Exploring the relationships between year of eligibility, self-perceptions and training behaviour in varsity student-athletes

by

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A thesis submitted to the
School of Graduate and Postdoctoral Studies in partial
fulfillment of the requirements for the degree of

Master of Health Sciences in Kinesiology

Kinesiology/Ontario Tech University/Faculty of Health Sciences

University of Ontario Institute of Technology (Ontario Tech University)

Oshawa, Ontario, Canada

June 2023

THESIS EXAMINATION INFORMATION

Submitted by: **Kassidy Ford**

Master of Health Sciences in **Kinesiology**

Thesis title:
Exploring the relationships between year of eligibility, self-perceptions and training behaviour in varsity student-athletes

An oral defense of this thesis took place on May 11, 2023 in front of the following examining committee:

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Chair of Examining Committee	Dr. Adam Dubrowski
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The above committee determined that the thesis is acceptable in form and content and that a satisfactory knowledge of the field covered by the thesis was demonstrated by the candidate during an oral examination. A signed copy of the Certificate of Approval is available from the School of Graduate and Postdoctoral Studies.

ABSTRACT

Although there is much research on the experiences and academic accomplishments of student-athletes, less work has focused on factors influencing training and performance outcomes among varsity student-athletes. This study aimed to explore the influence of psychological constraints on quality training outcomes and year of eligibility in a sample of varsity student-athletes. The purpose of this research is was to examine the relationships between year of eligibility, self-efficacy, self-regulation, and training behaviour in the varsity student-athlete population. Approximately 40 Ontario University Athletics (OUA) students from Ontario Tech University participated in this study. The Training Self-Efficacy Scale (TSS) was used to evaluate an athlete's practice history and general perceptions about training and practice settings. The Self-Regulated Learning for Sport Practice (SRLSP) was used to assess self-regulatory behaviours during practice/training settings. The largest correlation between the TSS and SRLSP subscales was observed between TSS Skills, Remediation, and Adjustments and TSS Overcoming Obstacles to Motivation (0.70). Moreover, strong significant relationships were observed between Age Started Playing Sport vs. Previous Training Hours Per Week. The very strong positive correlations included: TSS Time/effort & SRLSP reflecting/evaluating (0.76), TSS Skills & SRLSP Reflecting/Evaluation (.07), SRLSP Reflecting and Evaluating (0.72), Time/Efficacy (0.71), and Time/Expectation & Adjustments (.67). These results suggest that a high level of training and performance is associated with a higher level of motivation to complete sport-specific tasks.

Word count: 222 words

Keywords: student-athletes; confidence; motivation; performance; psychological constraints

AUTHOR'S DECLARATION

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Kassidy Ford

STATEMENT OF CONTRIBUTIONS

I hereby certify that I am the sole author of this thesis and that no part of this thesis has been published or submitted for publication. I have used standard referencing practices to acknowledge ideas, research techniques, or other materials that belong to others. Furthermore, I hereby certify that I am the sole source of the creative works and/or inventive knowledge described in this thesis.

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LIST OF ABBREVIATIONS AND SYMBOLS

TSS	Training Self-efficacy Scale
SRLSP	Self-Regulated Learning for Sport Practice
GPA	Grade Point Average
U SPORTS	University Sports

Chapter 1. Introduction

The psychological stressors present in the varsity athlete population are significant (Aquilina, 2009; Miller & Kerr, 2002). Students participating in sports while also enrolled in full-time studies are challenged to manage their time appropriately between coursework and training schedules. Furthermore, the demand of establishing a balance can cause various psychological stressors that may negatively impact an athlete's performance. Moreover, athletes are faced with many psychological barriers, such as motivation, concentration, mental preparation, anxiety management, and self-confidence in both practice and competition settings (Mahoney et al., 1987). These challenges were especially seen in first and second year student-athletes compared to upper years (Mahoney et al., 1987). This may be due to year of eligibility and that those with more years of experience are able to overcome challenges/barriers due to more hours accumulated during practice and competition settings. The year of eligibility is often referred to as the year in which the athlete is competing in his/her varsity sport. In this case, University Sports (U SPORTS) allows up to five years of eligibility for sports. Therefore, athletes are eligible to compete at the U SPORTS level for up to five years. U SPORTS is a single-tiered system of approximately 12,500 athletes from 48 member institutions separated into four regional conferences (Miller and Kerr, 2002).

As a result of having to balance additional responsibilities, student-athletes are predisposed to experiencing psychological and physiological barriers that may hinder performance-related outcomes in sport (Mahoney et al., 1987). In particular, student-athletes are challenged with barriers to motivation, and the need to possess the necessary self-efficacy required to achieve goals associated with positive performance outcomes in sport. Moreover, deliberate practice is a highly structured activity where goals are created to overcome

weaknesses and performance is monitored to provide feedback (Ericsson et al., 1993). It has been linked to large improvements in memory performance, suggesting expertise development is influenced by deliberate practice settings and the amount of practice completed (Baker & Young, 2014). The performer is challenged by the constraints of motivation, effort, and resources (Baker & Young, 2014). Parents and guardians are essential resources for the progression of aspiring athletes, and parental interest is key in aiding the transition from recreational/leisure sport involvement to structured practice (Baker & Young, 2014). Varsity student-athletes need to be more independent and accountable for their actions and involvement in athletic practices/training, and develop the psychological skills needed for deliberate practice to be accentuated.

Self-efficacy is an important psychological construct in sport. According to Feltz and Weiss (1982), self-efficacy is a person's belief that he/she can successfully execute the behaviour required to achieve a specific outcome. Self-efficacy plays a vital role in self-motivation and human agency (Bandura, 1981, 1982). Based on perceptions of self-efficacy individuals select what to do, how much effort to devote for certain activities, and the length of time he/she will spend pursuing the activities (Bandura & Cervone, 1983). Specifically, the ability to demonstrate self-efficacy is especially critical for athletes competing at the varsity/collegiate levels since these athletes are faced with the challenge of achieving both athletic and academic goals simultaneously. Further research by Bandura and Cervone (1983), suggests that whether negative inconsistencies between standards and performances are motivating or discouraging is likely to be influenced by individuals' perceptions of their efficacy to achieve these goals they make for themselves. In addition, those that have a low level of self-efficacy may be easily discouraged by the idea of failure, compared to those that

are able to validate their capabilities to achieve goals and intensify their motivational efforts when faced with obstacles that may impede performance (Bandura & Cervone, 1983). In summary, it is optimal for athletes to display higher levels of self-efficacy to successfully complete goals that align with specific sport outcomes.

Setting goals is an essential aspect in sports. However, in order to set goals, athletes must be able to demonstrate the ability to self-regulate. Self-regulation refers to a person's ability to suppress urges and resist temptations in order to further their long-term best interests (Baumeister et al., 2007; Muraven & Baumeister, 2000). It is made up of several interactions between physiology, affect, cognition, and environmental factors (Kirschenbaum, 1987). Self-regulated learning is a cognitively demanding procedure that includes feedback to maximise participation in goal-oriented practise. According to Tedesqui and Young (2015), understanding self-regulatory skill through a purposeful practise lens requires both inhibitory and active perspectives of self-regulation.

1.2 PURPOSE OF PROJECT

The purpose of this research is to determine the relationship between year of eligibility, self-perceptions and training behaviours in the varsity student-athlete population. Specifically, this research will investigate how self-efficacy, self-regulation skills and year of eligibility interact to influence varsity student-athlete practice behaviour.

Chapter 2. Literature Review

2.1 Student-Athletes

The student-athlete population is unique. In general, a student-athlete can be defined as a group of people that train at a high level, but are also still in education (Aquilina, 2009). This generic definition of "student-athlete" suggests that any student and age group could consider themselves to fall under this category, regardless of what level of sport they participate in. A varsity student-athlete can be considered a person who is a full-time university or high school student that participates in individual or team sport athletics of a federation, club, or sport association (Gomez et al., 2018). Therefore, unlike general definitions, this statement includes certain specifications that must be met to be considered a student-athlete such as age, academic workload, and sport affiliations. Additionally, Camiré (2014) suggests the organized, competitive, and interscholastic environment of high school sport is what separates it from other forms of physical activity fulfilled on school premises (such as physical education and intramural sport). These requirements are what help distinguish between students who participate in sport recreationally during their free time and students that participate in sport competitively in representation of their academic institution (at both the provincial and national levels).

Although both high school and collegiate student-athletes participate in sport to represent their academic institution, there are many fundamental differences between these two groups of athletes. Student-athletes in high school differ from student-athletes in college/university in many ways, such as age, academic workload, and psychosocial experiences. Camiré (2014) describes high school sport as involving students ages 14 to 18 years old participating in a formal competitive sport structure based on their skill level. These student-athletes differ from university/college student-athletes as they are younger and their

academic workload is less demanding. On average, a typical high school student is challenged with balancing homework from a maximum of four courses per semester, compared to student-athletes at the collegiate level who are required to be enrolled in at least three to five courses a term. Therefore, there is no minimum requirement of courses for high school student-athletes to remain eligible for sport participation, whereas collegiate student-athletes must meet full-time course load requirements (3 to 5 courses) in order to maintain eligibility. This means that the academic workload for collegiate student-athletes rather highly demanding and time consuming compared to workload requirements for high school student-athletes. Additionally, collegiate student-athletes are faced with the added challenge of independence and self-motivation in order to adhere to this type of academic lifestyle.

In Canada, collegiate varsity-student athletes participate at the U SPORTS level (formerly known as the Canadian Interuniversity Sport). Student-athletes are eligible to participate for five years if they are able to successfully maintain full-time academic status of at least three full course credits per academic term (Miller & Kerr, 2002). U SPORTS student-athletes have the additional demands of balancing academic responsibilities while completing the requirements of their highly competitive sporting activities. In addition to this added responsibility, student-athletes registered within U SPORTS are required to maintain an overall minimum 2.0 GPA (60% average) enrolled in full-time studies in order to preserve athletic eligibility (U SPORTS Eligibility Committee, 2018). This means that student-athletes are held to different academic standards than those that are not involved in varsity athletics. In the case that the student-athlete is not able to maintain the minimum academic standing of 60% as a full-time student, he/she risks losing athletic eligibility. This is a specific distinction between collegiate varsity student-athletes and grade school student-athletes. High school student-

athletes are not required to achieve a specific GPA. Therefore, the student-athlete experience varies across a variety of domains and cannot be characterized as a whole but rather an individual experience.

The student-athlete experience is not necessarily homogeneous due to a variety of factors, such as course load, sport (which dictates the amount of practice), gender, and training hours. Athletes are challenged to balance time between these domains in order to fulfill both athletic and academic timelines. For example, the varsity hockey season in U SPORTS is spread across both semesters (fall and winter) compared to varsity soccer which is primarily in the fall semester. This means that hockey student-athletes are faced with these challenges for a longer period of time. Furthermore, the typical hockey schedule at Ontario Tech University consists of 4-5 practices a week (depending on competition schedule) that are each 2 hours in length. In addition, these athletes must complete 3 off-ice training sessions per week that are each a minimum of 1 hour in length. The typical competition schedule per week is 2 games (home or away) ranging from 2 to 2.5 hours in length. This means that athletes are devoting almost 18 hours a week to their sport training, not including their class schedules. This is a lot of time to devote to training each and every week while balancing a full-time academic course load of 3 to 5 courses. For example, depending on the year of study the student-athlete is in can further dictate the academic course load since first year athletes may have more additional tutorials/labs compared to fourth or fifth year athletes that may only be enrolled in the minimum amount of courses required (at least 3 courses). These training and competition demands create unique experiences for varsity student-athletes compared to non-student-athletes.

2.1.1 Student-athlete experiences

There is a significant amount of research on the experiences of college and university student-athletes. Although most of this research focuses on the motivation, planning, and later life satisfaction of varsity student-athletes (Figler, 1987; Henschen & Fry, 1984; Shapiro, 1984; Miller & Kerr, 2002) , there is also a substantial interest in the relationship between students' participation in intercollegiate athletics and academic accomplishments (Curtis & McTeer, 1990). Results of this research suggest that the lives of Canadian student-athletes are influenced by a range of academic, athletic, and social factors. Additionally, the relationship between these constructs were competitive, requiring student-athletes to make compromises between these three constructs (Miller & Kerr, 2002).

These challenges create more pressure and responsibility for student-athletes to perform. Indeed, a study on psychological distress in Canadian student-athletes suggests that most athletes are exposed to some form of psychological distress (Sullivan et al., 2019). Together, this information suggests that student-athletes have to overcome or navigate numerous challenges while meeting the demands of school, training and competition. In particular, student-athletes have to navigate these challenges while also engaging in effortful training and practice in their sport. Furthermore, quality practice is one of the primary determinants of performance and skill acquisition in sport, which makes it an essential attribute in the student-athlete lifestyle. In most cases, quality practice refers to engaging in deliberate practice for athletes to grasp key concepts and skills that are imperative to their sport development. However, it is important to recognize that the student-athlete experience is uniquely diverse in that these student-athletes must establish a balance between academic and athletic pursuits while engaging in significant hours of deliberate practice.

2.2 Deliberate Practice

Deliberate practice can be defined as activities that require a significant amount of physical and/or cognitive effort for the purpose of improving performance (Baker & Young, 2014). Deliberate practice is highly structured activity where specific goals are created to overcome weaknesses and performance is monitored to provide feedback for ways to improve (Ericsson et al., 1993). Although deliberate practice is described as not inherently enjoyable, and requires a significant amount of effort, individuals are motivated to engage in these practice settings because practice improves performance (Ericsson et al., 1993). Deliberate practice has been linked to large improvements in memory performance (over 1000%), as demonstrated by a college student that participated in hundreds of hours of extended practice patterns (Ericsson et al., 1980). This suggests that expertise development is influenced by deliberate practice settings, as well as the amount of deliberate practice in which a person completes.

Ultimately, expert performance results from skill acquisition that is attained during extended deliberate practice. Indeed, the "monotonic benefits assumption" suggests a direct relationship between the amount of time an individual engages in deliberate practice and his/her own specific practice performance (Ericsson et al., 1993). The notion that the more time a person spends practicing sport-specific skills, the more likely he/she will achieve positive performance outcomes is central to the theory of deliberate practice.

According to Berry et al. (2008), the development of expert skills derives from the amount of time athletes engage in structured activity. This is likely because athletes' cognitive abilities are challenged when specific skills are targeted during repeated patterns of practice. Research by Hodges et al. (2004) suggests that expert performance is positively correlated with increased hours of deliberate practice. Moreover, skill level significantly influences the

relationship between performance and deliberate practice. In general, this evidence indicates that elite athletes spend more time engaging in structured sport activity than lower skilled athletes.

2.2.1 Constraints on Deliberate Practice

Importantly, deliberate practice requires individuals to stay engaged in these practice settings for extensive periods of time. For example, while deliberate practice might begin during early adolescence in ice hockey, athletes only reach expert levels until their early-to-mid twenties. Overall, deliberate practice is a challenging process that requires a significant amount of effort, repetition, and feedback (Coughlan et al., 2014). Yet, people that participate in deliberate practice are more likely to rate it as being relevant to increasing levels of performance, being more effortful, and being less enjoyable compared to other activities (Coughlan et al., 2014).

The performer is challenged with the constraints of resources, motivation, and effort (Baker & Young, 2014). The first constraint of deliberate practice challenges athletes' abilities to attain proper resources for improvement. Parents and guardians are essential resources for the progression of aspiring athletes participating in the deliberate practice framework (Ericsson, 1993). Furthermore, when an athlete has a role model present in his/her life encouraging practice and monitoring performance during development, this can significantly influence an athlete's performance (Ericcson, 1993). Parental interest is key in aiding the transition from recreational/leisure sport involvement to structured practice (Campbell & Parcels. 2013). This is especially prevalent in younger athletes that rely on parental support for transportation to practices and competitions. Not to mention, athletes may display more confidence during performance knowing that they have external support to participate in sports. However, parental

support is not necessarily prevalent in the same day-to-day format at the varsity level as it is during youth. Varsity student-athletes need to be more independent and accountable for their actions and involvement in athletic practices/training. Moreover, varsity student-athletes require skills to meet training and performance standards at this level of competition. Therefore, varsity athletes need to develop the psychological skills needed for deliberate practice to be accentuated.

The review by Baker and Young (2014) summarizes the expertise effects within sports to determine the difference between experts and non-experts. On average, experts typically spend more time training and engaged in deliberate practice tasks (Howe, Davidson, & Sloboda, 1998; Starkes, 2000). Not only do experts invest more time in training, but research suggests that experts tend to spend more time engaging in task-specific practice in order to improve certain component skills. Moreover, Ericsson (1996) suggested that experts are constantly modifying the level of practice difficulty to prevent learning plateaus and stimulate adaptation from external sources. Ultimately, this makes a difference in experts' abilities to adapt to various externals stressors during high pressure situations. Research by Young and Salmela (2010) concluded that experts (compared to non-experts) may not consistently do more of everything but may continually "do more of the little things", which may initially be dismissed as less important by non-expert athletes. Therefore, experts' abilities to recognize the importance of smaller tactics could make a greater difference in overall performance. Not to mention, experts who focussed on developing their weaknesses also rated practice as being more effortful and less enjoyable (Coughlan et al., 2013). Therefore, practice difficulty determined athletes' perceptions of enjoyment.

In order for athletes to be able to properly engage in deliberate practice settings, he/she must be able to sustain and maximize motivation for extended periods of time (Baker & Young, 2014). Athletes must be primarily motivated to engage in deliberate practice for the purpose of improving performance. This constraint differs between the youth and varsity athlete populations. This may be because during early stages of sport participation, young athletes attain motivation from many external sources, such as parents, coaches, and peers. Although athletes at the varsity level may attain motivation from these same external sources, much more intrinsic motivation is required in order to achieve successful results. This suggests that deliberate practice influences performance at a certain skill level (Macnamara et al., 2016). During early stages of development, the initiation of practice and formation of regular practice patterns in youth athletes may be directed by parents, but over time, athletes internalize these practice patterns to the extent that the motivation to practice translates into the goal of becoming an expert performer (Ericsson et al., 1993). Furthermore, results from Coughlan et al. (2014) coincide with previous theories in that the expert group rated the practice as more effortful and less enjoyable compared to the ratings of the intermediate group. Moreover, athletes that engage in intense training programs for longer periods of time often begin to view the practice as monotonous, which can result in a decreased interest over time.

The final constraint highlighted by Baker and Young (2014) deals with the physical demands of effort. Athletes' effort in deliberate practice settings focuses on two key elements: 1) the need for attention during practice and 2) the need to balance effortful training with appropriate rest and recovery (Baker & Young, 2014). During deliberate practice the need for attention is crucial in facilitating adaptations and improved levels of performance (Ericsson et al, 1993). This is most likely due to the fact that deliberate practice activities require high levels

of both physical and cognitive effort. Therefore, in an effort to adapt to the demands of deliberate practice, athletes must be able to establish an appropriate balance between training and rest in order to recover from intense levels of practice (Ericsson et al, 1993). In other words, athletes must be able to regulate their motivation, effort, and recovery.

In summary, deliberate practice is important, but it requires a significant amount of effort, motivation, concentration, and resilience to achieve desired results. Not to mention, one gap in deliberate practice research is the psychological skills necessary to navigate the motivation and effort constraints. Therefore, in order for athletes to succeed in deliberate practice settings and increase expertise development, he/she will require the necessary psychological skills to engage in prolonged deliberate practice.

2.3 Self-efficacy

One psychological construct that may have particular relevance for sustained deliberate practice, and therefore athlete performance, is self-efficacy. Self-efficacy is defined as a person's judgements of their abilities to execute the skills required to attain a specific performance outcome (Hepler & Chase, 2008). Additionally, self-efficacy can influence task decisions, the amount of effort expended completing the task, and motivation (Hepler & Chase, 2008). Self-efficacy has been found to exert strong influences on valuable experiences and how an individual responds behaviorally to these experiences (Nicholls, Polman, & Levy, 2010). Specifically, self-efficacy in sport is focused on athletes' confidence to complete sport-specific tasks. Athletes are more likely to engage in practicing sport-specific tasks (such as team/individual practice) when they know they can expect positive results.

Self-efficacy has been found to act as both a determinant and consequence of behaviour (McAuley & Blissmer, 2000). Research by McAuley et al. (1993) determined that people's self-efficacy is challenged when they have to create their own exercise regime, as well as when the intensity and difficulty of the exercise program increases. Additionally, recent studies suggest that self-efficacy is increased when people are exposed to acute forms of exercise compared to chronic exercise interventions (Sallis et al., 1986). Therefore, people's motivation is challenged when they have to engage in intense exercise programs for a longer period of time. Furthermore, people demonstrated higher levels of self-efficacy in socially enriched physical activity environments (Sallis et al., 1986). An explanation for this may be that people feel more motivated and confident to engage in exercise when they are stimulated by social factors (such as others) to be physically active.

High levels of self-efficacy can result in pursuing greater challenges and increased levels of goal setting (Moritz et al., 2000). Research by Moritz et al. (2000) analyzed the relationship between self-efficacy and performance to provide a guideline for future researchers. They analyzed the reference lists of all studies that were initially found and searched through the table of contents of 12 journals (Moritz et al., 2000). Overall, the average correlation between self-efficacy and performance in sport was 0.38, which is considered significant (Moritz et al., 2000). This is important to consider when conducting self-efficacy research on specific populations (such as the varsity student-athlete population) because implementing concordant measures (i.e., convergent validity) allows for the studies to produce results more tailored to the research question, whereas non-concordant measures tend to produce more generalized results.

Self-efficacy requires individuals to believe in their own capacity to execute actions to succeed in specific situations or accomplish specific tasks (Bandura, 1997). Additionally, self-

efficacy is one of the most robust/consistent predictors of behaviour, motivation, effort (Feltz, Short, & Sullivan, 2008). These findings suggest that self-efficacy likely has an influential role in determining athletic training behaviours during training and performance settings. Therefore, the link between self-efficacy and training behaviour makes intuitive and theoretical sense to explore in order to further understand athletes' behaviour .

2.4 Self-regulation

Self-regulation is a person's ability to suppress impulses and overrule temptations in order to expand their long-term best interests (Baumeister et al., 2007; Muraven & Baumeister, 2000). Self-regulation is composed of many different interactions between physiology, affect, cognition, and environmental variables (Kirschenbaum, 1987). Self- regulated learners to recognize and control their own thoughts, actions, and motivations to pursue their goals (Wilson et al., 2021). Self-regulated learning is a cognitively effortful process that incorporates feedback to optimize involvement in goal-oriented practice (Wilson et al, 2021). These characteristics of self-regulated learning parallel those required for deliberate practice since the feedback is goal-oriented compared to the completion of repeated tasks over time. Moreover, self-regulated learning requires the learner to; (a) be an active participant in the learning process; (b) be able to manage motivation, behaviour, cognition, and various environmental factors; (c) have goals to work towards; (d) allow self-regulated learning processes to balance the relationship between personal characteristics and achievements (Pintrich, 2000). Research by Tedesqui and Young (2015) determined that both inhibitory and active perspectives of self-regulation are necessary in order to understand self-regulatory expertise through a deliberate practice lens. This means that self-regulatory behaviours that are experienced during deliberate practice can influence positive development of sport expertise. For example, athletes that are able to identify and

correct weaknesses/barriers impeding performance during practice settings may be able to adapt these skills throughout various environments (such as competition).

Research by Kirschenbaum (1987) suggests that the five stages of self-regulation are: (1) problem identification, (2) commitment, (3) execution, (4) environmental management, and (5) generalization. In a sport setting, the problem identification phase is the stage in which the athlete takes responsibility for his/her performance and figures out ways to make improvements, whereas the commitment phase is when the athlete demonstrates his/her willingness to change in order to adhere to these improvements. The execution phase requires the athlete to attend to feedback about one's performance, evaluate performance alongside detailed criteria, and continue to show effort and determination to overcome adversity. The environmental management phase consists of being able to self-regulate performance through the balance of physical and social environments. Lastly, Kirschenbaum (1987) defines the generalization phase as the demands of continued effort over extended lengths of time regardless of the competing demands from a diversity of internal and external sources.

2.5 Influence of Self-efficacy on Self-regulation

Previous research indicates that there is a link between self-efficacy and self-regulation. As previously mentioned, self-regulated learning involves the control and recognition of social-cognitive processes (such as motivation) to complete goal-oriented practice tasks. These social-cognitive processes support the notion that learners are able to achieve their goals by regulating thought/emotions, behaviours and environment. Research by Zimmerman (2006) recommends that following a social-cognitive model composed of planning, self-monitoring or checking, evaluating and/or reflecting, effort, and self-efficacy leads to success in fulfilling goal-oriented practice tasks. However, it is more common for athletes to fail to generalize self-regulated

behaviour because it requires cautious self-monitoring and engaging in other applicable habit changes to the extent of increasing an obsessive-compulsive form of self-regulation (Kirschenbaum, 1987). Previous studies on golfers, divers, and wrestlers show that athletes achieved positive performance outcomes when they engaged in ritualistic behaviours (Kirschenbaum, 1987). Furthermore, athletes' self-efficacy and ability to self-regulate may be influenced by various levels of competition. A microanalytic study conducted by Cleary and Zimmerman (2001), assessed basketball players' self-regulated processes during free throw practice and concluded that experts had more specific free throw goals and selected more specific technique-related strategies to maintain their goals than non-experts and novices. Additionally, it was determined that during the forethought process of completing the task, experts presented significantly higher levels of self-efficacy perceptions before and after successful free throws compared to non-experts and/or novices (Cleary & Zimmerman, 2001). This may be due to the fact that experts have more experience playing basketball at a higher level and express the self-efficacy required to obtain successful performance outcomes.

According to Wilson et al. (2021), self-regulated learning is a significant factor in the development of sport expertise. During self-regulated learning, participants develop "quality over quantity" practice behaviours, which contribute to successful performance outcomes. Previous research on self-regulation and sport psychology suggests that there is an apparent distinction between two types of self-regulated learning in sport; an a) performance-enhancement orientation, and a b) practice-enhancement orientation (McCardle et al., 2017). The performance-enhancement orientation consists of self-regulation in the form of psychological skills training and cognitive-behavioural processes created to prepare athletes for competition (McCardle et al., 2017). The practice-enhancement orientation takes place when

self-regulation is used to strengthen the practice environment and assists athletes in developing skills in order to benefit from training regimes (McCardle et al., 2017). Moreover, these characteristics of self-regulated learning align with deliberate practice characteristics. Research by Ericsson et al. (1993), determined that deliberate practice tasks require continuous attention, evaluation, and adjustments based on feedback over a series of trials. These types of tasks can become very repetitive and depleting for athletes to sustain for full practice durations.

According to research by Tedesqui and Young (2015), certain psychological traits can influence athletes' abilities to properly self-regulate. Specifically, individuals with high levels of self-control are more likely to overcome depleting tasks and exhibit longer task persistence on subsequent tasks during deliberate practice settings (Tedesqui & Young, 2015). This is due to the fact that people with higher amounts of self-control are able to efficiently practice the dispositional tendency to preserve self-control measures over a longer period of time (Tedesqui & Young, 2015). Self-regulated learning has also been proven to be effective during training for athletes. According to McCardle et al. (2017), athletes must develop particular psychological skills in order to overcome obstacles and transitions during training. During training, athletes are challenged with balancing the amount of time they spend on various activities within training programs, the ability to perform certain skills to meet sport demands, and to attain social and cognitive resources to get the most out of training sessions (Baker & Young, 2014; Young & Medic, 2008; Zimmerman, 1998). Once athletes were able to fully commit to their sport domain, practice positive self-belief, and perform goal setting during practice, he/she was more likely to be successful in overcoming challenges such as injury and/or deselection from a team (MacNamara et al., 2010b). In addition, self-regulated learning has helped athletes improve skills during training. This is especially seen in athletes that engage in post-competition

reflection as it helps the athletes identify areas of improvement to focus on during subsequent training sessions and leads to increased levels of self-efficacy (Devonport, 2006).

Research by Coughlan et al. (2014) analyzed the expectations of the deliberate practice theory during the practice of challenging tasks by intermediate and expert Gaelic football players. The results suggest that stronger kicks were seen in the expert group compared to the intermediate group. Coughlan et al. (2014) determined that greater mental effort was expended by the expert group compared to the intermediate group. This was due to the fact that the expert group was engaged in higher quality deliberate practice and self-regulation compared to the intermediate group. The expert group also engaged in self-regulatory behaviours such as practicing certain kicks they had difficulties with in order to maximize improvement. In doing this, the expert group was able to challenge themselves both physically and mentally, which contributed to the overall success of the group.

2.6 Significance/Overview

This research focuses on the relationship between year of eligibility, self-perceptions, and training behaviour in the varsity student-athlete population. It is important for researchers to understand the significance of examining the influence of self-efficacy during both training and competition levels in sport, in order to distinguish if there are any training behaviours that may elicit specific performance outcomes. As previously mentioned, there is little research present on the development of varsity student-athletes, which further suggests that this research could potentially result in unprecedented findings. Additionally, the results of this study would be

beneficial for both student-athletes and coaches because it would provide evidence of how certain training tasks and schedules may elicit specific efficacy behaviours in sport.

Chapter 3. Methods

3.1 Purpose

The purpose of this research was to investigate the relationships between self-efficacy, self-regulation, and athlete participation/training histories in the varsity student-athlete population. Specifically, this research was concerned with how year of eligibility, self-perceptions, and training behaviours influence varsity student-athlete development and performance in training settings. Therefore, this study sought to explore the relationships between training self-efficacy, self-regulation, year of eligibility and varsity student-athletes' practice history. The researchers hypothesize that 1) student-athletes will demonstrate greater self-efficacy score ratings depending on his/her experience (i.e., year of eligibility), 2) there will be a positive relationship between training/deliberate practice and training self-efficacy, and self-regulation skills, and 3) there will be a positive relationship between self-efficacy and self-regulation.

3.2 Method

3.2.1 Participants

Approximately 40 Ontario University Athletics (OUA) student-athletes from Ontario Tech University and York University participated in this study. Athletes were drawn from both team (n=34) and individual sports (n=6). These sports included: soccer, basketball, hockey, rowing, and curling (see Figure 1 for details on the percentage of athletes from each sport). Among these student-athletes, 83% played either soccer or hockey. Moreover, it was also discovered that the majority of participants played team versus individual sports.

3.2.2 Procedure

Data collection occurred in two phases for this study. During the **first phase** participants completed a brief demographic survey and a short questionnaire measuring current training and participation history. Participants were also asked to complete the Training Self-efficacy Scale (TSS) and Self-Regulated Learning for Sport Practice (SRLSP). These questionnaires took approximately 15 to 20 minutes to complete.

The **second phase** consisted of data collection at the current season mark of 2-3 weeks into the start of their varsity season (September 2021). Participants were asked to summarize how much training they've done in the previous 7 days. This process took less than 5 minutes to complete.

All participants provided informed consent, and the study was approved by the Ontario Tech University research ethics board (REB **#16517).**

3.2.3 Measures

Phase 1 Measures

The pre-study questionnaires collected athletic practice history and demographic information. A demographic questionnaire was used to determine basic background information on each athlete and to get a sense of potential factors such as year of study, varsity sport played, etc. that may contribute to an athlete's ability to perform successfully (see Appendix A).

The Training Self-Efficacy Scale (TSS) was used to evaluate an athlete's practice history and general perceptions about training and practice settings (Baker et al., 2023) (see Appendix C). The questionnaire is comprised of 20 questions that required athletes to rate on a scale from 1 (no confidence) to 7 (complete confidence) how confident they were in situations pertaining

to training and practice settings. The scale is further broken up into 3 subscales: 1) Time/Effort (e.g. *"As an athlete, how confident are you in your ability to … put high amounts of effort into physical fitness training such as running or weight training?"*), 2) Skills, Remediation, Adjustments (e.g., "*As an athlete, how confident are you in your ability to… practice alone to improve your skills?"*), and 3) Overcoming Obstacles to Motivation (e.g., "*As an athlete, how confident are you in your ability to… maintain high motivation to practice even when practice is not fun?"*).

The Self-Regulation Learning for Sport Practice (see Appendix D) was used to assess an athlete's self-regulatory behaviours during practice/training settings (Wilson et al., 2021). The questionnaire is comprised of 31 questions that required athletes to rate on a scale from 1 (strongly disagree) to 7 (strongly agree) what best describes themselves during practice. The SRLSP can be further broken into 5 subscales: 1) Planning (e.g., *"I determine how to approach a practice task before I begin.*"), 2) Checking/Monitoring (e.g., "*I do not check how well I am doing during a practice session."*), 3) Reflecting/Evaluating (e.g., *"I think about my past experiences at practice to gain new insights."*), 4) Self-efficacy (e.g., *"I am confident that I can deal efficiently with unexpected events at practice."*), and 5) Effort (e.g., *"I concentrate fully when I do a task at practice."*).

Phase 2 Measures

Athletes were then required to report all involvement (hours/week) in deliberate practice activities completed within the past 7 days. Athletes were asked to report the age they started playing their sport, previous training hours per week, current training hours per week,

and competition hours per week (see Appendix B). These measures were loosely based on previous practice history questionnaires (Hopwood, 2013)

3.2.4 Analyses

The following analyses were performed using SPSS Statistical Software:: 1) Pearson Correlation between SRLSP and TSS Subscales; 2) Pearson Correlation between SRLSP Subscales and Practice information variables; 3) Pearson Correlation between TSS Subscales and Practice information variables; 4) One-way ANOVA between SRLSP and Year of Study; and 5) One-way ANOVA between TSS and Year of study. Statistical significance was evaluated related to a 0.05 level. Effect size (Cohen's d) were reported to illustrate the magnitude of a relationship between two variables. A small effect size is defined as less than the 0.2 level, medium effect size is around the 0.5 level, and a large effect size is greater than the 0.8 level in value.

Chapter 4. Results

4.1 Descriptives

The sample population for this study consisted of 40 student-athletes from Ontario Tech University. The participants in this sample consisted predominantly of soccer and hockey athletes, but also included basketball, rowing, and curling student-athletes (see Figure 1).

Figure 1. Percentage of Athletes Per Varsity Sport

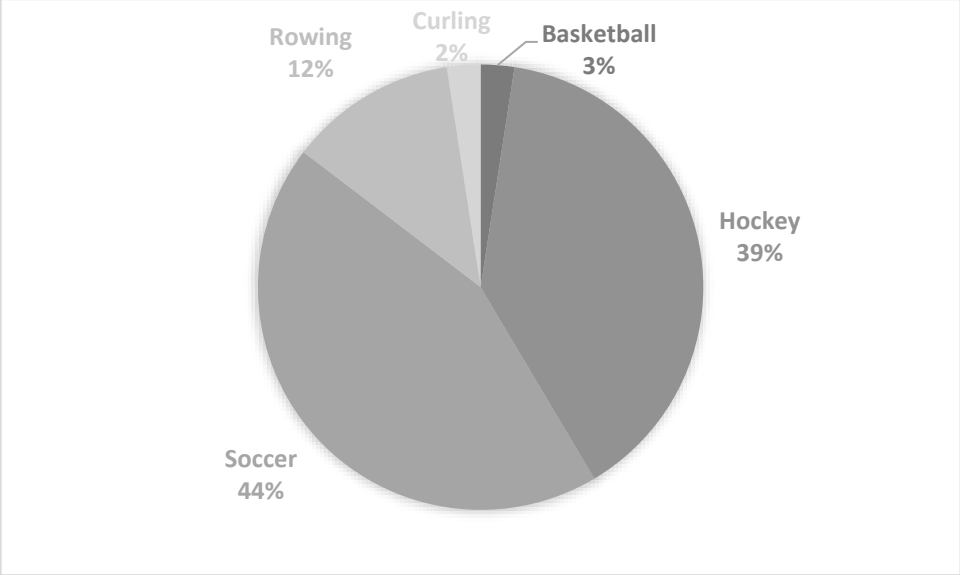


Figure 2. Number of Athletes by Year of Eligibility

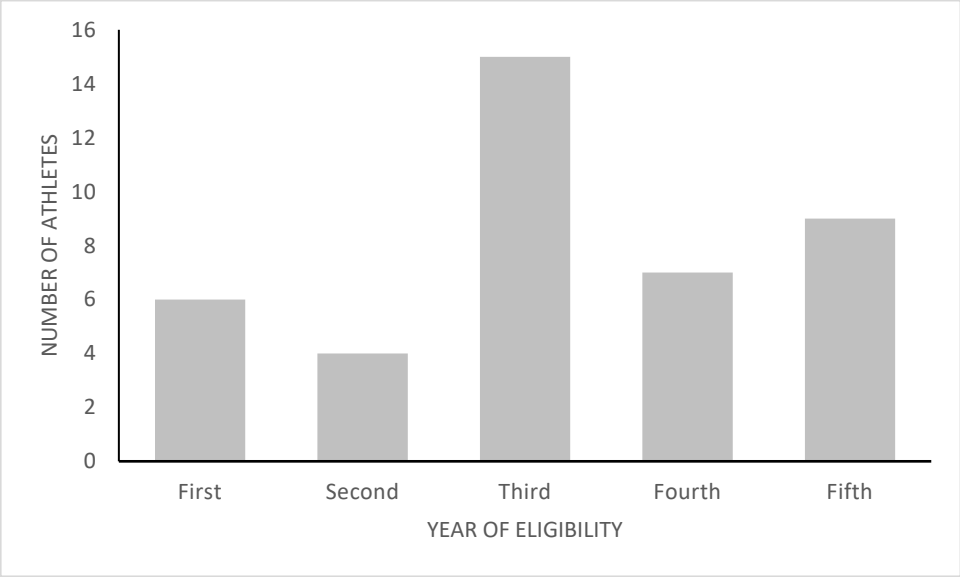


Table 1. Average Practice Variable Scores

Variables	Number	Mean	Std. Deviation	Minimum	Maximum
Age Started Playing Sport	40	6.89	5.28	2	21
Previous Training Hours	40	7.21	5.21	1.5	20
Current Training Hours	40	13.31	3.81	5.0	20
Current Competition Hours	40	4.16	2.81	0.00	14

On average, participants started playing their respective sports around 6.89 years of age, although the range in ages was substantial (i.e., 19 years). This large discrepancy may be accounted for depending on the specific sport the individual was playing, as it was more common for rowing athletes to begin playing at an older age than the other sports included in

the sample. Participants previous training hours ranged from 1.5 to 20 hours per week with an average of 7.21 hours per week. Although, there was a slight increase in current training hours reported per week, both previous and current hours seemed to reach a maximum of 20 hours per week reported. The current training hours per week ranged from 5 to 20 hours with an overall average of 13.31 hours. Current competition hours per week ranged from 0 to 14 hours with an average 4.16 hours per week. Therefore, some athletes were considered to be in post-season training, which provides an explanation as to why some athletes reported having zero competition hours per week.

Relationships between/within TSS And SRLSP Subscales

Overall, there were 24 large correlations and 4 moderate correlations between/within TSS and SRLSP subscales (see Table 2). This indicates that most athletes felt confident in their ability to perform well under various physiological and/or psychological stressors during practice and training settings.

Table 2. TSS, SRLSP subscales, and practice history

Variables	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10**	**11**	**12**
1. TSS Time/Effort	1											
2. TSS Skills, Remediation, Adjustments	.72**	1										
3. TSS Overcoming Obstacles to Motivation	.64**	.76**	1									
4. SRLSP Planning	.63**	.70*	.44*	1								
5. SRLSP Checking/Monitoring	.58**	.61**	.49**	.68**	1							
6. SRLSP Reflecting/Evaluating	.56**	.50**	.34*	.63**	.63**	1						
7. SRLSP Self-Efficacy	.63**	.60**	.66**	.69**	.60**	.58**	1					
8. SRLSP Effort	.65**	.50**	.37*	.61**	.49**	.57**	.68**	1				
9. Age Started Playing Sport	.14	.11	.24	.24	.08	.20	.11	.12	1			
10. Previous Training Hours/Week	.16	.36*	.47**	.04	.03	.08	.10	-.02	.41*	1		
11. Current Training Hours/Week	.15	.00	-.017	.10	.10	-.09	-.08	.03	.16	-.08	1	
12. Current Competition Hours/Week	-.15	-.015	-.19	.11	.11	.09	-.31	-.10	-.25	-.09	.28	1

** = Correlation is Significant at the 0.01 Level (2-Tailed)
* = Correlation is Significant at the 0.05 Level (2-Tailed).

Overall, there were 5 large correlations and 1 moderate correlation between/within TSS and practice information (see Table 2). This indicates that there is very few significant relationships between TSS and practice variables (such as Age Started Playing) amongst this sample of participants. Additionally, there were 9 large correlations and 2 moderate correlations within practice information and SRLSP subscales (see Table 2).

4.2 Correlations by Year of Study

The results were also broken down and categorized by year of study to closely compare the subscales and determine the effect each subscale has during each academic year.

4.2.1 Year 1 and 2

According to the data analyses, there were 13 significant correlations between the TSS and SRLSP subscales in first- and second-year student-athletes (see Table 3). Among these 14 positive correlations, 6 were considered very strong positive and 7 were considered strong positive correlations. The very strong positive correlations included: TSS time/effort & TSS Skills, Remediation, and Adjustments (r=.91), SRLSP check/monitoring & SRLSP reflecting/evaluating (r=.89), TSS time/effort & SRLSP effort (r=.86), SRLSP Planning & SRLSP Self-efficacy (r=.85), TSS Skills, Remediation, and Adjustments & SRLSP effort (r=.85), and TSS Overcoming Obstacles to Motivation and SRLSP effort (r=.82).

The strong positive correlations included: TSS Skills, remediation, and adjustments & SRLSP Planning (r=.77), SRLSP check/monitoring & SRLSP effort (r=.75), TSS time/effort & SRLSP checking/monitoring (r=.74), TSS OOM & SRLSP Self-efficacy (r=.74), TSS Overcoming Obstacles to Motivation & SRLSP reflect/evaluating (r=.70), TSS Skills,

remediation, and adjustments & SRLSP Self-efficacy (r=.70), and TSS time/effort & TSS Overcoming Obstacles to Motivation (r=.68).

TABLE 3. TSS VS. SRLSP SUBSCALES IN YEAR 1 AND 2 ATHLETES

Variables	1.	2.	3.	4.	5.	6.	7.	8.
1. TSS Time/Effort	1							
2. TSS Skills, Remediation, Adjustments	.91**	1						
3. TSS Overcoming Obstacles to Motivation	.68*	.60	1					
4. SRLSP Planning	.60	.77*	.42	1				
5. SRLSP Checking/Monitoring	.74*	.65	.65	.51	1			
6. SRLSP Reflecting/Evaluating	.58	.51	.70*	.58	.88**	1		
7. SRLSP Self-Efficacy	.64	.70*	.74*	.85**	.53	.73*	1	
8. SRLSP Effort	.86**	.85**	.82**	.59	.75*	.69*	.73*	1

****. CORRELATION IS SIGNIFICANT AT THE 0.01 LEVEL (2-TAILED).**
***. CORRELATION IS SIGNIFICANT AT THE 0.05 LEVEL (2-TAILED).**

4.2.2 Year 3

According to the data analyses, there were 10 significant correlations between the TSS and SRLSPsubscales in third year student-athletes. Among these 10 positive correlations, 6 were considered very strong positive and 4 were considered strong positive correlations. The very strong positive correlations included: TSS Skills, Remediation, and Adjustments & TSS Overcoming Obstacles to Motivation(r=.82), TSS time/effort & TSS Overcoming Obstacles to Motivation (r=.77), TSS time/effort & SRLSP Self-efficacy (r=.72), TSS Overcoming Obstacles to Motivation & SRLSP Self-efficacy (r=.71), TSS Skills, Remediation, and Adjustments &

SRLSP Self-efficacy (r=.70), and SRLSP Planning & SRLSP Self-efficacy (r=.69).The strong positive correlations included: TSS Skills, Remediation, and Adjustments & SRLSP Planning (r=.67), TSS time/effort & TSS Skills, Remediation, and adjustments (r=.65), SRLSP Planning & SRLSP effort (r=.60), and TSS time/effort & SRLSP Planning (r=.58).

TABLE 4. TSS vS. SRLSP SUBSCALES iN YEAR 3 ATHLETES

VARIABLES	1.	2.	3.	4.	5.	6.	7.	8.
1. TSS Time/Effort	1							
2. TSS Skills, Remediation, Adjustments	.65*	1						
3. TSS Overcoming Obstacles to Motivation	.77**	.82**	1					
4. **SRLSP** Planning	.58*	.67*	.40	1				
5. **SRLSP** Checking/Monitoring	.33	.32	.23	.62*	1			
6. **SRLSP** Reflecting/Evaluating	.33	.62*	.41	.58*	.59*	1		
7. **SRLSP** Self-Efficacy	.72**	.70**	.72**	.69**	.65*	.52	1	
8. **SRLSP** Effort	.26	.53	.39	.60*	.33	.26	.65*	1

****. CORRELATION IS SIGNIFICANT AT THE 0.01 LEVEL (2-TAILED).**
***. CORRELATION IS SIGNIFICANT AT THE 0.05 LEVEL (2-TAILED).**

4.2.3 Year 4 and 5

According to the data analyses, there were 16 significant correlations between the TSS and SRLSP subscales in fourth and fifth year student-athletes. Among these 16 positive correlations, 8 were considered very strong positive and 8 were considered strong positive correlations. The very strong positive correlations included: SRLSP Planning & SRLSP checking/monitoring (r=.85), TSS Skills, Remediation, and Adjustments & TSS Overcoming

Obstacles to Motivation (r=.79), TSS Time/effort & SRLSP reflecting/evaluating (r=.76), TSS Skills & SRLSP checking/monitoring (r=.76), SRLSP Planning & SRLSP reflecting/evaluating (r=.74), SRLSP reflecting/evaluating & SRLSP Self-efficacy (r=.72), TSS time/effort & SRLSP effort (.71), and TSS time/effort & TSS Skills, Remediation, and Adjustments(r=.67). The strong positive correlations included: SRLSP Self-efficacy & SRLSP effort (r=.66), TSS Overcoming Obstacles to Motivation & SRLSP Self-efficacy (r=.66), TSS Skills, remediation, and adjustments & SRLSP Planning (r=.66), TSS Overcoming Obstacles to Motivation & SRLSP checking/monitoring (r=.66), TSS time/effort & SRLSP Planning (r=.65), SRLSP checking/monitoring & SRLSP Self-efficacy (r=.60), SRLSP Planning & SRLSP effort (r=.59), and TSS time/effort & TSS Overcoming Obstacles to Motivation (r=.55).

Table 5. TSS vs. SRLSP Subscales in Year 4 and 5 Athletes

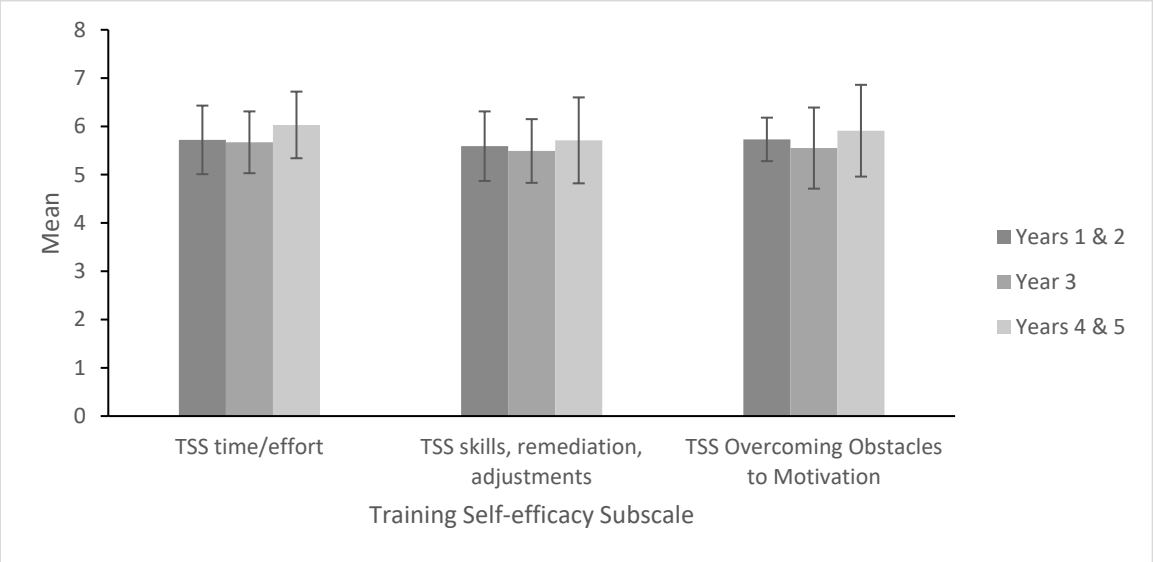
Variables	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**
1. TSS Time/Effort	1							
2. TSS Skills, Remediation, Adjustments	.67**	1						
3. TSS Overcoming Obstacles To Motivation	.55*	.79**	1					
4. **SRLSP** Planning	.65*	.66*	.44	1				
5. **SRLSP** Checking/Monitoring	.57	.76**	.66*	.85**	1			
6. **SRLSP** Reflecting/Evaluating	.76**	.46	.22	.74*	.48	1		
7. **SRLSP** Self-Efficacy	.54	.45	.66*	.54	.60*	.54	1	
8. **SRLSP** Effort	.71**	.18	.14	.59*	.33	.72*	.66*	1

****CORRELATION IS SIGNIFICANT AT THE 0.01 LEVEL (2-TAILED).**
***CORRELATION IS SIGNIFICANT AT THE 0.05 LEVEL (2-TAILED).**

4.3.1 Year of Eligibility vs. TSS Subscales

A one-way ANOVA revealed that there was no statistically significant difference in Training Self-efficacy (TSS) subscales between any of the years of eligibility (TSS time/effort ($F(2, 37) = 1.18$, $p = 0.32$); TSS Skills, Remediation, Adjustments($F(2, 37) = 0.29$, $p = 0.75$; TSS Overcoming Obstacles to Motivation($F(2, 37) = 0.70$, $p = 0.50$). The eta-squared (η^2) effect sizes for the TSS and SRLSP subscales were all small: 1) TSS time/effort ($\eta^2 = 0.06$), 2) TSS skills, remediation, adjustments ($\eta^2 = 0.02$), 3) TSS overcoming obstacles to motivation ($\eta^2 = 0.04$), 4) SRLSP Planning ($\eta^2 = 0.05$), 5) SRLSP checking/monitoring ($\eta^2 = 0.05$) , 6) SRLSP reflecting/evaluating ($\eta^2 = 0.01$), 7) SRLSP self-efficacy ($\eta^2 = 0.04$), and 8) SRLSP effort ($\eta^2 = 0.09$)

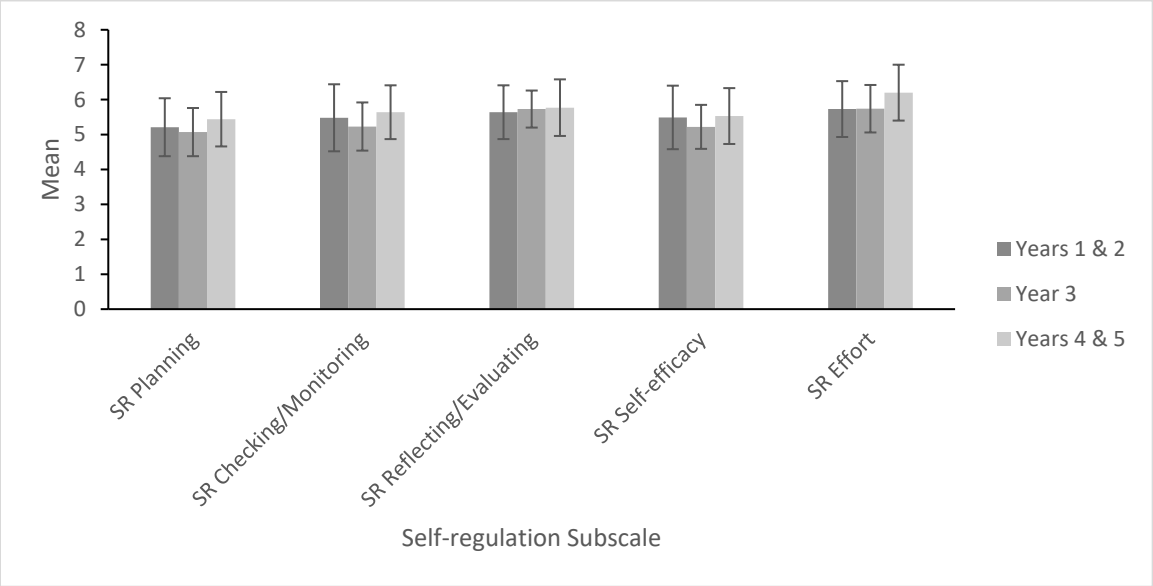
Figure 3. Average Scores vs. TSS Subscales of Athletes



4.3.2 Year of Eligibility vs. SRLSP Subscales

A one-way ANOVA revealed no significant differences in self-regulated learning for sport practice (SRLSP) subscales for any year of eligibility (SRLSP Planning($F(2,31) = 0.74$, $p = 0.49$), SRLSP Checking/Monitoring($F(2,31) = 0.84$, $p = 0.44$); SRLSP Reflecting/Evaluating($F(2,31) = 0.09$, $p = 0.91$); SRLSP Self-efficacy($F(2,31) = 0.61$, $p = 0.55$); SRLSP Effort($F(2,31) = 1.48$, $p = 0.25$).

Figure 4. Average Scores vs. SRLSP Subscales of Athletes



Chapter 5. Discussion

The purpose of this study was to explore the relationships between self-efficacy, self-regulation, and training behaviour in a sample of varsity student-athlete. Another purpose of this study was to explore the influence of year of eligibility on varsity student-athletes. The student-athletes were asked to provide insight on the amount of training and competition hours they spend per week playing their specific varsity sport. These athletes were also asked to complete the self-efficacy and self-regulation surveys to assess general perceptions about training and practice settings. Also, it is important to note that the influence of internal and external factors on student-athletes self-efficacy, self-regulation, and training behaviour were not measured during this study.

Training Behaviour

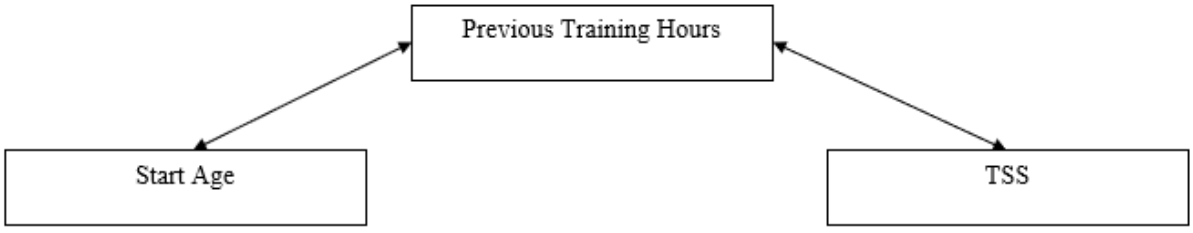
The results also suggest that athletes that started playing their respective sport *later* were likely to have logged more practice hours in their sport at that time. This makes logical sense, since later (i.e., older) stages of participation can be expected to involve more training/practice. However, these findings are not consistent with concerns that practice hours are positively correlated with early sport specialization since this allows athletes to accumulate a greater amount of total practice hours compared to athletes starting the sport at an older age (Macnamara et al., 2016). Therefore, early sport specialization was found to not be associated with more training hours accumulated at the time of data collection.

Self-Efficacy and Training Behaviour

As seen in Table 3, there were a significant positive correlations between Skills, Remediation, and Adjustments subscale and previous training hours ($r = 0.36$), as well as between overcoming obstacles to motivation and previous training hours per week ($r = 0.47$).

There was also a positive correlation between Age Started Playing Sport vs. Previous Training Hours Per Week ($r = 0.41$). This result is consistent with evidence derived from Social Cognitive Theory, which suggest that prior experience can be a source of self-efficacy (Zimmerman, 2006). The fact that TSS subscales were not significantly correlated with start age, but two TSS subscales were positively correlated with previous training hours, suggest that past training hours may mediate or moderate the relationship between start age and current self-efficacy (see Figure 5).

Figure 5. Possible mediating relationship between start age, previous training hours and training self-efficacy.



Overall, these results suggest that training self-efficacy scores were not significantly correlated with *current* training hours per week. There may be a number of reasons for this absence of relationship. First, if current training volume and type was strictly dictated by coaches, then the volume of training hours may have been homogeneous across all athletes, leaving little opportunity to individual agency and variation in training hours. It may be useful to explore the relationship between training self-efficacy and training hours during the off-

season (particularly spring/summer) when athletes may be away from campus and more strictly controlled training environments.

Furthermore, to increase training self-efficacy in these athletes, it is suggested that athletes focus more time on specific skills required to overcome barriers they may face during competition settings. For example, athletes that struggle with stamina during games may need to focus more on conditioning during practice settings.

Overall, the results of this study suggest that most athletes felt relatively confident (see Table 2) in specific situations pertaining to training and practice settings. Research by Hepler and Chase (2008) defines self-efficacy as a person's own judgment of their abilities to execute the skills required to attain a specific performance outcome. It is likely that many athletes in this study had been exposed to prior sport experiences that have helped shaped their confidence and self-percepts to the level they are currently at today. Research by Nicholls et al. (2010) determined that self-efficacy exerts strong influences on valuable experiences and how the individual responds behaviorally to these experiences. Another possible explanation for this may be because most of the athletes have positive internal and/or external influences present in their lives, which would directly influence athletes' experiences. Previous research by Bandura (1997) explains that individuals need to believe in their own abilities to complete specific tasks/actions to achieve successful outcomes; this is true for student-athletes.

Self-Regulation and Training Behaviour

This study found no statistically significant relationships between past and current practice information and SRLSP subscales (see Table 4). The results suggest that the correlations were too small to report a significant relationship between all practice and SRLSP

variables. This could be due to athletes' self-regulatory behaviours being influenced by the modified structure of their respective athletic seasons during the COVID-19 pandemic. According to Kirschenbaum (1987), self-regulation is made up of many different interactions between physiology, affect, cognition, and environmental variables. Pintrich (2000) found that self-regulated learners must be able manage motivation, behaviour, cognition, and various environmental factors. The pandemic may have made it more difficult for athletes to fully engage and establish a form of self-monitoring due to the everchanging guidelines and rules put in place that can influence access to training facilities.

Therefore, the high group scores on self-regulation suggests relatively small differentiation between training self-efficacy and training behaviour. This may be because possible opportunities for self-regulation are being *externally* regulated for these athletes by coaching and training staff. This means that what athletes are able to self-regulate is not reflected in the *amount* of hours they are spending in practice/training sessions. Moreover, the study consisted of very simple scales for *quantity* of training, not taking into account that most of the self-regulation content (i.e., quality of training) was not measured in the current study.

Furthermore, it was difficult for athletes to gain access to training facilities due to restrictions on the number of people allowed in the gym at a given time. Most of the time if athletes did gain access, it was only for a specified period. Therefore, it is possible that athletes that achieve higher self-regulation scores also have a higher *quality* of practice as opposed to just more training volume. Going forward it may be useful to collect more detailed and personalized training data in order to better understand relationships with self-regulation skills.

Relationship between Self-efficacy and Self-regulation

Data analyses also concluded that there were large correlations among all SRLSP subscales, and very strong significant relationships between almost all TSS subscales and SRLSP subscales (see Table 2). As seen in Table 2, there were 13 correlations of large effect sizes and 2 correlations of medium effect size. The largest correlation between the TSS and SRLSP subscales was observed between TSS Skills, Remediation, & Adjustments and SRLSP Planning. Additionally, the medium magnitude was observed in the relationship between TSS Overcoming Obstacles to Motivation and SRLSP Checking/Monitoring. This validates previous research findings suggesting that training self-efficacy is positively correlated with self-regulation principles (Zimmerman, 2006). Wilson et al. (2021) found that self-regulated learning significantly contributed in the development of sport expertise with the notion of "quality over quantity" practice behaviours. Not to mention, athletes with higher levels of self-control are more likely to overcome depleting task and achieve longer task persistence (on subsequent tasks) by exhibiting dispositional tendency to preserve self-control measures across a long period of time (Tedesqui & Young, 2015).

As mentioned, there were many large correlations observed between the TSS and SR subscales. These results are consistent with previous research and theories on the relationship between self-efficacy and self-regulation as these results reinforce the likely relationship between these variables in a variety of forms (Kirschenbaum, 1987; McCardle et al., 2017; Tedesqui & Young, 2015; Zimmerman, 2006). Furthermore, depending on the research purposes, it may be useful to utilize both sets of scales when investigating the relationship between these two variables because they may measure different psychosocial characteristics and relationships (e.g., current vs past training behaviour).

Correlations between TSS Subscales

The results of this study showed that there were correlations present between TSS subscales. As seen in Table 2, the largest correlation was seen between TSS Skills, Remediation, & Adjustments and TSS Overcoming Obstacles to Motivation. The smallest correlation between these subscales was the relationship between TSS Time/Effort and TSS Overcoming Obstacles to Motivation (r=0.64). This relationship is observed when an athlete continues to practice and put in the effort to overcome a barrier in their respective sport. Overall, this suggests that all TSS subscales are largely correlated with one another, which insinuates that some content may be redundant. Therefore, the researchers recommend that the TSS scale may need to be reduced to prevent duplicate questions of similar content. This would add a more simplistic and faster approach in assessing training self-efficacy in student-athletes by reducing the amount of questions needed to assess the subscales within the TSS scale.

Correlations between SRLSP Subscales

The results of this study showed that there were correlations present between SRLSP subscales. As seen in Table 2, the largest correlation was seen between SRLSP Planning and SRLSP Reflecting/Evaluating. An explanation of this may be that athletes tend to reflect/evaluate their performances when they plan/prepare ahead of time. Furthermore, the smallest correlation between these subscales was the relationship between SRLSP Checking/Monitoring and SRLSP Effort.

Year of Study

The largest correlations were seen in 4th and 5th year student-athletes (n=16). Overall, these 4th and 5th year student-athletes showed strong significant correlations between both TSS and SRLSP subscales. According to the data analyses, there were 16 significant correlations between the TSS and SRLSP subscales in fourth and fifth year student-athletes. Among these 16 positive correlations, 8 were considered very strong positive and 8 were considered strong positive correlations. The very strong positive correlations included: SRLSP Planning & SRLSP checking/monitoring, TSS Skills, Remediation, and Adjustments & TSS Overcoming Obstacles to Motivation, TSS Time/effort & SRLSP reflecting/evaluating, TSS Skills & SRLSP checking/monitoring, SRLSP Planning & SRLSP reflecting/evaluating, SRLSP reflecting/evaluating & SRLSP Self-efficacy, TSS time/effort & SRLSP effort, and TSS time/effort & TSS Skills, Remediation, and Adjustments. In comparison, student-athletes in years 1 and 2, as well as year 3, did not show the same number of significant relationships between TSS and SRLSP subscales. Although, strong significant relationships were observed in years 1 to 3, a more consistent trend was seen in senior student-athletes (years 4 and 5). This is likely because senior athletes are more experienced and have had the time to become accustomed to the student-athlete lifestyle. For example, training and performance expectations, finding a balance between academics and athletics, more games played at current level, etc.

Therefore, self-efficacy resources may need to be implemented more into training settings to address the needs of athletes in years 1 to 3. This would allow athletes the additional space to develop the required skills to overcome psychological barriers they are facing during current training sessions. Resources could include additional training sessions to improve psychological constraints, additional time spent in deliberate practice settings to allow athletes

more time to adjust/adapt to new settings, and/or supplementary feedback from external sources (such as coaches, parents, teammates) to increase psychological constraints. Not to mention, external supports (such as family) are not necessarily prevalent in the same daily format at the varsity level as it is during youth stages. Knowing this information, it is suggested that more resources should be available for athletes to develop their self-efficacy and self-regulation skills. This could be offered through resources such as workshops, readings, training activities, in order for athletes to realize the importance of self-efficacy and self-regulated learning. Training activities could include practicing a play multiple times each training session. By doing this, athletes are increasing their capacity to perfect specific skills that can later be utilized during competition. Not to mention, practicing skills repetitively during training can increase athletes' self-confidence and motivation to perform the skills during game/competition settings.

Limitations

This study was limited based on the effect size being a small (40) group of student-athletes from the same university (Ontario Tech), and predominantly from the soccer and ice hockey teams. Therefore, we cannot assume the results would be the same across all OUA institutions and different sports, as training regimes may vary depending on coaching styles, athletes' personal experiences, and various external factors (such as environment, friends/ family support; Henriksen & Stambulova, 2017). Furthermore, the participants of this study consisted of all female student-athletes. Although the study was not designed specifically for female athletes, the response rate indicated that all athletes were female based on the pre-survey demographic information questions. Going forward it may be useful to explicitly explore if

there are any differences between male and females in terms of the relationships between self-efficacy, self-regulation and training behaviour. It may also be worth exploring why there were such disproportionate response rates between male and female varsity athletes.

Another limitation of this study is that data collection is based on self-report questionnaires wherein the student-athletes are reporting his/her answers solely from his/her view of their own sport performance. This type of data collection method can further influence athletes to exaggerate his/her responses because they may not feel comfortable revealing their true self-perceptions (e.g., Hart, 2006). Although participants were reassured that no individual results would be shared with coaches or in any presentation of the data, these problems could have resulted. Similarly, there are always limitations to the accuracy of retrospective athlete training data that can influence the validity of research findings.

The results of this study were also collected during the modified 2021/2022 OUA season format. Therefore, the results of this study do not reflect a full season of training and competition due to revised guidelines put in place during the current COVID-19 pandemic. For example, these revised guidelines consisted of daily COVID-19 screening and rapid antigen tests before training and competitions, limited athletes allowed in training facilities (such as gyms) at a time, and condensed playing seasons (less games), smaller playing conferences (less competitors), multiple season pauses and resumptions due to increase in COVID-19 case counts, and extended return-to-play protocols for student-athletes that contracted COVID-19 during their playing season. When environments do not represent the more typical conditions that student-athletes train and perform in it may influence study outcomes (Cleary & Zimmerman, 2001). As previously mentioned, the experience of being a student athlete is distinct and is influenced by factors including the sport, the quantity of practice time, and the

workload. The varsity hockey season, for example, is split between the fall and winter semesters in U SPORTS. At Ontario Tech University, the typical hockey schedule involves 4-5 practices per week (depending on the competition calendar) and three off-ice training sessions. The average competition schedule per week consists of two games, and athletes devote almost 18 hours per week to their sport's training (either at home or away). In comparison to students in their fourth or fifth year of study, athletes in their first or second year may have more extra lessons or labs.

With respect to the current study, the COVID-19 disruptions also negatively impacted the planned study design for this project. Initially, the researchers had planned to take a pre-season baseline test of the TSS and SRLSP questionnaires and compare these to end of season results. The researchers had also planned to collect competition data (points, goals, assists) to determine if TSS and SRLSP scores were positively correlated with athletic performance during a game setting. However, due to the multiple COVID-19 pandemic in-season disruptions to the playing schedules and modifications to games depending on positive cases at select universities, this made it difficult to accurately collect this data at the time of data collection. Therefore, these results reflect a modified playing season post-COVID-19 lockdown in the 2020/2021 season.

Future Directions

Future research suggests that an equal distribution of male and female student-athletes may provide a more nuanced understanding of the influence of self-efficacy and self-regulation on training and performance outcomes in varsity athletes. The researchers also suggest that developing a different model for data collection (such as observations from various external

sources) that can be distributed to a variety of OUA sanctioned institutions would further eliminate any presumptions of sampling and response bias. The researchers recommend that a follow-up study should be completed to provide a more generalized representation of a complete OUA season since the results of this study were based on modified training and competition guidelines set in place due to the COVID-19 pandemic. Additionally, it is suggested that further research conducted on student-athletes should be completed for the duration of their athletic season in order to assess how different academic periods (ex. Midterms and final exams) can impact training performance. This would allow for a more accurate reading of athletes' performance as it considers many external factors that influence specific performance outcomes in collegiate sports. The researchers recommend performance related data to be collected at the conclusion of athletes' seasons to compare performance from start to finish. This information would provide researchers with a well-rounded insight on athletes' abilities to set goals and the rate at which they can complete these goals. Moreover, athletes may rate their self-efficacy and/or self-regulation as high, but the results of the performance data would further confirm the validity of the athletes' self-report questionnaires.

Conclusion

This study examined the relationship between self-efficacy, self-regulation, and training. Results showed that most athletes felt confident in specific situations pertaining to training and practice settings, but a more consistent trend was seen in senior student-athletes (years 4 and 5). The researchers recommend that a follow-up study should be completed to provide a more generalized representation of a complete OUA season. Performance related data should be collected at the conclusion of athletes' seasons to compare performance from start to finish.

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Appendices

PHASE 1 (START OF PLAYING SEASON)

Appendix A.

Section 1: Demographic Information

1. How old are you (in years)? _____
2. What year of study/eligibility are you currently in? a. Year 1 b. Year 2 c. Year 3 d. Year 4 e. Year 5
3. Please estimate your grade point average a. A (80-100%) b. B (70-79%) c. C (60-69%) d. D (50-59%) e. F (0-49%)

4. Are you on a men's or women's varsity team?

a. men's

b. women's

5. What is your varsity sport?

a. Basketball

b. Hockey

c. Soccer

d. Rowing

e. Swimming

f. Golf

g. Other (please specify):

_____

Appendix B.

Section 2: Practice Information

We would now like to ask about your practice history. ***Please answer the questions in this section with respect to your experience in your varsity sport.***

1. At what age did you start participating in your sport? _____

2. Roughly, how many hours a week did you devote to training/practice during this time? _____

3. How many hours a week on average do you <u>currently</u> spend in

training/practice? _____

4. How many hours a week on average do you <u>currently</u> spend in competition?

_____

Appendix C.

Section 3: TSS

1 = no confidence

2

3

4

5

6

7 = complete confidence

As an athlete, how confident are you in your ability to …

1. Put high amounts of effort into physical fitness training such as running or weight training? **1 2 3 4 5 6 7**
2. Practice hard even if teammates or other athletes are unavailable to work with you? **1 2 3 4 5 6 7**
3. Dedicate a lot of time and energy to practicing your sport? **1 2 3 4 5 6 7**
4. Put in the physical effort to practice for long periods of time? **1 2 3 4 5 6 7**
5. Practice alone to improve your skills? **1 2 3 4 5 6 7**
6. Put in the effort to meet the demands of the hardest forms of physical training in your sport? **1 2 3 4 5 6 7**
7. Increase your practice time and effort as your skills develop? **1 2 3 4 5 6 7**

8. Practice decision-making skills that improve your performance? **1 2 3 4 5 6 7**
9. Use your personal skills and abilities to maximize time and effort in training? **1 2 3 4 5 6 7**
10. practice game tactics and technical training to improve your skills? **1 2 3 4 5 6 7**
11. Practice psychological skills such as imagery, goal-setting, and relaxation techniques to improve performance? **1 2 3 4 5 6 7**
12. Practice weaker skills even when it requires a lot of physical effort? **1 2 3 4 5 6 7**
13. Practice weaker skills even when they require a lot of attention? **1 2 3 4 5 6 7**
14. Learn from your mistakes and fix them during practice? **1 2 3 4 5 6 7**
15. Use instructive feedback from your coaches in practice to improve your skills? **1 2 3 4 5 6 7**
16. Change and adjust your practices as your performance needs change? **1 2 3 4 5 6 7**
17. Maintain high motivation to practice without the Help of significant others such as parents and friends? **1 2 3 4 5 6 7**
18. Maintain high motivation to practice even when practice is not fun? **1 2 3 4 5 6 7**
19. Maintain motivation to practice without being identified as someone talent in your sport? **1 2 3 4 5 6 7**
20. Practice hard even if your coach is unavailable to work with you? **1 2 3 4 5 6 7**

Appendix D.

Section 4: Self-regulation Questionnaire

This appendix outlines the Self-Regulated Learning for Sport Practice (SRL-SP) survey (McCardle et al., 2018) *as it was used in the current study*. As noted in the conclusion of the affiliated article, to clearly distinguish this configuration from prior and disparate (i.e., dispositional) versions of self-regulated learning surveys, we have titled this version the Self-Regulation of Sport Practice (SRSP) survey.

Preface

Think about your most important practice sessions each week. Within these sessions you engage in many tasks and not all practice segments are equally relevant to your development as an athlete. We would like you to think in particular about those practice tasks that challenge you.

For example, they may challenge you because they address your specific performance gaps between where you are now and where you want to be. They may demand a lot of mental and physical effort. Because these important tasks target the areas that you have to work on the most, they might not be enjoyable but they are important for your development.

Please read the following statements and choose the response that best describes you. There are no right answers -- please describe yourself as you are, not how you want to be or think you should be.

Strongly Disagree	Disagree	Slightly Disagree	Neither Agree Or Disagree	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

1. I determine how to approach a practice task before I begin.	1	2	3	4	5	6	7
2. I do not check how well I am doing during a practice session.	1	2	3	4	5	6	7
3. After finishing, I look back on practice tasks to evaluate my performance.	1	2	3	4	5	6	7

4. I concentrate fully when I do a task at practice.	1	2	3	4	5	6	7
5. When facing difficulties at practice I can rely on my coping abilities.	1	2	3	4	5	6	7
6. Before practice tasks, I carefully plan my course of action.	1	2	3	4	5	6	7
7. Before practice tasks, I consider the parts of the task I have to complete.	1	2	3	4	5	6	7
8. I do not set specific goals before starting practice tasks.	1	2	3	4	5	6	7
9. I check aspects of my workout while doing it.	1	2	3	4	5	6	7
10. I think about my past experiences at practice to gain new insights.	1	2	3	4	5	6	7
11. I usually put forth my best effort when performing tasks at practice.	1	2	3	4	5	6	7
12. I am confident that I can deal efficiently with unexpected events at practice.	1	2	3	4	5	6	7
13. I try to understand the goal of a practice task before I do it.	1	2	3	4	5	6	7
14. Before practice tasks, I figure out what I need to do to accomplish my goals.	1	2	3	4	5	6	7
15. I reflect upon my actions at practice to see whether I can improve them.	1	2	3	4	5	6	7
16. I am unable to handle unanticipated challenges during practice.	1	2	3	4	5	6	7
17. I usually keep working hard even when sport training tasks become difficult.	1	2	3	4	5	6	7
18. When I am confronted with a difficulty during practice, I can usually find several solutions.	1	2	3	4	5	6	7
19. I think about what a practice task requires me to do before I do it.	1	2	3	4	5	6	7
20. Before I do a practice task, I think through the steps in my mind.	1	2	3	4	5	6	7

21. I look back to check if what I did in practice was right.	1	2	3	4	5	6	7
22. When thinking about my practice, I reflect about my strengths and weaknesses.	1	2	3	4	5	6	7
23. I know how to handle unforeseen situations during practice, because I am resourceful.	1	2	3	4	5	6	7
24. I have trouble maintaining my best effort when practice tasks become difficult.	1	2	3	4	5	6	7
25. I don't give up at practice even if a task is hard.	1	2	3	4	5	6	7
26. I clearly plan my course of action before starting practice tasks.	1	2	3	4	5	6	7
27. I look back to see if I did the correct procedures at practice.	1	2	3	4	5	6	7
28. I do not evaluate whether I am getting better from practice to practice.	1	2	3	4	5	6	7
29. Before practice tasks, I figure out my goals.	1	2	3	4	5	6	7
30. No matter what comes my way at practice, I am usually able to handle it.	1	2	3	4	5	6	7
31. Even when I don't like a task during practice, I work hard.	1	2	3	4	5	6	7

Appendix E.

PHASE 2 (CURRENT-SEASON)

Section 6: Current-Season Training Information

1.1 Thinking about all types of training/practice - team practice, any individual (solo) practice, strength & conditioning, mental prep (e.g., imagery or game tape):

How many total hours did you devote to training/practice during this past week (last 7 days)?

Have you had an injury or other circumstance that kept you from regular training during the last 7 days? (select one)

Yes	☐
No	☐

[three weeks later]

Thinking about all types of training - team practice, any individual (solo) practice, strength & conditioning, mental prep (e.g., imagery or game tape):

1.2. How many total hours did you devote to training/practice during this past week (last 7 days)?

1.1Have you had an injury or other circumstance that kept you from regular training during the last 7 days? (select one)

Yes	☐
No	☐