A PRELIMINARY INVESTIGATION OF THE IMPLICIT THEORIES IN SPORT COACHES

By

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Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.

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ABSTRACT

Mindsets are beliefs about the nature of human attributes. Research with teachers found that those with a growth mindset used feedback that was more supportive, displayed higher self-efficacy and engagement, and more leadership behaviours. The purpose of this research was to explore coaches' mindset of athletic ability and the influence of mindset on specific coaching variables. 113 coaches (M_{age} =38.44±12.15 years; 57.5% men) completed a survey that measured mindset of athletic ability, feedback style, leadership behaviours, coaching efficacy, and engagement. Results indicated that coaches had high growth mindset beliefs (M=4.31±0.54, Scale=1-5). Regression analysis revealed that coaches with higher growth mindset beliefs used more control feedback and positive leadership behaviours. Coaches with higher fixed mindset beliefs used less control feedback, displayed more autocratic leadership behaviours, had lower coaching technique efficacy, and higher coaching motivation efficacy. These findings provide initial evidence for the importance of a growth mindset in sport coaches.

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CHAPTER 1: INTRODUCTION

Carol Dweck's (1999) conceptualization of the implicit theories has shown that the way in which an individual views their abilities greatly influences many aspects in and consequences of their lives. In short, Dweck's (1999) research has investigated how the implicit theories affect leadership, school achievement, friendships, athletic performance, motivation, and more. These theories have been applied across several domains and have demonstrated positive outcomes for a variety of populations (Aronson et al., 2002; Chen et al., 2008; Costa & Faria, 2018; Orvidas et al., 2018). The implicit theories have, therefore, become important psychological theories that are adaptable to a variety of settings and populations.

The implicit theories are defined as beliefs about the nature of human attributes (Dweck, 1999). Two implicit theories were described by Dweck (1999) – the entity theory and incremental theory, which are also referred to as fixed and growth mindsets, respectively. An individual with a fixed mindset tends to think that their abilities are unchangeable, such that they believe they either have or do not have what it takes to succeed. Contrarily, an individual with a growth mindset believes their abilities are changeable and that with effort, they can improve. The latter is an important distinction between the two mindsets. Those with a fixed mindset believe that individuals who can be successful do not need to work hard because it comes easily to them. These individuals tend to seek opportunities where there is no risk of failure, impeding their ability to challenge themselves and in turn, develop. Those with a growth mindset are the opposite – they continually challenge themselves because they are not threatened by failure and view learning and working hard as part of the process (Dweck, 1999).

It has been repeatedly found that these mindsets influence whether an individual fulfills their potential (Dweck, 1999). In general, individuals with a growth mindset demonstrate higher self-efficacy, a desire for feedback, a greater ability to deal with setbacks, and overall better performance over time (Kanfer, 1990; Lirgg et al., 1996; Ommundsen, 2003). Importantly, the implicit theories are investigated in relation to specific human attributes. For example, the implicit theories of intelligence are heavily researched and therefore, most mindset research and corresponding interventions have been performed in the education sector. Students who have a growth mindset regarding intelligence demonstrate improved academic outcomes, including more academic engagement and enjoyment as well as higher academic achievement (Aronson et al., 2002; Burnette et al., 2018; Costa & Faria, 2018; Romero et al., 2014). Similarly, athletes in sport with a growth mindset regarding athletic ability experience more enjoyment and engagement, and higher perceived sport competence (Evans et al., 2020; Gardner et al., 2018; Vella et al., 2016). The implicit theories of intelligence in students and of athletic ability in athletes refer to beliefs about one's own attributes. However, implicit theories can also be applied to other individuals' attributes.

Often, implicit theories concerning other individuals' attributes are investigated in populations such as teachers. In particular, the implicit theories about others' (i.e., their students') intelligence have been of interest. More specifically, teachers' mindsets about their students' intelligence impacted how they provided feedback, their level of engagement, the leadership behaviours that they used, and their belief in their own ability (Lin et al., 2022; Seaton, 2018; Shoshani, 2021; Zarrinabadi et al., 2023).

In sport, a coach holds a similar role to a teacher in a classroom, such that they are actively involved in teaching and are leaders in the presence of a learner (Drewe, 2000). A sport coach has been defined as an individual that "fulfills a leadership role within sport, which is characterized by goals based on improved sports performance" (Lyle, 2002, p. 40). Sport coaches strive to improve an athlete's or a team's abilities by influencing the factors that affect performance (Lyle, 2002). Recently, teaching and sport coaching has become even more similar, as it has been suggested that sport coaching should focus on the global and humanistic development of athletes, using athlete-centered coaching (Kidman, 2010). Therefore, sports coaches' mindsets may result in similar behaviours and beliefs to that of teachers.

Feedback Style

The relationship between mindset beliefs and feedback style has been assessed in both education and sport. Teachers who underwent a growth mindset intervention identified a change in the language and feedback they used in their teaching (Seaton, 2018). Teachers with fixed mindset beliefs used more comforting feedback and less control feedback (Lee, 1996; Rattan et al., 2012). In sport, Shapcott and Carr (2020) found that golf coaches with a growth mindset regarding athletic ability also used less comforting and more control feedback. This feedback made golfers feel empowered to improve; hence, supporting the athlete's growth mindset (Shapcott & Carr, 2020). In these contexts, comforting feedback refers to the act of comforting individuals about their low ability and stems from a teacher or coach concluding that their student or athlete has low ability; thus, they feel as though they must console them (Rattan et al., 2012). While this response is often well-intentioned, it can be harmful to an individual's learning and

performance, as it can cause them to believe that they are permanently low achievers. On the other hand, those who convey high expectations can improve effort and motivation. With control feedback, teachers or coaches use caring statements that support students or athletes while motivating them by explaining how they can improve (Rattan et al., 2012). Thus, it was expected that sport coaches with higher growth mindset beliefs would use more control feedback and less comforting feedback. Furthermore, coaches with higher fixed mindset beliefs were expected to use more comforting feedback and less control feedback.

Coaching Efficacy

It was also found that teachers with a growth mindset of intelligence had higher self-efficacy (Seaton, 2018; Zarrinabadi et al., 2023). Specific to teaching, those with a growth mindset had more teacher efficacy, or belief in their ability to influence student performance (Lin et al., 2022). In sport, the concept of coaching efficacy has been defined as the extent to which coaches believe they have the capacity to influence the learning and performance of their athletes (Feltz et al., 1999). A coach's sense of efficacy operates across four dimensions: motivation efficacy (i.e., belief in coaches' ability to influence psychological skills and states), technique efficacy (i.e., belief in coaches' ability to teach the skills of their sport), character building efficacy (i.e., belief in coaches' ability to influence the personal growth of athletes), and game strategy efficacy (i.e., belief in coaches' ability to coach during competition and lead their team to a successful result). Coaching efficacy has an important influence on sport coaches' behaviour and the subsequent decisions they make (Busser & Carruthers, 2010; Mageau & Vallerand, 2003). Thus, it was expected that coaches with higher growth mindset

beliefs would have higher coaching efficacy, across all dimensions. Alternatively, it was expected that coaches with higher fixed mindset beliefs would have lower coaching efficacy.

Coaching Engagement

A teacher's growth mindset regarding their students' intelligence has been shown to result in more teaching engagement and enjoyment (Shoshani, 2021). Engagement across settings such as business and education is underpinned by an individual's energy and involvement in their role (Klassen et al., 2013). For the purposes of this research, the concept of coaching engagement is broadly suggested to be the energy and involvement that coaches put into their coaching role. Thus, it was hypothesized that coaches who held more of a growth mindset would have higher coaching engagement (i.e., are more engaged in their coaching role). Alternatively, it was hypothesized that coaches with higher fixed mindset beliefs would have lower coaching engagement.

Leadership Behaviours

Finally, a teacher's mindset is also associated with behaviour change, as those with a growth mindset show more ability to implement change (Seaton, 2018). More specifically, teachers' growth mindset was positively related to their perceptions of transformational leadership (Lin et al., 2022). In sport, some coaches are involved in transformational leadership, as they seek to enhance their athletes' beliefs, self-efficacy, and performance (Chelladurai, 2015, p. 148). The most prevalent leadership model in sport is the Multidimensional Model of Leadership in Sport (MML) which includes positive behaviours such as training and instruction (i.e., direct behaviours that improve athlete performance level), democratic behaviour (i.e., coaching behaviour that allows

greater participation by athletes in decisions), social support (i.e., supporting athletes through a positive group atmosphere and concern for well-being), and positive feedback (i.e., reinforcing an athlete by recognizing and rewarding good performance), and negative behaviour such as autocratic behaviour (i.e., coaching behaviour that stresses personal authority and removes autonomy from athletes) (Chelladurai & Saleh, 1980). Thus, these leadership behaviours may be influenced by a coach's mindset, where coaches with higher growth mindset beliefs would be expected to use more positive and less negative leadership behaviours. Alternatively, coaches with higher fixed mindset beliefs may use less positive and more negative leadership behaviours.

In short, coaches' mindsets of their athletes' ability may be related to many behaviours (i.e., feedback style, engagement, leadership behaviours) and efficacy beliefs. Coaches' mindsets and in turn, the behaviours they exhibit, may influence their athletes' outcomes and mindsets. In education, when teachers communicate fixed mindset beliefs, their students anticipate more negative psychological experiences, less academic motivation, and a decrease in anticipated academic performance (LaCosse et al., 2020). Teachers have also been shown to act as important figures in the formation and development of their students' mindsets (Smith et al., 2018; Yeager et al., 2021). Yeager and colleagues (2021) introduced the *Mindset + Supportive Context* hypothesis, which proposed that a student's growth mindset must be supported by their teacher's own growth mindset (Yeager et al., 2021). In other words, it was hypothesized that teachers must have a growth mindset for their students' growth mindset to develop and flourish (Yeager et al., 2021). For example, teachers with a growth mindset may convey the idea that mistakes are learning opportunities and create evaluations that reward improvement

(Canning et al., 2019; Muenks et al., 2020). Contrarily, teachers with a fixed mindset may interfere with a student who is developing a growth mindset by creating an environment where innate ability is promoted (Yeager et al., 2021). For instance, a teacher may indicate that only some students are good at a particular subject, such as mathematics. Yeager et al.'s (2021) results were in line with Dweck's (1999) previous findings – teaching students a growth mindset improved their academic performance. However, to fully benefit from a growth mindset intervention, a supportive environment was needed (Yeager et al., 2021). In other words, students who were in classrooms with teachers who had a growth mindset exhibited more meaningful gains in their mindset beliefs, compared to students who were in classrooms with teachers who had a fixed mindset (Yeager et al., 2021). These findings demonstrated the importance of an environment that supports a growth mindset. Therefore, coaches' mindsets may influence their athletes' outcomes and mindsets, emphasizing the importance of coaches who have appropriate beliefs.

It has been hypothesized that coaches with a fixed mindset may fail to evolve, receive feedback well, and may be threatened by losses (Chase, 2010). Further, coaches with a fixed mindset may not create an environment that is supportive of a growth mindset, thereby impeding their athletes' ability to fulfill their potential (Yeager et al., 2021). For example, sport coaches with a fixed mindset may convey to their athletes that they value natural talent above all, which may result in them spending less time with the athletes whom they believe have less ability (Dweck, 2009). On the other hand, coaches with a growth mindset may convey to their athletes that they value hard work, dedication, and effort. These coaches may be more open to developing athletes of all abilities and are more likely to foster teamwork and team spirit (Dweck, 2009). Overall, the literature is

lacking empirical evidence regarding coaches' mindsets of their athletes' athletic ability; specifically, in relation to the behaviours and efficacy beliefs that are related to their mindset.

Research Questions and Hypotheses

Therefore, the primary purpose of the present research was to determine whether sport coaches' mindset beliefs were related to their feedback style, leadership behaviours, coaching engagement, and coaching efficacy. It was hypothesized that those with higher growth mindset beliefs would use more control feedback (and less comforting feedback), more positive (and less negative) leadership behaviours, and have higher coaching engagement and higher coaching efficacy. Alternatively, coaches with higher fixed mindset beliefs were hypothesized to use less control feedback (and more comforting feedback), less positive (and more negative) leadership behaviours, and have lower coaching engagement and lower coaching efficacy. In a secondary, exploratory purpose, this study also aimed to determine whether coaches' mindset beliefs differed between sport-specific characteristics (e.g., type of sport and level coached, gender, age, etc.). Since sport is a unique domain, exploratory research is required to identify the factors that may predict a sport coach's mindset. Due to the exploratory nature of this secondary purpose, no hypotheses were outlined.

Study Design

Sport coaches who were registered with the National Coaching Certification Program (NCCP) were recruited for this study. These coaches were 18 years of age or older and currently coaching. The study design was cross-sectional, where participants were asked to complete a one-time survey using the online survey software, Opinio. This

survey gathered demographic (e.g., age, gender) and coaching (e.g., type of sport and level coached, coaching experience) information, and measured their mindset of athletic ability, feedback style, leadership behaviours, coaching efficacy, and coaching engagement. Regression analyses were performed to investigate the relationship between sport coaches' mindset and their behaviours and efficacy beliefs. Kruskal-Wallis testing and Kendall's tau correlations were performed to determine whether there were differences in mindset beliefs between sport-specific factors (e.g., gender, years of coaching experience, level coached, etc.).

Summary

The present research sought to determine the behaviours and efficacy beliefs that are associated with coaches' mindsets. Furthermore, this study also determined if sport coaches' mindsets differed between sport-specific factors. Thus far, mindset research has been conducted in the education sector, where both student and teacher mindsets have been investigated. Currently, the literature lacks empirical evidence regarding the mindset of sport coaches. This novel research is an important first step in helping coaches develop an environment that is supportive of athlete growth and development. This study is critical in creating a framework for further studying mindsets in sport coaching and will help provide a foundation for future intervention-based research in this domain.

CHAPTER 2: REVIEW OF LITERATURE

The implicit theories, more commonly known as mindsets, have become an important construct in psychology. It is well-known that the type of mindset an individual adopts has an important influence on their lives. These mindsets have been investigated across a number of domains, with the majority of research stemming from the education sector (e.g., Aronson et al., 2002; Costa & Faria, 2018). However, there has been minimal research examining the mindsets of sport coaches. This highlights the need for a comprehensive analysis of mindsets in this population, providing the rationale for this study.

Implicit Theories

The implicit theories, originally established by Carol Dweck (1999), are beliefs about the nature of human attributes. These core assumptions guide human behaviour and help people organize their world. The type of implicit theory one adopts has implications for their achievements, relationships, careers, and intergroup attitudes. Two implicit theories have been identified: the *entity* theory and *incremental* theory. *Entity theorists* believe that human attributes are fixed and cannot be enhanced, while *incremental theorists* believe that human attributes can grow and develop. Importantly, those who hold an incremental theory do not believe that everyone starts with the same talent or innate ability; rather, they believe that everyone has the *potential* to improve on their abilities with the proper motivation, opportunity, and instruction. It has repeatedly been demonstrated that the type of theory one holds makes a difference in the outcomes they experience throughout their life, particularly as they confront difficulties or setbacks (Dweck, 1999). As research surrounding the implicit theories has evolved, the term

mindset has been more commonly used to refer to the two theories. Individuals who hold an *entity* theory are said to have a fixed mindset, while those who hold an *incremental* theory are said to have a growth mindset. For the purposes of this literature review, fixed and growth mindsets will be used instead of *entity* and *incremental* theories to be consistent with the current convention.

Characteristics of Mindsets

Those who hold either a growth or fixed mindset display different characteristics with regard to their goals, effort beliefs, attributions, and helpless strategies. These characteristics help explain how and why individuals who adhere to the principles of each theory behave a certain way.

First, the type of mindset one holds influences the goals they set (Dweck, 2011). Those who hold more of a fixed mindset are motivated to validate their fixed traits through performance goals. Contrarily, those who hold more of a growth mindset are motivated to enhance their malleable traits through learning goals. In this context, performance goals are focused on demonstrating ability, while learning goals are focused on developing ability. The difference in goals often interferes with an individual's ability to learn, as those who have a fixed mindset will go to a great extent to prove their ability (e.g., look smart or not look dumb) (Dweck, 2011). Hong and colleagues (1999) demonstrated this learning interference in university students, where, compared to individuals with a growth mindset, those with a fixed mindset expressed significantly less interest in a remedial English course even when their English was poor. This study highlights how those with a fixed mindset may avoid opportunities to learn and improve to maintain a certain representation of their ability.

Second, one's effort beliefs also differ between mindsets (Dweck, 2011). This characteristic is based in attribution theory, where effort is viewed as a controllable factor and therefore, should generate high motivation and resilience. However, attribution theory also indicates that effort is negatively associated with ability, such that the more effort you require, the less ability you have. As previously mentioned, those with a fixed mindset strive to demonstrate the extent of their ability, so any effort that is required tends to be viewed as diminishing. Any effort that an individual with a fixed mindset invests decreases their confidence and evaluation of their performance. Contrarily, those who hold a growth mindset view effort as good and necessary in order to improve (Dweck, 2011). This belief is not only grounded in the implicit theories; rather, there is a substantial body of research investigating the importance of deliberate practice to achieve success (Ericsson et al., 1993; Hambrick et al., 2014). The type of theory one holds may interfere with their beliefs regarding effort and therefore, their ability to grow and improve.

Third, when faced with setbacks, the type of mindset one holds influences how they attribute it (Dweck, 2011). Individuals with a fixed mindset are more likely to attribute their setbacks towards their traits and abilities. Contrarily, those with a growth mindset are more likely to attribute their setbacks towards effort and motivation (Dweck, 2011). The way in which individuals attribute their setbacks results in specific behaviours. Fixed mindset individuals tend to partake in helpless or defensive strategies, while growth mindset individuals tend to partake in persistent, strategic, and mastery-oriented strategies (Dweck, 2011). Overall, these characteristics provided a theoretical

framework for the study of mindsets, which was initially investigated in the education domain.

Implicit Theories in Education

Dweck's (1999) mindset theory has gained a substantial amount of research traction since first theorized, across a variety of disciplines. Initially, Dweck (1999) was intrigued by why some individuals thrived in the face of challenges and setbacks, while others shied away. As previously stated, the implicit theories have primarily been investigated in the education sector. Therefore, initial research regarding individual outcomes studied the mindsets of intelligence in school-aged children.

Implicit Theories in Students

As outlined by Dweck's implicit theories, individuals may either display a fixed or growth mindset of intelligence. Those with a fixed mindset of intelligence view intelligence as an entity that is innate and cannot be changed (Dweck, 1999). For students, this means that they may worry about how much intelligence they have, which causes them to fixate on looking and feeling smart enough. Contrarily, those with a growth mindset of intelligence view intelligence as a quality that can be developed through learning. These students believe that, with effort and instruction, everyone can increase their intelligence (Dweck, 1999).

Aronson, Fried, and Good (2002) initially investigated the role of the implicit theories of intelligence on academic outcomes. In this study, Aronson et al. (2002) examined how a growth mindset could reduce the effects of stereotype threat in African American college students. In comparison to their White counterparts, research has demonstrated that African American college students performed worse academically,

which may be a result of the knowledge of negative stereotypes regarding Black students' intellectual abilities. By teaching these students a growth mindset, the researchers hoped to improve academic outcomes, thereby reducing the effects of stereotype threat. Aronson and his colleagues (2002) used a pen pal program to encourage a growth mindset and found that – after just three sessions – the intervention created an enduring and beneficial change in students' attitudes about intelligence. Furthermore, these students reported greater academic enjoyment, engagement, and performance compared to controls. This study provided initial evidence regarding the efficacy of a growth mindset intervention to improve academic outcomes.

The positive relationship between a growth mindset and academic outcomes has been demonstrated in several studies (e.g., Aronson et al., 2002; Burnette et al., 2018; Romero et al., 2014). However, these relationships have been called into question on numerous occasions, particularly those related to academic performance (Costa & Faria, 2018). This has caused controversy regarding the theoretical framework, where it has been questioned whether 1) mindsets predict student outcomes 2) growth mindset interventions are effective and 3) the effect sizes are large enough to be considered interesting (Yeager & Dweck, 2020). For the purpose of this review, the first controversy is of interest.

Initial evidence suggested that students with more of a growth mindset showed improvements in math grades across a two-year period, whereas those with more of a fixed mindset did not (Blackwell et al., 2007). In larger studies, similar associations have been found, where mindsets were correlated with achievement (Claro & Loeb, 2019). Specifically, the association between mindset and academic achievement is higher in

lower-achieving students; in other words, students who were facing the most academic setbacks or difficulties benefitted most from having a growth mindset (Yeager & Dweck, 2020). However, other studies have shown no relationship between a growth mindset and academic outcomes (Bazelais et al., 2018; Brougham & Kashubeck-West, 2017; Li & Bates, 2019). These null effects have commonly been seen in different cultures, such as in China and the Czech Republic (Yeager & Dweck, 2020). The literature is, therefore, quite mixed regarding the academic outcomes of a growth mindset and was lacking a comprehensive analysis. Costa and Faria (2018) conducted a meta-analytic review of 46 studies and found that there was a low-to-moderate association between mindset and academic achievement. Those with a growth mindset were more likely to have higher grades in specific subjects and overall achievement. This review provided support for the growth mindset, not only in terms of general academic outcomes (e.g., academic engagement and enjoyment) but also academic achievement. Overall, the association between students' mindsets and academic outcomes is complex, as it seems that effect sizes may vary between student achievement levels and across cultures. The findings in students have been monumental for investigating the implicit theories in other contexts, such as teaching.

Implicit Theories in Teaching

While much of the original mindset research has primarily focused on learners, there has been emerging evidence regarding teachers' mindsets. Growth mindset teachers are more likely to create a classroom environment that is supportive of learning, while fixed mindset teachers are more likely to create a high-risk classroom environment where students have limited autonomy over their learning (Stipek et al., 2001; Trouilloud et al.,

2006). These findings are important as teachers are influential figures in students' lives and, therefore, the learning environment that they create can foster student beliefs and outcomes (Yeager & Dweck, 2012). Two types of mindsets seem to be influential for teachers: a mindset about their own abilities and a mindset about others' abilities. A teacher's mindset has been demonstrated to influence their teaching effectiveness as well as the formation and development of student mindsets.

Teachers' Mindsets About Their Own Abilities.

The mindset a teacher holds about their own ability refers to their overall 'teaching ability.' Those with a growth mindset believe that their teaching ability can grow and develop, whereas those with a fixed mindset believe that their teaching ability is fixed and stable (Fives & Buehl, 2008; Nalipay et al., 2019). Teachers with a growth mindset regarding their teaching ability report higher levels of enjoyment with teaching and teaching engagement (Frondozo et al., 2020; Nalipay et al., 2021). These teachers also experienced higher levels of well-being across all dimensions, including positive emotions, engagement, positive relationships, meaning, and accomplishment (Nalipay et al., 2022). Finally, teachers with a growth mindset about their own teaching ability were also more intrinsically and extrinsically motivated to teach (Nalipay et al., 2021).

Teachers' Mindsets About Others' Abilities.

Teachers can also hold a growth mindset regarding others' intelligence. Similar to mindsets about their own ability, teachers who had a growth mindset regarding intelligence were more engaged and enthusiastic, and were more likely to experience professional well-being (Shoshani, 2021). Furthermore, teachers who underwent a growth mindset intervention identified a change in the language and feedback they used in their

teaching (Seaton, 2018). Not only did they experience behaviour change, but they were cognisant of this change as they were more self-reflective about their teaching approach. In other words, teachers attempted to adopt approaches that were most in-line with a growth mindset and continually thought about what they might have done differently in future situations. This finding is in line with other mindset research, which has demonstrated that a growth mindset about others' abilities predicts teachers' behaviour (Lee, 1996; Rattan et al., 2012). Overall, teachers with a growth mindset showed adaptive patterns of behaviour that focused on effort and learning, while those with a fixed mindset showed maladaptive patterns that were focused on student ability (Lee, 1996).

More specifically, teachers who had a growth mindset provided more effort-oriented feedback, rather than ability-oriented feedback (Lee, 1996). Teachers with a fixed mindset were the opposite, as they provided less effort-oriented and more ability-oriented feedback. This research on feedback styles was furthered by Rattan et al. (2012), where it was hypothesized that teachers with a fixed mindset would use feedback that is more comforting of students' low ability. This response typically comes from a student's poor academic performance, which results in the teacher concluding that they have low ability; thus, they feel the need to console the student for their lack of ability. While this response is often well-intentioned, it can be harmful to a student's learning and performance, as it can cause students to believe that they are permanently low achievers. On the other hand, teachers who convey high expectations can improve effort and motivation (Rattan et al., 2012). These studies concluded that teachers with fixed mindset beliefs used more comforting (maladaptive) feedback and less control (adaptive) feedback (Lee, 1996; Rattan et al., 2012).

Teachers who underwent a growth mindset intervention also demonstrated an increase in self-efficacy (Seaton, 2018). Self-efficacy has been defined as an individual's perceived capabilities for learning or performing actions (Bandura, 1977). Other studies have also found a relationship between mindsets and self-efficacy, where those with a growth mindset have higher self-efficacy and those with a fixed mindset have lower self-efficacy (Zarrinabadi et al., 2023). From self-efficacy theory, the concept of teacher efficacy was developed and defined as "the extent to which the teacher believes he or she has the capacity to affect student performance" (Berman et al., 1977, p. 137). It has been proposed that teacher efficacy influences the amount of effort a teacher will expend in a teaching situation, criticism used, professional commitment, as well as the specific teaching strategies and amount of experimentation adopted (Coladarci, 1992; Gibson & Dembo, 1984). In a sample of Chinese teachers, it was determined that there was a relationship between growth mindset and teacher efficacy, where higher growth mindset beliefs were associated with more teacher efficacy (Lin et al., 2022).

Lin et al. (2022) also found a significant relationship between teachers' mindset beliefs and transformational leadership. More specifically, teachers with higher growth mindset beliefs perceived greater transformational leadership behaviours in themselves (Lin et al., 2022). Bass (1990) proposed the concept of transformational leadership, whereby leaders influence their followers by broadening their interests, generating acceptance of a combined group mission, and inspiring them to seek benefits for the group, rather than themselves. In teachers, this can involve empowering others to set their own expectations, enhancing feelings of self-efficacy, and acting as role models (Pereira & Gomes, 2012). Importantly, these teaching outcomes that result from a growth mindset

may have implications for their students, including their academic outcomes and mindsets.

Teachers' Influence on Student Outcomes.

Other research has explored how teachers' mindset beliefs influence their students. For example, LaCosse, Murphy, Garcia and Zirkel (2020) examined how STEM professors' mindsets influence students anticipated psychological experiences and interest in a college course. The authors found that when professors communicate fixed mindset beliefs to their classes, students anticipate more negative psychological experiences and undergo a reduction in academic motivation (LaCosse et al., 2020). These negative consequences were strong enough that students in these classes reported a decrease in their anticipated performance (LaCosse et al., 2020). The findings of this study provide evidence that, although students' personal mindsets are important, other beliefs can also shape student outcomes.

Teachers can not only affect student outcomes, but also the mindset they hold. A significant positive relationship was found between teachers' mindsets and students' mindsets over time (Mesler et al., 2021). In other words, teachers who had more of a growth mindset at the start of the school year had students with higher growth mindsets at the end of the school year (Mesler et al., 2021). Smith and colleagues (2018) examined how feedback related to either a growth or fixed mindset influenced students' mindsets. After students participated in a statistics lesson (self-led, growth mindset feedback, or fixed mindset feedback), it was determined that the students receiving growth mindset feedback shifted their beliefs towards a growth mindset (Smith et al., 2018). These studies provide evidence that a teacher's mindset can influence students' mindsets.

Previous literature has suggested that a student's mindset has important implications for their academic outcomes and that a teacher's mindset may have an influence on the formation and development of a student's mindset. However, it was unclear if and how these mindsets work in unison to support student outcomes.

Mindset + Supportive Context Hypothesis.

To investigate whether students' personal growth mindset beliefs must be supported by their teacher's own growth mindset beliefs, Yeager and colleagues (2021) created the *Mindset + Supportive Context* hypothesis. This hypothesis states that "a teacher's growth mindset acts as an 'affordance' that can draw out a student's nascent growth mindset and make it tenable and actionable in the classroom" (Yeager et al., 2021, pg. 4). An affordance is defined as a context that allows for particular behaviours – in this case, the blossoming of a student's growth mindset (Walton & Yeager, 2020). The basis for this hypothesis stems from the idea that as individuals attempt to implement a belief or behaviour into a given context, they attend to cues in their environments to determine if their belief or behaviour is beneficial and legitimate (Yeager et al., 2021). In a classroom, students may look for cues (e.g., a teacher's mindset) to determine if their mindset is congruent with the teaching and learning styles.

In the *Mindset + Supportive Context* hypothesis, growth mindset teachers may support students by conveying that mistakes are learning opportunities, rather than signs of low ability. Further, these teachers may create assignments and evaluations that reward continual improvement (Canning et al., 2019; Muenks et al., 2020). On the other hand, fixed mindset teachers may interfere with a student's budding growth mindset by making it incompatible and inapplicable in the classroom (Yeager et al., 2021). For example,

teachers may convey that only some students are good at certain subjects (e.g., not everyone is a "math person"). Intuitively, it seems as though the *Mindset + Supportive Context* hypothesis should be supported. However, no specific empirical evidence was provided to support this hypothesis until data from the National Study of Learning Mindsets (NSLM) was examined.

The NLSM was conducted with a representative sample of 9th grade students from the United States in 2015-2016 (Yeager et al., 2021). These students were randomly assigned to a growth mindset intervention group or a control group, while math teachers were surveyed to measure their mindsets. As previous literature has found, the growth mindset intervention successfully improved math grades demonstrating the importance of students developing growth mindsets. However, the authors found something else that was fascinating – supportive classroom contexts mattered, providing support for the *Mindset + Supportive Context* hypothesis. Students who underwent the growth mindset intervention and were in a classroom with a fixed mindset teacher demonstrated no meaningful improvements in math grades. Interestingly, students who underwent the same intervention and were in a classroom with a growth mindset teacher showed meaningful gains in math grades. These findings indicate that students cannot simply implement their personal growth mindset into a classroom, rather they must be supported by the classroom environment (Yeager et al., 2021).

Overall, mindsets seem to be influential for both students and teachers. Furthermore, a teacher's mindset has been found to predict whether a student's mindset can flourish. These findings have been frequently reported in the education sector. In

sport, athletes and coaches are congruent with students and teachers. However, there is little research investigating mindsets in sport; particularly, in sport coaches.

Implicit Theories in Sport

Warburton and Spray (2017) have suggested that sport is a unique setting to study the implicit theories, as athletic ability is often viewed as a fixed trait by participants. In line with education, it has been hypothesized that mindsets influence both athlete and coach outcomes in sport. For the purposes of this review, athletes in sport are similar to students in education, while coaches in sport are similar to teachers in education. Interestingly, sport coaching began from a subset of teachers who were typically former athletes and coached team sports at their school (Lyle, 2002, p. 6). Initial literature distinguished teaching from sports coaching based on the idea that teachers educated their learners, whereas coaches trained their athletes (Drewe, 2000). In this context, training involved teaching a specific skill with an end goal, whereas educating was more broadly focused on overall development (Drewe, 2000). However, more recent coaching literature and development programs suggest that sport coaching should be focused on the global and humanistic development of athletes, using athlete-centered coaching (Kidman, 2010). Other differences included that teachers believed communication skills were most important to their profession, whereas sport coaches believed that subject matter expertise was most important. Teachers also tend to work with more learners and spend less time with them when compared to sport coaches (Drewe, 2000). These distinctions do not negate the fact that sport coaches are, fundamentally, still involved in teaching – they teach their athletes skills, technique, and strategy. The divide between teaching and sport coaching was problematic for both professions, as the roles are quite

similar in nature. Over time, the role of a sport coach has become increasingly similar to teachers, with more emphasis on the holistic development of their athletes (Drewe, 2000; Kidman, 2010). Therefore, the following review of implicit theories in sport will integrate literature from both sport and education to provide a deeper understanding of mindsets in sport. In line with the information presented previously, this section will begin by outlining the implicit theories in athletes (learners) followed by the implicit theories in coaches (teachers).

Implicit Theories in Athletes

Although the literature surrounding athletes' mindsets is less prevalent compared to students, there has been some research conducted in this area. The implicit theories of athletic ability demonstrate similar outcomes in athletes compared to the implicit theories of intelligence – a measure of ability in the education domain – in students. In sport, athletes with a fixed mindset believe that athletic ability, regardless of effort, cannot be acquired, such that it is something an individual does or does not have. Conversely, athletes with a growth mindset believe that athletic ability is a result of practice, guidance, and effort (Chen et al., 2008).

As with student mindsets in education, athletes with a growth mindset report greater enjoyment in their sport as well as higher sport competence and motivation (Evans et al., 2020; Gardner et al., 2018; Vella et al., 2016). These athletes also engage in more adaptive learning strategies than athletes with a fixed mindset (Chen et al., 2008; Khalkhali, 2012; Ommundsen, 2001; Stenling et al., 2014; Wang et al., 2009; Warburton & Spray, 2013). More specifically, athletes who have a fixed mindset regarding their athletic ability reduce their effort and make excuses when they encounter potential failure

(Chen et al., 2008). Contrarily, athletes with a growth mindset regarding their athletic ability did not reduce their effort when they encountered adversity and viewed this potential failure as an opportunity to learn and grow (Chen et al., 2008). Furthermore, athletes with a growth mindset perform better than athletes with a fixed mindset in tasks with a high-level of difficulty (Khalkhali, 2012). While not directly related to the purpose of this study, athletes with a growth mindset regarding their athletic ability experience many positive outcomes. These findings are in-line with literature from education and demonstrate the importance of fostering growth mindsets in athletes. Therefore, it is vital that coaches, like teachers, create an environment that is supportive of growth mindsets.

Implicit Theories in Sport Coaches

A sport coach has been defined as an individual that "fulfills a leadership role within sport, which is characterized by goals based on improved sports performance" (Lyle, 2002, p. 40). In sport, the coach most often plays a role in the execution of the performance. Since coaches influence many performance-related outcomes, they are responsible for the growth and development of their athletes (Lyle, 2002). Coaches, like teachers, are also responsible for teaching and modelling qualities such as cooperation, self-discipline, teamwork, and moral values (Lumpkin, 2010). Therefore, coaches have undue influence on their athletes which highlights the need for coaches who have appropriate belief systems.

The influence of coach beliefs dates back to the "Pygmalion experiment", where Rosenthal and Jacobson (1968) sought to determine whether teachers' expectations or beliefs concerning their students' intellectual abilities could affect the academic progress of those individuals. A sample of teachers were informed that, via a standardized test of

academic ability, certain children in their classes were identified as late bloomers and therefore, were expected to demonstrate gains in academic achievement over the upcoming school year. In reality, these children were randomly selected and were no different from the other students in the class. It was found that students who had been identified to improve made greater gains in academic performance than those who were not identified. In other words, students who had higher expectations surrounding their capacity to improve their intellectual ability had teachers act in ways that would help them perform better (Rosenthal & Jacobson, 1968).

Rosenthal and Jacobson's (1968) initial study provided a foundation for future work regarding expectancy effects in education and competitive sport (e.g., Horn, 1984; Martinek, 1988; Papaioannou, 1995; Rejeski et al., 1979; Sinclair & Vealey, 1989; Solomon et al., 1998). Overall, teachers' expectations impact students' learning and performance to some degree; however, the extent to which these expectations have an influence differs between teachers (Horn et al., 2015, p. 79). Thus, it was hypothesized that those who understand the self-fulfilling prophecy theory can avoid conforming to the expectations that they hold.

The self-fulfilling prophecy theory states that an individual's belief or expectation comes true simply because they hold it (Merton, 1948). Applied to coaching, the self-fulfilling prophecy theory would indicate that the beliefs or expectations coaches form about the ability of athletes will influence the behaviours of a coach and hence, the learning and development of their athletes. Horn, Lox and Labrador (2015, p. 79) proposed a four-stage self-fulfilling process that begins with a coach's expectation about an athlete's ability and is followed by a) coach behaviour change; b) athlete learning and

performance being affected; and c) athlete behaviour and performance conforming to their coach's expectations. In other words, coaches hold expectations about their athletes' abilities which results in them changing their coaching behaviours and in turn, altering the learning and performance of their athletes. As a result, the athletes' performance and behaviour then conforms to the coach's expectations which reinforces this original expectation and causes the cycle to continue. Therefore, there is evidence to suggest that coaches' expectations or beliefs about their athletes' abilities influences their behaviour as well as their athletes' learning and performance.

As with teachers, sport coaches can hold beliefs about their abilities and others' (their athletes) abilities. According to Dweck's (1999) implicit theories, coaches with a fixed mindset may convey to their athletes and teams that they value natural talent above all (Dweck, 2009). As a result of their fixed mindset, coaches may spend less time with athletes whom they deem less talented and fail to evolve and receive feedback well (Chase, 2010; Dweck, 2009). On the other hand, coaches with a growth mindset may convey to their athletes and teams that they value hard work, dedication, and effort. These coaches are also more likely to foster teamwork and team spirit (Dweck, 2009). The growth mindset beliefs of coaches may also interact with their athletes, as athletes with a coach that has more of a growth mindset have higher intentions to return to sport and more enjoyment in sport (Evans et al., 2020). The present literature lacks research on coaches' mindsets; particularly, specific empirical evidence.

Coaches' Mindsets About Their Own Abilities.

Initial evidence regarding coaches' mindsets was provided by Chase, Galli, Myers and Machida (2008) where high school coaches were asked about their beliefs regarding

the nature of coaching. It was determined that high school coaches believed their overall ability to coach was more learned than innate, indicating that coaches held a growth mindset regarding their overall coaching ability. Further, coaches indicated that their ability to motivate athletes, build character, physically condition athletes, and teach technique were also more learned than innate (Chase et al., 2008). These attitudes suggest that this sample of coaches held a growth mindset regarding specific coaching skills. Chase (2010) furthered research in this area by discussing sport coaches' mindset regarding their leadership ability. It was suggested that coaches with a fixed mindset may have less success over their career (i.e., win less) and have players that do not reach their full potential (Chase, 2010). Similar to education, research has also investigated coaches' mindsets about others' (i.e., their athletes') abilities.

Coaches' Mindsets About Others' Abilities.

Shapcott and Carr (2020) investigated golf coaches' mindsets regarding athletic ability. More specifically, they sought to determine the relationship between golf coaches' mindsets and their feedback mechanisms. It was hypothesized that coaches who held more of a growth mindset regarding athletic ability (in this case, golf ability) would provide feedback that was more adaptive (control) and less maladaptive (comforting). In this study, it was determined that mindset significantly predicted the type of feedback that coaches gave to their athletes, such that they provided more control feedback and less comforting feedback. In other words, those with more of a growth mindset used feedback that made golfers feel empowered to improve (Shapcott & Carr, 2020). This research was one of the first empirical mindset-related coaching studies, which demonstrates the need for this topic to be further investigated in the literature. This study was also one of the

first to demonstrate the importance of a coach's mindset regarding their athlete's athletic ability. While Shapcott and Carr (2020) did identify one coach-specific behaviour related to mindsets, their primary focus was to describe how coaches' mindset beliefs were different between male and female golfers. There was also little information about other behaviours or beliefs that may relate to a coach's mindset of athletic ability. The coach-related mindset literature is, therefore, quite limited and a comprehensive analysis of coaches' mindsets is needed.

In the education domain, a teacher's self-efficacy was previously identified to be influenced by a growth mindset (Martin & Mulvihill, 2019; Seaton, 2018; Zarrinabadi et al., 2023). Feltz et al. (1999) integrated the original self-efficacy theory (Bandura, 1977), research related to teacher efficacy (Coladarci, 1992; Gibson & Dembo, 1984; Tschannen-Moran et al., 1998), and their own coach-related research to create the concept of coaching efficacy. Coaching efficacy has been defined as the extent to which coaches believe they have the capacity to influence the learning and performance of their athletes (Feltz et al., 1999). A coach's sense of efficacy is an important influence on their behaviour and the subsequent decisions they make (Busser & Carruthers, 2010; Mageau & Vallerand, 2003). The dimensions of coaching efficacy include motivation, game strategy, technique, and character building. Motivation efficacy describes a coach's confidence in their ability to influence their athlete's psychological skills and states. Game strategy efficacy describes a coach's confidence in their ability to coach during competition and lead their team to a successful result. Technique efficacy describes a coach's belief in their instructional and diagnostic skills. Finally, character building efficacy describes a coach's confidence in their ability to affect their athletes' personal

growth and positive attitude toward sport (Feltz et al., 1999). These dimensions of coaching efficacy are hypothesized to predict coaches' mindsets; however, it is unknown how each dimension of coaching efficacy will associate with their mindset beliefs.

Previous literature in the education domain has also suggested that a teacher's mindset influences how engaged they are in their role (Shoshani, 2021). Engagement has most commonly been studied in workplaces, where it has been defined as "an active, positive work-related state that is characterized by vigor, dedication, and absorption" (Bakker, 2011, p. 265). Engagement across these settings is underpinned by an individual's energy and involvement in their role (Klassen et al., 2013). Research in education has used work engagement as a model for teachers; however, Klassen et al. (2013) argued that teaching engagement was a distinct concept. Importantly, teaching engagement was proposed to also include social engagement, which is the energy that teachers put into social relationships with both their students and colleagues (Klassen et al., 2013). For the purposes of this research, the concept of coaching engagement is grounded in teaching engagement. The concept of coaching engagement can be broadly suggested as the energy and involvement that coaches put into their coaching role. Thus, it can be hypothesized that coaches who hold more of a growth mindset are more engaged in their coaching role.

Furthermore, a teacher's mindset is associated with behaviour change, as those with a growth mindset show more ability to implement change (Seaton, 2018). More specifically, a teacher's growth mindset was also correlated with transformational leadership behaviours (Lin et al., 2022). Fundamentally, sport coaches are constantly involved in transformational leadership, as they attempt to enhance their athletes' beliefs,

self-efficacy, and performances (Chelladurai, 2015, p. 148). In sport, leadership behaviours are vital for maximizing athlete performance (Fletcher & Roberts, 2013). The most prevalent leadership model in sport is the Multidimensional Model of Leadership in Sport (MML) which includes behaviours such as training and instruction, democratic behaviour, autocratic behaviour, social support, and positive feedback (Chelladurai & Saleh, 1980). Training and instruction are focused on direct behaviours that improve athlete performance level (Chiu et al., 2016). Democratic behaviour has been defined as "coaching behaviour that allows greater participation by athletes in decisions pertaining to group goals, practice methods, and game tactics and strategies" (Chelladurai, 1999, p. 163), while autocratic behaviour has been defined as "coaching behaviour which involves independent decision making and stresses personal authority" (Chelladurai, 1999, p. 163). Social support is said to be "coaching behaviour characterized by a concern for the welfare of individual athletes, a positive group atmosphere and warm interpersonal relations with members" (Chelladurai, 1999, p. 163), while positive feedback is "coaching behaviour which reinforces an athlete by recognizing and rewarding good performance" (Chelladurai, 1999, p. 163). Therefore, it is hypothesized that coaches with higher growth mindset beliefs will use more positive coach leadership behaviours (e.g., training and instruction, democratic behaviour, social support, positive feedback) and less negative coaching leadership behaviours (e.g., autocratic behaviour).

Overall, the literature lacked information about the relationship between sport coaches' mindsets of athletic ability and their behaviours and efficacy beliefs. Therefore, the primary purpose of this study was to determine whether the mindset beliefs of a sport coach was related to coaching-specific outcomes, such as their leadership behaviours,

feedback style, coaching efficacy, and coaching engagement. Based on previous research in the education and sport domain, it was hypothesized that coaches who were more growth-mindset oriented would demonstrate more leadership behaviours, feedback that is more adaptive as well as higher levels of coaching efficacy and engagement. By conducting this cross-sectional research on a large sample of sport coaches, a deeper understanding of these concepts now exists. Furthermore, research has also yet to explore whether there are coach characteristics that relate to their mindset beliefs. The study, therefore, also sought to identify whether mindsets in coaches differ between sport-specific factors (e.g., type of sport and level coached, gender, age, etc.) via an exploratory analysis. This study is an important step in investigating coaching mindsets and provides a framework for future work in this area.

CHAPTER 3: METHODOLOGY

Reflexivity Statement

My experiences as a youth sport baseball coach inspired me to partake in this research. As a young athlete, sport coaches were some of my biggest role models and mentors in life. This led me to get involved in coaching myself, which I have been doing for the past eight years at both the club and provincial level. Over the years, I have become extremely passionate about athlete development and more specifically, about helping athletes reach their potential. Conducting this research has helped shape my own coaching practice, and it is likely that my coaching has also shaped this research. Although this thesis used a quantitative methodology, I would still like to acknowledge that my position and philosophies as a youth sport coach may have influenced the study's design, methodology, and interpretation of results.

Participants

It was determined from a power analysis (conducted in *G*Power2,* goal: .80 power, with $\alpha = .05$) that at least 111 coaches needed to be recruited based on the relationship between mindset and feedback style. One hundred and thirteen sport coaches who were registered with the National Coaching Certification Program (NCCP) were recruited for this study. To be eligible to participate in the research, coaches had to have an NCCP number, be 18 years of age or older, currently be coaching, and reside in Canada. The sample is described in detail in Tables 1, 2 and 3.

Table 1. Descriptive statistics for a sample of Canadian sport coaches.

Variable	Mean	SD	Range
Age (years)	38.44	12.15	19.00-66.00
Coaching Experience (years)	13.33	10.72	1.00-52.00
Athlete/Team Success	7.32	1.69	3.00-10.00

Study Design & Procedure

A cross-sectional survey design was used for this research as it provided a preliminary understanding of this novel topic and was suitable for the associated time constraints. Sport coaches were recruited using social media (Twitter, Facebook, and LinkedIn). Contacts at the Canadian Sport Institute Atlantic (CSIA) and Coaching Association of Canada (CAC) were also involved in recruitment, as they distributed an invitation to their followers and members to participate in the study via their social media platforms and email newsletters.

Participants were asked to complete a one-time anonymous survey, through the online survey software Opinio. The survey took participants approximately 20 minutes to complete. Prior to beginning the survey, participants were presented with an informed consent form, which stated the purpose, methods, risks, and benefits of study participation. Participants were also informed that they could withdraw at any time simply by exiting the survey. Due to the anonymity of the survey, once participants completed the survey, they were no longer be able to withdraw their responses.

Those participants who fully complete the survey were given the opportunity to enter a draw for a $100 gift card at a major sports equipment store. Although participants had to provide their name and email address to be entered in the draw, this information was collected using a separate survey so it could not be linked to participant responses.

Table 2. Demographic information for a sample of Canadian sport coaches.

Variable	*N*	Percentage (%)
Gender		
Man	65	57.5
Woman	45	39.8
Prefer Not to Say	3	2.7
Highest Level of Education		
High School	14	12.4
Diploma	11	9.7
Degree	45	39.8
Advanced/Professional	38	33.6
Other/Not Listed	5	4.4
Highest Level Coached		
Recreational	6	5.3
Competitive	56	49.6
Advanced	33	29.2
Elite/Professional	18	15.9
Type of Sport		
Individual	79	73.1
Team	20	18.5
Both	9	8.3
Gender of Athletes		
Men's Competition	81	50.9
Women's Competition	61	38.4
Co-Ed/Mixed Competition	17	10.7
Specific Populations		
Para-Sport	11	7.1
Special Olympics	18	11.6
Youth Sport	95	61.3
Masters Athletes	22	14.2

Table 3. Sports coached by a sample of Canadian sport coaches.

Sport	*N*	Percentage (%)
Baseball	44	30.3
Hockey	23	15.9
Volleyball	10	6.9
Basketball	8	5.5
Football	6	4.1
Soccer	6	4.1
Figure Skating	5	3.4
Track and Field	5	3.4
Martial Arts	4	2.8
Curling	3	2.1
Golf	3	2.1
Gymnastics	3	2.1
Rugby	3	2.1
Softball	3	2.1
Cross Country	2	1.4
Lacrosse	2	1.4
Rowing	2	1.4
Skiing/Snowboarding	2	1.4
Speed Skating	2	1.4
Strength and Conditioning	2	1.4
Swimming	2	1.4
Badminton	1	.70
Canoe Kayak	1	.70
Pickleball	1	.70
Ringette	1	.70
Sailing	1	.70

Measures

Participants completed an online survey comprised of questions regarding demographic information, coach-specific questions, mindset of athletic ability, feedback style, leadership behaviours, coaching efficacy, and coaching engagement.

Demographic Information & Coach-Specific Questions

At the beginning of the survey, coaches were asked to provide basic demographic information, including their age and gender (Appendix A). Participants then completed questions specific to their coaching, including their highest level they coached, years of coaching experience, and highest level of education. Coaches also reported the type of sport(s) that they coached in the past year. This question was open-ended so that coaches could report more than one sport, if applicable. From this, coaches were coded as having coached team sport, individual sport, or both. This coding system was used to calculate percentages for each of these categories (Table 2). An open-ended response box was then provided for coaches to report information regarding any additional educational background and certifications. Examples included advanced NCCP education (e.g., NCCP Competitive Development stream), sport-specific training (e.g., World Karate Federation accredited coach), and training for specific duties or populations (e.g., Mental Health First Aid, Aboriginal Sport). Previous season's success was then measured by obtaining coaches' subjective evaluation of their athlete(s) or team's success, by indicating – on a 10-point Likert scale – how well their athlete(s) performed to the coach's expectations. Finally, coaches were also asked to indicate if they coached any specific populations, including Para-Sport, Special Olympics, Youth Sport or Masters Athletes.

Mindset of Athletic Ability

Coaches' mindsets were measured using the Conceptions of the Nature of Athletic Ability Questionnaire–2 (CNAAQ-2; Appendix B; Biddle et al., 2003). This reliable and validated questionnaire assessed participants' growth and fixed mindset beliefs regarding athletic ability and had question stems modified to relate more to coaches, rather than athletes (Biddle et al., 2003; Wang et al., 2005). The scale included 12 items, across four subscales, where participants indicated, on a 5-point Likert scale, their agreeance with each stem (1 = strongly disagree, 5 = strongly agree). The questions were split equally across the four subscales (three items for each), where two subscales represented growth mindset beliefs and two subscales represented fixed mindset beliefs. The growth mindset subscales were specific to Learning (e.g., "Athletes need to learn and to work hard to be good at sport") and Improvement (e.g., "How good athletes are at sport will always improve if they work at it"). The fixed mindset subscales were specific to Giftedness (e.g., "To be good at sport athletes need to be naturally gifted") and Stability (e.g., "It is difficult to change how good athletes are in sport").

To maintain consistency with the literature (Biddle et al., 2003; Spray, 2017; Wang et al., 2005), coaches' mindset of athletic ability was assessed using the second-order factors of growth and fixed mindset beliefs, rather than the first-order factors of Learning, Improvement, Giftedness, and Stability. Growth mindset beliefs were assessed by calculating the mean score of the Learning and Improvement subscales. Fixed mindset beliefs were assessed by calculating the mean of only the Stability subscale. Based on the original theoretical framework and use of scales in other domains, fixed mindset beliefs typically assess the lack of change or difficulty in changing attributes; however, they do

not focus on the importance of giftedness or natural ability (Warburton & Spray, 2017). Therefore, it has been proposed that the Giftedness subscale on the CNAAQ-2 is not indicative of a fixed mindset belief, since it doesn't represent a fixed, stable view of ability (Warburton & Spray, 2017). For this reason, the Giftedness subscale was excluded from the analysis and the Stability subscale was used to measure fixed mindset beliefs. Cronbach's alpha indicated that both the growth mindset subscale ($\alpha = .76$) and fixed mindset subscale ($\alpha = .80$) had sufficient internal consistency that was reflective of previous literature (Biddle et al., 2003; Warburton & Spray, 2008).

Feedback Style

Coaches were then asked to complete Rattan et al.'s (2012) academic feedback scale (Appendix C). This questionnaire was modified, so that it was appropriate for sport feedback, rather than academic feedback. The adapted scale had been used before in sport, in a sample of golf coaches (Shapcott & Carr, 2020). The scale consisted of control and comforting feedback items, where control items indicated that athletes have control over their improvement and comforting items focused on comforting, unempowering feedback. The scale included 14 questions where participants indicated, on a 6-point Likert scale, their agreeance with how often they use different feedback strategies with their athletes (1 = strongly disagree, 6 = strongly agree). Sample questions included: "Inform them that they can improve their athletic ability with the right plan" (control), "Reassure them that if they want to improve their athletic ability, they can" (control), "Discreetly suggest to her that some people are born athletes and others just aren't" (comforting), and "Remind them that they are probably good at things other than their sport" (comforting). Cronbach's alpha indicated that both the control feedback ($\alpha = .60$)

and comforting feedback (α = .84) subscales demonstrated sufficient internal consistency that was in line with research in both education and sport (Rattan et al., 2012; Shapcott & Carr, 2020).

Leadership Behaviours

Coaches' leadership behaviours were assessed via The Revised Leadership Scale for Sport, which is a reliable and valid measure of leadership behaviours in coaches (Appendix D; Chiu et al., 2016). This questionnaire assessed coaches' perceptions of democratic and autocratic behaviours as well as behaviours related to training and instruction, social support, and positive feedback (Chiu et al., 2016). The scale included 25 questions where participants indicated, on a 5-point Likert scale, their level of agreeance with each stem (1 = strongly disagree, 5 = strongly agree). Response items were prefaced by "I…", and individual items pertained to "See to it that every athlete is working to their capacity", "Let my athletes share in decision making", "Look out for the personal welfare of the athletes", and "Tell an athlete when they do a particularly good job." Based on Cronbach's alpha, each subscale demonstrated sufficient internal consistency: training and instruction (α = .69), democratic behaviour (α = .85), autocratic behaviour (α = .89), social support (α = .72), and positive feedback (α = .68).

Coaching Efficacy

The participants then completed the coaching efficacy scale, which is a reliable and valid measure of coaching efficacy (Appendix E; Feltz et al., 1999). The questionnaire measured the four dimensions of coaching efficacy: motivation (5 items), game strategy (7 items), technique (6 items), and character building (4 items). This scale comprised 24 questions where participants indicated, on a 9-point Likert scale, their level

of confidence with each stem (1 = not at all confident; 9 = extremely confident). Response items were prefaced by "How confident are you in your ability to:", and individual items pertained to "coach individual athletes on technique", "recognize opposing team's strength during competition", "motivate your team", and "instill an attitude of good moral character." Cronbach's alpha indicated that all subscales had sufficient internal consistency: game strategy efficacy (α = .87), motivation efficacy (α = .83), technique efficacy (α = .89), character building efficacy (α = .73). These findings were in line with other recent research (Chao et al., 2023; Keatlholetswe & Malete, 2019; Villalon & Martin, 2020).

Coaching Engagement

Coaches were then asked to complete a modified version of the Engaged Teachers Scale (Appendix F; Klassen et al., 2013). This scale was modified for a sport coaching context, where teaching terminology was changed to coaching terminology. The questionnaire included 16 questions that were on a 7-point Likert scale (1 = never, 7 = always). The scale has displayed sufficient reliability (α = 0.91) and good content validity (Yerdelen et al., 2018). Sample items from the scale included: "I love coaching", "While coaching, I pay a lot of attention to my tasks", "At practices/competitions, I am empathetic towards my athletes", and "I value the relationships I build with my other coaches." Cronbach's alpha indicated that the scale had good internal consistency (α = .87).

Data Analysis

Data were stored on a secure Dalhousie server. Incomplete data sets were evaluated on an individual basis. Missing data points were assumed to have been left

empty on purpose and therefore, were included in the data analysis. Participants who quit the survey early and had questions left to complete were excluded from the data analysis.

All statistical analyses were performed using SPSS v.27 for Mac. Means were calculated for the mindset of athletic ability, leadership behaviour, feedback style, and coaching efficacy scales across each subscale to determine a total score. This included growth mindset beliefs and fixed mindset beliefs (mindset); training and instruction, democratic behaviour, autocratic behaviour, social support, and positive feedback (leadership behaviours); control feedback and comforting feedback (feedback style); technique efficacy, motivation efficacy, game strategy efficacy, character building efficacy (coaching efficacy). A mean score was calculated for the coaching engagement scale across all questions to determine a total score.

Regression analyses were used to investigate the study's primary research question. More specifically, the relationship between a coach's mindset and coaching outcomes, such as leadership behaviours, feedback style, coaching efficacy, and coaching engagement, was assessed. Due to the exploratory nature of the research in this population, a backwards regression analysis was initially conducted to determine which variables predicted coaches' mindset of athletic ability. After assessing the assumptions of a multiple linear regression (see Results section for more details), it was determined that there were violations; thus, a bootstrapping procedure was used to account for these violations. A simple sampling method was conducted (with N=1000 samples), using 95% bias-corrected and accelerated confidence intervals (BCa). Based on the variables that most strongly predicted coaches' growth and fixed mindset beliefs, a forced entry regression was performed with bootstrapped samples.

The second research question, which was exploratory in nature, evaluated the relationships between a coach's mindset and different coach characteristics. Assumptions of both correlation and ANOVAs were assessed, and it was determined that there were violations. Therefore, Kendall's-tau correlations were conducted between a coach's mindset beliefs and age, years of coaching experience, and athlete/team success. Furthermore, Kruskal-Wallis tests were performed to determine if there were differences in mindset based on coach's gender, type of sport coached, level of sport coached, highest level of education, as well as any special population that they coached. The Benjamini-Hochberg procedure was used to account for the number of Kruskal-Wallis tests that were performed and therefore, decrease the false discovery rate (Thissen et al., 2002). This procedure was performed by first ranking the p-values in ascending order. Next, Benjamini-Hochberg (B-H) critical values were calculated using the equation (i/m)Q, where i was the p-value's rank, m was the total number of tests performed, and Q was the false discovery rate (set at 25%). The original p-values were then compared to the B-H critical values, and the largest p-value that was smaller than the critical value was identified. This B-H critical value and the others that were smaller were considered significant.

CHAPTER 4: RESULTS

Descriptive statistics for the overall sample (N = 113) are presented in Table 4. Growth and Fixed Mindset Beliefs of sport coaches are presented in Figure 1.

Table 4. Descriptive statistics of main variables.

	Mean	Median	SD
Mindset			
Growth Beliefs	4.31	4.33	.54
Fixed Beliefs	2.04	2.00	.90
Feedback Style			
Control	5.01	5.00	.55
Comforting	2.52	2.29	1.01
Coaching Efficacy			
Technique	7.98	8.17	.86
Motivation	7.85	8.00	.89
Character Building	8.23	8.50	.83
Game Strategy	7.77	7.86	.87
Leadership Behaviours			
Training and Instruction	4.39	4.40	.47
Autocratic Behaviour	1.89	1.60	.95
Democratic Behaviour	3.97	4.00	.72
Positive Feedback	4.48	4.60	.45
Social Support	3.78	3.80	.68
Coaching Engagement	6.31	6.38	.51

Note. The scale measuring: Mindset ranged from 1 to 5; Feedback Style ranged from 1 to 6; Coaching Efficacy ranged from 1 to 9; Leadership Behaviours ranged from 1 to 5; Coaching Engagement ranged from 1 to 7.

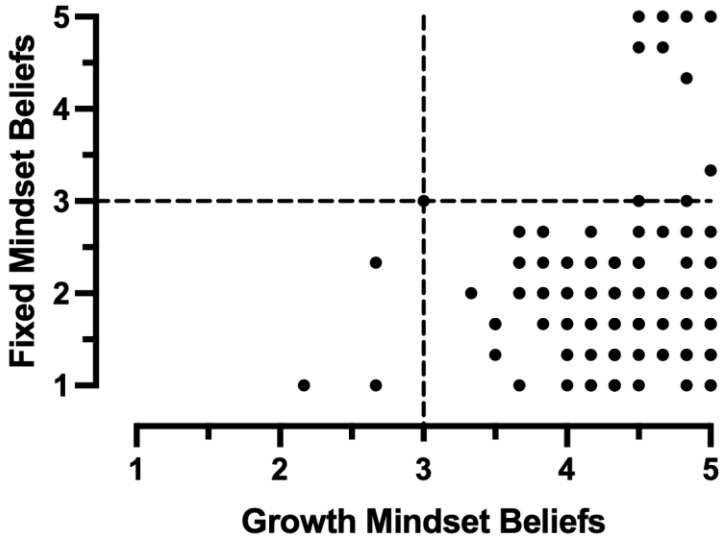

Figure 1. A scatterplot of sport coaches fixed and growth mindset beliefs.

Regression Analyses

Regression analyses were performed to investigate the relationship between coaches' mindset of athletic ability and coaching outcomes. Assumptions of a multiple linear regression were assessed to determine if there were violations. Normality checks were performed on all data, by assessing histograms and performing Kolmogorov-Smirnov testing (Appendix G). The outcome variables had data that were continuous and independent of each other. The predictor variables had data that were continuous and had non-zero variance. Each predictor was assessed for linearity with both outcome variables. Overall, linear relationships with the outcome variables were unclear across several of the predictor variables. Therefore, a backwards multiple regression analysis was used to determine which variables best fit the model.

Fixed Mindset Beliefs

The error terms were found to be independent of each other, based on the Durbin-Watson statistic (d = 1.784). A scatterplot of standardized residuals against standardized

predicted values showed that there was a violation of homoscedasticity, and that the data were heteroscedastic and non-linear (Appendix G). The assumption of normality of errors was performed by inspecting a histogram, which demonstrated that the errors were right-skewed and therefore, did not follow a normal distribution (Appendix G). Collinearity statistics were within acceptable ranges. All variables had a VIF well below 10 (highest VIF = 2.34) and a tolerance greater than 0.2 (smallest tolerance = .43).

The first model of the backwards regression (predictor variables: Control Feedback, Comforting Feedback, Technique Efficacy, Motivation Efficacy, Character Building Efficacy, Game Strategy Efficacy, Training and Instruction, Autocratic Behaviour, Democratic Behaviour, Positive Feedback, and Coaching Engagement) significantly predicted Fixed Mindset Beliefs among coaches, $F(12,99)=21.00$, $p < .001$, $R^2=.72$, $R^2_{adj}=.68$. Democratic Behaviour was removed in the second model because there was no significant difference in model fit with this predictor removed, $F(11,100)=23.14$, $p < .001$, $R^2=.72$, $R^2_{adj}=.69$. In the third model, Character Building Efficacy was removed without significant difference in fit, $F(10,101)=25.68$, $p < .001$, $R^2=.72$, $R^2_{adj}=.69$. In the fourth model, Social Support was removed, $F(9,102)=28.50$, $p < .001$, $R^2=.71$, $R^2_{adj}=.69$, and Coaching Engagement was removed in the fifth model without significant difference in fit, $F(8,103)=31.76$, $p < .001$, $R^2=.71$, $R^2_{adj}=.69$. Finally, the sixth model resulted in Positive Feedback being removed, $F(7,104)=35.82$, $p < .001$, $R^2=.71$, $R^2_{adj}=.69$, and the seventh model resulted in Training and Instruction being removed, $F(6,105)=41.08$, $p < .001$, $R^2=.70$, $R^2_{adj}=.68$, as there was no significant difference in either model fit. Following the principal of parsimony, the resultant model was the best model of Fixed Mindset Beliefs (Table 5). In this model, Control Feedback, Comforting Feedback,

Autocratic Behaviour, Motivation Efficacy, and Technique Efficacy significantly predicted Fixed Mindset Beliefs. Game Strategy Efficacy was marginally significant but was retained because removal decreased model fit.

Due to violations of assumptions (particularly, issues with linearity), the backwards regression model served the purpose of creating a statistically sound model. To account for these violations, a forced entry regression (predictor variables: Control Feedback, Comforting Feedback, Autocratic Behaviour, Motivation Efficacy, Technique Efficacy, Game Strategy Efficacy) was performed with bootstrapping. The overall model was a significant predictor of Fixed Mindset Beliefs, $F(6,106)=41.09$, $p < .001$, $R^2=.70$, $R^2_{adj}=.68$. In the model, Control Feedback, Comforting Feedback, Autocratic Behaviour, Motivation Efficacy, and Technique Efficacy significantly predicted Fixed Mindset Beliefs. Individual coefficients of the model are presented in Table 5. There was a significant negative relationship between Control Feedback and Fixed Mindset Beliefs (b=-.279, 95% Bootstrap CI[-.475,-.083], p=.006), while there was a significant positive relationship between Comforting Feedback and Fixed Mindset Beliefs (b=.469, 95% Bootstrap CI[.328,.611], p<.001). Furthermore, there was a significant positive relationship between Autocratic Behaviour and Fixed Mindset Beliefs (b=.346, 95% Bootstrap CI[.202,.490], p<.001). Finally, there was a significant positive relationship between Motivation Efficacy and Fixed Mindset Beliefs (b=.168, 95% Bootstrap CI[.038,.299], p=.012), as well as a significant negative relationship between Technique Efficacy and Fixed Mindset Beliefs (b=-.192, 95% Bootstrap CI[-.353,-.031], p=.020).

Table 5. Bootstrapped regression model of sport coaches' fixed mindset beliefs.

Predictor	*b*	*SE*	*p*	95% Bootstrap CI
Control Feedback	-.279*	.099	.006	[-.475, -.083]
Comforting Feedback	.469**	.072	<.001	[.328, .611]
Autocratic Behaviour	.346**	.073	<.001	[.202, .490]
Motivation Efficacy	.168*	.066	.012	[.038, .299]
Game Strategy Efficacy	.154	.083	.067	[-.011, .319]
Technique Efficacy	-.192*	.081	.020	[-.353, -.031]
Constant	.610	.582	.297	

*p<0.05, **p<0.001

Growth Mindset Beliefs

Similar to the fixed mindset model, the error terms were found to be independent of each other, based on the Durbin-Watson statistic (d = 1.651). A scatterplot of standardized residuals against standardized predicted values showed that there was a violation of homoscedasticity, and that the data was heteroscedastic and non-linear (Appendix G). The assumption of normality of errors was performed by inspecting a histogram, which demonstrated that the errors did not follow a normal distribution (Appendix G). Collinearity statistics were within acceptable ranges. All variables had a VIF well below 10 (highest VIF = 1.28) and a tolerance greater than 0.2 (smallest tolerance = .78).

The first model of the backwards regression (predictor variables: Control Feedback, Comforting Feedback, Technique Efficacy, Motivation Efficacy, Character Building Efficacy, Game Strategy Efficacy, Training and Instruction, Autocratic Behaviour, Democratic Behaviour, Positive Feedback, and Coaching Engagement) significantly predicted Growth Mindset Beliefs among coaches, $F(12,99)=4.18$, $p < .001$, $R^2=.34$, $R^2_{adj}=.26$. Democratic Behaviour was removed in the second model because there

was no significant difference in model fit with this predictor removed, $F(11,100)=4.61$, $p < .001$, $R^2=.34$, $R^2_{adj}=.26$. In the following order, each variable was removed without significant difference in fit: Game Strategy Efficacy, $F(10,101)=5.12$, $p < .001$, $R^2=.34$, $R^2_{adj}=.27$; Motivation Efficacy, $F(9,102)=5.73$, $p < .001$, $R^2=.34$, $R^2_{adj}=.28$; Social Support, $F(8,103)=6.37$, $p < .001$, $R^2=.33$, $R^2_{adj}=.28$; Character Building Efficacy, $F(7,104)=7.20$, $p < .001$, $R^2=.33$, $R^2_{adj}=.28$; Coaching Engagement, $F(6,105)=8.27$, $p < .001$, $R^2=.32$, $R^2_{adj}=.28$; Technique Efficacy, $F(5,106)=9.82$, $p < .001$, $R^2=.32$, $R^2_{adj}=.28$; Comforting Feedback, $F(4,107)=11.99$, $p < .001$, $R^2=.31$, $R^2_{adj}=.28$; Autocratic Behaviour, $F(3,108)=15.18$, $p < .001$, $R^2=.30$, $R^2_{adj}=.28$. In this final model, Control Feedback, Training and Instruction, and Positive Feedback significantly predicted Growth Mindset Beliefs.

Once again, the assumption violations resulted in the backwards regression model serving to create a statistically sound model. A forced entry regression (predictor variables: Control Feedback, Training and Instruction, and Positive Feedback) was performed with 95% bootstrapped BCa confidence intervals. The overall model was a significant predictor of Growth Mindset Beliefs, $F(3,109)=15.38$, $p < .001$, $R^2=.30$, $R^2_{adj}=.28$. In the model, Control Feedback, Training and Instruction, and Positive Feedback significantly predicted Fixed Mindset Beliefs. Individual coefficients of the model are presented in Table 6. There was a positive significant relationship between Control Feedback and Growth Mindset Beliefs ($b=.261$, 95% Bootstrap CI[.084,.437], $p=.004$). There was also a positive significant relationship between Positive Feedback and Growth Mindset Beliefs ($b=.300$, 95% Bootstrap CI[.091,.510], $p=.005$), as well as a

positive significant relationship between Training and Instruction and Growth Mindset Beliefs (*b*=.234, 95% Bootstrap CI[.033,.434], *p*=.023).

Table 6. Bootstrapped regression model of sport coaches' growth mindset beliefs.

Predictor	*b*	*SE*	*p*	95% Bootstrap CI
Control Feedback	.261*	.089	.004	[.084, .437]
Training and Instruction	.234*	.101	.023	[.033, .434]
Positive Feedback	.300*	.106	.005	[.091, .510]
Constant	.636	.584	.248	

*$p<0.05$

Mindset Differences

Kendall's tau correlations for continuous variables are presented in Table 7 and 8. There were no significant correlations between fixed mindset beliefs and a) age, b) years coached, c) athlete/team success. Furthermore, there were no significant correlations between growth mindset beliefs and a) age, b) years coached, c) athlete/team success. There was a moderate correlation between coaches' age and the number of years they had coached.

Table 7. Correlations between sport coaches' fixed mindset beliefs and sport-specific variables.

	Fixed Mindset	Age	Years Coached	Athlete/Team Success
Fixed Mindset	-			
Age	-.101	-		
Years Coached	-.129	.546**	-	
Athlete/Team Success	.067	-.018	.102	-

**$p<0.001$

Table 8. Correlations between sport coaches' growth mindset beliefs and sport-specific variables.

	Growth Mindset	Age	Years Coached	Athlete/Team Success
Growth Mindset	-			
Age	-.086	-		
Years Coached	-.103	.546**	-	
Athlete/Team Success	.123	-.018	.102	-

**$p<0.001$

The assumptions for a one-way ANOVA were assessed. Importantly, the data for both growth and fixed mindset beliefs were not normally distributed within each group and therefore, non-parametric testing was used. The Kruskal-Wallis test found that coaches' Gender ($H(2)=2.39$, $p=.302$), Type of Sport ($H(2)=.639$, $p=.727$), Highest Level Coached ($H(3)=1.34$, $p=.721$), Highest Level of Education ($H(4)=2.00$, $p=.737$), as well as coaching Para-Sport ($H(1)=.007$, $p=.933$), Special Olympics ($H(1)=.916$, $p=.338$), Youth Sport ($H(1)=3.71$, $p=.054$), Masters Athletes ($H(1)=1.05$, $p=.305$), Men's Competitions ($H(1)=.209$, $p=.647$), Women's Competitions ($H(1)=1.53$, $p=.216$), and Mixed/Co-Ed Competitions ($H(1)=.125$, $p=.724$) were not significantly associated with Growth Mindset Beliefs. The Benjamini-Hochberg procedure confirmed these findings (Table 9).

The Kruskal-Wallis test also found that coaches' Gender ($H(2)=2.32$, $p=.313$), Type of Sport ($H(2)=4.52$, $p=.105$), Highest Level Coached ($H(3)=3.86$, $p=.277$), Highest Level of Education ($H(4)=4.08$, $p=.395$), as well as coaching Para-Sport ($H(1)=2.51$, $p=.113$), Special Olympics ($H(1)=2.68$, $p=.102$), Masters Athletes ($H(1)=1.93$, $p=.164$), Men's Competitions ($H(1)=.172$, $p=.678$), and Women's Competitions ($H(1)=1.84$,

p=.175) were not significantly influenced by Fixed Mindset Beliefs. However, coaching Youth Sport ($H(1)=7.32$, $p=.007$) and Mixed/Co-Ed Competitions ($H(1)=4.09$, $p=.043$) were found to significantly influence Fixed Mindset Beliefs. After performing Benjamini-Hochberg corrections, it was determined that the Type of Sport as well as coaching Youth Sport, Mixed Gender Athletes, Special Olympics influenced Fixed Mindset Beliefs (Figure 2; Table 9). Follow-up analysis revealed that those who coached Team sports had higher Fixed Mindset Beliefs than those who coached Individual sports (Test Stat. = 15.13, $p = 0.051$, $p_{Adj} = 0.152$).

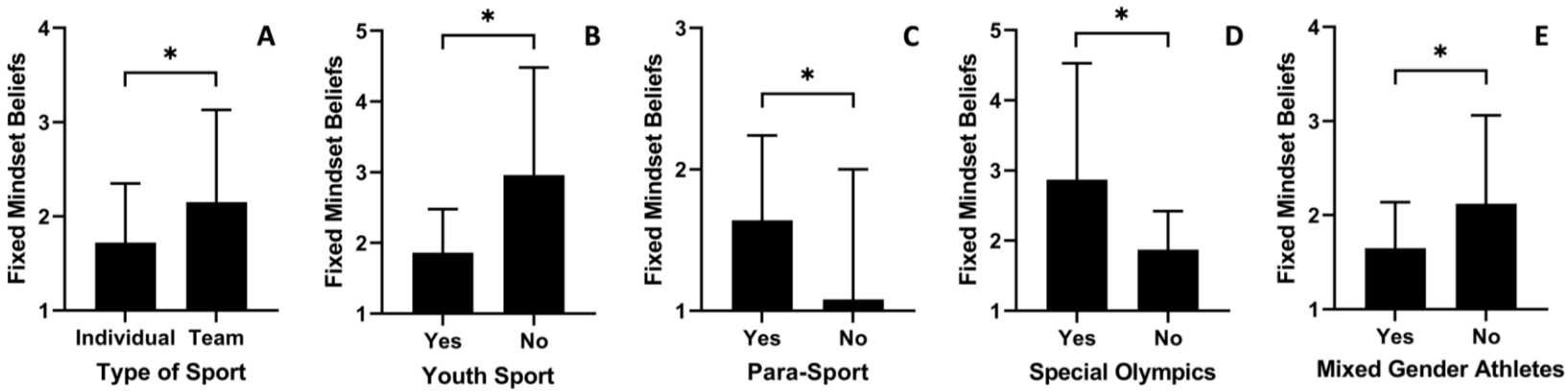

Figure 2. Differences in fixed mindset beliefs for A) Type of Sport B) Youth Sport C) Para-Sport D) Special Olympics E) Mixed Gender Athletes.

Table 9. Growth and fixed mindset beliefs for coach characteristics.

	Growth Mindset Beliefs				Fixed Mindset Beliefs			
Variable	Mean	SD	*p*	BH	Mean	SD	*p*	BH
Gender								
Man	4.30	0.57	0.302	0.068	1.92	0.62	0.313	0.205
Woman	4.35	0.50			2.24	1.18		
Prefer Not to Say	3.94	0.35			1.44	0.51		
Highest Level of Education								
High School	4.21	0.54	0.737	0.227	1.69	0.51	0.395	0.227
Diploma	4.50	0.34			2.39	1.28		
Degree	4.29	0.56			2.19	1.00		
Advanced/ Professional	4.32	0.59			1.91	0.75		
Other/ Not Listed	4.37	0.27			1.80	0.18		
Highest Level Coached								
Recreational	4.14	0.87	0.721	0.159	2.17	0.55	0.277	0.182
Competitive	4.31	0.54			1.95	0.76		
Advanced	4.26	0.56			1.96	0.96		
Elite/ Professional	4.47	0.36			2.39	1.20		
Type of Sport								
Individual	4.29	0.76	0.727	0.205	1.72	0.63	0.105*	0.091
Team	4.30	0.50			2.15	0.98		
Both	4.39	0.45			1.74	0.43		
Gender of Athletes								
Men's	4.29	0.55	0.647	0.136	2.10	1.00	0.678	0.250
Women's	4.35	0.55	0.216	0.045	2.02	1.00	0.175	0.159
Co-Ed/Mixed	4.20	0.69	0.724	0.182	1.65	0.49	0.043*	0.045

	Growth Mindset Beliefs				Fixed Mindset Beliefs			
Variable	Mean	SD	*p*	BH	Mean	SD	*p*	BH
Specific Populations								
Para-Sport	4.27	0.69	0.933	0.250	1.64	0.60	0.113*	0.114
Special Olympics	4.39	0.59	0.338	0.114	2.87	1.66	0.102*	0.068
Youth Sport	4.27	0.55	0.054	0.023	1.87	0.62	0.007*	0.023
Masters Athletes	4.33	0.74	0.305	0.091	2.02	1.24	0.164	0.136

*$p<0.05$; BH = Benjamini-Hochberg Correction

CHAPTER 5: DISCUSSION

This research presented an in-depth analysis of the implicit theories of athletic ability in sport coaches. Overall, sport coaches had high growth mindset beliefs and low fixed mindset beliefs, indicating that they believe their athletes' athletic ability can develop through practice and learning. The study sought to determine whether the mindset beliefs of sport coaches were related to their feedback style, leadership behaviours, coaching efficacy, and coaching engagement. It was hypothesized that sport coaches with higher growth mindset beliefs would use more control feedback, less comforting feedback, more positive (and less negative) leadership behaviours and have higher coaching efficacy and coaching engagement. Alternatively, coaches with higher fixed mindset beliefs were hypothesized to use less control feedback, more comforting feedback, more negative (and less positive) leadership behaviours, and have lower coaching efficacy and coaching engagement. The findings from this study will be discussed in turn.

In line with the hypotheses, sport coaches with higher growth mindset beliefs indicated that they used more control feedback in their coaching. The reverse was true for sport coaches with fixed mindset beliefs, where they indicated that they used less control feedback and additionally, more comforting feedback. These findings support previous research with teachers in education (Rattan et al., 2012) and coaches in sport (Shapcott & Carr, 2020). The use of control feedback (i.e., caring statements that convey high expectations and effort) by coaches may motivate athletes and have them expect better performances (Rattan et al., 2012). On the other hand, the use of comforting feedback (i.e., consoling athletes regarding their low ability) by coaches may cause their athletes to

be less motivated and anticipate poorer performances (Rattan et al., 2012). The results of this study indicate that the mindset beliefs of a sport coach influences whether they provide feedback that is supportive of a growth mindset.

Mindset beliefs were also related to sport-specific leadership behaviours, as described in the Multidimensional Model of Leadership in Sport (Chelladurai & Saleh, 1980). The present research found that coaches with higher growth mindset beliefs used more positive feedback in their coaching. The use of positive feedback by coaches has been shown to maintain the motivational level of athletes by expressing appreciation for athletes' performance and contribution (Chelladurai & Saleh, 1980). By holding high growth mindset beliefs, sport coaches may maintain athletes' motivation to improve by using positive feedback. Furthermore, coaches with higher growth mindset beliefs used more training and instruction behaviours in their coaching. Fundamentally, training and instruction behaviours are one of the most important functions of a coach, as it directly helps improve the performance of their athletes (Chelladurai & Saleh, 1980). Therefore, coaches who have higher growth mindset beliefs may be more inclined to improve their athletes' abilities; thus, using more of these behaviours to help athletes reach their maximum potential. Finally, coaches with higher fixed mindset beliefs used more autocratic behaviour. Autocratic behaviour in sport coaching emphasizes the authority of the coach, such that it is expected that athletes demand strict compliance with their decisions (Chelladurai & Saleh, 1980). This type of behaviour reduces athlete autonomy, thus, impacting their perceived competence and motivations (Amorose & Anderson-Butcher, 2007). As a result, this type of coaching behaviour does not align with more desirable coaching styles, such as athlete-centered coaching (Kidman, 2010). It was also

determined that social support and democratic behaviour were not associated with either growth or fixed mindset beliefs. Overall, these findings partially support the hypotheses, as coaches with higher growth mindset beliefs used more 'positive' leadership behaviours (e.g., positive feedback, training and instruction), while coaches with higher fixed mindset beliefs used more 'negative' leadership behaviours (e.g., autocratic behaviour).

The findings also demonstrated associations between fixed, but not growth, mindset beliefs and dimensions of coaching efficacy. In education, both fixed and growth mindset beliefs were associated with self-efficacy, as those with higher growth mindset beliefs had higher self-efficacy and those with higher fixed mindset beliefs had lower self-efficacy (Zarrinabadi et al., 2023). Specific to teaching, growth mindset beliefs were also related to the concept of teacher efficacy, where teachers with higher growth mindset beliefs had more teacher efficacy (Lin et al., 2022). Therefore, the hypotheses were partially supported as only fixed mindset beliefs were related to certain dimensions of coaching efficacy.

It was found that coaches with higher fixed mindset beliefs had less technique efficacy, indicating that they had less belief in their ability to instruct and teach their athletes the skills of their sport (Feltz et al., 1999). This finding supports Dweck's (1999) theoretical framework, as coaches with higher fixed mindset beliefs have less confidence in teaching the skills of their sport to help improve athlete performance; thus, they may believe that no matter the skills they teach, not all athletes can improve their athletic ability. Furthermore, coaches with higher fixed mindset beliefs had higher motivation efficacy. In other words, coaches with higher fixed mindset beliefs had more confidence in their ability to affect the psychological skills and states of their athletes (Feltz et al.,

1999). It is possible that coaches with higher fixed mindset beliefs felt extra confident in their ability to motivate their athletes to perform because they had less belief in their ability in other coaching tasks (e.g., instructing the skills of their sport). While not statistically significant, coaches with higher fixed mindset beliefs also had more game strategy efficacy, or belief in their ability to coach during competition and lead their team to a successful performance (Feltz et al., 1999). It is possible that coaches with higher fixed mindset beliefs may prioritize winning more and therefore, have greater belief in their ability to manage their athletes during games to produce a winning outcome (Dweck, 2009). The elevated motivation and game strategy efficacy seen in coaches with higher fixed mindset beliefs may not be an accurate representation of their true ability, as those with low competence tend to significantly overestimate their abilities (Sullivan et al., 2019). Fixed mindset coaches may have low competence in their coaching ability (i.e., ability to influence the performance of their athletes), and therefore, feel the need to believe that they can impact their athletes in some way. Finally, character building efficacy was not associated with fixed mindset beliefs. The results of this study indicate that the coaching efficacy dimensions of motivation efficacy, game strategy efficacy, and technique efficacy are related to only fixed mindset beliefs, which may indicate that mindsets influence efficacy beliefs differently in coaching than education.

Coaching engagement was not associated with either growth or fixed mindset beliefs in sport coaches. In education, mindset beliefs are strongly related to engagement and enjoyment in both students (Aronson et al., 2002) and teachers (Shoshani, 2021). There have been associations found in sport, but only in athletes (Evans et al., 2020; Gardner et al., 2018). It is possible that engagement may only be related to a coach's

belief in their own ability, as demonstrated in education with teachers (Frondozo et al., 2020; Nalipay et al., 2021). Alternatively, growth and fixed mindset beliefs may not predict engagement in sport coaches. However, it is likely that some relationship does exist, but was not found due to the measure of coaching engagement used. The measure used in this study was adapted from the teaching literature (Klassen et al., 2013) and therefore, has not been validated in sport coaches. Although there are similarities between sport coaches and teachers, it is possible that coaching engagement may not be represented by the items used in the adapted scale. For example, teaching involves a high level of demand for social engagement (i.e., energy put into establishing social relationships), which may not be as much of a priority for sport coaches (Klassen et al., 2013). Furthermore, many sport coaches are volunteers (Wiersma & Sherman, 2005), so unlike teachers, they may be less engaged due to a lack of incentive. Future research should seek to better define coaching engagement and validate a scale to determine the extent to which sport coaches are engaged in their role.

The findings presented above are related to the study's primary research question, which determined the relationships between sport coaches' mindsets and their behaviours and efficacy beliefs. The present research also sought to determine, through an exploratory analysis, whether there were differences in growth or fixed mindset beliefs between different coach characteristics. These coach characteristics included their age, coaching experience, perceived team/athlete success, gender, highest level coached, highest level of education, type of sport (i.e., individual, team, or both), the gender of their athletes, and whether they coached any specific populations.

It was found that there were no differences in growth mindset beliefs between any characteristics of sport coaches; however, differences were observed with regard to sport coaches' fixed mindset beliefs. First, coaches that coached team sports had higher fixed mindset beliefs than those who coached individual sports. It is possible that team sport coaches are exposed to an environment that clusters a wider variety of learning abilities and developmental stages; thus, they believe that not everyone can grow and develop since they may only see some athletes improve. Second, those who coached youth sport had lower fixed mindset beliefs than those who did not. This finding was expected, as youth sport occurs concurrently with important physical, social, and emotional development periods for youth (Fraser-Thomas et al., 2005); therefore, it would be expected that coaches believe their athletes can develop. Third, coaches who had coached athletes who competed in mixed gendered competitions had lower fixed mindset beliefs than those who did not. Other research in sport has found differences in coaches' mindsets regarding male and female golfers, where coaches believed that male golfers' ability was more malleable than female golfers' ability (Shapcott & Carr, 2020). Those who coach in mixed-gendered competitions may disregard gender, since all athletes compete together. As a result, these coaches may not categorize their athletes' ability to develop based on their gender. Finally, coaches who coached Special Olympics or Para-Sport had higher fixed mindset beliefs than those who did not. This finding is particularly concerning, as coaches who work with these populations may believe that certain disabilities or impairments interfere with their athletes' ability to grow and develop in their sport. These findings indicate that there may be differences in sport coaches fixed mindset beliefs depending on different characteristics. Based on the findings of the

primary research question, the results may also indicate that these specific fixed mindset populations (i.e., those who coach team sport, Special Olympics, Para-Sport) may use feedback styles that are less supportive of growth and learning, use an autocratic leadership style, and have higher levels of motivation and game strategy efficacy, as well as lower levels of technique efficacy. The findings presented in this exploratory analysis should be taken with discretion, as the sample sizes for some characteristics of sport coaches (e.g., Special Olympics, Para-Sport) may not have been large enough to achieve appropriate statistical power.

Limitations

While this study is an important first step in investigating sport coaches' mindset beliefs regarding their athletes' athletic ability, it is not without its limitations. Namely, the CNAAQ-2 (the measure of mindset of athletic ability) may present several pressing issues that have yet to be identified by previous literature. Most importantly, the scale is typically scored based on the second-order factors of growth and fixed mindset beliefs, which indicates that they are regarded as separate entities. However, Dweck's (1999) implicit theories indicate that mindsets are on a continuum from fixed to growth, such that an individual can be at different parts of the continuum (Yeager & Dweck, 2020). Fundamentally, the way in which the CNAAQ-2 is currently scored (i.e., as two dichotomous beliefs) does not align with the theoretical framework. While most studies to this date have scored the CNAAQ-2 based on its first- and second-order factors (Biddle et al., 2003; Spray, 2017; Wang et al., 2005), there is poor theoretical basis for this strategy. A third-order factor that provides a single score of an individual's mindset of athletic ability should be researched to better align with the theoretical framework.

Alternatively, the scale could be shortened to only include growth mindset items, where a lower score would indicate higher fixed mindset beliefs and a higher score would indicate higher growth mindset beliefs.

Another interesting issue with the CNAAQ-2 is that the first-order factor of giftedness on the fixed mindset subscale may also not align with Dweck's (1999) theory. Based on the theoretical framework, fixed mindset beliefs refer to the stability of attributes (or the inability to change attributes). Therefore, it has been argued that the giftedness scale of the CNAAQ-2 is invalid as the theoretical framework indicates that individuals can be gifted or naturally talented in their attributes (Warburton & Spray, 2017). To account for this discrepancy, the giftedness subscale was removed from all analyses in this research. Other studies in coaching have also only included the stability subscale of the fixed mindset factor (Evans et al., 2020). However, this method has not been validated in the literature. Furthermore, the CNAAQ-2 has yet to be validated in a sport coaching population.

Other issues may arise with scales that were used in this study. For example, the scales for feedback style and coaching engagement were adapted from the education literature and therefore, have yet to be validated in a sporting or coaching context. Other studies have used these adapted scales (Shapcott & Carr, 2020), but no complete validation studies have been conducted to this date. That said, sufficient internal reliability was achieved for all scales used in this study, indicating that they appropriately measured the desired constructs. Future research should seek to validate these scales in sporting populations, including both athletes and coaches.

Other limitations include that the study sample may have been selective in nature, as coaches with higher growth mindset beliefs may have been more inclined to participate in this voluntary study. This was evident with the narrow responses to mindset beliefs, where most coaches identified as having high growth mindset beliefs and low fixed mindset beliefs; thus, limiting the variability in coach responses. It is possible that most sport coaches have high growth mindset beliefs; however, it is more likely that coaches with high fixed mindset beliefs are unlikely to participate in research regarding the changeability of attributes. Future research should attempt to work with community organizations to obtain a more random sample of coaches so sport coaches with strong fixed mindset beliefs can be studied. Finally, the measures that were recorded, particularly regarding coaching behaviours, were subjective to the coach and therefore, relied on retrospective recall of their behaviours. Importantly, this would include evaluations of behaviours by coaches who are 'out of season', which may result in poor recall of typical coaching behaviours. Objective evaluations of these measures may provide more exact estimates of coaches' behaviours.

Future Directions

Future research should seek to measure the relationships between sport coaches' mindsets and athlete outcomes. The present research indicates that there are relationships between a coach's mindset and their behaviours. Therefore, similar to teachers, coaches' mindsets may influence their athletes. Based on literature from education, it is possible that coaches who communicate growth mindset beliefs in their coaching may improve the psychological experiences, motivation, and anticipated performance of their athletes (LaCosse et al., 2020). Research in sport coaching has shown that coaches with higher

growth mindset beliefs had athletes who reported more intention to return to sport (Evans et al., 2020). Other athlete outcomes, including overall well-being, psychological experiences, motivations, and performance should be assessed in relation to their coach's mindset. In line with the *Mindset + Supportive Context Hypothesis,* it is also possible that coaches may influence the mindsets of their athletes. Further research is needed to determine if this hypothesis holds in sport coaches, as other studies have found that athlete mindsets hold a protective effect over the mindset beliefs of their coach (Evans et al., 2020).

Growth mindset interventions should also be developed for sport coaches. Mindset beliefs have been found to be malleable in other domains, such as education, where individuals with fixed mindset beliefs shift their mindset to hold growth mindset beliefs (Aronson et al., 2002; Miller, 2019; Yeager et al., 2019). To date, however, growth mindset interventions have not been successful in teachers (Foliano et al., 2019; Rienzo et al., 2015). It is likely that these interventions have been unsuccessful due to the difficulties in changing teacher behaviour through professional development (TNTP, 2015). There are also other complications related to teachers' mindsets themselves, as it is unclear: a) whether interventions should address mindsets about themselves or their students, and b) which behaviours lead to supporting students' mindsets (Yeager & Dweck, 2020). Therefore, more research is needed to determine how to maximize the effectiveness of growth mindset interventions in teachers. The same questions exist for developing effective interventions in sport coaches. However, unlike teachers, coach education programs have been shown to be extremely effective at developing coach behaviours (Feltz et al., 2008), which may lend itself to creating growth mindset

interventions that can shift coaches' mindsets. The development of effective growth mindset interventions that are sport and coach-specific would give sport organizations another tool to develop their coaches.

Contribution to Literature & Practical Implications

This study is the first to provide an overview of the implicit theories of athletic ability across a diverse sample of sport coaches. Furthermore, this study is also one of the first to provide empirical evidence regarding the relationship between sport coaches' mindsets and their behaviours and efficacy beliefs. The study also raises several theoretical questions regarding the use of the CNAAQ-2 as a measure of an individual's mindset of athletic ability.

The importance of a coach's mindset beliefs was demonstrated in this study, as certain coaching behaviours were shown to be related to their mindset. Sport coaches should use the information presented in this study to further their own coaching practice. Importantly, coaches should seek to increase their growth mindset beliefs and reduce their fixed mindset beliefs, to better support their athletes' development. Dweck (2006) has outlined individual strategies for coaches to become more growth mindset oriented. First, Dweck (2006, p. 210) suggests that coaches always ask for full effort and preparation from their players. The focus of both practices and competitions should be placed on effort and getting better, rather than being mistake-free or winning. Second, coaches should give equal time and attention to all players, no matter their skill level (Dweck, 2006, p. 210). Finally, coaches should help athletes fulfill their potential, both inside and outside of sport. This can be accomplished by expressing concern, compassion, and consideration for athletes, and highlighting the importance of life

lessons in sport (Dweck, 2006, p. 211). By prioritizing the strategies above, coaches can begin creating an environment that prioritizes a growth mindset.

Sport organizations and education programs may also be able to use information from this research to further develop their coaches. Coach education programs have been identified as an effective way to improve coaching effectiveness and efficacy (Feltz et al., 2008). Educating coaches on the mindset theory may, therefore, further develop growth mindsets in coaches and across organizations. The theory could be taught at a higher level, through sport organizations (i.e., the Coaching Association of Canada and NCCP), or at a lower level, through individual sport clubs (i.e., information taught by technical directors, etc.). This research also helps identify coaches that may be more likely to have higher fixed mindset beliefs, including those who coach team sport, Special Olympics, and Para-Sport. This information can help sport organizations target specific populations with information regarding growth mindset, with the goal of shaping their beliefs to be more growth mindset oriented.

CHAPTER 6: CONCLUSION

Coaches are leaders in the sport community and have an important influence on an athlete's sporting career. Therefore, it is crucial that these individuals hold appropriate beliefs. The present research identified the specific behaviours and efficacy beliefs that are related to a coach's beliefs about the nature of their athletes' athletic ability. More specifically, coaches who held higher growth mindset beliefs used more control feedback and more positive leadership behaviours (i.e., training and instruction, positive feedback). Furthermore, coaches with higher fixed mindset beliefs used more comforting feedback, less control feedback, more negative leadership behaviours (i.e., autocratic behaviour), and had lower technique efficacy and higher motivation efficacy. Therefore, coaches' mindset regarding their athletes' athletic ability influences certain coaching behaviours and beliefs, which may impact their athlete's outcomes and mindsets. The study also identified characteristics of coaches (team sport, Special Olympic and Para-Sport coaches) that may be more likely to hold fixed mindset beliefs. This work is the first to associate coaches' mindsets and their behaviours, providing further evidence for the importance of a growth mindset in sport coaches. The results of this research indicate that growth mindset beliefs are more desirable than fixed mindset beliefs for coaches, as it has been shown that they are related to specific behaviours that better support athlete development.

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APPENDIX A

Demographic and Coaching Information

Section 1: Demographics

1. Age: _____years

2. Gender (select one)
   - Gender-Fluid
   - Man
   - Non-Binary
   - Trans Man
   - Trans Woman
   - Two-Spirit
   - Woman
   - I don't identify with any option provided
   - I prefer not to answer
   - I identify as _____

Section 2: Coach-Related Questions

3. What sport(s) do you coach? Please list all that you have coached in the past year. (open ended)

4. Level of Competition (select the highest level you have coached)
   - Elite/Professional
   - Advanced
   - Competitive
   - Recreational

5. Do you coach any of the following groups of athletes? (select all that apply)
   - Para-sport
   - Special Olympics
   - Youth sport (athletes 18 years of age or younger)
   - Masters athletes (athletes 35 years of age or older)
   - None of the above

6. Do you coach athletes who: (select all that apply)
   - Compete in men's competitions (e.g., boys' hockey, men's football)
   - Compete in women's competitions (e.g., girls' soccer, women's volleyball)
   - Compete in non-gendered/mixed competitions (e.g., equestrian, mixed curling)

7. How long have you been coaching?
   _____ years

8. Please rate how well your athlete(s)/team has performed to your expectations? (Scale 1-10)

9. What is your highest level of formal education:

High School
Diploma (open end for type)
Degree (open end for type)
Advanced/professional degree (open end for type)
Other/not listed (open end)

8. Indicate any additional education or coaching certifications (open ended)

APPENDIX B

Mindset Scale

Conceptions of the Nature of Athletic Ability Questionnaire-2 (Biddle, 2003)

My beliefs about my athlete's ability in sport:

1. Athletes have a certain level of ability in sport and they cannot really do much to change that level.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

2. To be successful in sport athletes need to learn techniques and skills, and practise them regularly.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

3. Even if athletes try, the level they reach in sport will change very little.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

4. Athletes need to have certain 'gifts' to be good at sport.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

5. Athletes need to learn and to work hard to be good at sport.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

6. In sport, if you work hard at it, athletes will always get better.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

7. To be good at sport, athletes need to be born with the basic qualities which allow them succeed.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

8. To reach a high level of performance in sport, athletes must go through periods of learning and training.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

9. How good athletes are at sport will always improve if they work at it.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

10. It is difficult to change how good athletes are at sport.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

11. To be good at sport athletes need to be naturally gifted.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

12. If athletes put enough effort into it, they will always get better at sport.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

APPENDIX C

Feedback Style Scale

Coaches' Feedback Scale (Shapcott & Carr, 2020)

How much do you agree that this is the type of feedback you would give an athlete.

1. Inform them that they can improve their athletic ability with the right plan. (Control)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

2. Reassure them that if they want to improve their athletic ability, they can. (Control)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

3. Tell them that their strengths as an athlete will be limited to a couple of skills (i.e., they won't be skilled in all aspects of their sport). (Comforting)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

4. Discreetly suggest to her that some people are born athletes and others just aren't. (Comforting)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

5. Suggest that they stick to their current level of competition (i.e., not aim for the next level). (Comforting)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

6. Point out that it's OK – all athletes struggle with their performance at times. (Control)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

7. Tell them that to improve their ability, they need to practice harder. (Control)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

8. Remind them how much they have improved their game since starting the sport. (Control)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

9. Remind them that they are probably good at things other than their sport. (Comforting)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

10. Tell them not to worry, not everyone can be good at sports. (Comforting)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

11. Reassure them that there is nothing that they can't fix in their game. (Control)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

12. Advise them that it will be hard to change their technique. (Comforting)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

13. Gradually start reducing their expectations for their performance. (Comforting)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

14. Educate them so they can practice more strategically. (Control)

Strongly Disagree					*Strongly Agree*
1	2	3	4	5	6

APPENDIX D

Sport Leadership Scale

Revised Leadership Scale for Sport – Coach Perspective (Chiu et al., 2016)

Item contents (I ...)

Training and instruction

1. See to it that every athlete is working to their capacity.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

2. Explain to each athlete the techniques and tactics of the sport.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

3. Pay special attention to correcting athletes' mistakes.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

4. See to it that efforts are coordinated.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

5. Specify in detail what is expected of each athlete.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

Democratic behavior

6. Ask for the opinions of athletes on strategies for specific competitions.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

7. Let my athletes share in decision making.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

8. Encourage athletes to make suggestions on conducting practices.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

9. Let the group set its own goal.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

10. Let the athletes try their own way, even if they make mistakes.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

Autocratic behavior

11. Work relatively independent of the athletes

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

12. Do not explain my actions.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

13. Refuse to compromise on a point.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

14. Keep to myself.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

15. Speak in a manner not to be questioned.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

Social support

16. Help the athletes with their personal problems.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

17. Help members of the group settle their conflicts.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

18. Look out for the personal welfare of the athletes.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

19. Encourage athletes to confide in me.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

20. Encourage close and informal relationships with athletes.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

Positive feedback

21. Compliment an athlete for their performance in front of others.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

22. Tell an athlete when they do a particularly good job.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

23. See that an athlete is rewarded for a good performance.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

24. Express appreciation when an athlete performs well.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

25. Give credit when credit is due.

Strongly Disagree				*Strongly Agree*
1	2	3	4	5

APPENDIX E

Coaching Efficacy Scale (Feltz et al., 1999)

Please rate how confident you are in your ability to do the following.

1. Maintain confidence in your team/athlete.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

2. Recognize opposing team's/athlete's strengths during competition.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

3. Mentally prepare your team/athlete for game strategies.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

4. Understand competitive strategies.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

5. Instil an attitude of good moral character.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

6. Build the self-esteem of your team/athlete.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

7. Demonstrate the skills of your sport.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

8. Adapt to different game situations.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

9. Recognize opposing team's/athlete's weaknesses during competition.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

10. Motivate your team/athlete.

Not at all Confident *Very Confident*

1 2 3 4 5 6 7 8 9

11. Make critical decisions during competition.

Not at all Confident *Very Confident*

1 2 3 4 5 6 7 8 9

12. Build a team cohesion.

Not at all Confident *Very Confident*

1 2 3 4 5 6 7 8 9

13. Instil an attitude of fair play amongst your team.

Not at all Confident *Very Confident*

1 2 3 4 5 6 7 8 9

14. Coach athletes individually on their technique.

Not at all Confident *Very Confident*

1 2 3 4 5 6 7 8 9

15. Build self-confidence in your team/athlete.

Not at all Confident *Very Confident*

1 2 3 4 5 6 7 8 9

16. Develop athletes' abilities.

Not at all Confident *Very Confident*

1 2 3 4 5 6 7 8 9

17. Maximize your team's/athlete's strengths during competition.

Not at all Confident *Very Confident*

1 2 3 4 5 6 7 8 9

18. Recognize talent in your team/athlete.

Not at all Confident *Very Confident*

1 2 3 4 5 6 7 8 9

19. Promote good sportsmanship.

Not at all Confident *Very Confident*

1 2 3 4 5 6 7 8 9

20. Being able to detect skill errors.

Not at all Confident *Very Confident*

1 2 3 4 5 6 7 8 9

21. Adjust your game strategy to fit your team's/athlete's talent.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

22. Teach the skills of your sport.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

23. Build your team's/athlete's confidence.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

24. Instill an attitude of respect for others.

Not at all Confident								*Very Confident*
1	2	3	4	5	6	7	8	9

APPENDIX F

Coaching Engagement Scale

Modified Engaged Teachers Scale (Klassen et al., 2013)

1. I connect well with my other coaches.

Never						*Always*
1	2	3	4	5	6	7

2. I am excited about coaching.

Never						*Always*
1	2	3	4	5	6	7

3. In practices/competitions, I show warmth to my athletes.

Never						*Always*
1	2	3	4	5	6	7

4. I try my hardest to perform well while coaching.

Never						*Always*
1	2	3	4	5	6	7

5. I feel happy while coaching.

Never						*Always*
1	2	3	4	5	6	7

6. In practices/competitions, I am aware of my athletes' feelings.

Never						*Always*
1	2	3	4	5	6	7

7. I am committed to helping my other coaches.

Never						*Always*
1	2	3	4	5	6	7

8. While coaching, I really "throw" myself into my role.

Never						*Always*
1	2	3	4	5	6	7

9. I value the relationships I build with my other coaches.

Never						*Always*
1	2	3	4	5	6	7

10. I love coaching.

Never						*Always*
1	2	3	4	5	6	7

11. While coaching, I pay a lot of attention to my tasks.

Never						*Always*
1	2	3	4	5	6	7

12. I care about the problems of my other coaches.

Never						*Always*
1	2	3	4	5	6	7

13. I find coaching fun.

Never						*Always*
1	2	3	4	5	6	7

14. In practices/competitions, I care about the problems of my athletes.

Never						*Always*
1	2	3	4	5	6	7

15. While coaching, I coach with intensity.

Never						*Always*
1	2	3	4	5	6	7

16. In practices/competitions, I am empathetic towards my athletes.

Never						*Always*
1	2	3	4	5	6	7

APPENDIX G

Table G1. Kolmogorov-Smirnov testing.

		Statistic	df	*p*
Mindset Beliefs	Growth Mindset Beliefs	.126*	113	<.001
	Fixed Mindset Beliefs	.193*	113	<.001
Feedback Style	Control Feedback	.096*	113	.013
	Comforting Feedback	.168*	113	<.001
Leadership	Training and Instruction	.122*	113	<.001
Behaviours	Democratic Behaviour	.140*	113	<.001
	Autocratic Behaviour	.191*	113	<.001
	Social Support	.083	113	.055
	Positive Feedback	.151*	113	<.001
Coaching	Game Strategy Efficacy	.085*	113	.044
Efficacy	Motivation Efficacy	.122*	113	<.001
	Technique Efficacy	.118*	113	<.001
	Character Building Efficacy	.176*	113	<.001
Coaching Engagement		.089*	112	.031

*p<.001

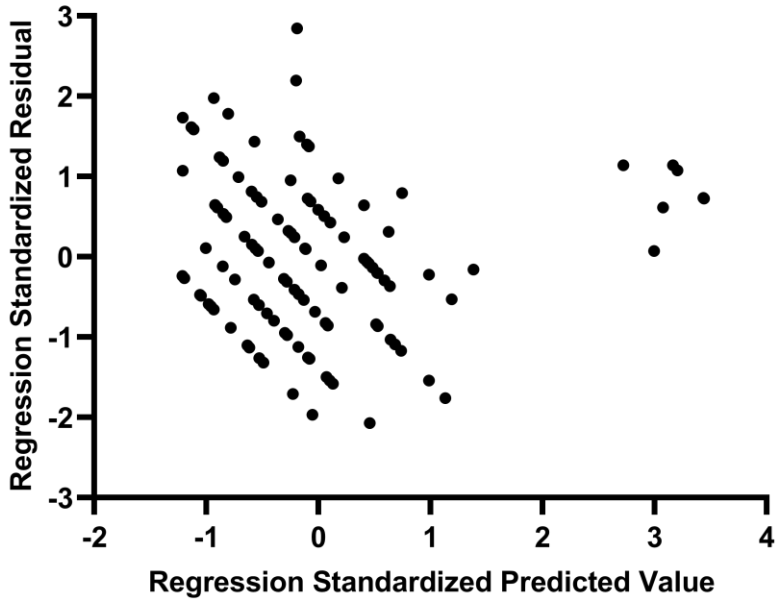

Figure G1. Scatterplot of regression standardized residuals against regression standardized predicted values to check for violations of homoscedasticity for the fixed mindset regression model.

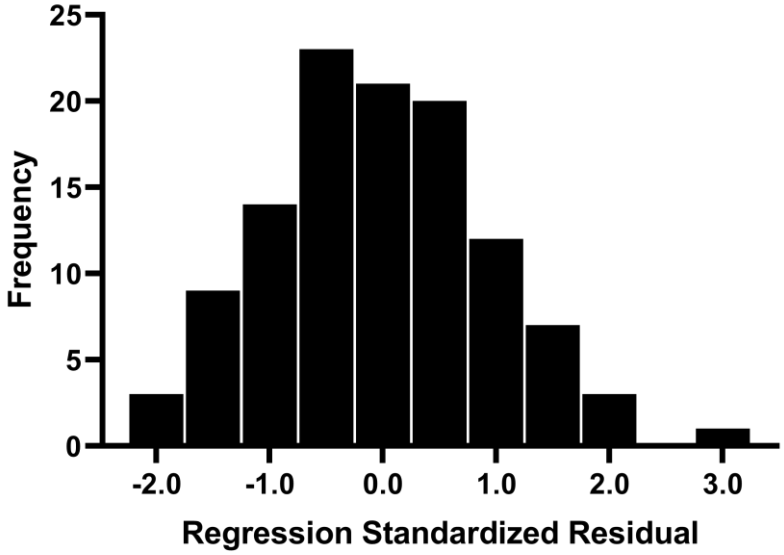

Figure G2. A histogram of regression standardized residuals to check for violations of the normality of errors for the fixed mindset regression model.

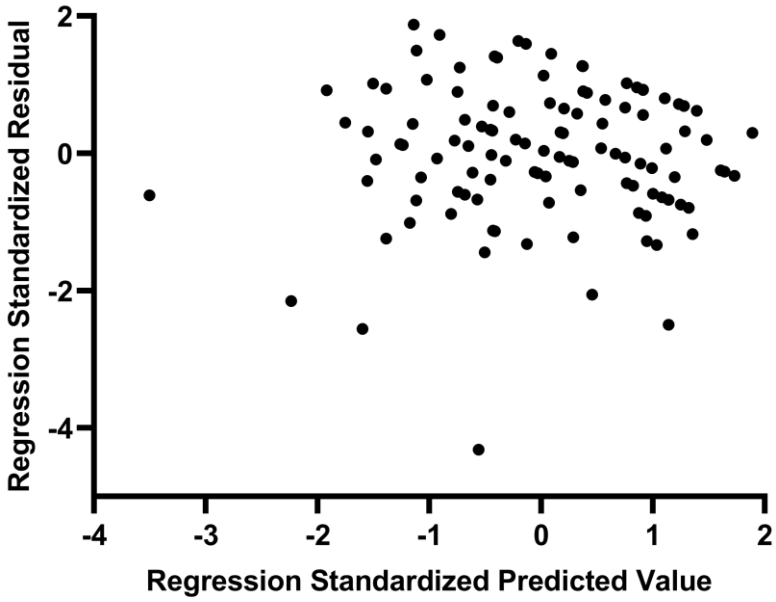

Figure G3. Scatterplot of regression standardized residuals against regression standardized predicted values to check for violations of homoscedasticity for the growth mindset regression model.

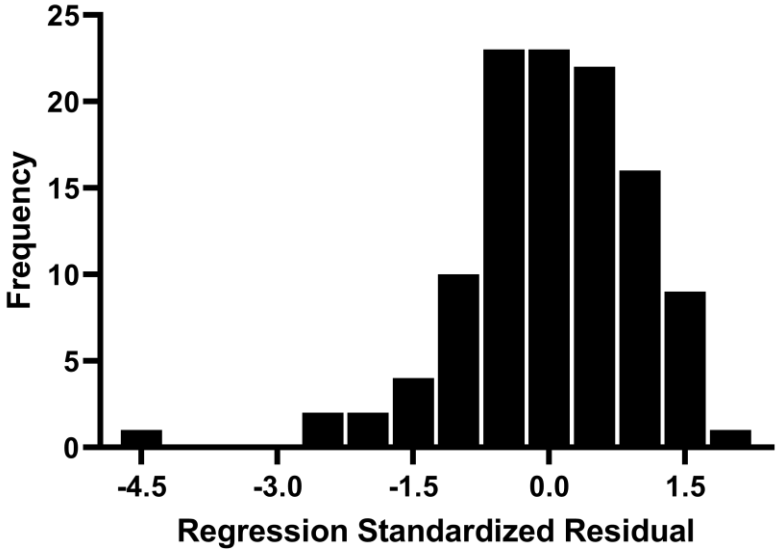

Figure G4. A histogram of regression standardized residuals to check for violations of the normality of errors for the fixed mindset regression model.