2022

Concussion education reporting and training (CERT)

BOSTON UNIVERSITY

SARGENT COLLEGE OF HEALTH AND REHABILITATION SCIENCES

Doctoral Project

CONCUSSION EDUCATION REPORTING AND TRAINING (CERT)

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Submitted in partial fulfillment of the

requirements for the degree of

Doctor of Occupational Therapy

2022

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ACKNOWLEDGMENTS

My Family and Friends: Mom, Dad, my sisters Teresa and Bella, my grandmother, cousins, and friends thank you for your constant encouragement and motivation throughout this doctorate journey. Also, for tolerating my lack of presence.

Thank you, to Dr. Daniel Rortvedt, my Academic Mentor at Boston University, classmates, instructors in the occupational therapy doctorate program, and Dr. Lauren Telesmanic. Thank you all for your support.

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ABSTRACT

Introduction of the problem: According to McCrory et al., (2017) a sports related concussion is a traumatic brain injury induced by biomechanical forces (pp. 839). It is estimated that up to 1.9 million of those reports account for adolescents and children (Bryan et al., 2016, as cited in Halstead et al., 2018). Despite the high prevalence, many adolescent athletes have limited knowledge regarding concussions and even with the knowledge they refuse to report their possible concussion to a coach or another authority figure. A professional's knowledge and self-efficacy to identify and treat a possible concussion are key components in the recovery and safety of the adolescent athlete. **Proposed intervention:** To address the above area of need, this author is proposing the Concussion Education Reporting and Training (CERT) program. The primary stakeholders participating in the program will be adolescent athletes participating in team-based sports for their respective schools and school-based staff. The adolescent athlete portion will be divided into two sections. The first section will be with the entire team to educate them on signs and symptoms of concussions, management, return to play guidelines, and the importance of reporting concussions. The second part will be provided to selected members of the team identified by the coaches. This phase will focus on implementing strategies to increase their reporting of concussions and encouragement of teammates to report their concussions. **Design:** Qualitative and quantitative data will be collected through pre and post survey, comparison of reporting concussions through the seasons, and semi-structured interviews with participants. **Conclusion:** Supported by evidence found in literature, this program has the capability to educate and promote concussion awareness that will prevent devastating outcomes for your student athletes impacting their quality of life and will provide staff with the means to effectively manage student athletes' concussions to maintain their independence and return to full participation in athletics and academics.

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CHAPTER ONE
Outline of Doctoral Project

Outline

"It is estimated that 1.6 million to 3.8 million sports and recreation related traumatic brain injuries, including concussions, occur every year in the United States" (Langlois et al., 2006, as cited in Rivara & Graham, 2013). Of those numbers it is estimated that up to 1.9 million of those reports account for adolescents and children (Bryan et al., 2016, as cited in Halstead et al., 2018) After, a review of the literature, there are no estimates on the number of unreported sports related concussions per year. Given the mentioned statistics of concussions related to sports, the occupational therapy profession has not addressed an effective course of action to educate themselves to address this need. After an in-depth review of current and past literature on occupational therapy and concussions, found there was limited literature of this topic. This statement was confirmed by Finn (2019) and Sinnett & Franzsen (2020). Despite the lack of research in this area, occupational therapists have a valuable role to play in concussion management. Whether it's environmental modifications, re engagement in valued occupations, and ocular motor intervention, are just a few examples occupational therapists can use in treating an individual suffering from a concussion.

The two problems I will address in my doctoral project are to increase reporting of sports related concussions within the adolescent population and promote occupational therapists and other school-based staff management of adolescent concussions. To promote school-based staff concussion management abilities, the outcome I am seeking is to educate school staff on functional assessments, evidence-based interventions, and environmental modifications to reengage student athletes back to their valued roles safely. While for the adolescent athletes the outcome I am seeking is to increase knowledge and reporting of concussions through education. My method for measuring these outcomes are pre/post surveys, semi structured interviews, and comparisons of diagnosed concussions from the prior season to the current season

Implication of the Problem to the OT Profession

Despite the high prevalence of concussions adolescent athletes often remain in the game running the increased risk of a secondary and more detrimental concussion (Halstead, 2018; Lueke, 2011). As Beidler et al., (2018) found that 76% of athletes witnessed a teammate suspected of a sports related concussion remain in the game. This creates opportunities for occupational therapists and other school-based staff to make a positive impact in so many lives. Due to the varying symptoms and length of recovery it is important that athletes understand how a concussion can impact their occupational performance in both the short and long term. Consequences for an athlete failing to understand can result in a loss of preferred leisure activity, and impaired ability to functionally engage in areas of occupations. Student athletes can experience delays in intellectual and social development and decreased performance in school resulting from a concussion (Beilinsohn, 2001; Guskiewicz & Mcleod, 2011, as cited in Sinnett & Franzsen, 2020).

Undiagnosed sports-related concussions affect four areas of an adolescent's daily life such as cognition, rest/sleep, emotion, and body (Beidler et al., 2018; Chrisman et al., 2017; McCrory et al., 2017). These areas have a significant impact as stated in the

Domain of Occupational Therapy Practice Framework (OTPF). Within the context section of the OTPF is attitude for both the individual and social group. It is common practice within sports for players to not report a concussion or their teammates (Beidler et al., 2018; Cook & Hunt, 2020; Sye et al., 2006) This is because players want to be in the game and not let their teammates down. As for performance patterns concussions cause minor to major disruptions in an individual daily habits, roles, and routines. Symptoms of a concussion can decrease an individual's performance skills in the areas of motor, processing, organizing timing, and maintaining flow of social interaction. Concussions can impact client factors in the areas of specific mental functions, global mental functions, and sensory functions. In combination with these factors, athletes can experience negative occupational performance in the areas of sleep, education, socialization, and participation in physical activity (Chrisman et al., 2017; Sinnett & Franzsen, 2020)

Table 1.1

Effects of a Concussion within the Occupational Therapy Domain

Occupations Contexts	Performance Patterns	Performance Skills	Client Factors	
-ADLS -IADLS -Leisure -Rest & Sleep -Social Participation	-Environmental factors (attitudes)	-Habits -Roles -Routines	-Motor -Processing -Organizing Timing -Maintaining flow -Social Interaction	-Specific mental functions -Global mental functions -Sensory functions

Cause/Contributing to this problem

1. Potential fear of losing playing time- Student athletes want to play. From personal experience, my teammates and I always wanted to play and despised sitting on the bench. Unless it was a significant injury that could visibly be recognized by others we always tried to play through the pain because if we didn't, we would have to sit the bench and if our backup played well there was no guarantee our starting role would be available when we recovered.

2. Lack of knowledge- Though concussions are a hot topic in the media and in sports medicine, most student athletes lack the knowledge to identify a concussion, impact on their lives, and the danger of multiple concussions can have on their long-term health. In some cases, players may not be aware of all the symptoms of a concussion or do not interpret it as significant. In a study by Beidler et al. (2018), found that 63% of athletes did not report a concussion, stating either they did not know it was a concussion or did not think it was a serious matter.

3. Difficult to identify-For many professionals, identifying an athlete with a concussion can be difficult. Unlike physical injuries where a player is visibly impacted by their inability to run, throw, or move, concussions are hard to assess or notice at first glance.

4. Lack of clear understanding of concussions- In the medical field there is a lack of universal clarity of the minimal requirements to be diagnosed with a concussion (Guskiewicz & Valovich McLeod, 2011). Without this clarity athletes and professionals will continue with their difficulty to appropriate assess the extent of the concussion.

5. Exclusion from the team- When a player of a team is suffering from a possible concussion it is common that teammates won't report their symptoms. There are several reasons why. One example is nobody wants to be viewed as a whistle blower and risk being excluded from members of the team.

6. Loss of role for the player- Injured players often feel excluded from the team, as they are not active participants within practice, game planning, games or team events.

Proposal to address the problem

1. Education- Providing athletes with the knowledge of symptoms and long-term effects may decrease the number of concussions that go unreported. Also, by providing school-based staff with information and strategies to assist the athlete in returning to sport, academics, and social life. The intent is to provide an online educational course that not only provides education, but changes behaviors

2. Group intervention- In a study by Beidler et al. (2018), found that 76% of college student athletes witnessed a teammate remain in the game while having a suspected sports-related concussion. The goal of group intervention is for teammates to assist in identifying and encouraging a teammate exhibiting concussion like symptoms to be evaluated. This will be completed within the second section for the adolescent athletes.

4.Interventions and Assessments for school-based staff- This section will focus on the OT process of assessments, planning (education & collaboration), interventions (modifications, education, and treatment). Based on the limited literature on occupational therapy and concussion management, the most commonly used assessment tools are those based on vision, ADLs, and the SCAT3(Brayton-Chung et al., 2016; Finn & Waskiewicz, 2015). In the planning process, educating and collaborating are essential to effectively treating student athletes' concussion symptoms. Occupational therapists can assist in the recovery of student athletes in the areas of education, assessment, intervention that focus on return to valued occupations, and environmental modifications. Collaborating with teachers, parents, and coaches in modifications they can implement to ease the student athletes' concussion symptoms can keep them involved in valued occupations while they recover. These can be environmental modifications such as dim lighting, and quiet environment. Also, extension of school assignments, and chores. For intervention, a study by Boisgontier et al. (2020), concluded that as adolescents gradually increased their participation in daily life physical activities, concussion symptoms decreased. Incorporating the results of this study to valued occupations may have similar results. Here is an example of gradual use of daily life activities. A student athlete whose concussion impacts their ability to complete chores at home, a gradual time increase in completing those chores will be beneficial in occupational engagement without exacerbating their symptoms, while also preventing deconditioning from excessive rest. To address the loss of role, OTPs can base their interventions around gradual re engagement in those valued roles.

CHAPTER TWO
Theory and Evidence Based Explanatory Model

Introduction

In the previous chapter this author identified the problem of adolescent athletes and concussion, with an identified gap/opportunity for occupational therapy practitioners (OTPs) and other school-based staff to support these athletes in their recovery and resumption to meaningful occupations. Throughout this chapter the author will synthesize the proposed problem supported from literature using Social Cognitive Theory. First, an overview of the proposed problem will bring to light the many problems adolescent athletes find in reporting concussions and difficulty in effectively treating concussions. Finally, the author will provide an in-depth review of literature gathered to support the proposed explanatory model.

Social Cognitive Theory

According to LaMorte (2019), Social Cognitive Theory (SCT) was created by Albert Bandura in 1986. SCT theory originated from his Social Learning Theory, which he developed in the 1960s. The context of Social Cognitive Theory seeks to explain the multi-dimensional interactions between personal factors, the environment, and behaviors to achieve an overarching goal that people can achieve and maintain a skill. Bandura (1986) details this theory further by stating that the three factors (personal, environment, behavior) interact bidirectionally rather than unidirectionally. The bidirectional causation was a unique component as prior psychological theories only explained a unilateral causation.

The core assumption of SCT is that people can learn and change their behaviors through the development of skills. In order to explain this assumption, SCT is broken down into six constructs. The six constructs; reciprocal determinism, behavioral capacity, observational learning, reinforcement, expectations, and self-efficacy, explain the processes that change human behavior (LaMorte, 2019).

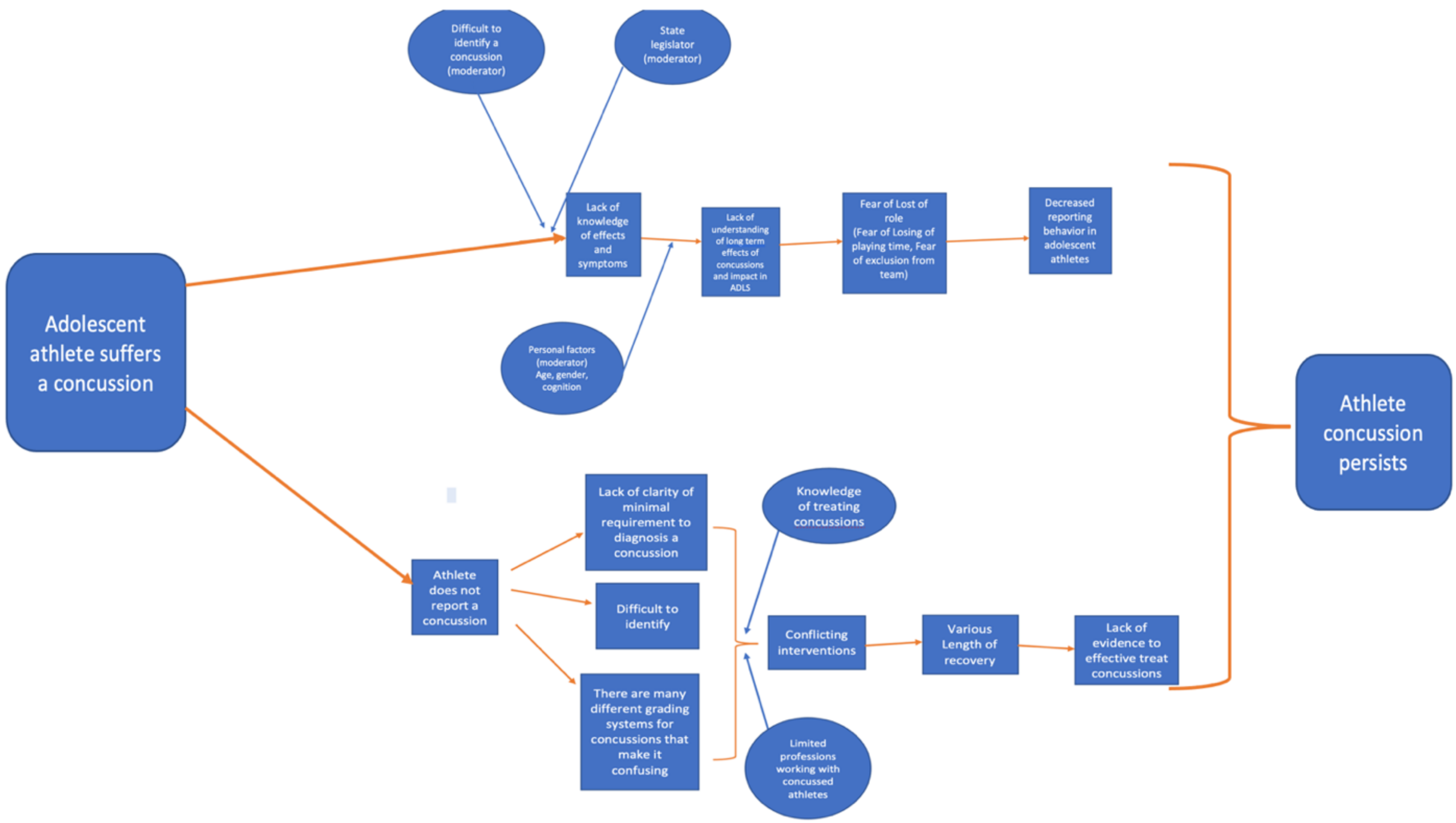
After a review of the literature, many studies identified that behaviors inhibit self-reporting of concussions (Beidler et al., 2018; Black et al., 2020; Carpenter et al., 2020; Chinn & Porter, 2016; Cook & Hunt, 2020; Eagles et al., 2016; Guskiewicz &Valovich McLeod, 2011; Halstead et al., 2018; Kurowski et al., 2014; Manasse-Cohick & Shapley, 2014; Meier et al., 2014; Ramsey & Dahinten, 2020; Sye et al., 2006). SCT was designed by Bandura to change human behavior through the development of skills taught using the six constructs. Combining the problem of behaviors inhibiting the reporting of concussions for adolescent athletes, SCT will be utilized as a framework to address these factors to promote a behavior change to increase self-reporting of concussions.

Overview of proposed visual model of the problem

The moment an adolescent athlete becomes concussed during a sporting event it is up to the coach or athletic trainer present to remove that athlete from play. However, due to many factors this is not always the case. Beidler et al., (2018) found that 76% of athletes witnessed a teammate suspected of a sports related concussion remain in the game. A clinician’s knowledge and self-efficacy to identify and treat a possible concussion are key components in the recovery and safety of the adolescent athlete. There are several factors that hinders a clinician’s ability to effectively identify and diagnose an athlete with a concussion. Unlike most injuries that hinder an athlete's ability to complete basic motor functions required of the sport, concussions can easily go unnoticed. In the medical community there are several available grading scales to assess the severity of concussions. Without a standard method, professionals can be confused and therefore misinterpret the severity of each concussion. Just as education and self-efficacy impacts a professional ability to assess a concussion. This also hinders the athlete’s ability to self-report their concussion. Based upon each state's legislation an adolescent athlete may not be educated on the symptoms (Lueke, 2011) and effects concussions can have on their ability to perform ADLs or meaningful occupations. When treating concussions, it was found that many occupational therapists have limited knowledge and experience, with OTPs scoring lower than most healthcare professionals on concussion knowledge (Finn, 2019). Without a standardized method of treatment, excessive rest may lead to deconditioning and early engagement in physical activity can cause further harm to their well-being (Chrisman et al., 2017). Due to lack of education and personal factors such as age, gender, and cognition an athlete may not know how to manage their concussion. Taking these moderators and mediators into account along with the athlete not wanting to miss playing time, be excluded from the team, or fear of losing a valued role, athletes are less likely to report their concussion. Please see Figure 2.1 for a visual representation of the causal pathway to the problem.

Figure 2.1

Causal Pathway of the Problem



Evidence supporting the proposed explanatory model

From the time an adolescent athlete suffers a concussion there are several factors impacting self-reporting. One influencing factor of why an athlete may not report a concussion is the extent of their knowledge. This is explicitly referenced in several articles: Beidler et al. (2018), Guskiewicz & McLeod (2011), Halstead et al. (2018), Lueke (2011), and Sye et al. (2006). Due to the limited of knowledge of concussions, adolescent athletes lack the understanding of the effects concussions can have on their occupations. In a study by Beidler et al. (2018), 63% of athletes did not report a concussion, stating either they did not know it was a concussion or did not think it was a serious matter. This was also reinforced by many articles previously mentioned. Even with proper knowledge and understanding of concussions, many athletes fear missing playing time, resulting in potential loss of a valued role such as being a team member. Many of the articles cited reasons of fear of losing playing time, not wanting to let the team down, or the importance of a game to not report a concussion. Combining these mediators continues the under reporting of sports related concussions in this population.

From a clinician perspective, there is difficulty in identifying/diagnosing a concussion. According to Halstead et al. (2018) there are over 25 different concussion grading scales and no universally accepted definition of sports related concussions. This makes it difficult to identify a possibly concussed athlete. With multiple assessments available, clinicians typically rely on self-reporting from the athletes. Through these factors the author anticipates that there is a lack of clarity of the minimal requirement to diagnose a concussion. Within the occupational therapy (OT) process there is a pattern of assessment followed by treatment. This is mirrored within the process of concussion management. The literature states that clinician experience/confidence plays a major role in effective treatment of concussions. In an article by Finn (2019) OTPs who engaged in continuing education on this topic and training were more confident in treating concussions. To magnify the limitations that clinicians face during the intervention process is the conflicting literature between rest and gradual return to meaningful occupations. Depending on the severity, the length of the concussion intervention will vary. According to McCrory et al. (2017), clinicians have a difficult time establishing a time of recovery due to a lack of evidence-based testing. Concussions within this population can range from one to four weeks (Halstead et al., 2018). However, if an adolescent athlete is diagnosed with persistent concussion syndrome the length of recovery may be several months to a year. The final influencer many clinicians face is the lack of evidence-based interventions to support their treatments. From this author's literature review there appears to be a lack of consensus around best practices for intervention. The two main staples of interventions are complete rest and gradual return to sport and academics.

Level of evidence

A total of fifteen articles were reviewed. Of these, nine articles were deemed level five evidence. Three articles were deemed level four evidence. Two articles were deemed level three evidence and one article was deemed level two evidence. Though the articles incorporated in the critical appraisal are low levels of evidence, the information found provided strong qualitative information that is useful in addressing why adolescent athletes do not report concussions and barriers affecting treatment of concussions.

Impact of limitations

Of the fifteen articles that were reviewed, fourteen are low levels of evidence. What qualifies as low levels of evidence are those that are between level five and three. Low levels of evidence can impact what interventions can improve underreporting and treatments of concussions within the adolescent populations. This was apparent as most of the studies only identified the problem and did not provide interventions.

Within five of the articles that were not qualitative studies, all had small sample sizes. This was due to limited access to other sports or self-limitation to certain sports. This limitation impacts the generalization of their study to the population as a whole.

Conclusion

An in-depth review of current and past literature on occupational therapy and concussions found there was limited literature on the topic of educating adolescent athletes on concussion management and addressing behaviors that inhibit reporting. When literature was found that fit the scope of this topic, the author noted that an overwhelming majority of research was qualitative and low levels of evidence. As stated previously this limits the authors ability to effectively assess interventions to address this area of focus and due to small sample sizes within these studies inhibits the ability to generalize the results to the population at large.

A review of the literature found that based upon each state's legislation an adolescent athlete may not receive concussion education (Lueke, 2011) and the impact on their ability to perform ADLs or meaningful occupations. Not wanting to miss playing time, being excluded from the team, or fear of losing a valued role, are all factors that result in athletes' reduced likelihood to report their concussion. Without a standard method, professionals can be confused and therefore misinterpret the severity of each concussion. Without a standardized method of treatment, over rest may lead to deconditioning and premature engagement in physical activity can cause further harm to their well-being. When treating concussions, it was found that many occupational therapists have limited knowledge and experience. To address problems in athletes' and clinicians’ knowledge, reporting behaviors, and management, the SCT framework will serve as a foundation to the proposed educational training.

CHAPTER THREE
Review of current approaches and methods

Throughout this reading this author will summarize interventions that have been utilized to address the proposed problems. First, an overview of what studies/educational trainings have been used to increase knowledge and reporting of concussions within the adolescent population and trainings that has been used to educate clinicians working with this population will be provided. Finally, the author will provide an in-depth review of the proposed doctoral project, highlighting differences and opportunities to address areas believed to be of importance from the current literature.

Evaluative summary of methods

A search and evaluation of the literature from the Boston University library database primarily focused on studies whose participants were adolescent athletes and/or clinicians managing or receiving concussion education. Narrowing the search to peer reviewed articles from 2010 to the current year (2022) the following search terms were used; concussions, reporting behaviors, interventions, adolescents. With interventions focused on group education to improve concussion knowledge, reporting behaviors, improving clinician knowledge regarding concussion management and interventions. What follows is an evaluative summary of the studies that fit the focus of this search and results for each.

Adolescent athletes

A review of the literature revealed a variety of courses that exist which have been designed to educate the adolescent athlete population on concussions, but there appears to be limited interventions designed to address reporting behaviors. Williamson et al. (2014) reviewed five nationally recognized concussion education courses. These authors summarize each course focus population, dissemination of information, and differences. While all appeared to address either concussion knowledge or reporting behaviors, none addressed both. Ramsay and Dahinten (2020) conducted a literature review on concussion education with youth athletes. Their results indicated that increased knowledge did not translate to increased reporting of concussions (also found in Manasse-Cohick & Shapley, 2014) there was wide variability in youth athletes' knowledge of concussion and return-to-play guidelines, and that concussion education courses had immediate effects, but were not lasting.

This variability in athletes' concussion knowledge may be dictated by the sport they play and previous concussion education. In a study by Carroll-Alfano (2017), a concussion education course for college athletes found that though athletes are mandated to receive concussion education playing high school sports, 25% of freshman college athletes reported they have not received previous concussion training prior to college. Diving deeper into this problem, results concluded this could be due to the sport they play as football players reported a significantly higher rate in concussion education than volleyball players. To address carry over of newly acquired knowledge of concussions and reporting a theoretical paper by Kroshus & Chrisman (2019) suggest using the integrated behavioral model to create "safety huddles". The purpose of these safety huddles are for coaches, athletes from opposing teams, and referees to review concussion education and emphasis the importance of reporting as a method to increase carry over and apply acquired knowledge in a realistic setting. However, it should be noted that the authors are suggesting a theoretical concept that has not been applied.

The use of social media has also been incorporated in concussion education for adolescent athletes. Ahmed et al., (2017) used a private Facebook page to invite participants with a sports related concussion to engage in concussion education with each other, a physician, and a physical therapist. Information posted consisted of key information for the 2008 consensus statement: signs/symptoms, rest, return to play, and seeking medical attention. Also, websites with accurate information, videos, daily posts, and polls to stimulate engagement were provided. Participants could also email the physician for a consultation. Results from this study found the setting to be well-received and a significant number of participants reported their concussion knowledge increased. Key points highlighted by the participants are need of rest, importance of gradual return to play, and to be symptom free before return to play. However, very few of the participants followed the advice stated in the Facebook page. One area not addressed was peer-to-peer interaction as this educational design may be perfect for peer-to-peer interaction to help cope with the emotional effects that are associated with concussions.

Clinicians

Clinicians are frequently unaware of appropriate interventions to address sports related concussions (Chrisman et al., 2017; McCrory et al, 2017). Maerlender et al., (2019), provided training to school-based clinicians on ten competencies. Clinicians rated treatment approaches and individual recovery as the two most important information learned in the class from a five month follow up.

One treatment option that may be effective within the occupational therapy profession is gradual resumption to daily life activities. Boisgontier et al., (2020) found that adolescent athletes diagnosed with a concussion who engaged in unstructured physical activity that was motivating correlated with reduction in concussive symptoms. Interestingly, the authors found that for every increase in physical activity by one standard deviation correlated to a decrease in concussion symptoms by over four units. Similar results were found by physical therapists in a study by Chrisman et al., (2017) along with an increase in emotional state and confidence.

Though this author has emphasized interventions from the physical therapy and occupational therapy perspectives these interventions can be replicated across multiple disciplines. Also, it is imperative to remember that speech language pathologists, teachers, athletic trainers, coaches, and the adolescent are important members of the team that have unique and valuable knowledge. Each discipline is encouraged to provide evidence-based interventions that are of the highest quality to the concussed athlete. "An intimate understanding of each other's roles and responsibilities with optimal communication between members, and contemporary knowledge of best practices in concussion management will ensure safe and efficient return to activity by athletes" (Pabian et al., 2017, pp. 130).

Impact to the proposed program

A literature review by Ramsay and Dahinten (2020), four areas of concern were involved when addressing concussion education for youths. There is wide variability in youth's concussion knowledge also stated in a study by Carroll-Alfano (2017). Youth are unaware of return to play guidelines, information learned in concussion education courses are not retained over the course of a season similarly stated by Kroshus & Chrisman (2019), and that concussion education does not necessarily translate to behavior change (Black et al., 2020, and Manasse-Cohick & Shapley, 2014).

Aspects from these studies that may be incorporated into the proposed doctoral project that will be beneficial for learners. This may be especially true for clinicians rather than the adolescent athletes. Within this section will be a proposal of concerns within the literature that will be addressed and strengths that may be incorporated to create "guidelines" that benefits the adolescent athletes and the clinicians to assist.

Clinicians

For many clinicians using appropriate evidence-based interventions is a top priority when managing concussion symptoms within this population. Several articles found that a gradual return to physical activity that is just below the level where symptoms exacerbate has shown evidence to decrease concussion symptoms (Boisgontier et al., 2020, Leddy et al., 2010, Chrisman et al., 2017). This has been supported by the 2016 International Conference on concussion in sport. This gradual increase in physical activity can be used across multiple disciplines and very easy to incorporate in daily practice. Along with commonly used activities and environmental modifications to lessen the impact of symptoms.

Most importantly will be interdisciplinary collaboration between the disciplines. Though concussions are short lived compared to other diagnoses, the impact on learning and function can be just as debilitating. Promoting an interdisciplinary team approach during the course along with SCT will assist the team to identify roles, monitor progress, and effective interventions to increase self-efficacy and to aid in safe recovery.

Adolescent Athletes

The identified barriers from Ramsay and Dahinten (2020) that are similarly stated in other studies along with SCT will be used as guidelines to support the proposed intervention for adolescent athletes. To address each barrier a construct from SCT will be used to educate, change behavior, and increase self-efficacy. Below will be a description of how each construct will be used to address barriers.

To address both concussion education and reporting behaviors the educational course will be broken down into two phases that will be conducted in a virtual setting. The first phase will be with the entire team to educate them on signs and symptoms of concussions, management, and importance of reporting concussions. The second phase will be with influential members of the team selected by the coaches. This phase will focus on implementing strategies to increase reporting concussions and encourage teammates to report their concussions.

Given the various cognitive levels of adolescents (ages 12–18), educational materials appropriate for each age range will be provided for learning of concussion symptoms, impact on their daily lives, and management including return to play guidelines (behavioral capacity). However, the needs and social dynamic of each team are different. To provide a meaningful experience and individualize the course to their unique needs, reciprocal determinism would be used to identify barriers within personal factors, environment(team), or behavior that prevent athletes from reporting concussions.

In the second phase with influential team members, they will develop the skills needed to address a possible concussion with a teammate or themselves. Implementing these strategies will be key as teammates will observe and adopt these methods from influential team members through observational learning. As athletes become confident (self-efficacy) with these strategies and implement them into the team setting, the hope is that they will increase reporting behavior leading to safe engagement in a meaningful occupation.

CHAPTER FOUR
Description of the Proposed Program

"It is estimated that 1.6 million to 3.8 million sports and recreation related traumatic brain injuries, including concussions, occur every year in the United States" (Langlois et al., 2006, as cited in Rivara & Graham, 2013, pp. 239). Of those numbers it is estimated that up to 1.9 million of those reports account for adolescents and children (Bryan et al., 2016, as cited in Halstead et al., 2018). Since 2010 there has been a significant increase in concussion research, however educational programs designed to increase knowledge and reporting are lacking. A variety of courses exist which have been designed to educate the adolescent athlete population on concussions, but there appears to be limited interventions designed to address reporting behaviors. Williamson et al. (2014) reviewed five nationally recognized concussion education courses to summarize the population, dissemination of information, and differences for each course. While all appeared to address either concussion knowledge or reporting behaviors, none addressed both. Ramsay and Dahinten (2020) conducted a literature review of concussion education with youth athletes. Their results indicated that increased knowledge did not translate to increased reporting of concussion (also cited in Manasse-Cohick & Shapley, 2014) there was wide variability in youth athletes' knowledge of concussion and knowledge of return-to-play guidelines. Further research found concussion education courses had immediate effects, but were not lasting (Kroshus & Chrisman, 2019; Ramsay & Dahinten, 2020). Leading to the belief that behavioral changes surrounding concussion education is needed.

A professional's knowledge and self-efficacy to identify and treat a possible concussion are key components in the recovery and safety of the adolescent athlete. There are several factors that hinders a professional's ability to effectively identify and diagnose an athlete with a concussion. Unlike most injuries that hinder an athlete's ability to complete basic motor functions required of the sport, concussions can easily go unnoticed. In the medical community there are several available grading scales to assess the severity of concussions. Without a standard method, professionals can be confused and therefore misinterpret the severity of each concussion. When treating concussions, it was found that many occupational therapists have limited knowledge and experience. Without a standardized method of treatment, over rest may lead to deconditioning and early engagement in physical activity can cause further harm to their well-being.

Description of Program

To address the above area of need, this author is proposing the Concussion Education Reporting and Training (CERT) program. The primary stakeholders participating in the program will be adolescent athletes participating in team-based sports for their respective schools and school-based staff. As the sole instructor, this author expects to deliver the CERT program through a live virtual educational platform.

Adolescent Athletes

The adolescent athlete portion will be divided into two sections. The first section will be with the entire team to educate them on signs and symptoms of concussions, management, return to play guidelines, and the importance of reporting concussions. The second part will be provided to selected members of the team identified by the coaches.

This phase will focus on implementing strategies to increase their reporting of concussions and encouragement of teammates to report their concussions. This piece is important to changing the behavior on an individual and team level. A study by Kneavel et al., (2020) found peer led concussion program exhibit positive effects towards increased concussion knowledge and reporting intention. Using SCT to teach skills and the construct of observational learning to model the desired behavior through the selected members of the team may increase knowledge and reporting behaviors of the entire team. Most of the behavioral strategies utilized to educate this group will be derived from Social Cognitive Theory.

School Based Staff

For school-based clinicians, the CERT program will be held through a live virtual educational platform. In a one-time course the primary stakeholders (teachers, OTPs, PTs, Speech, and other providers) will receive training on assessments, an evidence-based intervention, and collaboration to help manage symptoms and promote recovery for the adolescent athlete in a school setting. Providing this training the sole instructor will incorporate components of SCT to assist the learners in acquiring skills and increasing their self-efficacy.

Stakeholders & Program scenarios

The CERT program will include key stakeholders who have vested interest in this area. Anticipated key stakeholders for the program are coaches, adolescent athletes, administrators, and school-based staff. A soft launch of the CERT program will incorporate primary stakeholders, living in Orange County, NY. To establish contact with the primary stakeholders this author will promote and seek approval from local school administrators to provide the CERT program to their athletes and clinicians free of cost. To engage the stakeholders this author will provide reasons supported by literature to appeal to each stakeholder's interest and benefits of this program to their health and knowledge.

Overview of important stakeholders & program practice scenario

Stakeholders invited to participate in CERT have been identified to have vested interest in the success of the program. On a micro level, individuals to be included are adolescent athletes, coaches, and school-based staff (related service providers, athletic trainers, teachers, and administrators). While on a meso level, school districts will have vested interest in the safety and well-being for their student athletes. Though parents/caregivers are valuable to the health and well-being of the adolescent, this program is specifically designed for a school setting. Therefore, parents/caregivers are not intended stakeholders, but additional materials could be provided to them outside of the program.

Athletes

Each of the previously mentioned stakeholders have unique needs/problems that participation in this program could address. For the adolescent athletes, many will not report a concussion due to limited knowledge, fear of losing playing time (Beidler et al., 2018, Cook & Hunt, 2020, Lueke, 2011, Halstead, 2018), unaware of the impact a concussion could have on their daily lives (Lueke, 2011), and personal/team beliefs (Beidler et al., Kurowski et al., 2014, Cook & Hunt, 2020, Lueke, 2011). However, playing while experiencing concussion symptoms can increase the likelihood of a second concussion that will be more severe and prolong their recovery time (Lueke, 2011, Halstead, 2018). What was once a two-week recovery timeline may now be six months to a year. Therefore, identifying and reporting a concussion can benefit their health and well-being. As for coaches, they are charged with the care and safety of these athletes. Increasing their knowledge and awareness not only maintains that, but prevents athletes from missing an entire season due to a second concussion.

School Based Staff

School-based staff collective purpose is to increase/maintain students' independence in learning, ADLs, social interactions, and engagement in meaningful occupations. Due to the nature of concussion and the impact on the brain, body, emotions, and sleep (McCrory et al., 2017) engagement and independence in meaningful occupations are affected. As more adolescent athletes increase their concussion reporting the demand for schools to assist will be needed. This also correlates to the school district having a vested interest in this program.

Main objectives

This author intends to address the identified problem by creating an educational course that increases concussion knowledge and reporting behaviors for adolescent athletes. Also, to provide evidence-based interventions while increasing self-efficacy for staff to assess, manage, and assist student athletes in returning to meaningful occupations safely. Through both educational programs adolescent athletes will receive the necessary treatment to manage their concussion so they can return to academics, leisure, and social engagement safely.

Figure 4.1
Logic Model for Adolescent Athletes

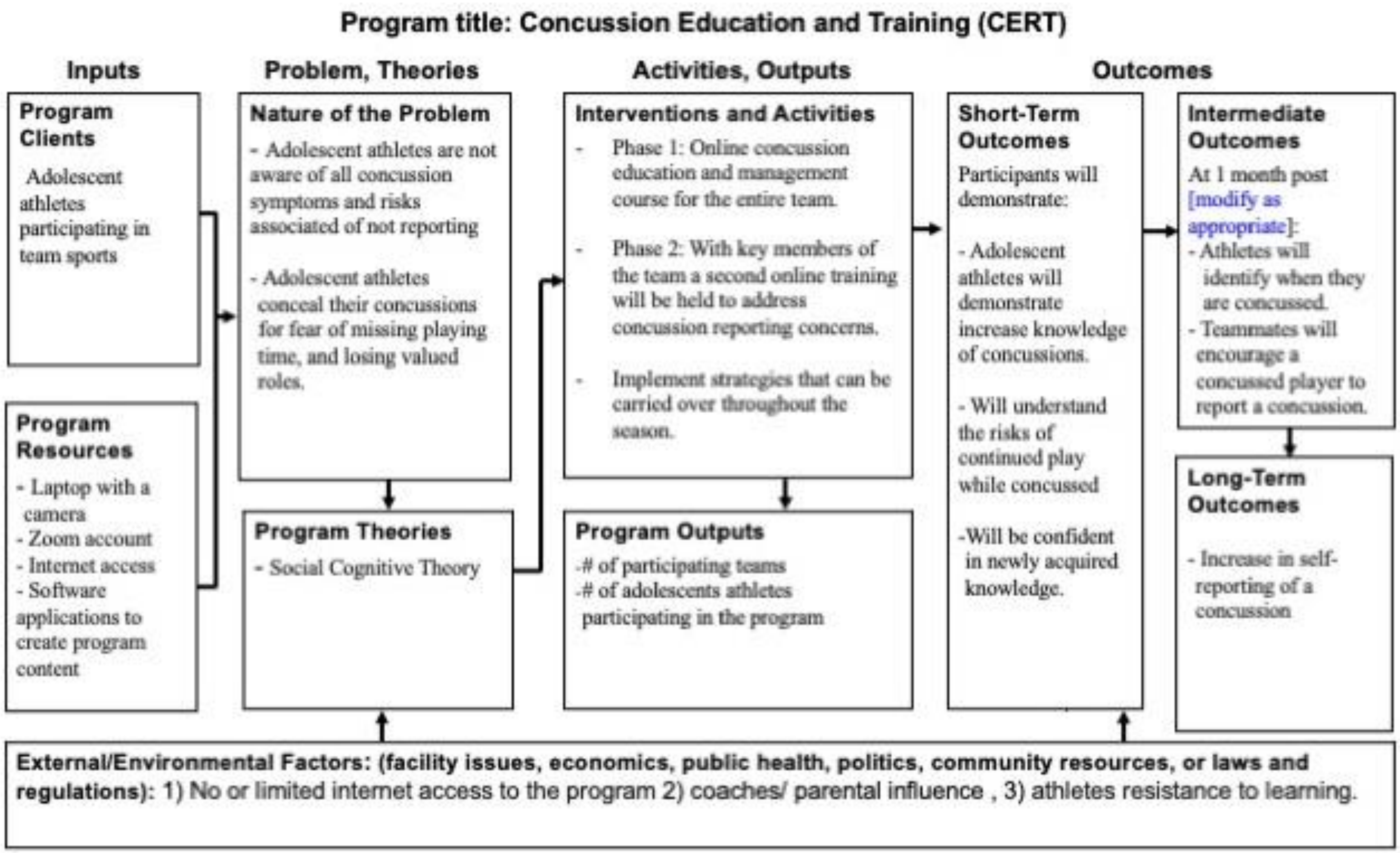
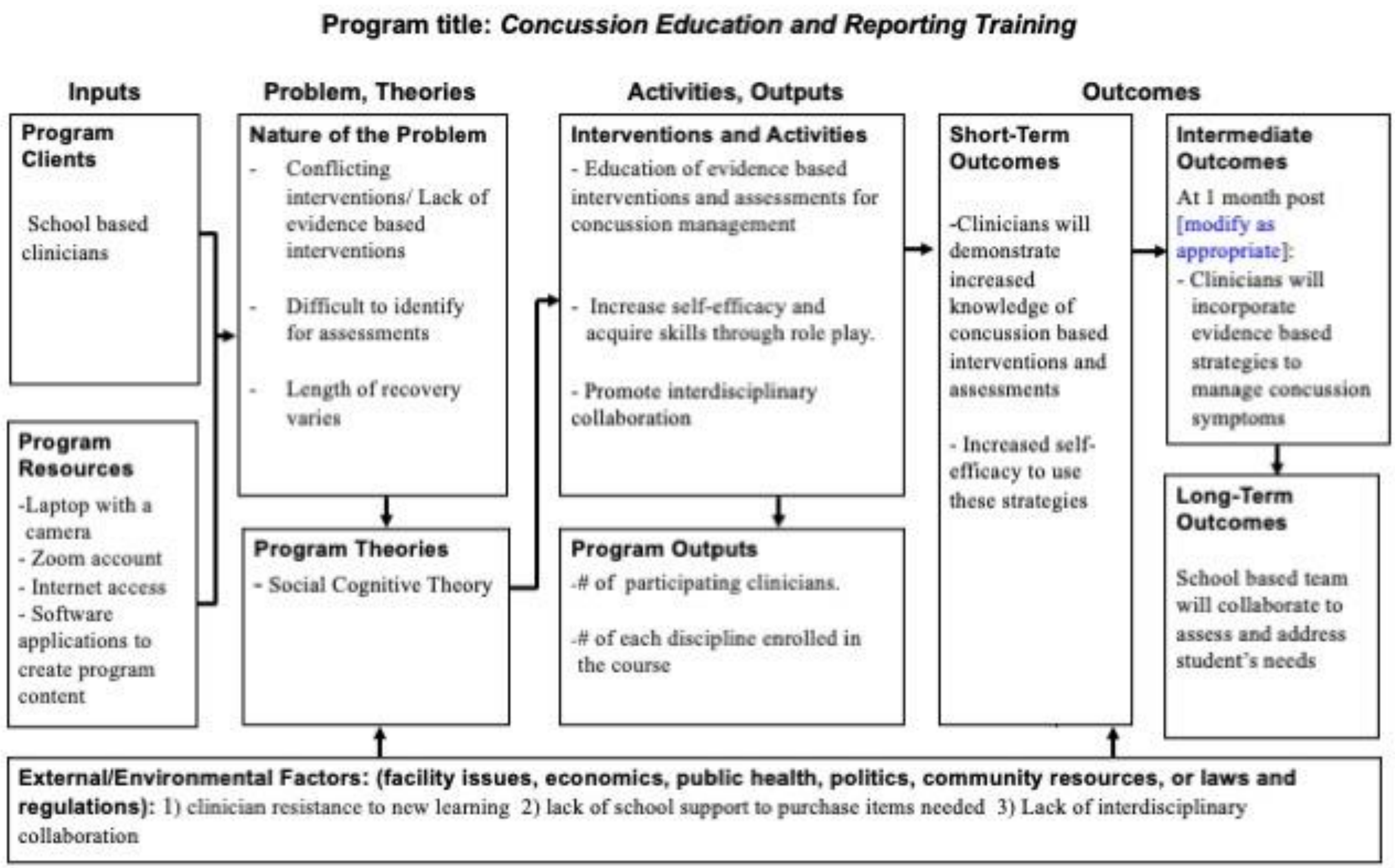


Figure 4.2

Logic Model for School-Based Staff



Program Participants and Resources

Program Participants

As stated earlier, this author is proposing the Concussion Education Reporting and Training (CERT) educational program. The primary stakeholders participating in the program will be adolescent athletes participating in team-based sports and staff employed at their respective school districts. To recruit the participants this author intends to seek approval from each school district to mandate attendance for each team-based sport. For the staff the school districts could offer this as a free "CEU" course during conference days.

To market the program school administrators (primary audience) will be contacted via email, webinar, and social media to set up a in person meeting to discuss the possibility of implementing the CERT program. Included will be contact information and a two-page executive summary that ends with the key message to pique their interest. The two-page executive summary may be the most appropriate approach because it briefly describes the program in a concise and easy to understand format. Once approved, adolescent athletes will receive a text message or email. This author anticipates using one sentence summary of the key message stated. This will allow the adolescent athletes to easily understand the purpose of the program. Please refer to chapter seven regarding the dissemination plan of the Concussion Education, Reporting and Training (CERT) program.

Resources

This author intends to solely carry out this program with a research assistant to help with collecting and measuring data. The CERT program will be carried out on a virtual platform for convenience and to allow learners to be in a physical environment that is conducive for learning. The virtual platform this author is considering to use is Zoom due to familiarity with the program, recording feature, and the popularity of the platform.

Interventions and Activities

Stated prior, the adolescent athlete section will be divided into two parts. The first part will be with the entire team to educate on signs/symptoms of concussions, management, return to play guidelines, and the importance of reporting concussions. To educate the entire team on a virtual platform a slideshow presentation will be used to address signs and symptoms and return to play guidelines. The slideshow will consist of important information with visual, auditory, and interactive modalities to engage the learners. The material will be modified to each age group to increase understanding (behavioral capacity construct from SCT). Management and importance of reporting concussions will be a group discussion to address and individualize strategies that can be beneficial to the team. Reciprocal determinism (construct of SCT) of environmental, personal, and behavior factors that impact reporting and management of concussions. Carry over of the learned information and skills teammates will role play to identify and report concussion symptoms. Through continuous role play their self-efficacy (SCT) will increase.

The second section with the selected team members will focus on implementing strategies to increase concussion reporting and encouragement of teammates to report their concussions. In this phase members will learn strategies and implement through role play. A role play scenario will be a conversation with a possibly concussed teammate to report their concussion or reporting their own concussion. Once self-efficacy has been established, they will implement these strategies in a real scenario. The hope is once the entire team observes the selected team members using these strategies, they will adopt these same behaviors and therefore change the team's behavior (observational learning).

School based staff will receive training on assessments, an evidence-based strategy to help manage symptoms and promote recovery in a school setting. A slideshow presentation using visual, auditory, and interactive modalities will be used to engage the learners. The slideshow will be modified to fit the experience and educational level of the participants enrolled in the course (behavioral capacity). Group discussions will be used to address barriers from an environmental, personal, and behavior perspective (Reciprocal determinism of SCT). Then implement individualize effective strategies that can be beneficial to the team. Self-efficacy will be increased through a case scenario where members will use an interdisciplinary approach to identify symptoms and implement appropriate strategies that will assist the student athlete in a full return to academics, athletics, and other meaningful areas of their lives. Please see the table below for detail on the use of these constructs.

Table 4.1

Summary of key elements of Social Cognitive Theory and connection to specific doctoral project features

Key element	**Brief description of key element**	**Application to doctoral project**
Behavioral capacity	Behavioral capacity is an individual's ability to perform a behavior through skills and/or knowledge (LaMorte, 2019)	Given the various cognitive levels of adolescents (ages 12–18) and education levels within the school-based staff, educational materials will be modified appropriately. This will increase learning and understanding for both groups.
Reciprocal determinism	Reciprocal determinism is a bidirectional causation between personal factors, environment, and behavior that cause change within an individual.	Reciprocal determinism would be used in the initial stages of learning to identify barriers within personal factors, environment or behaviors that prevent athletes from reporting concussions and school-based staff from effectively treating concussions.
Observational learning	Observational learning is a person's ability to learn through the modelling of others.	Once barriers are identified and athletes understand how concussions can affect their everyday lives along with increased knowledge in identifying concussions, next will be providing strategies through observational learning. Observational learning will be utilized for carry over and maintaining the strategies throughout the team.
Self-efficacy	Self-efficacy can be defined as an individual's confidence to implement and maintain a new skill or behavior	Athletes and school-based staff will increase confidence (self-efficacy) with strategies learned from the program and implement them into their appropriate setting. The hope is that they will increase reporting behavior and effective concussion management.

Program Outputs and Outcomes

To measure concussion knowledge, management, and return to play guidelines, a survey (see appendix B and C) will be distributed just before the training and just after to assess changes. The short-term outcome of the pre/post testing is to measure intended changes from the course. A previous study that demonstrated concussion knowledge retention was Eagles et al., (2016). This study measured concussion knowledge retention during a follow-up period of four to six months post. Results showed that concussion knowledge was retained during the follow up. Therefore, this author is confident that once the knowledge is achieved the effects will be lasting for that season. PowerPoint slides will also be distributed so the athletes could refer back in the future. Changes in reporting behaviors will be measured over the course of a season (3–5 months). This author anticipates to collect reported concussions throughout the current season to compare with previous seasons. Comparing reported concussions from previous seasons to the current season following the program will quantify the adolescent athletes' behavior change through the number of reported concussions. Using school records and survey answers, this author will be able to compare data. A key dependent variable will be adolescent reporting behavior and will be measured throughout the season to be compared to the previous seasons. This allows the author to effectively answer research questions and quantify the success of the program. Desired outcomes for the adolescent athlete's portion of the CERT program are to improve health management (physical activity, social & emotional health), education, leisure (AOTA, 2020), knowledge, and behavioral change.

For school-based staff the program outputs will be an educational lecture on appropriate functional assessments, evidence-based interventions, strategies for modification, and interdisciplinary collaboration. To measure newly gained knowledge in these areas, a survey (see appendix B and C) will be distributed just before the training and just after to assess changes. The short-term outcome of the pre/post testing is to measure intended changes from the course. Desired outcomes from this portion of the CERT program are to improve health management (physical activity, social & emotional health), improve occupations for student athletes in the areas of ADLs, rest/sleep, education, leisure, and social participation (AOTA, 2020).

Anticipated Barriers and Challenges

Three barriers or challenges that would impact the implementation of the program for the athletes are 1) limited or no internet access to learn via a virtual setting, 2) parental/ coaches influences, and 3) resistance to learning. For the clinicians 1) resistance to learning, 2) lack of school support, and 3) limited collaboration between disciplines are challenges to the implementation of the program. While barriers exist, this author has developed strategies to mitigate these risks that are stated below.

Prior to beginning the class, a text or email will be sent to remind the participants of the time and date of the class, to complete the survey, and to check the internet connection in their preferred learning environment. By notifying the athletes ahead of time could mitigate the first risk. Also, providing an alternative of staying on the school campus and connecting to that wifi could be an option. Parents and coaches are major influencers on the athlete’s decision making. The strategy to promote cooperation from both is to send a fact sheet to the home and have a pre-program meeting with the coaches detailing the impact concussions can have on the athlete's health and well-being. Along with the consequences of a second concussion while still suffering symptoms from the first. To begin the class this author plans to state "the why" taking and learning the material from this class is important to not only their athletic career, but for their future health and well-being.

Similar to the athletes, beginning the class with "the why" statement will promote understanding and meaning to the material being taught. Though school support may not always be fiscally possible, this author plans to advocate along with the staff for necessary items to assist the staff in helping the student athletes return to learning and sport. In the meantime, providing creative strategies that are cost effective will be beneficial for the school staff to feel confident in treating/managing concussions. While some clinicians may be resistant to collaboration with other team members, assigning respected staff as leaders of the team may increase the likelihood of collaboration and accountability.

Conclusion

Identifying and managing concussions for both the athletes and staff within the school environment is a problem that if left unaddressed can further impact participation in meaningful occupations. The most significant problems faced are limited concussion knowledge and reporting for the adolescent athletes. Staff struggle to use interventions that are evidenced based to effectively treat and lack confidence in their ability to manage symptoms. Using evidence-based research along with SCT to impact behavior change is the core of the CERT program.

CHAPTER FIVE
Plan for Program Evaluation Research

Program Scenario & Stakeholders

The Concussion Education and Reporting Training (CERT) program will include key stakeholders who have interest in this area of study. Anticipated key stakeholders for the program are coaches, adolescent athletes (12–18) participating in team sports, and school-based staff. A soft launch of the CERT program will incorporate primary stakeholders, living in Orange County, NY.

CERT is a virtual educational course designed to increase concussion knowledge, reporting behaviors, and treatment for adolescent students within a school environment. The program is divided into two sections; the first section is for adolescent athletes and the second are for school-based staff. The adolescent athlete section will be divided into two parts. The first part will be with the entire team to educate on signs/symptoms of concussions, management, return to play guidelines, and the importance of reporting concussions. For the second part coaches will select influential members of the team. This author anticipates these members to be team captains and/or popular members of the team. The second part with the selected team members will focus on implementing strategies to increase reporting concussions and encouragement of teammates to report their concussions. School based staff will receive a one-time training on assessments, an evidence-based strategy to help manage symptoms, and collaboration to promote recovery for the adolescent athlete in a school setting. This author intends to be the sole instructor of the course along with a research assistant to aid in collecting and analyzing data.

Stakeholders

Stakeholders invited to participate in CERT have been identified to have vested interest in the success of the program. On a micro level, individuals to be included are adolescent athletes, coaches, and school-based professionals (related service providers, athletic trainers, teachers, and administrators). On a meso level, school districts will have vested interest in the safety and well-being for their student athletes. Though parents/caregivers are valuable to the health and well-being of the adolescent, this program is specifically designed for a school setting. Therefore, parents/caregivers are not intended stakeholders, but additional materials could be provided to them outside of the program. Based on the listed stakeholders, the intended users of the program evaluation research findings will be school administrators as they have final say in the approval of the program and continuous use of the program in the future.

Research Practice Scenario

According to Guskiewicz & Valovich McLeod (2011), adolescent athletes' brains take longer than the adult brain to recover from a concussion. This leads to concussion recovery time to range from a few days to just over a week (Halstead et al., 2018). Adolescent athletes who return to play while concussed run the risk of a second concussion. Having a second concussion while concussed may lead to worsening symptoms and persistent concussion syndrome which can last over 6 months. Adolescent athletes using the CERT program will learn how to identify a possible concussion and consider the risks of returning to play prematurely. At that moment report and seek medical attention to manage their concussion symptoms. Once able to return to school, the school-based team will effectively manage symptoms to promote return to learning, return to sport, and allow the student to maintain participation in their daily lives.

Vision

Adolescent athletes who participate in the CERT program will demonstrate increased self-reporting of a possible concussion than prior to participating in CERT (quantitative). Apply acquired knowledge and behavioral strategies into a game setting (qualitative). School based staff will demonstrate increased knowledge of evidence-based management of concussions(quantitative). Using a collaborative approach, the multidisciplinary team will apply knowledge in managing concussion symptoms for student athletes (qualitative).

Benefits to the occupational therapy profession

The occupational therapy profession has not addressed an effective course of action to educate themselves to address this need. An in-depth review of current and past literature on occupational therapy and concussions found there was limited literature on this topic. This statement was confirmed by Finn’s (2019) article on occupational therapy practitioners perceived confidence in the management of concussions. One study cited in this article found variability in knowledge regarding concussions for various health professionals. Occupational therapy practitioners scored lower than most healthcare professionals (Salisbury et al., 2017 as cited in Finn, 2019). Despite the lack of research and education in this area, occupational therapy practitioners have a valuable role to play in concussion management. Concussions impact adolescent athletes' engagement in meaningful occupations in the areas of academics, sensory processing, sleep, ADLs, leisure, social emotional regulation, and motor function. All of these areas are explicitly cited in the Occupational Therapy Practice Framework (2020, pp.44–47) as areas occupational therapy practitioners are uniquely qualified to address.

Engagement of Stakeholders

The CERT program will be an entrepreneurial enterprise by this author to include key stakeholders who have vested interest in this area of study. Anticipated key stakeholders for the program are teachers, related service providers, school administrators, and adolescent athletes. Another key stakeholder will be a research assistant. As a key stakeholder their role will be to assist in collecting and managing data. Recruitment of a research assistant will be a volunteer student from a doctorate level occupational therapy program.

A soft launch of the CERT program will incorporate primary stakeholders made of adolescent athletes and school-based staff at their respective school districts within Orange County, NY. To establish contact with the primary stakeholders this author will seek IRB approval from Boston University. Then implement the dissemination plan (see chapter seven) that will result in approval from school administrators to provide the CERT program to their athletes and staff free of cost. To engage these stakeholders this author will provide reasons supported by literature to appeal to each stakeholder's interest and benefits of this program.

To recruit the participants this author intends to seek approval from each school district to mandate attendance for each team-based sport. For the staff, the school district could offer this as a free “CEU” course during conference days. Marketing the program to the school districts will be a key component to the success of the program. School administrators will be contacted via email to set up a meeting to discuss the possibility of implementing the CERT program. Included in the email will be a two-page executive summary that ends with the core message to pique their interest. The two-page executive summary may be the most appropriate approach because it briefly describes the program in a concise and easy to understand format. Once approved, adolescent athletes will receive a text message or email. This author anticipates using one sentence summary of the core message. This will allow the adolescent athletes to easily understand the purpose of the program and how it benefits them.

Figure 5.1
Simplified Logic Model for Adolescent Athletes

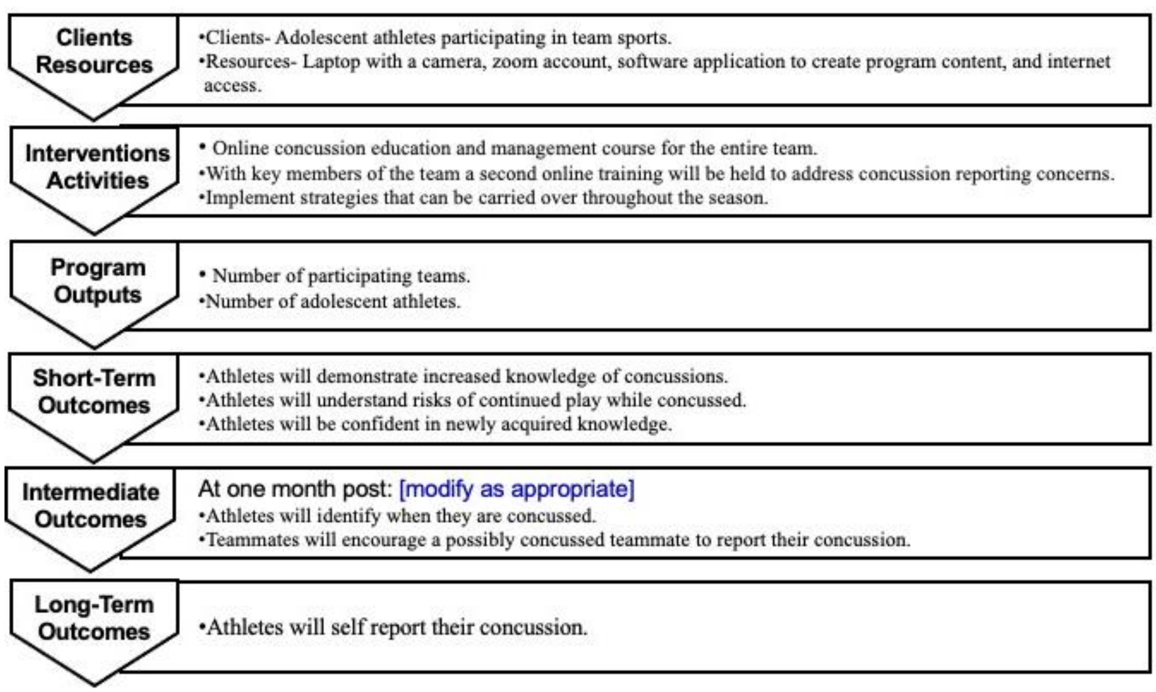
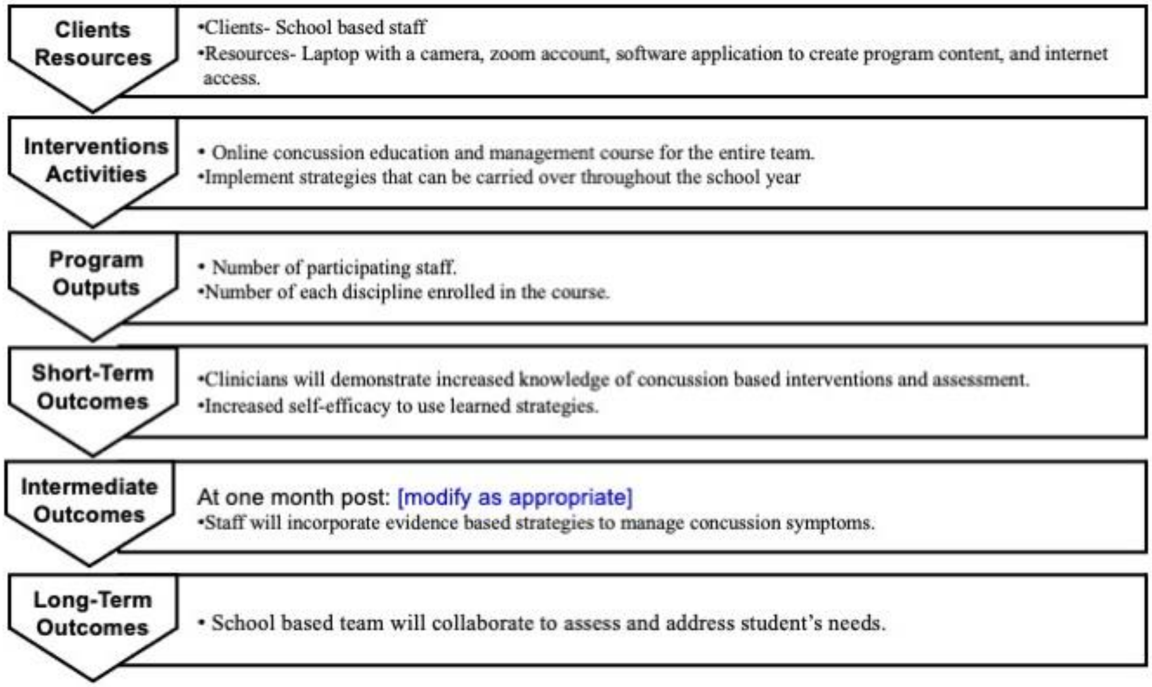


Figure 5.2
Simplified Logic Model for School Based Staff



Preliminary Exploration

Stakeholders invited to participate in the confirmatory process are those that have been identified to have vested interest in the success of the program. Individuals who may be included in the confirmatory process are adolescent athletes, coaches, parents, and school-based professionals (OTPs, other related service providers, teachers, and administrators). Included in the confirmatory process will be the circle of advisors (college head soccer coach and athletic trainer) one adolescent athlete, one parent, a school-based OTP, and a school administrator.

Confirmatory Process

Meetings will take place virtually on a bi-weekly basis until the program is ready to be implemented. To optimize the time spent during meetings, there will be two groups formed with this author involved in both groups. The first group will be made up of the adolescent athlete, parent, college head soccer coach, athletic trainer, and school-based OTP to work on the information that should be included in the program. The second group will be with a school administrator, a teacher, and head college soccer coach to create the best method to teach the staff and adolescent athletes the information. Then on a quarterly basis a large group meeting to discuss progress of the program, and creation of survey questions.

Prior to the start of the confirmatory meetings, members will need background information regarding the purpose and logic of the program. Background information/documentation provided to the team will be important statistics to highlight the problem and need for this program, logic model, budget, projected research design, methods to collect data, and general purpose/goal of the program. The author's doctoral project will also be distributed, but this will not be a required read. The approach to negotiate achieved consensus among stakeholders regarding the research plan will be through open discussions. Providing their input to identify strengths and weaknesses of each proposal, the team will collaboratively come to a consensus. Decisions will be made to choose the proposal that best aligns with our purpose and long-term goals.

Members included in the confirmatory process will collaborate with the author to create research questions designed for each participant group. These questions will be designed with the needs of each group. To ensure these questions are achieving their intended purpose mock surveys and semi structured interviews will be trialed to collect data. Once the author begins collecting data on each question, refinement to the survey and semi structured interviews will be made.

Program Evaluation Research Questions by Stakeholder Group

Table 5.1.

Research Questions per Stakeholder Group

Types of research questions that might be asked by users of the program evaluation data that could be answered by the study accompanying launch of the author's proposed project.

Stakeholder or Stakeholder Group	Types of Program Evaluation Research Questions
the author	· **Quantitative question:** Will participation in the CERT program demonstrate increased respective concussion knowledge than prior to participating in CERT? · **Qualitative question:** How will knowledge learned in the program be applied? **Quantitative question:** Will participation in the CERT program demonstrate increased use of evidence-based practice to manage student athletes concussions? **Qualitative question:** How will skills learned in the class be applied in an interdisciplinary approach?
Adolescent athletes (Direct stakeholders)	· **Quantitative question:** Will participation in an online educational program increase concussion reporting? · **Qualitative question:** Will strategies implemented in the selected group training be carried over to the team?
School based clinicians (Direct stakeholders)	· **Quantitative question:** Will participation in an online educational program increase concussion management? · **Qualitative question:** How will clinicians apply and collaborate to treat a concussed student athlete?
School administrators (Indirect stakeholders)	What are the benefits of the program? What is the cost of the program? Does the program accomplish the set intention? How will students and school-based staff respond to the program?

Research Design

Formative/qualitative designs

To collect formative information semi-structured interviews will be planned after the educational program concludes. Due to the various roster sizes within each team sport, the number of adolescent athletes participating in semi structured interviews will vary. This author anticipates to interview two to five adolescent athletes from just the first section and two athletes from the selected group. This author decided to maintain two participants from the second group due to the already small numbers in that group.

Similar to adolescent athletes, information will be collected from the school-based staff through semi-structured interviews following the program. Interviews will be conducted in a group setting with all participants from that group. The focus of the interviews will to assess applications on newly acquired skills in concussion management, self-efficacy, and change in collaboration. This author chose a group semi structured interview for this participant group to maximize efficiency and understand the group dynamic

Summative/ quantitative designs

Methodology for collecting summative data will be pre/posttest surveys and collecting reported concussions throughout the current season to compare with previous seasons. Within the survey adolescent athletes will be able to disclose if they suspected of having a concussion and not reporting it in previous seasons anonymously. Comparing reported concussions from previous seasons to the current season following the program will quantify if adolescent athletes exhibit a behavior change and increased the number of reported concussions. Using school records and survey answers, this author will be able to compare data. A key dependent variable will be adolescent reporting behavior and will be measured throughout the season to be compared to the previous seasons. This allows the author to effectively answer research questions and quantify the success of the program. Pre/posttest surveys will be used to quantify newly acquired knowledge on concussion education from the course. A key dependent variable will be concussion knowledge and will be measure just before and after the program.

Methodology for collecting summative data will be pre/posttest surveys. Each participant from the school-based staff section will complete the pre and post testing to assess change in their self-efficacy in managing concussions, change in knowledge regarding evidence-based interventions/assessments, change in collaboration, and change in their ability to implement into practice. Key dependent variables will be change in knowledge, self-efficacy, and collaboration. Understanding these dependent variables will allow this author to effectively answer research questions and quantify the success of the program.

Methods

Confidentiality

Maintaining IRB regulations, confidentiality will be afforded to all research participants. Prior to starting the program informed consent and consent/assent forms will be distributed to each participant and if applicable to their guardian. The age ranges for adolescent athletes accepted into the CERT program varies from 12–18 years of age, therefore guardian consent will be required for those under the age of 18. For clinicians participating in the program, only consent for themselves will be required. Once consent forms have been received, the author will begin implementing codes to ensure confidentiality.

Each participant will be assigned a letter and a number, ensuring that no person other than the researcher (also this author) will be able to identify them. In a separate file that is password protected will contain participant information that only the researcher knows. Data from the formative and summative methods will be stored within a file in a laptop that will be password protected that only the researcher and research assistant know. Through these measures the author will maintain consent and confidentiality of each participant.

Formative/Qualitative Data Collection Methods

Immediately after the program has concluded, participants will schedule a time and date with the author to conduct semi-structured interviews on Zoom. To collect and store data for the semi-structured interviews the use of the recording feature on Zoom will be utilized. This will allow the author to save and review each interview when ready. There will be three sets of semi structured interviews planned. In the first set, semi structured interviews with two to five participants will focus on delivery of information from the program, understanding of concussions, confidence in reporting concussions, and experiences/feelings of concussion prior to the program. In the second set, semi structured interviews will be with participants from the selected group. The focus of the interviews will be on delivery of information from the program, understanding of concussions, experiences/feelings of concussion prior to the program, implementation of strategies used for increasing self-reporting behaviors, peer modeling to the rest of the team, and barriers. In the third set, a group semi structured interview with staff from different professions will discuss barriers in concussion management, their self-efficacy in managing concussions, use of evidence-based interventions, and interdisciplinary collaboration.

Methods for Formative/Qualitative Data Management and Analysis

Analyzing data, the author and research assistant will transcribe each interview to be categorized into common themes using hermeneutic methods. To analyze data the author will be first to transcribe the interviews into text using either the Zoom speak to text feature or a specialized computer software (NVivo). After, the research assistant will transcribe the interviews to ensure accuracy. Second, both the author and the research assistant will categorize the transcribed interviews to identify themes. Once the author and research assistant have concluded their qualitative analysis, both will meet to discuss findings and cross check themes that will later be presented to participants for member checking. Data management will be primarily handled by the author with access to the data file shared with only the research assistant.

Summative/Quantitative Data Collection Methods

Prior to starting the program and after the program ends, participants will either receive an email or text message to complete a pre and post intervention survey. To collect and save data from the surveys, each participant will complete them on Qualtrics. This will be a convenient method to collect data regarding concussion education, reporting behaviors, and management to save each participant’s entry to a cloud feature.

After receiving approval from the participants' school, the author will review records from previous seasons and answers from the unreported concussion survey question to assess the number of concussions for a baseline. Then the same method will occur with the current season to assess the number of reported concussions. Records will be collected from where the school stores this data, either the school nurse or the athletic trainer.

Methods for Summative/Quantitative Data Management and Analysis.

Using the Qualtrics software, the author will be able to analyze data from the pre/post surveys. Using this feature will minimize user error and increase accurate results. Therefore, a research assistant will not be needed to analyze this data. However, once the data is completely analyzed the research assistant will be needed to check this author’s work to ensure accuracy and validity. Data management will be primarily handled by the author with a password to access the data file shared with only the research assistant. Through the Qualtrics system, pre and post testing will assess change in athletes’ knowledge of concussions, understanding of risks, and confidence to apply newly acquired skills. For school-based staff pre and post testing will assess change in self-efficacy of managing concussions, application of evidenced based interventions and assessments, and interdisciplinary collaboration. All will be analyzed by Chi-square within subjects with standard of change being $p<.05$

Once data has been collected to compare the number of concussions from prior seasons to the current season, this researcher will store the data in a file on a laptop. At this point this researcher will analyze the data to assess if there was an increase in self-reporting of concussions. After this researcher has completed analyzing the data, a research assistant will conduct a similar analysis to ensure accuracy of the data. Similar to the surveys, a chi-square within subjects will be used with standard of change being $p<.05$.

CHAPTER SIX
Funding Plan

Description of the Program

An estimated 1.9 million concussions within adolescents and children happen a year (Bryan et al., 2016, as cited in Halstead et al., 2018). Since 2010 there has been a significant increase in concussion research, however educational programs designed to increase knowledge and reporting are lacking, impacting adolescents' ability to engage in learning, activities of daily living (ADLs), social, and engagement in meaningful occupations. As more adolescent athletes increase their concussion reporting, the demand for the school-based team, including occupational therapy practitioners to assist will be needed. Despite the high prevalence of concussions adolescent athletes often remain in the game running the increased risk of a secondary and more disastrous concussion. As Beidler et al., (2018) found that 76% of athletes witnessed a teammate suspected of a sports related concussion remain in the game. When treating concussions, it was found that many occupational therapists have limited knowledge and experience. Without an understanding of concussion assessments, treatments, and management can cause further harm to adolescents' well-being. Therefore, training of the athletes and school-based staff are important to the safety and well-being in sport, academics, and everyday life.

The Concussion Education and Reporting Training (CERT) program is a virtual educational course designed to increase concussion knowledge, reporting behaviors, and treatment for adolescent students within a school environment. The program is divided into two sections; participants: 1. adolescent athletes and participants 2. school-based staff. The adolescent athlete section will be divided into two parts. The first part will be with the entire team to educate signs/symptoms of concussions, management, return-to-play guidelines, and the importance of reporting concussions. While the second part will be with selected members of the team with a focus on implementing strategies to increase reporting concussions and encouragement of teammates to report their concussions. School based staff will receive a one-time training on, assessments, an evidence-based strategy to help manage symptoms, and collaboration to promote recovery for the adolescent athlete in a school setting. Changes in concussion reporting and management will be explored using pre/post surveys, semi structured interviews, and comparisons of diagnosis concussions from the prior season to the current season. Local resources and funding of the program will be necessary to successfully deliver the program.

Local Resources Year 1 (2022–2023)

One school district in Orange County, NY will provide their resources of WIFI, laptops, and printers that will allow both participants to attend and engage in the training.

Table 6.1
Year 1 (2022–2023) Funding Plan with one school district

Item	***Description***	***Cost***
Personnel-Instructional designer	To help design the program to promote learning and achieve outcomes	$39 per hour (anticipated 4 hours)
Personnel-Research assistant	Help manage and interpret qualitative and quantitative data	Time donated during OTD program
Equipment- Zoom	The platform where the online training will occur.	$199.90 per year
Equipment-NVivo	Used to transcribe semi-structured interviews from talk to text.	$1249.00 per year
Equipment- Qualtrics	Used to calculate changes from pre- and post- surveys. Also, to calculate changes in diagnosed concussions from previous season to current season	Free through Boston University (If not, $1500
Communication- text and email	Communicate with participants for scheduling, distribution of surveys and slides	Free. Research assistant will use their laptop
Communication- in person meeting	To effectively promote the program to school administrators	$15 to commute
Communication- NYSOTA Conference	Poster presentation	$300 (Registration and travel)
Program Evaluation	Semi-structured interviews and surveys will be used to assess program	Free
Total Year 1 costs: $3,433.90		

Table 6.2

Year 2 (2023–2024) After revisions made to the program Funding Plan with two new school districts

Item	***Description***	***Cost***
Personnel-Research assistant	To help manage and interpret qualitative and quantitative data	Time donated during OTD program
Equipment- Zoom	The platform where the online training will occur.	$199.90 per year
Equipment-NVivo	Used to transcribe semi-structured interviews from talk to text.	$1249.00 per year
Equipment- Qualtrics	Used to calculate changes from pre- and post- surveys. Also, to calculate changes in diagnosed concussions from previous season to current season	Free through Boston University (If not, $1500
Communication- text and email	Communicate with participants for scheduling, distribution of surveys and slides	Free. Research assistant will use their laptop
Communication- in person meeting	To effectively promote the program to school administrators	$15 to commute
Communication- AOTA Conference	Poster presentation	$1000 (Registration and travel)
Program Evaluation	Semi-structured interviews and surveys will be used to assess program	Free
Total Year 2 costs: $3,963.90		
Total cost over a two year period: $7,397.80		

Potential Funding Source

Table 6.3

Potential funding Source

Funding Source name	***Description***	***Amount***
Brain Injury Association of America	The dissertation grant is awarded to an individual's or institution's doctoral dissertation	Total of $5,000 over two years
Health Resources and Service Administration	"The purpose of the Child and Adolescent health Promotion and Preventive Services program is to improve the quality of health promotion and preventive services for all children, adolescents, and young adults through the development and dissemination of evidence-driven, strengths-based clinical guidance with a particular focus on the areas of adolescent and young adult health, mental/behavioral health, LGBTQ-affirming practices, and health equity." (Health Resources and Service Administration, 2022).	Varies
Brain Injury Association of America	The seed grant is to support first time researchers who are paired with a mentor.	Total of $25,000 up to two years
The NEA Foundation	To promote students' learning that is connected with real-world issues and challenges	Ranges from $1,500 to $5000
Robert Wood Johnson Foundation	The Pioneering Ideas fund is awarded to those you take an existing problem and challenges it with a new spin to change the future in the next 5–15 years	Usually $315,000

Conclusion

This online training is designed to educate adolescent athletes participating in team-based sports and school-based staff on concussion symptoms, importance of reporting, and concussion management. As research and funding in the area of concussion management expands, this program may address a key gap of education and behavior while improving concussion management in an education setting. Costs incurred as a result of the program are to ensure that the program is professional, creates an environment for learning, and is sustainable to achieve the desired outcomes.

CHAPTER SEVEN
Dissemination Plan

Description of the Program

An estimated 1.9 million concussions within the adolescents and children population happen each year (Bryan et al., 2016, as cited in Halstead et al., 2018). Despite the high prevalence of concussions, adolescent athletes often remain in the game running the increased risk of a secondary and more devastating concussion. Beidler et al., (2018) found that 76% of athletes witnessed a teammate suspected of a sports-related concussion remain in the game. This indicates a need for athletes to report their concussions. As more adolescent athletes increase their concussion reporting, the demand for the school-based team, including occupational therapy practitioners (OTPs) to assist will be needed. Since 2010 there has been a significant increase in concussion research, however educational programs designed to increase knowledge and reporting are lacking, which influences adolescents' ability to engage in meaningful occupations. When treating concussions, it was found that many occupational therapists have limited knowledge and experience (Finn 2019). Without an understanding of concussion assessments, treatments, and management can cause further harm to adolescents' well-being. Therefore, training of the athletes and school-based staff are important to the safety and well-being in sport, academics, and everyday life.

The Concussion Education and Reporting Training (CERT) program is a virtual educational course designed to increase concussion knowledge, reporting behaviors, and treatment for adolescent students within a school environment. The program is divided into two sections 1. adolescent athletes and 2. school-based staff. The adolescent athlete section will be divided into two parts. The first part will be with the entire team to educate signs/symptoms of concussions, management, return-to-play guidelines, and the importance of reporting concussions. The second part will be with selected members of the team with a focus on implementing strategies to increase reporting concussions and encouragement of teammates to report their concussions. School based staff will receive a one-time training on assessments, an evidence-based strategy to help manage symptoms, and collaboration to promote recovery for the adolescent athlete in a school setting. Changes in concussion reporting and management will be explored using pre/post surveys, semi structured interviews, and comparisons of diagnosed concussions from the prior season to the current season.

Dissemination Goals

The purpose of the dissemination plan is to spread awareness of the program designed to address the importance of concussion reporting and concussion management. The long-term goal of disseminating the doctoral project will be to implement the CERT program to four schools that participate in junior varsity and varsity team-based sports in Orange County, NY. One short term goal is to be invited by one school district to promote the CERT program within a one-year time period through email and social media. The second short-term goal is to receive an invitation to promote the CERT program from two school districts within a one-year period from a webinar. The third short term objective is to be approved from two school districts to implement the CERT program within a one-year period following an in-person meeting.

Target Audience

Target audiences for the dissemination plan will differ from the CERT program as the primary audience are those who have the authority to approve the program at a district wide level. Therefore, the primary audience will be school administrators and superintendents. The secondary audiences will be student athletes, coaches, and school-based staff. Secondary audience members will be important as they are most impacted by concussions and the beneficiaries of the CERT program.

Key Messages

Important to successfully promoting the program key action driven messages are required to engage the audience. For school administrators and superintendents, a key message may state “Supported by evidence found in literature, this program has the capability to educate and promote concussion awareness that will prevent devastating outcomes for your student athletes impacting their quality of life. While also providing your staff with the means to effectively manage student athletes’ concussions to maintain their independence and return to full participation in athletics and academics”. This key message to the primary audience will be communicated via email, webinars, social media, and during in person meetings. For the secondary audience the key message will vary. For student athletes and coaches the key message will state “Information and skills learned from the program can improve your long-term quality of life and prevent further missed playing time”. This information will be communicated via social media, emails, and webinars. School based staff key message may state “From this course you will learn current evidence to assess and treat student athletes in need of your services to resume their participation in academics, athletics, and other meaningful areas of their lives”. This key message will be communicated via email, social media, poster presentations, and webinars.

Source Messengers

Part of the school administration team are athletic directors. They will be influential spokespersons to communicate the key message to the primary audience. As their role is specific to sports and the safety of student athletes participating in sports. For the secondary audience, coaches will be perfect to communicate the key messages as many of them are teachers within the school district themselves. This allows them to communicate the message to both school-based staff and the athletes. OTPs will be key messengers to pass information learned during NYSOTA and AOTA Conferences to promote the program to other related service members. Through email exchanges it is the hope of this author to discuss with the key messengers the benefits of this program that will result with a in person meeting with the primary audience to approve the program for implementation.

Dissemination Activities

As stated earlier, dissemination activities will include email, social media, webinars, poster presentations, and in-person meetings. Creation and dissemination of the free webinar will be prioritized so that school-based staff, administrators, and superintendents can view at their convenience. Second will be actively promoting the program via email and social media to all audiences with a link to access the free webinar for more detail. Third, promoting the program at a New York State Occupational Therapy

Association (NYSOTA) and American Occupational Therapy Association (AOTA) conferences during a poster presentation. Finally, setting up in-person meetings to promote the program in hopes of approval.

Table 7.1
Budget

Audience	***Activity***	***Cost***
Both	Webinar via Zoom	$199.90 per year
Both	Email	Free
Secondary	Social media	Free
Primary	In-person meeting	$15 per year
Secondary	Poster at NYSOTA conference	$300 (Registration and commute)
Secondary	Post at AOTA conference	$1000 (Registration and travel

Evaluation

To measure the success of the dissemination plan this author intends to compare the start of each dissemination activity to the matching objective. From the day the webinar is available on various websites specific to each target audience until the time invited by two school districts to present the program will dictate if the dissemination was a success. After emailing multiple school administrators and coaches from different school districts across the county, this author will evaluate the amount of time from the first email until invited by at least one school district to present the program will dictate the success or failure of the dissemination plan. Finally, the amount of time to be approved from one school district to implement the program. If one or more of the short-term goals are not achieved, then this author will assess why and implement a new dissemination plan.

Conclusion

Informing the primary target audience (school administrators and superintendents) and secondary target audience (student athletes, coaches, and school-based staff) about the program will be distributed via email, webinars, social media, poster presentations, and in person meetings. To assist with disseminating to both audience source messengers such as coaches, OTPs, and athletic directors will be helpful in advocating and spreading the program throughout the school. The entire dissemination process is solely focused on receiving an invitation by school districts to present the program for an in-person meeting. An in-person meeting will be the most effective strategy for this author to accurately and passionately present the program to achieve the next objective of approval by one school district. With continuous dissemination the hope will be to successfully implement the program to three more schools.

CHAPTER EIGHT

Conclusion

Introduction

According to McCrory et al., (2017) a sports related concussion is a traumatic brain injury induced by biomechanical forces (pp. 839). “It is estimated that 1.6 million to 3.8 million sports and recreation related traumatic brain injuries, including concussions, occur every year in the United States” (Langlois et al., 2006, as cited in Rivara & Graham, 2013, p. 239). Of those numbers it is estimated that up to 1.9 million of those reports account for adolescents and children (Bryan et al., 2016, as cited in Halstead et al., 2018). Despite the high prevalence, many adolescent athletes have limited knowledge regarding concussions, and even with the knowledge they refuse to report their possible concussion to a coach or another authority figure. A professional’s knowledge and self-efficacy to identify and treat a possible concussion are key components in the recovery and safety of the adolescent athlete. There are several factors that hinders a professional’s ability to effectively identify and treat an athlete with a concussion.

Review of Program Proposal

Concussion Education Reporting and Training (CERT) is a virtual educational course designed for adolescent student athletes and school-based staff within a school environment. The program is divided into two sections; the first section is for adolescent athletes and the second is for school-based staff. The adolescent athlete section will be divided into two parts. The first part will be with the entire team to educate on signs/symptoms of concussions, concussion management, return to play guidelines, and the importance of reporting concussions. For the second part coaches will select influential members of the team. This author anticipates these members to be team captains and/or popular members of the team. The second part with the selected team members will focus on implementing strategies for them to report their own possible concussions and encouragement of teammates to report their concussions. School based staff will receive a one-time training on assessments, an evidence-based strategy to help manage symptoms and collaboration to promote recovery for the adolescent athlete in a school setting.

Review of Evidence Based Foundation

There are two reasons why an adolescent athlete will not report their concussion. First is limited knowledge. Confirmed by four studies, athletes struggle to identify a concussion, struggle to understand their school's return to play guidelines, or are not fully aware of effects a concussion can have on their health and well-being. Next, many adolescent athletes refuse to report their concussions due to fear of missing playing time and not wanting to let their teammates down (Beidler et al., 2018; Black et al., 2020; Carpenter et al., 2020; Chinn & Porter, 2016; Cook & Hunt, 2020; Eagles et al., 2016; Guskiewicz &Valovich McLeod, 2011; Halstead et al., 2018; Kurowski et al., 2014; Manasse-Cohick & Shapley, 2014; Meier et al., 2014; Ramsey & Dahinten, 2020; Sye et al., 2006).

Many school-based staff do not have knowledge regarding concussion management. This is especially true for occupational therapy practitioners (OTPs). Finn

(2019), stated that OTPs scored lowered in concussion knowledge than other professions. Based on a review of the literature there are only two interventions regarding concussion management exist. They are complete rest and gradual return to activity (Chrisman et al., 2017). Limited knowledge and limited concussion management interventions can lead to lower self-efficacy (Finn, 2019).

Review of Theoretical Framework

As stated in chapter two, Social Cognitive Theory seeks to explain the multi-dimensional interactions between personal factors, the environment, and behaviors to achieve an overarching goal that people can achieve and maintain a skill. This theory was used to both identify the problem and to address the problem through CERT. CERT utilizes four of the six constructs to address the problem. Behavioral capacity is an individual's ability to perform a behavior through skills and/or knowledge (LaMorte, 2019). Based on the definition behavioral capacity will be used to adapt the material to each developmental age or education level of the learners. Reciprocal determinism is a bidirectional causation between personal factors, environment, and behavior that cause change within an individual. Use of reciprocal determinism will assist the learners to identify barriers with reporting or managing a concussion from a personal, environmental, and behavior viewpoint. Self-efficacy can be defined as an individual's confidence to implement and maintain a new skill or behavior. In class activities will be used to increase self-efficacy, therefore increasing the likelihood it will be carry over into practice. Observational learning is a person's ability to learn through the modelling of others. This construct is specific to the selected team members from part two of the training. Strategies learned in this part will carry over for the rest of the team to adopt through observation.

Key Findings

Anticipated results from pre/post testing will demonstrate changes in all focus areas for each participant group, with a significant increase in knowledge and self-efficacy. Comparing the number of reported concussions from previous seasons to the current season should demonstrate a significant increase in the number of reported concussions in the current season. This change will signify an increase in concussion reporting for the athletes, leading to a behavior change. Semi-structured interviews should demonstrate a significant increase in self-efficacy, collaboration, and feedback to improve the program. Based on the findings for each measuring tool, this program hopes to achieve the intended outcomes as well as target areas to improve the program for each participant group.

Review of Funding Plan

As discussed in chapter six, costs incurred as a result of the program are to ensure that the program is professional, creates an environment for learning, and is sustainable to achieve the desired outcomes. Costs include equipment, personnel, communication, and travel. It is anticipated that costs will be covered through national and local grants. Additional information is provided in the funding plan (chapter six).

Review of Dissemination Plan

As stated in chapter seven, informing the primary target audience (school administrators and superintendents) and secondary target audience (student athletes, coaches, and school-based staff) about the program will be distributed via email, webinars, social media, poster presentations, and in person meetings. To assist with disseminating to both audience source messengers such as coaches, OTPs, and athletic directors will be helpful in advocating and spreading the program throughout the school. The entire dissemination process is solely focused on receiving an invitation by school districts to present the program during an in-person meeting. An in-person meeting will be the most effective strategy for this author to accurately and passionately present the program to achieve the next objective of approval by one school district. With continuous dissemination the hope will be to successfully implement the program to three more schools.

Conclusion

Supported by evidence found in the literature, this program has the capability to educate and promote concussion awareness that will prevent devastating outcomes for student athletes impacting their quality of life. Providing school-based staff with the means to effectively manage student athletes' concussions will help maintain athletes' independence and promote return to full participation in athletics, academics, and other meaningful occupations. This pilot program will provide an opportunity to lay the foundation needed to achieve the long-term goal, of spreading awareness of sports-related concussion reporting.

Appendix A: Search Report

Prepare a summary of your search for evidence for each question (i.e. a separate report for each question). This summary will be provided to your mentor for review so that he/she can ensure you are searching effectively and thoroughly.

Organize your report using the template on the next page. Each section of the report is described below.

(1) **Question guiding the search.**
- Why don't adolescent athletes report concussions?

-What barriers affect clinicians' treatment of concussions?

(2) Identify the databases you searched and briefly describe why you believed those sources were the most appropriate.

Databases searched are CINHAL and BU library search engine. The CINAHL database is an appropriate for the specialty of allied health. BU library is an appropriate database for the variety and vast research.

(3) Describe the steps in your search, in sequence. This description should read like a protocol that another person could follow to reproduce what you did.

Step	Reporting format
BU search-occupational therapist, sports, concussion • Limited search to 2008–2021 and peer-reviewed	• This search yielded 263 results
CINHAL- adolescents, concussions, reporting	• Yielded 246 results
CINHAL- sports related concussions & reporting • Limited search to 2011–2021	• Yielded 91 results

(4). Describe the process and criteria you used to select the articles you chose to review (i.e., those reported in the summary table or that you have appraised using the modified CAT template).

Articles that fit the set criteria and included all search terms in the abstract were selected.

Why don't adolescent athletes report concussions?

Reporting

- Concussion reporting behavior in community college athletes CAT
- Factors influencing concussion CAT
- SRC in children and adolescents CAT
- SRC knowledge & reporting college athletes CAT
- Intrapersonal factors concussion reporting
- Factors influencing reporting concussions
- Underreporting of self-reporting

Knowledge

- HS rugby understand concussion
- Self-management peds concussion CAT
- SRC in children and adolescents CAT
- Factors influencing reporting concussions
- Underreporting of self-reporting (mainly psychiatric symptoms)

What barriers affect clinicians' treatment of concussions?

- CAT for Peds
- Clinical Practice OT CAT
- HS athletes and concussions CAT
- OTs perceived confidence CAT
- SRC in children and adolescents CAT
- Pilot Study CAT
- CSIG
- Underreporting of self-reporting

Appendix B

Survey and Learner Profile for Adolescent Athletes

Characteristics:

How old are you? ______________________

How likely are you to self-report a possible concussion (circle which one applies)?

Not likely **somewhat** **likely** **very likely** **always**

What team sport(s) do you play? ____

What is your gender? ____

Have you experience or suspected of having a concussion before? **Yes** **No**

Concussion Knowledge

To your knowledge what are signs and symptoms of a concussion?

____
____
____
____

How long does it take to recover from a concussion?

____

Who is the school staff that you report concussions to? ___________________________

Are you familiar with your school's return to play guidelines? **Yes** **No**

On a scale 1–5, 5 being the highest knowledge, how would you rank your concussion knowledge?

1 **2** **3** **4** **5**

Concussion reporting

How confident are you in reporting a concussion?

not at all confident **somewhat** **not so confident** **Very confident**

Have you ever reported a concussion? If yes please explain why?

____
____
____

Have you noticed a concussed teammate remain in the game? **Yes** **No**

Did you encourage them to report their concussion? Why or why not?

____
____
____

How confident are you in encouraging a teammate to report a concussion?

not at all confident **somewhat** **not so confident** **Very confident**

Needs:

What knowledge or support will you need to identify a possible concussion?

____

____

What will you need to feel more confident reporting a possible concussion?

____

____

Preferences

The best form of learning for me is:

- listening
- watching
- reading
- talking

I prefer to learn in:

- small group (2–5 people)
- medium group (6–10 people)
- large group (10+)

Readiness

My physical environment is calm and good for me to learn through a virtual setting?

Yes **No**

I have a good support system to help me when I am concussed?

Yes **No**

Motivation

Being in this class was encouraged by:

- yourself
- the school
- coach
- family member

How would this class change your understanding of concussions?

____

____

How would you like this class to change your views about reporting concussions?

____

____

Goals

What do you hope to gain from this class? _____________________________________

How will you use this information when playing your sport?

____

Appendix C

Survey and Learner Profile for School based staff

Characteristics:

How long have you been practicing in your respected profession? ____________________

How often do you work with concussed student athletes (circle which one applies)?

Never   Not often   often   very often   My caseload is full of these cases

What is your profession? ____

Have often do you collaborate with other professions?

Never   Not often   often   very often   daily

Concussion Knowledge

On a scale of 1–5, 5 being the highest, how would you rank your knowledge regarding assessments for concussed student athletes?

1   2   3   4   5

On a scale of 1–5, 5 being the highest, how would you rank your knowledge regarding evidenced based treatments for concussed student athletes?

1   2   3   4   5

On a scale of 1–5, 5 being the highest, how would you rank your knowledge environmental modifications for concussed student athletes?

1   2   3   4   5

On a scale 1–5, 5 being the highest knowledge, how would you rank your knowledge regarding each team members role in concussion management?

1 **2** **3** **4** **5**

Are you familiar with your schools return to play guidelines? **Yes** **No**

Needs:

What knowledge or support will you need to identify and assess a possible concussion?

____

____

What will you need to feel more confident in concussion management?

____

____

Preferences

The best form of learning for me is:

- listening
- watching
- reading
- talking

I prefer to learn in:

- small group (2–5 people)
- medium group (6–10 people)
- large group (10+)

Readiness

My physical environment is calm and good for me to learn through a virtual setting?

Yes **No**

Motivation

Being in this class was encouraged by:

- yourself
- coworkers
- administration
- other please explain. ____

How would this class change your understanding of concussion management?

____

____

How would you like this class to change your confidence in concussion management?

____

____

Goals

What do you hope to gain from this class? ____________________________________

How will you use this information going forward?

____

Appendix D: Executive Summary for Concussion Education Reporting and Training (CERT)

Introduction

An estimated 1.9 million concussions within the adolescents and children population happen each year (Bryan et al., 2016, as cited in Halstead et al., 2018). Despite the high prevalence of concussions, adolescent athletes often remain in the game running the increased risk of a secondary and more devastating concussion. Beidler et al., (2018) found that 76% of athletes witnessed a teammate suspected of a sports-related concussion remain in the game. This indicates a need for athletes to report their concussions. As more adolescent athletes increase their concussion reporting, the demand for the school-based team, including occupational therapy practitioners (OTPs) to assist will be needed. When treating concussions, it was found that many occupational therapy practitioners have limited knowledge and experience (Finn 2019; Sinnett & Franzsen, 2020). Without an understanding of concussion assessments, treatments, and management can cause further harm to adolescents' well-being. Since 2010 there has been a significant increase in concussion research, however educational programs designed to increase knowledge and reporting are lacking, which influences adolescents' ability to engage in meaningful occupations. Therefore, training of the athletes and school-based staff are important to the safety and well-being in sport, academics, and everyday life.

To address the identified gap the Concussion Education Reporting and Training (CERT) program was designed to address education, behaviors, and concussion management for adolescent athletes and school-based staff. Components from Social Cognitive Theory (SCT) and evidence found in the literature were used in the design of the program to address behaviors and educate the participants. Following the course, participants completed surveys and semi structured interviews along with records from previous seasons to the current season were analyzed to determine effectiveness. This document contains a project overview, key findings, recommendations, and general conclusions.

Project Overview

CERT is a virtual educational course designed to increase concussion knowledge, reporting behaviors, and treatment for adolescent students within a school environment. The program is divided into two sections; the first section is for adolescent athletes and the second section is for school-based staff. The adolescent athlete section will be divided into two parts. The first part will be with the entire team to educate on signs/symptoms of concussions, management, return to play guidelines, and the importance of reporting concussions. The second part will be with selected team members to focus on implementing strategies to increase their reporting of concussions and encouragement of teammates to report their concussions. School based staff will receive a one-time training on assessments, an evidence-based strategy to help manage symptoms and collaboration to promote recovery for the adolescent athlete in a school setting.

Williamson et al. (2014) reviewed five nationally recognized concussion education courses. These authors summarize the population focus, dissemination of information, and differences for each course. While all appeared to address either concussion knowledge or reporting behaviors, none addressed both. Ramsay and Dahinten (2020) conducted a literature review on concussion education with youth athletes. Their results indicated that increased knowledge did not translate to increased reporting of concussions (also found in Manasse-Cohick & Shapley, 2014). CERT is an educational concussion program that is not only designed to educate the adolescent athlete, but also focuses on reporting behaviors. Through constructs in SCT, this program can be adapted to fit the behavioral capacity of the learners, address behavioral, personal, and environmental factors inhibiting reporting, and increase self-efficacy to implement what they learn through observational learning.

Clinicians are frequently unaware of appropriate interventions to address sports related concussions (Chrisman et al., 2017; McCrory et al, 2017). One treatment option that may be effective within the occupational therapy profession is gradual resumption to daily life activities. Boisgontier et al., (2020) found that adolescent athletes diagnosed with a concussion who engaged in unstructured physical activity that was motivating correlated with reduction in concussive symptoms. Interestingly, the authors found for every increase in physical activity by one standard deviation correlated to a decrease in concussion symptoms by over four units. Studies from the physical therapy profession found similar results. CERT is designed to educate various professions within the school setting on how to manage and treat concussions with a multidisciplinary approach. Constructs from SCT have been implemented throughout the training. The slideshow presentation will be modified to fit the experience and educational level of the participants enrolled in the course (behavioral capacity). Group discussions will be used to address barriers from an environmental, personal, and behavior perspective (Reciprocal determinism of SCT). Then implement individualized effective strategies that can be beneficial to the team. Self-efficacy will be increased through a case scenario where members will use a multidisciplinary approach to identify symptoms and implement appropriate strategies. Aiding the student athlete in a full return to academics, athletics, and other meaningful areas of their lives.

Key Findings

Online surveys for pre- and post-testing were developed for all participants to complete. The focus areas of change for the adolescent athletes are knowledge of concussions, understanding of risks, and confidence to apply newly acquired skills. For school-based staff pre- and post-testing will assess changes in self-efficacy of managing concussions and application of evidenced based interventions and assessments. Concussion reporting will be analyzed by comparing the number of reported concussions from previous seasons to the current season. Semi structured interviews for the adolescent athletes are designed to assess their perspective on the delivery of information from the program, understanding of concussions, confidence in reporting concussions, experiences/feelings of concussion prior to the program, implementation of strategies used for increasing self-reporting behaviors, peer modeling to the rest of the team, and barriers. For school-based staff, the group semi-structured interviews are designed to discuss barriers in concussion management, their self-efficacy in managing concussions, use of evidence-based interventions, and multidisciplinary collaboration. With the help of a research assistant semi-structured interviews will be categorized into themes. Results from pre-and post-testing and concussion reporting per season will be compared to assess changes.

Anticipated results from pre-and post-testing should demonstrate changes in all focus areas for each participant group. With a significant increase in knowledge and self-efficacy. Comparing the number of reported concussions from previous seasons to the current season should demonstrate a significant increase in the number of reported concussions in the current season. This change should signify an increase in concussion reporting for the athletes, leading to a behavior change. While semi-structured interviews should demonstrate a significant increase in self-efficacy, understanding of concussions, and feedback to improve the program. Based on the findings for each measuring tool, this program achieved the intended outcome along with areas to improve the program for each participant group.

Recommendations

Based on the anticipated findings from this program addressing both education and behaviors for adolescent athletes and knowledge, self-efficacy, and collaboration for school-based staff are important. As research from these studies support the need to address behaviors for athletes (Beidler et al., 2018; Black et al., 2020; Carpenter et al., 2020; Chinn & Porter, 2016; Cook & Hunt, 2020; Eagles et al., 2016; Guskiewicz & Valovich McLeod, 2011; Halstead et al., 2018; Kurowski et al., 2014; Manasse-Cohick & Shapley, 2014; Meier et al., 2014; Ramsey & Dahinten, 2020; Sye et al., 2006). Research from Chrisman et al., (2017), Finn (2019), McCrory et al., (2017), and Sinnett & Franzsen (2020) suggest the need to address knowledge and self-efficacy for school-based staff. Second, adapting the curriculum to the population's behavioral capacity will improve implementation of newly acquired skills. Third, identifying each group's barriers from a personal, environmental, and behavior standpoint can assist the educator to individualize the training to address each specific need. Leading to an increased likelihood that the participants will carry over the skills learned in the training to their personal lives.

Conclusion

Supported by evidence found in literature, this program has the capability to educate and promote concussion awareness that will prevent devastating outcomes for your student athletes impacting their quality of life. Also, providing your staff with the means to effectively manage student athletes' concussions to maintain their independence and return to full participation in athletics and academics.

In conclusion the CERT program provides the necessary training to educate and address behaviors that many student athletes participating in team-based sports appear to neglect that will impact their health. Also, CERT can educate staff on evidence-based interventions, assessments, and modifications to assist the student athlete with a concussion to return to full participation in academics, athletics, and other meaningful areas of their lives. Based on the anticipated key findings this program can achieve intended outcomes with recommendations supported in literature. In the event a concussion to a student athlete occurs, the athlete feels confident to report their concussion and that the school-based team can collaborate with the student with a gradual return to normalcy and prevent further harm to their well-being. As school administrators you can provide your student athletes and staff with the knowledge and confidence that when a concussion does occur that they have the tools for a successful recovery through the CERT program.

Appendix E: Teaching Plan Table for adolescent athletes

Overall learning goal: After completion of the Concussion Education and Reporting Training (CERT) adolescent athletes will demonstrate an increase in concussion knowledge and self-efficacy to report a concussion based upon pre and post testing from provided survey.

Specific learning objective	Learning activity(ies) and supporting learning theory(ies)	Method of teaching	Time allotted (in minutes)	Resources (e.g., instructional materials)	Method of evaluation
1. After a 20-minute teaching lesson(C), adolescent athletes (A) will be able to list at least two (B) new concussion symptoms from baseline in 1/1 opportunity during the training(D).	Presentation of information via visual and verbal methods-Cognitive domain (Bastable & Rabbia, 2020) Modifying the material to each age group to increase understanding-Behavioral capacity construct from SCT	Lecture (Fitzgerald and Jacobs, 2020) Brain based learning strategies-why and attention (Yee & Boyd, 2018)	20 minutes	Printed materials developed by myself Telecommunication resource-video teleconferencing (Hainsworth and Jacobs, 2020)	Pre- and post-test
2. Following a group discussion (C) adolescent athletes(A) will express 3 barriers to reporting concussions (B), in 1/1 opportunity during the training (D).	Group discussions of feelings about reporting concussions-Affective domain (Bastable & Rabbia, 2020) Group discussion of environmental, personal and behavior that impact reporting of concussions-Reciprocal determinism (SCT)	Cooperative/team based learning (Fitzgerald and Jacobs, 2020) Brain based learning strategies-emotions and novelty (Yee & Boyd, 2018)	40–45 minutes	Telecommunication resource-video teleconferencing (Hains worth and Jacobs, 2020)	observation

3.	By the end of the training (C), adolescent athletes (A) will express an increase in self-efficacy to report a concussion (B) by at least one score on a Likert scale within the provided survey (D).	Role play of reporting a concussion or encouragement to report a concussion- affective domain (Bastable & Rabbia, 2020) Continuous role playing attempts for mastery- self-efficacy domain of SCT	Role play/ simulating scenarios (Fitzgerald and Jacobs, 2020) Brain based learning strategy- repetition (Yee & Boyd, 2018)	30 minutes	Telecommunication (Hainsworth and Jacobs, 2020) Mastery (Bandura, 2003)	Pre and post test

Appendix F: Teaching Plan Table for school-based staff

Overall learning goal: After completion of the Concussion Education and Reporting Training (CERT) school-based staff will demonstrate an increase in concussion knowledge, collaboration and self-efficacy to manage concussions based upon the data that is collected.

Specific learning objective	Learning activity(ies) and supporting learning theory(ies)	Method of teaching	Time allotted (in minutes)	Resources (e.g., instructional materials)	Method of evaluation
1. After a 20-minute teaching lesson(C), school based staff (A) will be able to list at least two (B) new concussion management techniques from baseline in 1/1 opportunity during the training(D).	Presentation of information via visual and verbal methods-Cognitive domain (Bastable & Rabbia, 2020) Modifying the material to each education level to increase understanding-Behavioral capacity construct from SCT	Lecture (Fitzgerald and Jacobs, 2020) Brain based learning strategies-why and attention (Yee & Boyd, 2018)	20 minutes	Printed materials developed by myself Telecommunication resource-video teleconferencing (Hainsworth and Jacobs, 2020)	Pre and post test
2. Following a case scenario (C) school-based staff (A) will express an increase in collaboration (B), in 1/1 opportunity during the training (D).	Case scenarios of working together to manage a concussion-Affective domain (Bastable & Rabbia, 2020) Continuous role playing attempts for mastery- self-efficacy domain of SCT	Role play/simulating scenarios (Fitzgerald and Jacobs, 2020) Brain based learning strategy-repetition (Yee & Boyd, 2018	40–45 minutes	Telecommunication resource-video teleconferencing (Hainsworth and Jacobs, 2020)	Observation/ semi-structured interviews

3. By the end of the training (C), school based staff (A) will express an increase in self-efficacy in managing concussions (B) by at least one score on a Likert scale within the provided survey (D).	Role play of concussion management- affective domain (Bastable & Rabbia, 2020) Continuous role playing attempts for mastery- self-efficacy domain of SCT Group discussions of feelings about reporting concussions-Affective domain (Bastable & Rabbia, 2020) Group discussion of environmental, personal and behavior that impact reporting of concussions-Reciprocal determinism (SCT)	Role play/simulating scenarios (Fitzgerald and Jacobs, 2020) Brain based learning strategy-repetition (Yee & Boyd, 2018) Cooperative/team based learning (Fitzgerald and Jacobs, 2020) Brain based learning strategies-emotions and novelty (Yee & Boyd, 2018)	30 minutes 45 minutes	Telecommunication (Hainsworth and Jacobs, 2020) Mastery (Bandura, 2003)	Pre and post test

Appendix G: Fact sheet

BOSTON UNIVERSITY

CERT: Concussion Education Reporting and Training

Antonio Fotino MS, OTR/L

Concussion Education Reporting and Training (CERT) is a virtual educational course designed to increase concussion knowledge, reporting behaviors, and treatment for adolescent students within a school environment. The program is divided into two sections. The focus of the adolescent athlete section is to educate on signs/symptoms of concussions, management, return to play guidelines, and the importance of reporting concussions; and the focus of the school-based staff section is on assessment, evidence-based strategy to help manage symptoms and collaboration to promote recovery for the adolescent athlete.

What is a sports related concussion?

According to the 5th International Conference on concussion in sports, a sports related concussion is a traumatic brain injury induced by biomechanical forces (McCrory et al., 2017)

Symptoms?

COGNITION: forgetfulness and trouble focusing

BODY: Headaches, dizzy, tired, trouble with vision, sensitivity to light and sounds.

SLEEP: Trouble falling asleep and trouble staying asleep.

EMOTION: Anxiety, frustration, depression

Figure 1: Suffering from a Concussion
Resource:
https://www.gettyimages.com/detail/photo/teenage-football-player-hanging-head-in-locker-room-royalty-free-image/200193319-001

Issues for the Adolescent athlete

- Address limited knowledge
- Address reporting behaviors

Figure 2: Identify and report a possible concussion
Resource: https://www.cuimc.columbia.edu/news/what-do-we-know-about-heading-and-concussions

Issues for the School Based Staff

- Limited knowledge
- Limited evidence-based interventions
- Low self-efficacy

Figure 3: Teamwork equals successful outcomes
Resource: https://dpi.wi.gov/sped/educators

Personnel Application

- CERT is designed for two population groups:
  - Adolescent athletes (12-18 years of age) participating in team-based sports. This will be a two-part series.
  - Professionals working in a school district such as teachers, PTs, OTPs, SLPs, nurses, coaches, athletic trainers, and school administrators. This will be a one-time training.

Concussions and OT

Despite the role we can play in concussion management there is very little research on occupational therapy (OT) and concussions (Finn, 2019; Sinnett & Franzsen 2020). With such high prevalence of concussions per year, symptoms of concussions falling within the OT domain, and number of occupational therapy practitioners (OTPs) working in schools it makes sense to for each school district to educate the professionals they have to address this problem. This also gives the OT profession an opportunity to expand our area of practice.

Suggested reads:

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