes that can impede motivation in university (Papanikolaou, Nikolaidis, Patsiaouras, & Alexopoulos, 2003; Pritchard, 2005).

Study 1 findings are in keeping with Weiner's attribution theory (1985, 2018) in several ways. According to the theory, employing attributions that are internal and stable (low ability) for negative outcomes can result in lowered expectancies for future success, dysfunctional emotions (i.e., lowered hope, increased helplessness). Control-relinquished student athletes and non-athletes who indicated low levels of control and at least moderate levels of uncontrollable attributions for poor performance had the most maladaptive profiles (control-relinquished). When validated with a course-based test, control-relinquished students attained lower test scores than other student profiles. These findings help to establish important associations between attribution-based determinants of motivation (e.g., causal attributions, emotions) and actual behaviour outcomes (performance).

For athlete and non-athlete LPA profiles, control-focused students had the most adaptive levels of motivation variables in alignment with Weiner's theory. Specifically, control-focused students had the highest levels of PAC, disavowed uncontrollable attributions, had motivationally-adaptive, attribution-based emotions (i.e., hope, helplessness), and also achieved the highest performance test scores.

Control-disengaged students, who comprised roughly 30% of both athlete and non-athlete samples had relatively neutral profiles. Conceptually, these individuals did not have adaptive or maladaptive levels of the motivation variables but they did have below average levels of PAC. Although the control-disengaged profiles had similar psychosocial patterns for both the athlete and non-athletes, the student-athletes attained low performance test scores comparable to the control-relinquished students. In contrast, non-athlete control-disengaged students outperformed their control-relinquished peers. Thus, student-athletes with control-disengaged profiles may be experiencing more motivational challenges in their competitive learning environments.

For the control-ambivalent profile, the findings are less clear. Control-ambivalent non-athletes are of theoretical interest since they endorse high levels of controllable and uncontrollable attributions for performance which reflects some ambivalence in their causal analysis of negative performance outcomes. However, they also indicate high PAC and adaptive emotions that are synonymous with the control-focused students. Drawing from Weiner's attribution theory (1985), further empirical analysis could investigate whether endorsing maladaptive attributions has long-term effects on these individuals' motivation that could not be tested within the methodological design of Study 1. In addition, other motivation factors (autonomous support from parents, teachers, coaches) or demographic variables (SES, ethnicity) could be incorporated in the model for future explication of the profiles.

Despite the many similarities between athlete and non-athlete motivation profiles in Study 1, more of the student athletes attained lower test performance on the class test. In fact, 44% of the student athletes achieved test scores below 60% (control-disengaged and control-relinquished groups). Given that these low performing student athletes are not only adjusting to the first year of university, but are also managing additional sport demands, Studies 2 and 3 were conducted to administer an attribution-based motivation treatment (AR) to student athletes. Research on AR is promising for students with varying risk profiles and points to the possibility that athletes may be good candidates. Thus, building on the first study, Studies 2 and 3 investigated whether these competitive athletes benefit from AR and whether potential academic risk factors moderate the AR→performance relationship.

Attribution-based Treatments: Moderating Variables

In Study 2, student athletes who differed in their PAC scores (low, high) were examined based on the premise that individuals' causal ascriptions for success and failure outcomes impact perceptions of control over future outcomes (Weiner, 1985, 2006, 2012). Relative to their no-treatment peers, student athletes who received the AR treatment and who had low PAC upon entering college had a sizable 12% increase on a course-based test two weeks post-treatment. The partially standardized effect ($\beta = .73$) for this treatment boost is large according to statistical conventions (Cohen, 1988; Hayes, 2013). A similar effect emerged for student athletes' final grades where AR recipients attained 6% higher final grades than their no-treatment peers. This partially standardized effect ($\beta = .53$) indicates an approximate full letter grade increase according to the grading system used in the course. These treatment effects replicate past research on AR's effects that test other moderating variables including: low to moderate initial test performance (Perry, Stupnisky, Hall, Chipperfield, & Weiner, 2010; converted $d = .37$ to .96), high failure acceptance (Hamm et al., 2014; $d = .46$), and low cognitive elaboration (Hamm, Perry, Chipperfield, Murayama, & Weiner, 2017; $d = .39$). Considering the longitudinal randomized treatment design employed, these effect sizes are notable since they were detected up to eight months post-AR treatment.

Furthermore, fewer low-PAC competitive athletes who received AR (vs. no-AR) withdrew from their first-year introductory course (12% vs. 27%). This is a noteworthy finding since studies indicate most voluntary withdrawals (VW) are common within the first year of university (Bernardo et al., 2016; Willcoxson, 2010; Willcoxson, Cotter, & Joy, 2011) and national estimates by the U.S. Department of Education reveal about 30% of first-year students drop out (Snyder & Dillow, 2013). VW rates represent an objective persistence outcome in academic settings shown to be negatively associated with important achievement indicators (Belloc, Maruotti, & Petrella, 2011; Bennett, 2003). Helping student athletes who are at risk of drop out can potentially save them from experiencing a number of losses, including costs (tuition fees), time invested in the course, and confidence in completing their degrees. Improving student athlete retention can also be beneficial for decision makers in education (e.g., deans, department heads), instructors, and coaches who care about the educational development of these students.

Another important factor impacting achievement motivation, particularly for student athletes, is stress. Perceived stress has been studied across varying educational contexts including primary and secondary education (Connor, 2001, 2003; Kyriacou & Butcher, 1993), undergraduate (Baghurst & Kelley, 2014; Clinciu, 2013; Veena & Shastri, 2016), and graduate (Stewart, Lam, Betson, Wong & Wong, 1999) settings. Not surprisingly, a consistent finding is that high stress is associated with poorer academic performance (Stewart et al., 1999; Veena & Shastri, 2016) and adjustment (Clinciu, 2013; Friedlander, Reid, Cribbie, & Shupak, 2007).

Unfortunately, the emergent research literature in sport indicates student athletes commonly experience stress in their academic programs (Kimball & Freysinger, 2003; Papanikolaou et al., 2003; Yow et al., 2000). These individuals encounter practice and class conflicts, overtraining, and performance pressure at high levels (McKay, Niven, Lavallee, and White, 2008; Papanikolaou et al., 2003; Simons et al., 1999) that can have deleterious effects on achievement striving, and consequently, make them optimal candidates for AR. In Study 3, specifically, students' perceived stress was tested as a moderator of AR's effects. Findings indicate student athletes' levels of perceived stress moderated AR's effects on a post-treatment course test whereby athletes with high-stress (achieving +1 *SD* above the mean) achieved higher test grades relative to their no-AR peers (76% vs. 70%).

Both Studies 2 and 3 advance the AR literature by specifying key academic risk factors (e.g., low PAC, high stress) that moderate AR efficacy. These studies also assess effects of an attribution-based motivation treatment on a unique group of students (competitive athletes) who have not been specifically examined in AR studies. AR research that has focused on traditional student groups (i.e., not specifically competitive athletes) supports these findings and evidences a range of student dispositions and adverse learning conditions shown to moderate AR-performance linkages. In particular, Menec and colleagues (1994) found AR was effective for boosting the academic performance of students who were in supportive learning environments (i.e., effective teaching), whereas those in non-supportive learning environments (i.e., ineffective teaching) did not have AR effects. The study also revealed AR benefitted students who exhibited an external (vs. internal) locus of control. Other randomized treatment studies examined student risk factors such as failure-avoidance (Boese, Stewart, Perry, & Hamm, 2013), low cognitive elaboration (Hamm et al., 2017), and over-optimism (Haynes, Ruthig, Perry, Stupnisky, & Hall, 2006). The present findings in Studies 2 and 3 extend these AR studies by testing novel academic risk factors (low PAC, high perceived stress) that moderate AR efficacy in a low control learning environment for students engaged in competitive sport.

Attribution-based Treatments: Mediating Variables

Study 3 presents new insights into *how* AR impacts academic performance via a number of theory-derived motivation variables. Previous research demonstrates AR's efficacy for cognitive, affective, and motivation outcomes, but only a couple of studies directly tested mediating variables in the AR → performance relationship. For example, Hamm et al. (2017) examined whether an AR treatment promoted goal attainment for university students via a hypothesized causal sequence of attributions, cognitions, and emotions. They found AR (vs. a stress-reduction treatment) reduced low-elaboration students' uncontrollable attributions for failure, which predicted higher PAC, which in turn increased positive emotions and decreased negative emotions. Further, this AR → attribution → perceived control → emotions mediation sequence influenced final course grades for low-elaboration students. These findings suggest this sequence of cognitive, affective, and motivational processes may help explain AR's performance effects that fit within Weiner's (1985) theoretical framework.

In addition, Study 3 supports this mediation sequence in two ways. First, high-stress AR recipients reported higher ratings of positive achievement-related emotions and lower ratings of negative achievement-related emotions compared to their no-AR counterparts as a result of AR's influence on PAC. Second, the predicted path model revealed these theory-based process variables (PAC, achievement-related emotions) were found to mediate AR's effects on performance for student athletes with high perceived stress. The measures of these emotions were aggregated into positive (hope and pride) and negative (shame and helplessness) emotions in keeping with methods used by Hamm et al. (2017). Similar to the concerns discussed by Hamm et al. (2017), these select emotions do not capture the complex and broad range of emotions in Weiner's (1985, 2012) attribution theory (e.g., self-esteem, hopelessness, guilt, anger, gratitude, sympathy, regret, etc.). Consequently, such findings convey only a piece of the puzzle in terms of identifying the many emotions experienced by students in university.

Study 3 also tested AR effects on objective performance outcomes (final grades) and tested the mediation of cognitive (PAC) and affective (emotional well-being) changes in the AR→performance relationship. However, the role of each of these mediating variables requires greater clarity in order to fully understand the complex motivational processes at work. For example, according to Weiner (2014), guilt is a control-related emotion that results when poor performance is explained by internal and controllable causes, whereas shame results when poor performance is explained by internal and uncontrollable causes. Hence, future research could incorporate guilt into the model and investigate whether AR's effects on performance are mediated by a reduction in shame and hopelessness, an increase in guilt, or some combination of these. In addition, if AR is effective in promoting controllable attributions and reducing uncontrollable attributions, increases in PAC are expected, and in turn, emotions in Weiner's hypothesized model such as reduced shame and hopelessness, increase guilt and hope, and possibly other emotions may result.

In the broader AR literature, there are a few studies that have looked at mediators in the AR→performance relationship. For example, Hall and colleagues (2007) found students' academic expectations mediated AR's effects on students' final grades for high elaborating students (i.e., those with high cognitive elaboration ratings). In addition, for low elaborating students, positive achievement-related emotions (happiness, hope, and pride) mediated AR's effects on final course grades but negative achievement-related emotions (anger, apathy, and shame) did not. In another longitudinal study, students' mastery motivation (intrinsic goals) mediated AR's effects on their final GPA (Haynes, Daniels, Stupnisky, Perry, & Hladykj, 2008). The mediating effects found in these abovementioned AR studies align with Study 3 findings because they all suggest AR impacts academic achievement through theory-based cognitive (i.e., control-related constructs) and affective processes (i.e., attribution-based emotions).

However, there are several methodological and analytic factors that distinguish these studies from Study 3. First, Hall et al. (2007) used a cognitive moderator (elaboration), whereas Study 3 used an affective moderator (perceived stress). Haynes et al. (2008) did not use any moderators when assessing AR's effects. This is an important distinction since the focus on what type of student benefits from the treatment is different for each of the studies conducted. In addition, both Hall et al. (2007) and Haynes et al. (2008) used an AR delivery format that involved a video of two graduate students discussing the importance of certain attributions. In contrast, Study 3 used a delivery of AR which entailed a more structured PowerPoint video presentation encouraging the use of controllable attributions and discouraging uncontrollable attributions for poor performance. These differences in format delivery, moderators, and mediators are noteworthy, but also highlight the strength and reliability of AR's efficacy despite various approaches used.

The intervention studies in this dissertation fit within the burgeoning field of psychological interventions (Walton, 2014) that "target specific psychological processes and recursive dynamics" (p. 79). Walton (2014) notes these interventions are not "silver bullets" meaning they have boundary conditions: (a) effective for certain populations and contexts, (b) effective in changing targeted psychological processes, and (c) effective for impacting longitudinal outcomes if they intervene with important recursive processes. In this dissertation, AR addresses these conditions since it was effective for student athletes encountering the first year of university (context-dependent) and for a specific population of student athletes with low PAC (Study 2) and high-stress (Study 3). AR was also effective in targeting certain cognitive processes (attributions, perceptions of control) for these vulnerable individuals.

Finally, the implementation of AR at a critical point in a first-year introductory course (i.e., following initial test feedback) allowed for students to think deeply about relevant performance feedback. By delivering AR at this time, it helped students make a real connection with the actual causes they ascribe to their performance and reflect on which causes might be most adaptive for their future performances. This is an example of how AR acts to impact outcomes over the long-term (future test performance and final grades) by intervening with critical recursive processes (e.g., endorsing a maladaptive attribution such as low ability after test feedback). For these reasons, the intervention studies in this dissertation are relevant to the growing field of psychological interventions.

Strengths, Limitations, and Future Directions

This dissertation has a number of strengths. All three studies examined self-report psychosocial measures and objective performance and persistence measures. Study 1 employed a person-centered analytic design to address the need for motivation treatments for vulnerable student athletes. Studies 2 and 3 involved longitudinal (eight-month) quasi-experimental, randomized treatment designs which help to strengthen causal inferences relative to research that uses cross-sectional data or does not manipulate predictor variables (Shadish, Cook, & Campbell, 2002). The two treatment studies involved a two-semester study design to test longitudinal treatment effects (vs. control conditions); Study 2 measures were collected at five time points in the year (September, early and late October, March, May) and Study 3 measures were collected at four time points (October, December, March, May).

All of the studies are grounded in a rich theoretical framework based on Weiner's (1985, 2018) attribution theory of motivation and emotion. Attribution theory has been a prominent motivation theory for almost 50 years guiding research in achievement, sport, and health contexts. However, relatively few studies have empirically tested moderation and mediation relationships when causal attributions are made regarding important performance outcomes. In addition, research that focuses on reframing attributions to promote academic motivation in *student athletes* has received very little attention in the achievement literature, and consequently, Studies 2 and 3 offer new insights in this area.

Another strength of this dissertation involved the advanced analytic procedures and experimental designs that were incorporated: Study 1 used person-centered latent profile analysis, Study 2 tested a moderation design, and Study 3 tested a moderation-mediation design to explore how and under what conditions AR promotes academic attainment for competitive student athletes. Each of the studies used ecologically valid achievement measures as an outcome variable to objectively assess the participants' academic performance in course-based tests and final grades (see Richardson, Abraham, & Bond, 2012; Shadish et al., 2002). These kinds of performance measures reflect reliable and informative outcomes that are associated with achievement motivation (r = .30), academic self-efficacy (r = .50), and occupation level (r = .33; Robbins et al., 2004; Strenze, 2007). Another strength involved the use of several critical covariates (e.g., age, sex, English as a first language, and high school grade) which have been shown to influence academic success for student athletes (Comeaux & Harrison, 2011).

Several limitations for this dissertation are also important to note. First, participant groups in all three studies are based on self-identification criteria. In other words, student athletes are defined using participants' self-reports indicating if they are a "competitive athlete." However, the self-report item is worded for participants in a way that explains the "competitive sport" level must be higher than intramural or recreation which should provide a reference point to gauge athletic status. Another limitation involved the criteria concerning the athletes' frequency of participation in practices and competitions in their competitive sport (five times or more per week). This criterion was implemented in Studies 1 and 2 but not in Study 3 which is important to consider since one cannot be certain if the student athletes in Study 3 had busy competition schedules. However, Study 3 assessed student athletes who varied in perceived stress, and the study directly tested treatment effects for student athletes indicating high levels of self-reported stress. As a result, these findings may reflect a more precise depiction of how overwhelmed student athletes feel as they balance sport and academic demands. In addition, this study considered student athletes' levels of general stress which encompasses a broader range of commitments not just in sport but across varying life domains (e.g., social, work, etc.).

Finally, the generalizability of the findings is another limitation. The sample of students in this dissertation represent introductory psychology students from a Midwestern Canadian university that may not generalize to other Canadian institutions or institutions elsewhere. Furthermore, Studies 2 and 3 present results of an AR treatment delivered to students in a blended learning setting. The method of delivery via a blended learning course is unique and may not represent other settings faced by students in university (e.g., face-to-face instruction).

The present dissertation contains the first study to examine the effects of an attribution-based motivation treatment for student athletes exhibiting risk factors in an academic setting. Future research should seek to disentangle which risk factor (i.e., low PAC, high perceived stress) is the key determinant in moderating AR's treatment efficacy. As addressed in Chapter 1, PAC and perceived stress, are two psychosocial factors that can strongly impact achievement striving. In this dissertation, PAC and stress were used in combination to generate latent motivation profiles, and were also tested as moderators of AR treatment efficacy in Studies 2 and 3, respectively. In Studies 1-3, and in other studies (Hall, Chipperfield, Perry, Ruthig, & Goetz, 2006; Ruthig, Haynes, Stupnisky, & Perry, 2009), PAC and stress scores are negatively correlated (*r* range = -.19 to -.26), indicating some overlap, but also conceptual distinctness. Thus, future research could tease apart whether AR's effects enhance student motivation by increasing academic control which alleviates stress (causal relationship), or perhaps test whether AR uniquely impacts students who report high levels of stress and low levels of control (multiple-occurring risk factors).

In this vein, AR efficacy for individuals with multiple-occurring academic risk factors is another avenue for future research. In earlier AR studies, the effects of AR are evidenced for students who exhibit single-occurring risk factors, such as failure-avoidance (Boese et al., 2013), external (vs. internal) locus of control (Menec et al. 1994), over-optimism (Haynes et al., 2006), to name a few (cf. Perry, Chipperfield, Hladkyj, Pekrun, & Hamm, 2014). Unfortunately, these studies that assess single-occurring risk factors do not consider the ecological nature of competitive learning settings experienced by students encountering many risks. One study that addresses this issue examines students at varying levels of PAC and boredom (Parker, Perry, Chipperfield, Hamm, & Pekrun, 2018), showing that AR was particularly effective for students who exhibited low levels of PAC and high boredom. Such findings suggest there is a need to determine the boundary conditions for *who* benefits from AR so that treatments can be tailored for appropriate target populations.

Another important aspect to consider is that students may have demographic risk factors (i.e., first-generation vs. continuing-generation, low socioeconomic status; SES; Sirin, 2005; White, 1982) that exacerbate their academic achievement striving. “First-generation” denotes students whose parents do not have university degrees and have historically been underrepresented in higher education, whereas “continuing-generation” denotes those whose parents have university degrees. First-generation students typically have lower GPAs and higher attrition rates than continuing-generation students and this disparity represents a social class achievement gap (Grayson, 1997; Radford, Berkner, Wheeless, & Shepherd, 2010; Thomas & Quinn, 2006). Considering these demographic risk factors in research going further would generate a richer and more contextualized understanding of the multi-faceted determinants involved in student motivation.

In addition, the sex of the student athletes should not be overlooked when examining academic motivation. For this dissertation, sex was controlled in Studies 1 and 2 and was not controlled for in Study 3. In several sport studies, sex is associated with student athletes’ academic performance and graduation rates (Comeaux & Harrison, 2011; Miller, Melnick, Barnes, Farrell, & Sabo, 2005), whereas in other studies, sex is not significantly related to their academic performance (Gaston-Gayles, 2004). However, these sport studies vary in their measurement of athletes across secondary and post-secondary school settings, and across individual versus multiple institution assessments. Furthermore, many of these sport studies are conducted in the United States and do not examine athletes at Canadian universities (Miller, 2002). Since academic motivation can vary among students with different sexes and backgrounds (Comeaux & Harrison, 2011), efforts to consider these differences are needed in research going forward.

Another area for future research would be to investigate the role of attributions from a social identity approach (Haslam, 2004; Haslam, 2014; Rees, Haslam, Coffee, & Lavallee, 2015). According to social identity theory, individuals categorize themselves and others into social groups. Research reveals individuals tend to view one's "in-group" more positively than "out-groups" (Cruwys, South, & Greenway, 2015). In light of this, it may be adaptive to encourage student athletes to think about their poor performance by considering the group (e.g., "we performed well") as opposed to focusing on their personal outcome ("I performed poor"). This group-referent thinking (Coffee, Freeman, & Allen, 2017; Coffee, Greenlees, & Allen, 2015) is a potential solution for individuals who tend to ruminate on internal and uncontrollable causes for their poor performances. Further, this group-referent thinking may also be transferable to achievement settings in sport where performance is more often evaluated at the group level (vs. academic settings).

Finally, researchers interested in studying the academic adjustment of students during the first-year transition to university could think of other competitive or extra-curricular commitments that potentially conflict with their academic pursuits. For example, students involved in performing arts, music competitions, and other demanding extra-curricular activities may face similar academic motivational obstacles. Very few attribution-based treatment studies have been geared toward motivating these individuals who are expected to excel in other competitive achievement domains. Thus, these individuals may also be prime candidates for AR treatments that are evidenced in this dissertation to help university students balancing competitive sport.

Conclusion

This dissertation builds on past attribution research by assessing (a) whether attributions for significant events (e.g., poor performance) impact student athletes and (b) whether motivation treatments that promote the use of adaptive attributions are important for at-risk student athletes. Using latent profile analyses, student athlete profiles were identified based upon motivational factors such as attributions for poor performance (bad strategy, low ability), perceived academic control (PAC), achievement-related hope and helplessness, and perceived stress. For comparison purposes, non-athlete profiles were identified based on these same motivational factors. Study 2 used hierarchical regression tests to assess the conditional effects of an Attributional Retraining (AR) treatment on student athletes' academic performance, cognitions (perceived success, control), and voluntary withdrawal rates. Simple slope analyses probed AR x PAC interactions and revealed AR benefitted student athletes with low PAC. Finally, Study 3 employed a path analysis and found AR effects on final course performance were mediated by cognitive and affective processes for high-stress student athletes.

Together, the findings suggest that, although there are student athletes who are motivated and successful in university, there are still many who are academically at-risk. The present dissertation shows that AR is an effective treatment for ameliorating negative performance and persistence outcomes for vulnerable student athletes in competitive achievement settings.

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