USING INTERPROFESSIONAL COLLABORATION TO BRIDGE ATHLETIC TRAINING AND STRENGTH AND CONDITION PROGRAMS IN HIGH SCHOOL SETTINGS TO REDUCE INJURIES

By

Craig Stephen Hermans

Liberty University

An Applied Research Report Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Health Science

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Abstract

The purpose of this practicum is to identify the differences between between the athletic training professional and the strength and conditioning professional in a school which may cause barriers in using interprofessional collaboration. Currently, the rate of reinjury in a student-athlete population is quite high due, in part, to the different focuses between athletic trainers and that of strength and conditioning coaches. This practicum prepares a compiled review of the literature of research as well as independent research evaluating the student/athletes' recovery from injury in relation to reinjury. The findings from the research serve a purpose to establish a deeper relationship between athletic training/physical therapy and strength and conditioning. The framework for rehabilitative protocol from the National Athletic Training Association (NATA) recommendations will be utilized to create a new training platform to be added to a school's strength program. Current recommendations from the National Strength and Conditioning Association (NSCA) for periodization training of athletes will be utilized to maintain sports performance goals. This practicum will then merge principles in rehabilitation with sports performance based upon guidelines from these leading agencies to create a protocol that will both reduce the rate of reinjury as well as to prevent new injuries without negatively impacting sports performance. A new case study design was then presented applying a new protocol using qualitative analysis to prove value and create future discussion. This study was disseminated to qualified participants to gain insight into the relationship, challenges, and potential resolutions which may be implemented to improve the communication between athletic trainers and strength and conditioning coaches.

Keywords: interprofessional collaboration, athletic training, strength and conditioning, injury reduction

Dedication

This work is dedicated to the educators, coaches, and athletic trainers who work long hours and sacrifice time with their own families to serve and guide children to follow their passion for sports and exercise. I would also like to thank Liberty University and my professors who have always encouraged my pursuit of education, and in my endeavors to share a Christian worldview in an open format exploring His influence in all things. Special thanks to Dr. Justin Kilian who had offered to act as my committee chair for his friendship, guidance, and patience during my process to create something that may be found meaningful to contribute to my academic community. I would also like to thank Dr. Theodore Croy, my committee member and methodologist, for his service to our U.S. military as well as for his guidance and insight to physical therapy perspectives considered in my practicum, and Dr. JoAnna Cupp for her valuable insight and guidance. To Tracy Howard, Jennifer Cline, and my family at Southwest Christian School, I cannot express enough my deep appreciation for the stewardship through my professional journey. There is no way that I would have been able to pursue my passions and research without your confidence and support; particularly as my family struggled through health complications.

Finally, I dedicate my life to my loving wife Caroline who has been my rock and my soulmate. Your ability to see things within me that I had not seen myself, and to put our family before yourself each day is the epitome of love. Without this woman placed in my life by God, I would be lost. Thank you to my kids who have shared their time with countless hours dedicated to the pursuit of my education. Without the constant love and encouragement of my family this work would not be possible. Above all, I offer all things to God; for without him nothing is possible.

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List of Abbreviations

Anterior Cruciate Ligament (ACL)

Athletic Trainer (AT)

High Impact Rotational Landing (HIRL)

Mechanism of Injury (MOI)

National Athletic Training Association (NATA)

National Strength and Conditioning Association (NSCA)

Physical Therapist (PT)

Return to Play (RTP)

Southwest Christian School (SCS)

Strength and Conditioning (S&C)

CHAPTER ONE: INTRODUCTION

Overview

This practicum aims to create a stronger relationship between the athletic training professional and the strength and conditioning professional in a high school setting by evaluating interprofessional collaboration. Currently, there are over 7 million student-athletes in American high schools, (Pelet et al., 2022) In part, there is a breakdown in communication between professionals due to the different focuses between athletic trainers (ATs) and of strength and conditioning coaches (S&Cs). For example, AT is focused on the identification of acute injuries as well as the rehabilitation of an athlete, and documenting events thoroughly. S&Cs on the other hand are focused on partnering with coaching staff and athletes to continually improve upon athletic performance and reduce imbalances of an athlete. Student-athletes face tremendous pressure to participate in practices, games, and club teams, and manage educational responsibilities.

Background

In the United States, high schools are seeing a quick growth in the number of athletes as well as athletic injuries. The objective of this practicum is to identify key indicators of injuries and to present systematic research, methods, and protocols for strength and conditioning programs to protect young athletes and to further partnerships with athletic trainers. It is the goal of the researcher to create a 'soft handoff' from the athletic trainer to the strength and conditioning coach with shared frameworks to reduce recurrent injury. A soft handoff for the context of this research refers to a specific communication between the AT and S&C by which language and terminology is shared and understood by all parties to ensure player safety during

the RTP protocol. The sharing of information regarding the athlete and their respective injury as well as certifications, software, and education overlap will be examined for potential solutions in creating an improved framework. The newly constructed framework could then be implemented into the S&C (strength and conditioning) programming to act as a preventative measure for new injuries as well.

To determine the degree of recurring injuries, the researcher evaluated data from existing literature to identify trends for injuries in high school sports, as well as acute injuries. This project will further explore the dynamics of practicing athletic trainers, and strength coaches within high school programs through conducting an online survey of licensed practitioners. Finally, consideration will be made to the different focuses of these professionals as well as to potential opportunities to build upon the interprofessional communication of this team. The following chapters will entail a literature review, an explanation of procedures for independent research for the practicum as well as the findings resulting from both the literature review and the independent research.

Situation to Self

The researcher: Craig Hermans has a 27-year background in fitness, strength and conditioning, and graduate-level athletic training work. Additionally, the researcher is United States Weightlifting Organization (USAW) licensed where he has eight years overseeing conditioning programs in the US Air Force, four years in local law enforcement teaching physical fitness as well as tactics, and 26 years training in different gyms around the globe. The researcher currently works as the head of strength and conditioning for Southwest Christian Schools of Fort Worth, TX where he creates all programming for every sport in grades 7-12 and is an adjunct Professor at Texas Christian University in the department of kinesiology. The

researcher's personal experience of self-rehabilitating in the weight room could potentially create a personal bias to circumvent established rehab protocol. To circumvent this bias, all data collected is from established research and literature reviews of high integrity and maintains alignment with current best practices from both the NATA as well as the NSCA.

This project takes a methodological approach to the problem as it uses inductive reasoning and logic to evaluate the benefits of effective communication in the scope of high school athletics. At the same time, there are current gaps in research within the high school athletics arena necessitating a correlation between a medical setting for the similar dynamics of a team consisting of varying licensed professionals. A methodological approach additionally relies upon the continual revision of the study based on feedback and experiences in the field.

Problem Statement

The problem as defined in current literature is the steep rise in the injury rate of high school athletes. The context of this project is focused on the collection of data from current literature to explore the reasoning behind the rate of injury/reinjury as well as potential opportunities to reduce this problem. When many athletes become injured, the athletic trainer is likely first on the scene. However, upon completing the return to play protocol (RTP), there is often a handoff to the strength and conditioning coach without further consideration, void of further injury. This separation of training methods may be a pitfall.

An evaluation of current research quickly identifies a deficiency in what is currently known about the high school population. For example, there is very limited research in RTP for high school injuries as well as for the rate of re-injury. Furthermore, there is a lack of data tracking to the location of practicing athletic trainers as well as strength and conditioning

coaches which creates a gap when attempting to assess these professionals in relation to injury rates. The lack of data available creates a need for the researcher to draw a correlation to collegiate settings as well as health care teams specifically.

Many aspects of rehab should be embedded in strength training to identify strength imbalances, gait pattern deviations, and potential injury concerns. (Reiman & Lorenz, 2011a) identified that there is ample information available for both rehabilitation as well as strength and conditioning; however, there is a gap in research connecting both considerations. The purpose of this research is to identify the experiences, constraints, and perspectives of these two practitioners as well as the differences and similarities between the two, thereby providing possible solutions to reduce breaks in communication during the RTP process as well as reducing the risk of re-injury.

Purpose Statement

The purpose of this phenomenological study is to understand the rate of reinjuries faced by student-athletes to determine if there is a correlation between the breakdown in communication between athletic training staff and the strength and conditioning program which may lead to an increase in injuries sustained. At this stage in the research, recurrent/preventable injuries of high school athletes will generally be defined as 'reinjury.' The theory guiding this study is phenomenology. According to the researcher Edmond Husserl, phenomenology works to explain how we define and explain a social phenomenon. This project will seek to explore what, if any relationship may be observed between the sports performance team and the rate of injury and reinjuries of high school athletes.

It is the purpose of this practicum to evaluate aspects of athletic training protocol for return-to-play goals to combine with strength training. This practicum includes a collection of current data surrounding student-athlete injuries and their rate of recurrence of injury following rehab by the athletic trainer. Data from research reviews may be found later in later chapters as they were compiled in conjunction with strength programs. The overarching purpose of this study is to address this gap in research as well as to propose training inclusion of aspects of rehab into strength training.

Significance of the Study

The significance of this study is to identify potential risks in the rate of injury and reinjury faced by high school athletes across the nation. Specific to this study, an evaluation has been created to discover the relationship and communication between athletic trainers as well as strength and conditioning coaches. If a correlation may be made between observable injuries, a theoretical solution may be presented for future practitioners. The underlying significance of identifying any correlation could lead to reduced injuries throughout the nation by creating stronger team communication.

Research Questions

What are the most common injuries of high school athletes that may have been prevented as seen by the athletic training community? This practicum used a literature review collection methodology to attain current trends, guidelines, and opportunities for prevention. Furthermore, this practicum uses current case studies to identify gaps in research.

What data collection methods (if any) are regularly communicated with strength and conditioning coaches that would be useful to share goals, and improve upon injury preventative

measures? This practicum used a systematic review of existing literature to evaluate current practices.

What methods are currently in place in the strength and conditioning community to specifically identify imbalances for injury prevention and rehabilitation? A literature review of current recommendations by the National Strength and Conditioning Association will be used in conjunction with current systematic reviews of literature as well as case studies to identify the current methodology.

What might a recommended strength program look like in a school setting that would imbed aspects of rehab without negatively affecting performance? This practicum presents a new case study based on recommendations from existing research. The proposed program has been used by a high school based in Texas.

Summary

This practicum aims to understand the relationship between the athletic training professional and the strength and conditioning professional in a school setting and to provide methods by which a stronger relationship may be created. The problem faced by student-athletes is the breakdown in communication between athletic training staff and the strength and conditioning program which may lead to an increase in injuries sustained. Increasing athletic injuries is a well-established pattern as seen in the following literature, and may be a result of staffing shortages, education/certifications of the ATs and S&C coaches, as well as technology gaps. This practicum identifies significant statistical data to apply to current the sociological problem of student-athlete injuries. The practicum will answer many significant questions to create a proposed protocol to reduce future athletic injuries.

CHAPTER TWO: LITERATURE REVIEW

Overview

A review of existing data was collected to identify common injuries as well as the protocol used by athletic training staff to rehabilitate these injuries. Additionally, a second data review was necessary to evaluate strength and conditioning programs, specifically, periodization training in school settings. The purpose of incorporating aspects of rehab protocol without negatively impacting performance goals will be the goal of this compilation of existing research. The resulting data collected has assisted in addressing a gap in research with the goal of an improved transition from athletic training protocol to the weight room, thereby reducing the rate of re-injury as well as new injuries; a concern as athletes that have passed the RTP are not necessarily ready for an unrestricted return to programming. The following literature supports more discussions, prevention, and modifications that may be needed following RTP.

This study aims to provide a proof of concept regarding the potential for reducing athletic injuries through examining and reporting on the interprofessional communication between athletic trainers and strength and conditioning coaches within a high school setting. This research project will seek to support this proof of concept by thoroughly analyzing current literature regarding sports injuries as well as the potential for miscommunication between sports performance team members. Further analysis was gathered by surveying high school athletic trainers and strength and conditioning coaches to expand upon current research and to gain insight into potential opportunities for this change.

Theoretical Framework

A theoretical framework has been assembled from current literature regarding recurrent injuries in high school sports. Through the evaluation of the rate of reinjury, certain conclusions may be made determining the injuries that could have been preventable assuming coherence with RTP protocol. This project then added the concept of prevention and applied it to concepts within both athletic training and strength and conditioning. The type of research conducted is a qualitative methodology to fully account for the personal experiences of respondents as well as to objectively offer recommendations as to ways to improve communication between athletic trainers as well as strength and conditioning coaches. A new, qualitative survey was drafted for final IRB approval which seeks to identify factors that may negatively affect the communications amongst the sports performance team. For example, findings currently show that a large percentage of recurrent injuries were preventable and that in many cases rehabilitative protocol in the chain of RTP programming may be the result of a communication breakdown.

Both strength and conditioning as well as athletic training concepts and practices were then compiled and evaluated to comprehensively examine this relationship for the athlete during rehabilitation and reintegration back into sports. Among the considerations of this relationship were education, certifications, software systems, and communication. These concepts found within the dynamics of each team professional then built upon the broader concept of communication within the sports performance team.

Related Literature

Current research to be evaluated for this practicum includes current trends of high school injuries, recurrent injuries, and considerations for the prevention of future injuries. Through evaluation of the current landscape in high school injuries, a correlation may be made to explain these injuries. Furthering this understanding, this practicum examines the current literature

regarding the professions of athletic training, strength and conditioning, and finally the 'sports performance team'. This practicum will identify the current necessity to strengthen the relationship between the AT, and S&C with communication as a primary consideration to reduce high school injuries. There are several important recurring themes within the discussion of sports injuries. The current research supports a rising rate of reinjury in high school sports across the nation (Borse, 2006). Among most of those injuries, the research also supports the opportunity for the prevention of injuries (Talpey & Siesmaa, 2017; Tounsi et al., 2019). Current studies further this theme by identifying the most common injuries by sport as seen above in Table 1.

Trends in High School Injury Rates

The discussion of injuries at any level must be broken down into acute injuries versus overuse injuries. Understanding the differences between these types of injuries allows the practitioner to address the mechanism of injury (MOI) as well as the modality and intensity of rehabilitation. Notably, there are differences in injury per sport, as well as gender differences. This collection of data linking injury types to specific sports can establish patterns as reported by (Cuff et al., 2010; Fältström et al., 2021; Liller et al., 2019; Lundberg Zachrisson et al., 2020; Ritzer et al., 2021).

Table 1 highlights these most common methods of injuries (MOI) as they are observed in different sports. Furthering the understanding of the MOI, research such as the Falstrom article identifies a specific injury to be most prevalent in a specific sport; in this case anterior cruciate ligament (ACL) injuries in female soccer players. Identifying these precise trends of risks per sport may allow for the AT and S&C coach to work together to create programs that monitor athletes for those MOIs that may lead to an injury, and to create continual programming that

serves to strengthen an athlete throughout a range of motion (ROM) which mirrors an MOI, though in a controlled setting.

Trends

Ritzer et al. (2021) reported a high school injury reporting system from 2006/7 – 2018/2019 school years recorded 17,434,646 injuries, of which 92% were acute versus 8% from overuse in all sports combined within the United States. Interestingly, this study did find that the number of acute injuries was higher in male athletes, with a slightly higher number of overuse injuries in females which indicates a need to consider gender differences when evaluating a patient. This same study revealed that males reported 69.8% of acute injuries, and 55.9% of injuries reported were classified as 'overuse'; an injury that may be avoidable with improved communication amongst the sports performance team. Ritzer also identified the highest number of acute injuries in men occurring in football and soccer for ladies, and competition to have a higher risk than in practice; findings that are also supported by Pelet et al. (2022) An interesting takeaway from these studies is the vast differences observed by sport, grade level, and gender.

To further the discussion of acute injuries compared to overuse injuries, acute injuries have been defined as "injuries that happen suddenly, such as when a person falls, receives a blow, or twists a joint, while chronic injuries usually result from overuse of one area of the body and develop gradually over time" (National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2017, p.1). Having these injuries defined adds to the understanding of repetitive microtrauma to tissue, adequate or inadequate rest times, and even the force observed of an injury according to current literature (Culvenor et al., 2022; DiFiori, JP., Benjamin, H., Brenner, J., Gregory, A., Jayanthi, N., Landry, G., Luke, A., 2014; Hernandez et al., 2012; Hubbard & Hicks-Little, 2008). (Musko & Demetriades, 2023) additionally point out concussive injuries

that require over a 1-week RTP protocol or longer. These factors assist researchers in understanding the method of injury, which sports are more inclined to see specific injuries, and where preventative methods may be implemented to reduce the rate of injury.

A recent study conducted by Bradsell & Frank (2022) is a 1++ graded systematic review of randomized, controlled trials (RCTs) from current injury prevention protocols. Bradsell conducted both qualitative and quantitative analysis to assess the efficacy of each which ultimately led to an over-arching recommendation for this population. The findings of this review determined education of the mechanisms of injuries when instructed to the coaching staff, athletes, organizations, and medical practitioners to be the best deterrent of future ACL (anterior cruciate ligament) injuries as well as reoccurrences. Further research was conducted by the author of this practicum to further understand recommendations for exercise rehabilitation, the specific sports associated with a high probability of ACL injury, etc.

As considerations are made regarding the reduction of high school injuries in sports, there must be a separation of injuries that may be preventable versus non-preventable, acute injuries. According to a study conducted by Belzile, there are over 7 million students in high school sports. Belize has also found the number one sport responsible for the largest portion of these injuries is football with over 1.5 million students playing this sport; unfortunately, between 50-80% of these athletes will be injured annually.

Recurrent Injuries

In every sport, there are injuries that have been researched and found to be most common based on sport and gender. Each injury is also commonly identified to specific methods of injuries, or MOIs. Where these injuries become problematic is the susceptibility of the athlete to the injury themselves as well as the likelihood of re-injury. These trends have been identified by

athletic trainers, physical therapists, doctors, and even strength and conditioning coaches nationwide.

"Anterior cruciate ligament (ACL) tear is one of the most common knee injuries in sports, especially in those involving landing and cutting tasks such as soccer, volleyball, and American football" (Lopes et al., 2018, p. 14). This systematic review evaluated 28 case studies totaling 466 athletes evaluating mechanisms of injuries, rates of reinjury, gender inequalities in injury, and the potential to strengthen the hamstring and reduce quadricep dominance to reduce ACL injury rates in young athletes. To further expand upon the previous findings in the literature, (Montalvo et al., 2019) conducted another systematic review and meta-analysis breaking down injury rates by gender and individual sports as seen in Table 1 below.

Table 1.

Most Common Mechanism of Injury by Sport

Classification of MOI	Sport
Collision	Boxing
	Men's Lacrosse
	Close-quarters combat
	Football
	Ice Hockey
	Rugby
	Wrestling
Contact	Basketball

	Field Hockey
	Girl's lacrosse
	Soccer
Limited Contact	Baseball
	Cheer
	Softball
	Volleyball
Noncontact	Dance
	Track
Fixed object, high-impact rotational landing	Gymnastics

Prevention Considerations

As research is conducted to analyze preventative measures, statistics that support new injuries versus chronic injuries become another important consideration. According to Ritzer et al. (2021), 90.3% of acute injuries were new, while 8% of injuries were recurrent injuries (IPR: 1.11, 95% CI 1.09-1.13). This data remains important as there may be a direct correlation between the injury and the time lost from participation. Culvenor et al. (2022); Post et al. (2020); Yang et al. (2012) speculate that the variation between genders may be in part related to

the differences in biomechanics, coaching, or help-seeking behavior. Many acute injuries could also be prevented through a specified training program.

Fox (2018) was a study conducted to evaluate biomechanical considerations for the causation of ACL injuries specifically in young athletes. These proven methodologies were then compiled to create a set of recommendations to implement into an injury prevention program with the highest efficacy rating. This study found the additional change of direction drills (replicating the most common method of injury) in conjunction with fore-foot patterned landings, trunk rotation as well and lateral flexion were highly effective and reducing re-injury and preventing ACL injuries.

Fältström et al. (2019) conducted a large, systematic, and unbiased review of RCTs with a large population. To further increase the clinical value, the researchers conducted a two-year post-op evaluation including self-reporting from 236 female soccer players. Utilizing the 'Tegner activity scale', the researchers determined there to be a five times increased rate of potential reinjury for ACL reoccurrences. Finally, the researchers identified a lack of confidence being a major component in recovery from said surgery ultimately leading to the athletes ceasing sports in the future. Faltstrom recommends coupling functional movement training with physical therapy and rebuilding athletic competence to best reduce future injury.

Lopes et al. (2018) designed to evaluate injury prevention programs (IPP) based on landing mechanics to reduce ACL injuries in athletes. This systematic review evaluated 28 studies including 466 participants to create recommendations for the IPPs. The concluding recommendations are to implement exercises to increase knee and hip flexion angles. Additionally, decreasing knee abduction works to reduce over-dominant ligaments during dynamic movement patterns.

Matsuo et al. (2022) conducted a case-controlled laboratory study evaluating the effect of static stretching concerning blood volume and oxidation. Researchers observed and measured the effects of static stretching of the gastrocnemius of 10 male athletes for a prescribed duration of time to determine the effects of blood volume in the muscle. Upon evaluating muscle stiffness and passive torque, they discovered there to be more benefit from a longer duration of stretching; in this case over two minutes. Quantitative research methods were used in the data collection of raw numbers. A near-infrared spectroscopy (NIRS) device was utilized to observe blood oxidation and volume based on calculations using the Beer-Lambert law. The understanding of optimal static stretching durations, as they impact blood volume and oxidation, may add to the recommendations for recovery from a workout or injury.

Montalvo et al. (2019) presented the evaluation of ACL incidence rates as broken down by sport type, and gender. The purpose of this study was to evaluate and guide future research in a sport and gender-specific direction to make the most impact in protecting athletes. The conclusion as offered through this study was a much higher risk in female athletes, though both genders had the highest number of reported cases in sports incorporating high-impact rotational landings (HIRL). These considerations must therefore be considered when bridging the functions of the sports performance team.

Oleksy et al. (2021), conducted a study of 65 footballers were studied post-ACL injury to determine if motor deficits would elicit an increased likelihood of a re-injury. The study was effective in that they used simple tests such as the Y-balance, FMS test, and tuck-jump assessment which are easy to measure, administer, and replicate later. This study was appropriate in that verbal, as well as motor control was gathered to establish a holistic readiness score of functional deficits following ACL surgery, and athlete input was available. This study

is also deemed feasible as it is a low-cost study that may be easily replicated by any facility and practitioner. This study did not require specific programs, protocols, or equipment of any kind that would preclude smaller researchers from attempting the same study. The methods of testing are not typically seen in the strength and conditioning room, but instead remain under athletic training. This study reflects a low-cost method of reducing injuries and further bridging the sports performance team by sharing concepts of testing athletes for imbalances which have proven to increase the likelihood of injury.

Expanding upon the Olesky study, Olivares-Jabalera et al. (2021) expanded upon the ACL findings through a review of 29 studies containing 4,502 males and 1,589 females. Olivares-Jabalera examined those athletes by applying exercise therapy, warm-up interventions, and muscle-balance interventions. This systematic review has an excellent level of evidence as it is effective, feasible, and appropriate in nature. The randomized control trials studied were collected by different researchers, in different labs, thereby expanding the population of the study and adding to its merit. Furthermore, this study had a low risk of bias as it evaluated RCTs, NRCTs, and finally a literature review. For these reasons, this study had a high level of significance in both statistical as well as clinical applications.

This study was selected for the selection of different methods utilized in the trials. The variety in methodology aids the student in offering an unbiased data source to create a protocol. Specifically, Olivares-Jabalera may have been the first study to evaluate exercise as a preventative intervention for ACL injuries in soccer players. The findings from studies such as this are beneficial as they provide statistical evidence for the application of exercises such as FIFA 11+, balance and stability training, and the potential to reduce injuries resulting from measures taken within the training program for non-injured athletes.

Culvenor et al. 2022 conducted a randomized control trial that included over 140 teams to be studied to reduce ACL injuries in Australian football. More specifically, this RCT was created with 10 clusters, and determined before administering the study in 2021. This RCT by Culvenor created a series of workshops for coaches as well as players to educate about the risks of ACL injuries as well as to prevent those injuries through a series of 'prep-to-play' methods. As an RCT, Culvenor's work allowed for a large population over 2 years of study. Being an RCT also allows for the study to have clinical significance for many reasons. The study is easily replicable, non-biased randomized by nature, and both highly reliable and valid. The work by Patterson was highly valuable as it specifically created forms of dissemination and education for the selected population of the researcher.

Wu et al. (2022) were quite effective as a search result for the topic of ACL injury, and prevention. This study was effective in that it studied the use of FLOSS bands as well as the stability and ROM measurements of the participants. Wu's approach also evaluated those participants (college-aged female athletes) who were tested physically in their performance of testing as well as able to give their feedback and responses to the stimuli provided by the examiners. From a feasibility standpoint, this study was conducted by trained researchers; though the materials used were very inexpensive and readily sourced by any person; excellent factors for the continuance of the study later and by other institutions.

Among the current research available, the lower extremities have been documented to be the most common site for both acute and chronic injuries (Culvenor et al., 2022; Hubbard & Hicks-Little, 2008; Rechel et al., 2008; Yang et al., 2012). The same studies have identified over half of all acute injuries are lower extremity injuries, and two-thirds of chronic injuries were in the lower extremity as well; alarmingly high numbers that indeed validate the necessity for

preventative measures (Welton et al., 2018). The solution to both acute and chronic injuries may begin with the efficiency of communication and planning that occurs within the sports performance team (Druvenga, 2017).

The Sports Performance Team

Druvenga (2017) wrote a journal article for the Board of Certification for the Athletic Trainer in which she identified the sports performance team to consist of the athletic trainer, strength and conditioning coach, sports nutritionist, and team psychologist. This article articulates the 'tumultuous relationship' with causation of "budget restrictions, disagreements in philosophy and the feeling of stepping on the other discipline's toes", (p. 1). Within this article, Druvenga designated the term 'sports performance team' to encompass the different professional roles within the athletic setting.

When considering a sports performance team, the first in the chain of care for an athlete is the athletic trainer. Athletic trainers are educated in injury identification, basic emergency medical care, rehabilitation protocol, and return to play protocol according to the NATA (2015). ATs are also trained in kinesiology, emergency care, manual therapy techniques, and more according to the Liberty University Athletic Training program (Liberty University, 2020). What this program; as with nearly every program across the United States does not require is strength and conditioning, or the CSCS certification. The CSCS certification supports the assurance that the working professional meets and exceeds the necessary educational background to develop strategic exercise programs based on science. Furthermore, the CSCS ensures that all professional S&C coaches begin an appointment of title with a similar baseline and can communicate the purpose behind their programming with the AT as well as coaching staff, students, and parents.

The strength and conditioning coach has a defined goal according to the NSCA to create an exercise program to improve sports performance (Gardner, 2021). Gardner also explains that communication is essential for the sports performance team to create a strength program catered to individual athletes, allowing them to progress through a treatment plan. Druvenga (2017) reiterates the necessity for communication among the sports performance team. Druvenga suggests that ATs and S&Cs should fall within a 'sports performance department' together and share responsibilities as equals. Kojima (2021) goes as far as to articulate that the breakdown in communication, or miscommunication may lead to "poor athletic performance, unnecessary athletic injuries, and decreased athlete availability", (p. 6). The culmination of current literature leads researchers to understand the value of communication between professionals as well as the detriment of the absence of communication. Radbil (2019) interviewed the athletic trainer for the Texas Rangers baseball club who stated "Communication and good working relationships ensure proper transitions. Weight room visits offer opportunities for athletic trainers to observe the work ethic, intensity, focus, strength, power, and pain thresholds of players", (p. 1).

High School Athletic Trainers

A census was taken in 2019 of 20,072 US secondary schools to determine access to athletic trainers (Huggins et al., 2019). This study found that 67% of respondents indicated access to their AT; out of this number 35% of schools had full-time positions, 30% had a part-time AT, and 2% had an AT on per diem. To further identify the separation of services between public and private school settings, 37% of public schools (n=16.076) had a full-time AT, and 32% had a part-time AT whereas 27% of private schools (n=4,196) had a full-time AT, and 28% had a part-time AT.

The statistics are an important consideration as the lack of an athletic trainer in a full-time capacity may lead to a decrease in effective communication which may then increase sports injuries. The athlete will have a varying amount of time between visits to the surgeon, AT, and physical therapist due to the nature of the injuries. The ability of the sports performance team to communicate effectively is paramount in ensuring an adequate level of care to facilitate the RTP protocol from start to finish. This communication will also work to ensure the athlete is unable to progress the RTP protocol without verified consent of progression from the physical therapist and physician. It should not be until this approval that the athlete begins treatments and progressions with the athletic trainer, and finally the S&C coach. Furthermore, without access to an athletic trainer in any capacity, the return to play protocol is most often conducted by a physical therapist by the recommendation of the orthopedic physician, yet limited information may be passed back to the school or the S&C coach. The statistics reveal that the safety of student-athletes across the US is not a high priority in secondary school settings. Currently, many studies have been conducted analyzing injuries within the high school setting as well as the ability of those athletes to prevent further injury in the future.

Lauersen et al. (2018) conducted a recent research analysis that consisted of six studies with five different interventions and identified 7,738 total participants. The accumulated results indicated a high level of strength of evidence as a 10% increase in strength training volume simultaneously decreased injury amongst participants. This study was designed to evaluate different strength programs with varying sets and repetitions as well as intensity. All six randomized, controlled trials provided a large pool of participants which adds to the validity of the statistical level of evidence. One finding by Lauersen is the importance and necessity to train "focusing on improved core stability, pelvis control, and extremity coordination." The

conclusion of this systematic review was the importance of correctly determining the "dose-response relationship between strength training and sports injury prevention" (Lauersen et al., 2018, p. 3).

Education

The core curriculum for an athletic training program, per (NATA, 2015) should consist of evidence-based practice, prevention and health promotion, clinical examination and diagnoses, acute care, therapeutic intervention, and health care administration. Currently, the Commission on Accreditation of Athletic Training Education (CAATE) acts as a certification body for collegiate programs to ensure alignment with the goals and outcomes dictated by the NATA. The NATA has also pushed strongly for organizational change to require a master's degree, changing the previous requirement of a bachelor's degree.

The top 10 recommended Master of Science in Athletic Training programs are currently offered at Thomas Jefferson University, A T Still University, George Washington University, Texas Tech University, St. Louis University, Pacific University, University of Wisconsin- La Crosse, Marquette University, Stony Brook University, and the University of the Pacific. Out of these top programs, only 4 require a S&C course. Out of the 4 programs that require a S&C course, no program requires more than a single course, and 2 are specific for AT.

Certification

To become certified as an athletic trainer, the student must have graduated from a CAATE-approved program, and then take a national, and optional state license. The focus of the examination encompasses injury and illness, examination and assessment, emergency response, therapeutic intervention, and health care administration, (NATA, 2015). Currently, no additional

certifications are required from athletic training professionals which creates potential for communication breakdown with an S&C coach in the high school setting as they may lack an understanding of how programming is created, and how to adequately reintegrate an injured player to the weight room.

High School Strength and Conditioning Coaches

Identifying the exact number of high school S&C coaches is very challenging due to a lack of data available as well as a current necessity for consistent licensing and requirements. Breslin, (2022); a current and certified CSCS holder, reported there are over 43,000 secondary schools in the US and only 40,000 strength coaches worldwide per the NSCA. In the US, Breslin estimates there to be only 10-15% of all US high schools with a full-time S&C, meaning there are over 35,000 schools nationwide lacking this expertise.

The alarming lack of a knowledgeable coach on staff only adds to the opportunity for reinjury amongst the high school athletic population. Assuming the school has an athletic trainer on staff, there is no one to communicate back to the trainer regarding the progress, mobility, stability, or other concerns of the athlete. When considering the demographic of high school athletes; consideration must be given to the age of the athlete as well as the inability to comprehend the severity of the injury, or the RTP process adequately. In this way, if the athlete provides information back to the AT, the parent and medical professionals should be contacted to verify the injury as well as the recovery process. In other settings such as a hospital or physician's office would mandate the presence of a parent or guardian. So then should consideration be made whether the minor is capable of being their own advocate? Potentially an even more concerning situation may result when the sports coach or teacher lacking the

education or certification of a professional strength coach attempts to program and reintegrate recently injured athletes.

Education

In university degree programs, strength and conditioning are commonly offered as a bachelor's degree program. Reflecting upon athletic training which in many states is now a master's degree requirement may indicate a lower level of education necessary to prescribe exercise; a concept which may be conflicting considering that many S&Cs assist in the RTP process as well as work alongside the athletic trainer. In a degree-seeking program, most strength and conditioning curriculum consists of courses such as exercise and sport physiology, sports biomechanics, nutrition, performance programming, internships, and principles of strength and conditioning, (Arizona State University, 2023).

Currently, the NSCA offers recommendations to the CASCE (Council on Accreditation of Strength and Conditioning Education). This accreditation is voluntary by the University, which seeks to evaluate a program against peer evaluation of established standards within the industry (National Strength and Conditioning Association, 2023). Among the CASCE approved, and NSCA recommended programs are Avila University, Central College, Chadron State, Parker University, Springfield College, Texas A&M University, University of Mary-Hardin Baylor, University of North Carolina at Charlotte, and the University of Wisconsin Oshkosh. Out of these programs, only two programs require any coursework in injury prevention; and both of those programs only require one course. None of the programs listed require even a single interprofessional communication course. Therefore, if only 20% of programs offer any injury prevention-focused coursework, and those programs only require 5% of the curriculum to this focus, it could be argued that a graduate of the program is not speaking the same 'language' of

the athletic trainer, nor is their knowledge base of injury prevention, identification, and corrective exercise sufficient. This may become a gap in the interprofessional communication amongst the sports performance team professionals.

Certification

Currently, the Certified Strength and Conditioning Specialist (CSCS) license, which requires a Bachelor of Science degree in a science-related background and is offered by the National Strength and Conditioning Association (NSCA) is considered the 'gold standard' within this field. As posted on the NSCA's webpage, (https://www.nsca.com/certification-overview/) this certification exam is broken into two domains. Scientific foundations entail exercise science and nutrition. The practical/applied domain involves exercise technique, program design, organization, and testing/evaluation (Triplett & Chandler, 2017). This certification does encompass considerations as needed for injury identification, as well as prevention of reinjury; though in abbreviations found in the sub-domains whereas sports performance remains the overarching theme.

Effects of Rehabilitative Exercise on Sports Performance

The prevalence of recurrent and preventable injuries in high school sports is both a high number and an opportunity for change. As research is conducted to analyze preventative measures, statistics that support new injuries versus chronic injuries become another important consideration. According to Ritzer et al. (2021), 90.3% of acute injuries were new, while 81.6% of recurrent injuries were new (IPR: 1.11, 95% CI 1.09-1.13). This estimate may be considerably underreported according to the CDC which estimates that approximately 50% of sports injuries were preventable (Borse, 2006). This data remains important as there may be a

direct correlation between the injury and the time lost from participation. Bruder et al. (2023); Culvenor et al. (2022); Post et al. (2020); Tounsi et al. (2019); Yang et al. (2012) speculate that the variation between genders may be in part related to the differences in "biomechanics, coaching, or help-seeking behavior." Many acute injuries could also be prevented through a specified training program.

According to Borse, (2006), athletic injuries must be reported by the athletic trainer, and they must be disseminated to the athletic administration and coaching staff to ensure accurate and complete data collection. Assuming there is an athletic trainer at the school, and that the trainer has observed and reported the injury accurately, the strength coach then plays an important role in injury prevention (Gardner, 2021; Haff & Triplett, 2015; Ritzer et al., 2021; Talpey & Siesmaa, 2017). Ritzer coined the term 'sports performance team'; an important concept as a team approach is the only solution to truly reducing sports injuries. Ritzer suggests that the team should consist of an athletic trainer, strength and conditioning coach, and potentially a physician, and dietician.

Currently, there is a lack of precise data regarding the number of secondary schools with either a full-time AT or S&C coach much less schools with both on staff. Recognizing this limitation, a correlation may be made between a healthcare setting and the sports performance team, (Cottrell & McKenzie, 2010; Hu & Broome, 2019; NATA, 2015; Pryor et al., 2015; Radbil, 2019; Till et al., 2019). A healthcare-centered practice offers practitioners of differing education, certifications, and expertise; a trait that is shared by the sports performance team (Keshmiri et al., 2020; Kraft et al., 2014; Li et al., 2018; Millender & Valentine, 2020; Oates, 2016; Reiman & Lorenz, 2011b; Slusser et al., 2018). In both settings, evidence has shown the

importance of communication among team members as well as the proven success of an effective team at reducing reinjury and improving patient outcomes.

To further the discussion of bridging the relationship between the athletic trainer or physical therapist with the strength and conditioning coach, there needs to be further research into best practices for embedding many of the concepts of exercise and rehab with sports performance. If acceptable and mutually beneficial exercises were identified that could enable a reduction in injury as well as to protect those athletes in the rehabilitative phase; yet with an RTP protocol, overall injury rates and reinjury rates may be reduced. These exercises could work to create injury reductions in each sport which then may lead to increased playing time as those injuries have been avoided. Reduction of injuries which allows the athlete to remain healthy would allow for the advancement of sports performance. This practicum will seek to evaluate based on existing research the best exercises currently recommended to rehab and prevent injuries. This practicum considers the rehabilitation protocol study conducted by Olivares-Jabalera et al., (2021) on several therapies to identify their effects on sports performance.

Communication Between Professionals

Communication between professionals of different specialties is vital in the recovery of injured athletes. The team benefits from interprofessional communication as each professional has a designated role in the recovery process and engages with one another collaboratively on timelines, metrics by which the recovery progresses, and ongoing considerations following recovery as seen in Table 2 below. The injured athlete benefits as the team works cohesively together throughout the RTP protocol. If the relationship between the sports performance team begins to have conflict, the most common causes are “budgeting restrictions, disagreements in philosophy, and the feeling of stepping on the other discipline’s toes” (Druvenga, 2017, p.1).

This division amongst the sports performance team then becomes detrimental to the athlete. Interprofessional communication then is the essential component of the effectiveness of the team.

To further the discussion of communication and the sports performance team, empirical findings that shared current injury data highlight those injuries that may have been avoidable; a proposal that will strengthen the necessity for communication amongst interprofessional providers. Theoretical literature was also included for the discussion of methods by which communication may be improved upon. To build stronger interprofessional communication among team members, research was conducted for this project into the circumstances and constraints faced by the professionals to offer potential intervention by way of strengthening the communication.

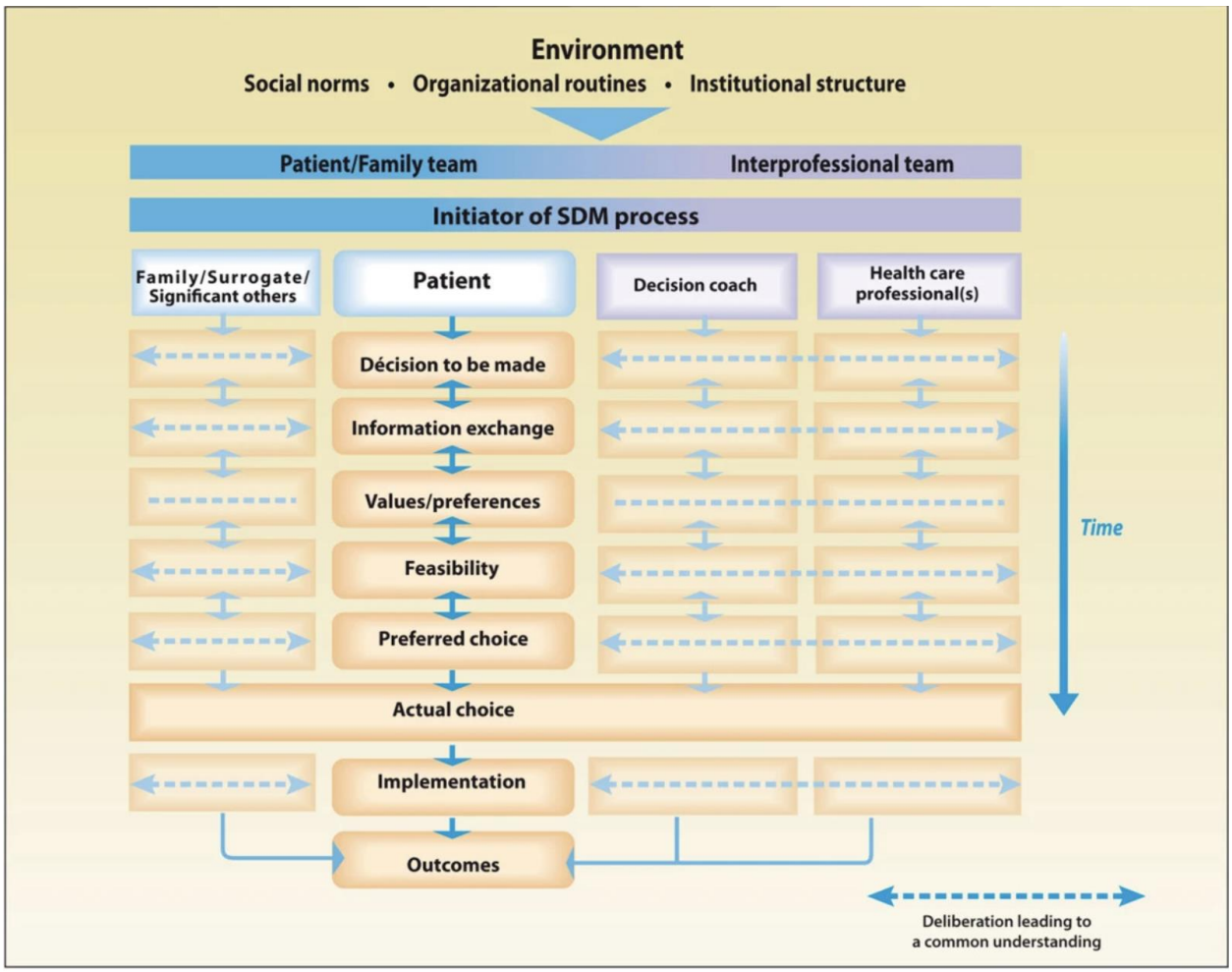
The researcher has combined preventable injuries, a lack of adequate staffing, variations between the educational background and experience of professionals, as well as the survey created by the researcher to surmise the project with a firm recommendation. The data from the survey was then input into Atlas.ti software, which evaluates and compiles qualitative reporting methods to present a visual representation of data for the reader. The purpose of this project is to offer a theoretical proposal by which a stronger sports performance team may be created through the improvement of communication and expectations.

Despite a current lack of data in literature regarding the relationship between the AT, and S&C coach, a similar correlation may be made to the interprofessional relationship between healthcare providers. Keshmiri et al. (2020) conducted a study of physicians and nurses from two separate hospitals in which the participants were exposed to learning sessions. The study was based on the theory of planned behavior. The outcome of the study showed that discussing

cases as a team of professionals allowed the providers "to engage in an interprofessional shared decision-making (IP-SDM) process" (Keshmiri, pg. 1).

Figure 18.

IP-SDM Process (Légaré et al., 2014)



Hu & Broome (2019) furthered the theory of interprofessional communication to advance patient-centered care. This study determined that the communication of the team is developed in three stages: 'exploration, integration, and continuous adjustment'. Hu identified the outcome of this study to be each team member feeling more valued, and there to be a significant

improvement in the communication among team members. Li et al. (2018) considered the interprofessional teamwork's impact on improving patient-centered care. This study evaluated emergency room teams and created a group focused on interprofessional communication and a control group. The resulting data concluded a reduction in hospital readmissions within 30 days, as indicated by a 95% confidence interval.

Clear and ample research has been conducted on the development of team dynamics and interprofessional communication within a healthcare setting. The benefits of this team dynamic are supported by improved patient outcomes, reduced rate of reinjuries, and patient satisfaction (Druvenga, 2017; Hu & Broome, 2019; Keshmiri et al., 2020; Li et al., 2018). Another important consideration in developing a stronger team dynamic is the perspectives of the healthcare professionals involved. Kraft et al. (2014) interviewed a team of 10 members consisting of occupational therapists, physiotherapists, and nurses within a rehabilitative setting. Respondents of this survey were asked open-ended questions examining their viewpoints on collaboration.

The conclusion of the study found that each team member valued collaboration in the work setting, and that listening to one another improved this process. The study also identified that the respondents felt the collaboration to have suffered the most when information was slow to transfer among team members. This study reflects the importance of each member being aware of their role within the group as well as their limitations. As this self-awareness takes place, the team works most efficiently in the sharing of tasks and responsibilities.

The RTP Process

Currently, athletic trainers are typically first responders on the scene to evaluate injuries in student-athletes. ATs are responsible for referring the athlete to a physical therapist or doctor

as needed. Upon the athlete's return from outside medical professionals, the AT usually reviews their current ability for RTP. Once the athlete is released from RTP protocol, they typically return to the strength and conditioning coach as well as the sport-specific coach with minimal handoff. This break in communication creates an opportunity for reinjury as ATs, PTs, and S&C coaches do not often have further communication after the athlete is released from rehab. Based on current research, we know that the rate of injury for ACL tears for example is quite high; therefore, further consideration should be given to the handoff between professionals (Bruder et al., 2023; Oleksy et al., 2021; Olivares-Jabalera et al., 2021; Truong et al., 2020).

Staffing

The first, and most obvious cause for a gap in interprofessional communication is that of a lack of staffing. Pryor et al. (2015) found that only 42% of high schools in the U.S. have access to an athletic trainer, though only 37% percent had a full-time AT. 31% of schools had a part-time trainer, and 2% provided care by per diem. Without a consistent AT on staff, many injuries may go undocumented, and there is no way to ensure a warm hand-off with the strength coach; a consideration which may lend to the rate of reinjury. The warm hand-off in the context of the sports performance team is inclusive of sharing of the surgical/medical details, phase within the recovery process of RTP, and considerations of rehabilitation; discussions that may be shared and documented either in person, by phone, or electronically on shared databases.

As aforementioned, only 10-15% of high schools in the U.S. have a full-time S&C on staff (Breslin, 2022). The lack of an educated and certified S&C coach creates a significant concern as the RTP assurances are essentially nonexistent. In most cases wherein a secondary school is unable to hire a full-time S&C, it is common for there to be a coach from a different sport who creates a training program which will be unlikely to communicate regularly about

observable trends within the AT room. If the district is lacking either position in the full-time capacity, it is not uncommon for the hiring of a contract employee. A lack of adequate full-time staff in either position may create a substantial gap in injury data collection as well as oversight for follow-up programming after RTP to reduce the likelihood of re-injury.

Improving the team communication of contracted help can be challenging. Talpey & Siesmaa (2017) identified the necessity of a multidisciplinary approach to strength and conditioning programs. Talpey's study highlights the necessity of early reporting of injury through team communication and suggests the use of meetings, software programs, and a familiar language. When schools cannot fund a full-time position, these considerations must be enforced even more to avoid the risk of reinjury to the athletes.

The alarming lack of full-time ATs and S&C coaches individually is cause for concern when identifying preventable injuries. Adding to this disparity in care is that even fewer secondary schools have both professionals in a full-time capacity. Though coverage is often contracted out for a professional, current literature supports a lack of documentation of the injuries, as well as an extremely high rate of reinjury amongst high school athletes. Talpey & Siesmaa (2017) suggest that injury prevention requires interprofessional communication with a team of experts. Without the AT, many injuries go unreported and treated, (Talpey & Siesmaa). Without the S&C coach, potentially avoidable injuries are missed through remaining unidentified and addressed in the training program. Talpey created a proof of concept for the implementation of a six-step process as seen in the table below.

Table 3.

The six strategies of the translating research into the injury prevention (Finch, 2006).

	The 6 Strategies of the Translating Research into Injury Prevention Practice (TRIPP)
Stage Number	Description of Stage
1	Survey for injuries
2	Establish etiology and mechanism of injury
3	Develop the preventative measure
4	Evaluate the science in ideal conditioning
5	Describe implementation context to inform implementation strategy
6	Evaluate effectiveness of preventative measure in real world context

Education

The educational background of an AT, and S&C is the second area of concern for the breakdown in interprofessional communication within the sports performance team. The athletic trainers' focus of study is injury, prevention, acute care, and rehabilitation. Considering the lack of education in strength and conditioning, the AT may allow an athlete to return to play without fully appreciating the current phase of periodization training that they would reintegrate into. This consideration may then lead to an increased rate of reinjury (Welton et al., 2018).

The educational background of the strength coach is heavily focused on sports performance and biomechanics. While the S&C would have received the education regarding faults in the movement pattern of an athlete, they are not nearly as well versed with the

mechanism of injury (MOI), muscle insertions, and origins, nor in nerve innervation. Without strong interprofessional communication amongst the team, the strength coach may unknowingly allow an athlete back to the weight room and into a movement pattern replicating the MOI before the athlete's stability and range of motion having returned to a healthy state.

Pre-certification education of the S&C coach is at the bachelor's degree level, and to the master's level in some geographic areas for AT. Variation in education programs supports this concept as strength and conditioning collegiate programs currently do not require any corrective exercise programming and are typically a career field (even with a CSCS) as a B.S. degree. Conversely, athletic training collegiate programs do not typically offer strength training programming; instead, they focus on emergency response as well as corrective exercise alone. Athletic training requirements do vary by State, though in Texas, the requirement is now a master's degree. During an AT's degree program, only four of the top 10 NATA recommended programs offer a strength and conditioning course; half of those being only specific to ATs, (NATA, 2015). Conversely, Breslin identified that only 10-15% of all secondary schools in the nation provide a full-time S&C coach. S&C major-degree paths only mandate a single injury prevention course according to the NSCA's top 10 recommended programs.

The siloed approach to the education of each profession creates a gap in the 'common language'. The understanding of nerve innervation, muscle origin and insertion, mechanism of injury, and recovery considerations are not currently required information for S&C majors. Similarly, periodization training, sports nutrition, hypertrophy development, speed development, and biomechanics are not currently required courses for AT majors (NATA, NSCA). Without additional certifications to be required for their licensing or position, neither professional may be adequately prepared to work in partnership with the other; hence a necessity to bridge the

interprofessional communication will be required (Li et al., 2018; Meskimen et al., 2022; Slusser et al., 2018).

To bridge the interprofessional communication of the sports performance team, Universities need to require the implementation of the opposing major's coursework (AT students taking S&C coursework for example), even at a simplistic level. As students begin to experience a similar knowledgebase, the communication among team members shall improve. ATs will be able to provide a smooth hand-off to the S&C having a deeper understanding of a strength program, and the S&C coach will begin to identify mechanical faults that also pose as potential injuries by replicating the mechanism of injury within the athlete's sport. Employers and credentialing organizations should also seek a well-rounded candidate through the additional certifications offered.

Certifications

The required certifications for ATs and S&Cs currently provide no overlap in concept which may also move the sports performance team further from a 'common language.' As indicated by the NATA as well as the NSCA, each professional is trained, educated, and tested to remain siloed within their scope of practice only. ATs speak in medical terminology for the necessity of communicating with physicians, surgeons, and physical therapists. Their position requires them to possess the ability to interpret the doctor's recommendations, as well as to communicate the acute injury to emergency medical responders (Pryor et al., 2015).

S&C coaches work more closely align with sports performance; a function to which the practitioner must coordinate sports performance with the coaching staff. The S&C coaches must thereby interpret an athlete's performance on the court or field and create programming to improve upon their performance. The S&C coach must be versed in the movement patterns of

the sport, the timing or phase of the sports season, and possess an ability to communicate effectively with administration, coaches, and athletes alike.

Upon completion of a degree program, both ATs as well as S&Cs are required to sit for a certifying exam before entering their profession. The ATC license (athletic training certification) is only allowable to be attempted by a student from an accredited AT program. However, the CSCS (certified strength and conditioning license) only requires a bachelor's degree; though, this is preparing to change by 2030. For an S&C coach, licensing such as 'Corrective Exercise Specialist' from the National Academy of Sports Medicine (NASM) would advance the knowledge of rehabilitation thus adding to the opportunity of the S&C coach to interpret aspects of the AT function. Another option for certification is offered through FMS (Functional movement systems); this system leans into the use of screening as an injury prevention and identification tool though the evidence remains on the fence as to its scientific support. This leveled course sequence teaches the practitioner to evaluate movement patterns through a battery of tests to improve upon the rehabilitation and sports performance of an athlete. Many of these tests are utilized by an AT and would allow the S&C coach to watch the same movement patterns, and thus improve upon the communication of the team.

Software and Technology

The use of software and technology is truly valuable in the communication and dissemination of patient care information/injuries among the sports performance team. As the injured athlete visits their doctor following any injury, the athletic trainer typically takes the form to upload into a database where the information is stored electronically for an extended period. Systems such as Rank One, Sports ware Online, Athletic Trainer System, or Healthy Roster do have limitations. Currently, the software systems are designed to act as an online storage

database of injury records, though they are only manipulated by the athletic trainer. The databases are typically emailed off to the designated parties such as the head coach, athletic director, and possibly the strength coach (RankOne, 2023).

The communication to those respondents is typically as simple as name, date of injury, type of injury, and time needed before returning to play. Among the common respondents are the AT, S&C coach, head coach, school nurse, and athletic director. The email notification is often only interpreted by the athletic department staff as the player was injured but will return in 'X' amount of time. While this communication is quick to disseminate, the downfall occurs when there is not a full-time athletic trainer on staff, the recipient of the email lacks the medical terminology knowledge to understand the depth of the communication, and it may oversimplify the recovery process.

Gaps in Research

There is currently a large volume of research regarding the most common injuries in high school sports, yet according to Ritzer et al. (2021) further investigation must be focused on causation for the injuries such as technique, failure to completely heal from a prior injury, risk-taking behavior, etc. Welton indicates the defined RTP protocol for acute injuries to be far superior to that of overuse injuries as they tend to be more subjective by nature. Additionally, there is a good number of recommendations on exercises best used to rehabilitate said injuries. Some of these existing gaps such as staffing, communication, and the effects on sports performance will be the focus of this practicum.

Yang et al. (2012) evaluated concussions, and identified that one-fourth of acute injuries were concussions specifically. Pelet et al. (2022) reinforce the findings by Yang by identifying

that most concussions observed in a study of 707 football players who had received a concussion had required a full rehabilitation protocol before completing the RPT protocol. Yang also identifies the prevalence of this type of injury particularly in the media over the past several years which have led to the implementation of new laws, regulations, and awareness of the severity of long-term complications. The benefits from the new awareness have produced a decline in the rate of concussions; specifically, as the RTP requirements. Yang poses that "a similar public policy approach may help reduce other types of sports-related injury", (p. 9).

Depending upon the athlete's specific school, they may not have an athletic trainer, or if they do there may not be much relationship with the strength and conditioning coach, assuming there is a person of that role on campus. For athletes working through injury, specific care must be given, and guidelines followed to ensure a full recovery and return to sport, such as concussion protocols which have been demonstrated to be effective. To address these concerns, this chapter will discuss existing research from athletic training experts as well as strength and conditioning experts to create a program that benefits both sides of the field.

Summary

The purpose of this practicum is to examine the relationship between the athletic training professional and the strength and conditioning professional in a school setting. The problem faced by student-athletes is the breakdown in communication between athletic training staff and the strength and conditioning program which may lead to an increase in injuries sustained. This practicum applies a theoretical framework to a narrative review of current case studies and systematic reviews pulling statistics to establish significant patterns.

CHAPTER THREE: METHODOLOGY

Overview

The purpose of this practicum is to present a current framework for the athletic training/RTP (return to play) protocol utilized in schools today. Additionally, this practicum provides a sample strength and conditioning protocol based upon recommendations from established research to offer a bridged approach to rehab and strength training. This practicum consists of meta-analyses, systematic reviews of randomized, controlled trials (with a low risk of bias) as well as a new qualitative survey prepared by this researcher incorporating the concepts that currently exist in established research.

This study has been designed as experimental field research evaluating the cause-and-effect relationship of interprofessional communication on injury rates. According to Cottrell & McKenzie (2010), this type of study has been considered the 'gold standard' in field research. The validity of the study will only be suggested as hypothetical based on respondent feedback as it would not be possible to evaluate the relationship of professionals located in outside organizations. Instead, the researcher will attempt to draw conclusions that are reasonable based upon the evidence between trends observed, and in line with proven best practices.

Design

A qualitative research methodology will be taken as well as certain philosophical frameworks established in the research of this practicum. According to (Creswell et al., 2008), "Quantitative research is the process of collecting, analyzing, interpreting, and writing the results of a study", (p. 6). A qualitative approach is appropriate as the systematic review of existing research is significant in identifying the strengths and weaknesses of both athletic training as

well as strength and conditioning in school settings. This research project will focus on testing approaches and theories of strength and conditioning, as well as athletic training; then it will consider the ramifications of interprofessional communication as it may affect student injury rates. The research to be collected will be subjective, and not statistically based; content to which qualitative research is well-suited to addressing.

Postpositivist Approach

According to Tanlaka et al. (2019), a 'postpositivist critical multiplism' approach worked well when evaluating nursing research as it valued the importance of knowledge sharing while addressing complex phenomena and opinions based on personal experiences. This objective approach to defining a causational effect lends well to a more thorough understanding of the working dynamic differences between different professionals. When a community can appreciate the objective differences of others, a deeper level of knowledge sharing may help in redefining the reality of each to better bridge an interprofessional community (Tanlaka et al., 2019).

A postpositivist approach to research will be taken to impartially evaluate current recommendations in research as well as to evaluate the underlying themes in relationship to injury and sports performance specifically. In practice, a postpositivist approach will be used to gain data from multiple perspectives and resources during the literature review phase of data collection. The research will be pragmatic in nature as it focuses on the outcomes of established research to create a recommendation for further injury reduction in student-athletes.

Evaluating the experiences of current professionals within the athletic training, physical therapy, and S&C careers is significant to gain insight into qualitative data as they work closely

with student-athletes to improve their sports performance and rehabilitate injuries. Current professionals have been interviewed in an open-ended format touching on at least 10 key points evaluating trends, communication, and recommendations for the future. The interviews were conducted through an online platform to ensure the anonymity of respondents while providing space for additional comments from the respondents should they need to elaborate upon an answer.

The data from these interviews were evaluated and then loaded into Atlas.ti. Atlas.ti was then used to apply codes as well as to extrapolate specific data in a bar chart to identify these codes. The interviews were also then evaluated for key quotes for future reference which were stored within the research database. Considering the information being evaluated was based on experiences and opinions, this portion of the practicum was conducted with qualitative research methods. The questions from the interviews are the following:

This practicum presents a new case study approach to further explore existing scientific recommendations. Creswell et al. (2008) presented qualitative research as theoretical frameworks and philosophical assumptions to present research information. This practicum is qualitative as it develops from existing assumptions in literature from multiple functions of athletics. The populations within the systematic research were also studied and interpreted in the setting of the activity.

A part of this study incorporated a new survey that sought to determine or examine the relationship between the interprofessional communication of the AT and S&C coach with the rate of reinjury, and injury prevention. This survey may then be considered a relationship-based research project seeking to answer a relationship-based research hypothesis. Research to explore this relationship includes a literature review of the rate of reinjury and injury prevention among

high school athletes. The survey conducted provides respondents with a range of multiple-choice answers, yet also allows for the option to add additional comments to further their experiences with the research question.

A postpositivist approach to data collection is relevant as this practicum incorporates data collection from numerous systematic reviews, and methods of exercise/rehab which aligns with the definition presented by Creswell, (2018) of refining and abandoning some claims based on research, and creating an opportunity, though not generalizable to all athletes as each athlete is individual as well. The collection of systematic research is also based upon several case studies which is also a component of qualitative research. The researcher (I) utilized case studies to answer the presented questions for the population within the study.

Setting

The setting of this study is American High Schools throughout the nation, and both current and prior HS athletic trainers and strength coaches were surveyed. The survey was sent out to respondents by way of email through Survey Monkey specifically. Assuming the respondent meets the criteria, and is a willing and unpaid participant, they then continued upon the link to the survey. Special considerations have been made to ensure the anonymity of the population of respondents to allow the researcher better insight into the operations of their setting while maintaining the most honest feedback possible.

An important consideration may be the potential variation between resources in a public setting versus a private one. For example, SCS has not had a full-time strength coach until July 2022; there is still only one part-time/contracted (PRN) status athletic trainer. This alone may cause for a breakdown in the communication, and observed injury rates as there is an obvious

lack of resources. The researcher for this study had elected not to restrict the setting to only one style of high school due to the restrictions in time until completion of this survey. Finally, further considerations may be the State in which the school is located. For example, injury prevalence in hockey in Texas would quite likely be near zero considering that hockey is not a popular sport within the State. This variance in the location should also be considered a potential need for further research.

Participants

The population of this practicum varies between the separate case studies that had been compiled within the framework of the literature reviews. The overarching population studied was student-athletes with a focus on high school-aged participants (ages 14-18). The population consisted of injured and previously injured athletes, both male and female, within the rehabilitated component of the practicum. The purpose behind including all injuries and genders was to ensure a large enough population for statistical value as well as validity for future recommendations.

All literature reviewed was from scientifically sound research, with most data coming from the past five years. Systematic reviews with a large population and high confidence are preferential sources to ensure the integrity of data and findings. The researcher worked to have a fair and impartial evaluation of all aspects of the practicum including the athletic trainer, strength coach, communication, resources available, and finally the injury trends observed.

The population for the survey conducted were prior and current, practicing athletic trainers as well as strength and conditioning coaches in the high school setting. This population is often working with the high school population on an ongoing basis and therefore offers the

most insight into trends and opportunities. These professionals must be over 18 years of age and carry a current license (which additionally demands a degree). Finally, this population will be held anonymous to preserve the integrity of anonymity for both the respondent as well as their employers. The survey will be sent out digitally to respondents that are licensed, professionals that work in high school athletics departments. For the intent of reaching a larger population, both public and private school settings will be considered within the survey. The survey concluded with 35 responses from both athletic trainers as well as strength and conditioning coaches. Through many responses, the researcher shall work to ensure an unbiased conclusion. The survey was designed to be purposeful, and no participants were compensated in any manner.

Procedures

The basis of this practicum has been the literature review of existing case studies. This step-in research was to ensure the validity and level of evidence being studied would be high. The researcher then compiled data from both rehabilitation research as well as strength and conditioning. This project intends to interpret information collected through the survey by which to improve upon the communication of the sports performance team, and thereby allow future team members to create a refined strength program aimed at high school athletes to include aspects of rehabilitation while cross-examining the effects of those exercises against the effect in sports performance.

This project incorporates the use of a survey, created on Survey Monkey upon all questions having been approved by the project committee as well as the IRB. A total of 17 questions were created to explore the relationships between the ATs and S&C coaches; yet in a manner to which afforded complete anonymity. In this manner, the study was double-blind to protect the integrity of participation and to ensure the integrity and unbiased results may be

gathered. Data collection for this study was planned for one week in duration and focused on the presence of a full-time AT or S&C coach on campus. Further questioning was designed to determine what, if any impact the sports team had upon the rate of reinjury and prevention of injury.

The procedure for the survey conducted was to evaluate the findings within the current literature in support of this project. The current gaps identified in research found within scholarly journals, and primarily within the past five years of study were then identified. The research gaps served to assist in creating a survey for current practitioners, both athletic trainers as well as strength and conditioning coaches. Finally, the findings resulting from the survey collected were evaluated for trends and a thematic analysis was carried out.

Researcher's Role

The researcher's role was to evaluate the relationship between the sports performance team; specifically, this was accomplished through reviewing the current literature and creating a survey administered to S&C/AT professionals in a high school setting, to review the trends in responses to identify themes. The software platform 'Atlas.ti' was programmed to identify terms such as 'ACL injury', 'shoulder injury', 'preventable', 'athletic trainer', 'strength coach', and 'reinjury' within collected literature. This collection was then used to build a case for the rate of reinjury as well as preventable injuries; thus, furthering a discussion of the need for change. The researcher then evaluated the totality of the data and provided a suggested recommendation that may be implemented to better bridge interprofessional communication as well as to reduce the rate of injury by combining concepts from both practices.

Data Collection Plan

Data collection for the survey was done in an online format. The researcher used the software platform 'Survey Monkey' to code all data points for relevancy and correlation. All data collected from both components of this research will protect the anonymity of each participant, and lack any possible identifiers to include name, social security number, phone number, address, etcetera. Data will then be stored in an encrypted, online database that no person other than the PI will have access to.

Data Analysis

Data analysis for this project will utilize SurveyMonkey for data collection from a qualitative survey distributed through a weblink to participants. The distributed survey will contain 17 questions with several selectable responses, as well as the option to add additional comments. SurveyMonkey is an online platform, which allows the researcher to determine most of the constructs of the survey. For instance, the researcher may create a mailable survey, or an online survey utilizing a web link. Furthermore, the platform allows for the researcher to create any type of question and response format, as well as the embedding of a consent form to respondents as needed. This platform has been selected for this project due to user ease, simplicity of function, and the ability to disseminate to a selected audience at a global scale if desired.

Respondents' answers were then graphed and coded according to their responses within the same webpage. Once all the data had been coded, the data was evaluated to determine trends within the responses. These trends, which will seek to examine potential communication breakdowns in communication between ATs and S&Cs, as well as opportunities to improve upon this communication will be compared against the current literature.

Further data collection will consist of sources of literature from scholarly sources. These articles were loaded into Atlas.ti as well to identify current trends within the research. This coding will benefit the researcher by increasing the speed and efficiency of the review. The project will also include the use of a bar graph reflecting the outcomes of the survey responses to present a physical representation of the information collected. Additional graphs representing recorded injury trends will also be presented within the literature review and analysis section of this project. This data is being collected to present the value of improving the relationship between the AT, and S&C as many of the recorded injuries may be preventable.

Trustworthiness

A process of 'data triangulation' was used as this project contains the results of many case studies evaluating the communication, types of injuries, as well as the specific nuances of both ATs and S&C coaches. The purpose of this triangulation was to provide a comprehensive evaluation of injury rates within the high school populations and to determine any correlations to the sports performance team specifically. The data from the current literature is trustworthy as it is supported in scholarly journals and consists of systematic reviews.

Credibility

The credibility of the referenced materials was evaluated through the exclusion of any source not from a scholarly journal or study, the confidence interval of the studies researched, and the date of the research. Credibility was also important in the creation of a survey. Respondents were restricted in the very dissemination of the questionnaire through the exclusion of non-licensed AT/S&C professionals. In this restriction, the responses gained maintained their credibility as they were strictly from relevant professionals.

Dependability and Confirmability

The dependability of this project is high due to the vast amount of information included can be found by any person seeking the same information. Additionally, the survey created allowed for participation by the included professionals across the U.S. Should this survey have excluded participants from purely a single geographic location, a larger variance in response may have been observed. The survey questions disseminated to the target audience are included within this project allowing for repeatability in testing by a separate researcher should one so choose.

Finally, this project provides transferability by allowing any reader or researcher to access the evidence as found through both the included literature research as well as the survey created. The finding of this study may allow future researchers to apply the same information to other contexts such as the creation of a sports performance team, defining roles and responsibilities of team members, or the creation of budgetary considerations for a team.

Transferability

There is a significant amount of transferability between high schools in America. For example, communication, and a necessity for a common language are potential barriers for any high school in the country. There is also a degree of transferability between the sports performance team's communication and that of healthcare workers in that both require efficient communication and collaboration among professionals with a variety of licensure and education.

Ethical Considerations

The respondent privacy, employer privacy, and data integrity considerations of this project are rather simplistic. Upon receiving the emailed invitation, the opening of several pages

of the survey ensure, and explain to the participant if they are eligible to participate, a written consent explanation, and the right to withdraw from the study at any time. Further explanation was provided to explain the confidentiality of the survey as well as data security. The only person having access to the responses to the survey are the PI for this project. Further consideration was given to ensure no vulnerable population would be involved, and that the only participants included were over 18 years of age, and with the needed experience to provide valuable insight.

This survey does not include special populations, nor is there any means by which any personal information from respondents to be captured. No additional information regarding this study shall be given to any person participating in the research until after the study has been completed. Furthermore, no names of any participants are necessary, nor shall they be recorded as the evidence shall be statistical and only numerical in nature. All ethical considerations were provided to and approved by the IRB of Liberty University.

Summary

This practicum aims to create a stronger relationship between the athletic training professional and the strength and conditioning professional in a school setting. The problem faced by student-athletes is the breakdown in communication between athletic training staff and the strength and conditioning program which may lead to an increase in injuries sustained. The practicum achieves this goal through an independent survey delivered to current, practicing high school ATs and S&C coaches to build upon the current research and identify trends as well as any variability.

CHAPTER FOUR: FINDINGS

Overview

The created survey was disseminated nationwide through an online platform and was made available to athletic trainers as well as strength coaches with a professional license or certification, and experience within the high school setting. The survey was made available for 24 hours at which time the researcher had closed the survey; the result to which was a total of 35 respondents. The survey sought to examine what, if any relationship may exist between the rate of injury and communication among the sports performance team. A series of 17 questions were used to determine different considerations for this purpose.

Participants

The survey questions as observed below were answered by 35 ATs, or S&C coaches from around the nation. Each respondent self-identified only by region within the United States; East North Central, East South Central, Middle Atlantic, Mountain, New England, Pacific, South Atlantic, West North Central, or West South Central with three participants skipping this question. All participants were currently licensed and practicing within their profession. Additionally, every participant was working in either a full-time or part-time capacity; though they were not asked to which capacity they operated.

Results

The survey as presented had been constructed based upon the observations made from reviewing current literature. A theme from the current literature was a lack of data from high school rates of injury and re-injury. Furthering this absence of data was the lack of literature discussing the relationship or communication between the athletic trainer and strength and conditioning coach. Finding a high rate of injury as well as a growing athletic population did

draw a correlation, though further evaluation of this theme was necessary through evaluating healthcare professionals as well as practices among American Universities. These themes from the literature aided in creating a new survey to serve the purpose of gaining insight from current practitioners. The thematic results observed from the survey did conflict with the current literature in a few areas. First, the respondents of the included survey did report a higher percentage of licensed professionals in the high school setting than what is currently reflected as the national average. This finding may be the result of the specific participants that had responded to the survey.

The survey was disseminated online through Survey Monkey to active, licensed ATs or S&C coaches. The purpose behind this participation restriction was to ensure feedback gained came from the first-hand experience of practitioners. The first two questions (SQ1, SQ2) posed the question of determining the number of full-time ATs and S&C coaches employed by the high school. 25.7% of respondents reported no full-time ATs, while 28.6% reported a single AT, and 45.7% reported two or more. These figures identify a trend of the high variability of the employment of professionals in work status. Similarly, 31.4% reported no full-time S&C coaches on staff, 34.3% reported one, and 34.3% reported two or more employed. Finally, SQ3 sought to expand the discussion by asking if the school had both a full-time AT and S&C coach to which only 48.6% responded in the affirmative.

There were many observable themes as indicated above, though other questions, such as SQ3, 4, and 9 were presented with a split opinion. SQ3 sought to assess if the respondent had both a full-time AT and S&C coach on staff and reflected a near 50/50 result. This question indicated a lack of team members at the secondary level; though the percentage of schools with both professionals on campus resulted higher than anticipated due to the research. SQ4 asked to

which role the respondent was originally at the school for, teacher, college internship, AT, or S&C coach. Over 30% of respondents answered their initial role was that of a 'teacher". Approximately 28% answered in 'a college internship'. Most respondents: over 50% had answered SQ9 by selecting that they believed their AT and S&C had a good working relationship and communication contrary to this researcher's initial assumption based solely on the literature. The high variability in responses is significant due to specific education and licensing for each position respectively. For example, a teacher who decided to become an AT would need to resign from their position to attend AT school for both education and licensing. Furthermore, there may be a correlation between the lack of team members with rehab outcomes and perspectives regarding team communication.

The survey proves integrity in recruiting as the survey was open to any professional within the sports performance team, and that the survey provided no identifiers. In this manner, complete anonymity was protected, and the results were not skewed. This survey intended to seek any correlation between existing research or literature to the experiences of working professionals within secondary schools. The survey provides value to this research, though more importantly offers future researchers a platform from which to further explore the dynamic of interprofessional communication of the sports performance team.

Another interesting theme arose from SQ4 which asked, "In what role did you begin to work with a high school student population?" This question had been included to determine what, if any cross-over of professions had existed before licensing of the respondent. 80% of respondents did report either having been a coach, a teacher, or having experienced an internship before appointment. Additional space was made available for commentary to add thoughts to the response, though answers such as 'I didn't', 'none', and 'not now' for example were provided;

none of which had added value to the discussion, nor question. Furthering this discussion, SQ6 asked the respondent "Prior to attaining your professional license, what was your opinion on student-athlete injuries and school-run programs?" This question specifically explores the potential relationship between interprofessional communication with the rate of injury and re-injury. Among the 35 respondents, 40% stated either no program existing, or poor programs existing from which major concerns had been identified. Another 22.9% of respondents reported a very good program, yet with some areas for improvement. A final 22.9% reported a very good program with little concerns. These statistics add to the theme of inadequate programs existing today. SQ10 then found that 45.7% of respondents answered that there was not a close working relationship between the AT and S&C coach. SQ10 did carry the theme presented by SQ6. 62.9% of respondents articulated that there was either no interprofessional communication or if there was a program that there were certainly areas of improvement necessary.

Having identified a theme of an absence of practitioners within the high school setting, SQ7, SQ8, and SQ9 evaluated injuries specifically to search for further themes among responses. SQ7 identified the most common injuries observed by practitioners; however, as posed in an open-ended question a variety of responses had been given. 'Anterior knee pain and low back spasms', 'shoulders and knees', 'ankle sprains, hamstring strains, concussions, rotator cuff strains', 'knee and shoulder', 'pulled muscles', and 'legs' were the most common thematic results. It should be noted that four respondents had not answered this question. SQ8 asked participants if the injuries that they had observed were a student-wide issue, or if they were consistent with a larger nationwide issue. 30 out of 35 participants had answered in individual answers that they believed their patients represented a much larger issue. One respondent articulated well all, but four answers observed by stating: "A little bit of both. Overuse injuries

and poor recovery techniques can be pinned on the athletes themselves. A larger issue would be the ignorance of young coaches and time constraints for proper warm-up & recovery. Especially static stretching post activity." SQ7 and SQ8 were potentially too open-ended as a variety of very similar answers were given, yet with not enough specificity.

SQ9 was added to determine if the injuries were the result of reinjury to which 71.4% responded in the affirmative. SQ11 then asked about the communication and interactions between the ATs, PTs, and S&C coaches during the RTP protocol to identify if this theme was carried throughout the post-injury care. Again, 30/35 respondents had answered open-ended questions with a variety of answers. One respondent answered 'For the most part, it depends upon the relationship of the AT and the coaches responsible for designing the workouts. Better to be proactive than reactive when working with these coaches.' This answer, while more elaborative than the others did not truly answer the question posed. Additional responses included 'minimal', 'NA', 'meetings', 'yes', 'little to none', 'good', etcetera. A final interesting response stated "There was originally a gap in communication. Once their technology got put into place they communicated well on injuries, concerns, next steps, and how to improve." This response was interesting as it also followed a theme sought by this researcher. SQ9 and SQ11 are found to support a strong connection between the benefit of effective communication and patient outcomes.

Another theme taken from the current literature was that education and certifications/licensing overlap as well as differences. SQ12 asked participants if they had seen ATs and S&C coaches with the same certificate; 57.1% stated they had not. While all participants answered the yes/no portion, four of those participants had additionally answered with 'I don't know', or 'not sure' which had been allowable comments. The survey platform

does not allow for the identification of any participant, and therefore it is not clear if they had answered yes or no to the question either. This theme was consistent with the literature in that athletic training programs are designed in a cohort fashion alone. For this reason, ATs may sit for the CSCS, though S&C coaches are unable to take AT course loads. A similar theme may be observed within education paths for this purpose; SQ13 asked participants if they had seen ATs and S&C coaches with similar education to continue developing the survey. 40% of respondents stated they had not seen similar education backgrounds, with another 11.4% stating 'other' as an option, and 'I don't know' as the comments to further their answer. This roughly 50/50 split response was interesting in that it was far closer than anticipated based on the literature.

With the survey having identified themes in the responses provided, SQ15, SQ16, and SQ17 had been provided to highlight and identify potential opportunities to improve upon the division among professional communication. SQ15 asked 'How would you imbed this stronger relationship in a school setting?" in another open response with 29/35 participants responding. "Start by showing an interest in being involved with the athletes' total performance. Lack of funding, there are great alternatives e.g. Tabata, plyometrics, cross fit, etc." was one answer. Additional responses included "create a closer team with shared terminology", "mutual respect for each other's knowledge", "involved parents", "require weekly reports", and "better communication". These responses were, again consistent with observable gaps within the current literature as well as the purpose of this project.

A common theme in literature had been a lack of professionals in the high school setting; a potential challenge being the funding of such positions. SQ16 was responded to by 29/35 participants; a very well-developed answer by one participant was:

Here is where the discussion tends to lend in most cases with adversity. I agree 100%!! It boils down to being proactive with planning the program before the school year starts! You must avoid the 'one size fits all' activities when working with grades 7-12. Cookie-cutter programs can be disastrous for the younger developing athletes aged 12-14, especially males (SQ16).

Additional suggestions included 'fundraise', 'NA', 'involvement of parents', 'increase communication', 'volunteers', and 'can't get it done'. A final question sought to be answered in this project was if the implementation of AT exercises within the S&C program would benefit sports performance; the same is seen in SQ17. In the same question, 11.4% of participants responded that it would not be beneficial, and 17.1% stated that only small benefits would occur. 40% of respondents answered that moderate benefits would arise from AT exercises, and the remaining 31.4% answered that those exercises would be highly beneficial.

Summary

The current literature remains very much consistent with the thematic analysis conducted in the review of the included survey. Within both content formats, there is a clear necessity for licensed professionals and a need for improving the communication between ATs and S&C coaches. This is supported by many of the responses within the survey of 35 current practitioners as well as the current literature. Furthermore, many of the participants of the survey had stated a degree of being unaware of how to answer some of the questions regarding the relationship and number of both professionals. This again is consistent with a lack of data regarding the current rate of full-time professionals in the high school setting.

CHAPTER FIVE: CONCLUSION

Overview

The purpose of this practicum was to examine and analyze a stronger relationship between the athletic training professional and the strength and conditioning professional in a high school setting through evaluating interprofessional collaboration. The necessity for interprofessional collaboration and a 'shared language' between practitioners is made evident by the alarming number of sports-related injuries that occur, and by the number of preventable injuries. The collected body of evidence in this project has shown a positive correlation between the interprofessional collaboration of the sports performance team with the opportunity to provide improved medical care as well as the reduction of injuries within the secondary school setting in the U.S.

Summary of Findings

Constructing a sports performance team may be a challenge for many secondary schools across the nation due to the reportedly small percentage of schools that currently reflect a full-time AT, or S&C coach on staff; much less both, (NATA, NSCA). As the challenge to the school district becomes a lack of funding, the survey respondents to this project suggested the possibility for fundraising, grant applications, involving parents, and time donation/volunteering as reflected in SQ15. As athletic directors seek to strengthen communication within the team, certifications, and advanced education will allow for a shared language.

Professional athletic trainers should be encouraged to prepare for certifications such as the CSCS to build upon their knowledge of how the strength coach creates their training protocol. This would then allow for the AT to pass on considerations for the recovering athlete

and ensure a warm handoff to the S&C coach. For the S&C coach, the athletic director should encourage a certification from a governing body such as NASM for corrective exercise. In the college program from both professions, current research reflects rare and minimal requirements for the other profession's specialty knowledge base (NATA, 2015; Triplett & Chandler, 2017). As new positions open at the school district, the athletic director and program would be best served to add requirements to the position for such certifications, or collegiate work.

Athletic trainers and strength and conditioning coaches both serve to provide an undeniable value to the athletic development and recovery of athletes. However, ATs are trained in a deeper understanding of anatomy and physiology as well as medical terminology to allow them conversations with specifically medical personnel. Strength and conditioning coaches traditionally work in a closer relationship with team sports coaches, and require an understanding of periodization training, and biomechanical patterns of the specific sport. This distinction is important as it may be a barrier to communication if the team does not work to overcome it.

Discussion

The respondents to this survey were intentionally selected to only be athletic trainers or strength and conditioning coaches at the high school level. As previously identified, there is a nationwide lack of both professionals much less both at the same school and at the same time. For this reason, the variability of data between what is currently known on the national level with the respondents of this survey. Every survey reported the respondent at a minimum was in a full-time capacity; though a very high percentage of respondents indicated that the other licensed practitioner was also present on site. The literature however indicates a high variability, and that data represents a much lower percentage of secondary schools with a full-time AT or S&C. A potential consideration for the variance may be that the survey only polled schools with at least

one professional. A second consideration may be an overwhelming lack of data tracking these numbers.

Studies such as Druvenga, (2017); Hu & Broome, (2019); Radbil, (2019;) Talpey & Siesmaa, (2017) provide evidence supporting the importance of collaboration among the sports performance team, through the creation of this team as well as methods to be used to ensure success and efficiency are very limited between ATs and S&Cs specifically. The application in practice may best be compared to a more traditional healthcare setting such as a hospital where many practitioners of various degrees, specialties, and education must work together (Cottrell & McKenzie, 2010; Hu & Broome, 2019; NATA, 2015; Pryor et al., 2015; Radbil, 2019; Till et al., 2019). In application from a medical setting, the sports performance team would benefit from regular team meetings, quick dissemination of information regarding the athletes, ensuring a common language for all team members, and clear and defined roles.

Communication during meetings is a simple form of communication by which all parties in the sports performance team may remain up to date with their population. Furthering this communication is the implementation of software such as Rank One. Software platforms are designed for the AT to enter relevant information regarding a patient and their injury into a stored database. Upon a successful entry into the program, an email is auto-generated and shared with the preassigned professionals instantaneously. Further documentation such as doctor's notes, surgical follow-ups, imaging summaries, and more would then be uploaded by the AT. This process ensures that up-to-date and accurate information remains available for the protection of the school and athlete alike. To ensure complete communication, further details may need to be shared by the AT to provide a common language explanation to the sports performance team.

Implications

As team members communicate effectively, an opportunity for collaboration is created. For the AT, their expertise may include concepts of special testing to identify injuries to be brought into the weight room (Chang et al., 2020; Cole et al., 2019; Dexter et al., 2020; Lutz et al., 2020; Rotto et al., 2020). Testing such as the star excursion balance test, the sit and reach test, the Y-balance test, internal/external rotation exercises for the shoulder, and jumping/landing drills may be implemented into regular programming to the S&C's program. Thus, the implementation of special testing and exercise modifications have proven to allow the coaches, AT, and S&C coaches to detect potential weaknesses or injuries at an early stage when collaborative evaluations are conducted (dos Santos et al., 2022; Lauersen et al., 2018; Lopes et al., 2018). Finally, S&C coaches that include PNF (proprioceptive neuromuscular facilitation) stretching, and athlete education is another example of a method proven to reduce injuries through the monitoring and education on the importance of the range of motion (Kabra et al., 2020; Puentedura et al., 2011; Truong et al., 2020).

Within a traditional workout program, the S&C coach may implement into their programming exercises such as 90-degree box jumps with the addition of a correct landing pattern. Recognizing that the most identified injury among female athletes is an injury to the knee, this exercise would allow for the S&C coach and AT to observe a replicated movement pattern in this exercise that would most resemble the MOI on the court or field (Bruder et al., 2023; Clark et al., 2020; Garnett et al., 2023; Liu et al., 2023; Pelet et al., 2022). Should the athlete have a fault in their movement pattern, the AT and S&C coach would have an opportunity to address it through corrective exercise before an imbalance becomes an injury.

Delimitations and Limitations

The researcher had created a series of delimitations to limit potential respondents. This delimitation was supported by only allowing for athletic trainers and strength and conditioning coaches to be respondents. Furthermore, the researcher had additionally required each respondent to have an active license or certification as well as experience in the secondary school setting. These delimitations were implemented to ensure each respondent was well qualified to provide insightful context to the discussion of the sports performance team dynamic, more specifically aspects of their communication.

There are several limitations within the current literature regarding the communication between the sports performance team members. There is currently very limited data to determine how many secondary schools offer full-time AT and S&C coaches on staff. There is also no current data representing where the secondary schools are located that are short-staffed. For these reasons, future research may be conducted to identify precisely where these disparities are. For example, does the disparity exist in public schools versus private? Is there a disparity primarily in lower socioeconomic areas? If a researcher were to examine the locations of performance team members, recommendations may be made to ensure the interprofessional communication functions smoothly, yet to the best of the school's ability.

The limitations within the included survey include the number of participants, as well as identifiers of the respondents. While 35 respondents for a qualitative survey are above the 30 recommended as meaningful by current research bodies, a larger respondent base may also provide insight into a larger array of school sizes, and socioeconomic conditions (Dworkin, 2012; Musko & Demetriades, 2023). Finally, future research may include feedback regarding the software platform used as well as the pros or cons thereof.

Recommendations for Future Research

Future research conducted regarding the sports performance team should examine the lack of team members at secondary schools across the nation. According to a study by the NATA (2019), student safety is simply not currently a priority in high school settings. Further promotion for a full-time AT and S&C coach must occur, though, without additional research, the problem will not be truly evaluated. Future research may also seek to examine why a school district had elected not to provide such coverage by advocating to the board members. The articulation in support of this advocating should reflect the recommendation of minimal staffing levels within the sports performance team as supported by the survey of this project as well as by the current literature in support of full-time AT and S&C professionals.

Another potential study that would be beneficial would be the application of combining S&C programming with functional movement exercise and screenings as well as PNF, or partner stretching. If a future study offered a control group and an experimental group, it would provide additional support for the implementation and benefit of more cross-over concepts between the AT and S&C coach professions and thereby improve communication between the sports performance team. Reducing sports injuries within the secondary population must remain a high consideration through continuous reevaluation.

Summary

The purpose of the project was to examine a way to use interprofessional communication to bridge athletic training and strength and conditioning programs in high school settings to reduce injuries. The value of the sports performance team cannot be underestimated for the prevention of sports injuries. Armed with a substantial number of recent studies, athletic trainers

and strength and conditioning coaches have an opportunity to reduce these injuries through improving upon the interprofessional communication between team members. This communication may be ensured and improved upon in education, certifications, software, and staffing as previously discussed.

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Appendix

Appendix A: IRB Approval Letter

Date: 7-27-2023

IRB #: IRB-FY22-23-1269
Title: Using Interprofessional Collaboration toBridge Athletic Training and the Strength and Conditioning Programs in High School Settings to Reduce Injuries
Creation Date: 3-21-2023
End Date:
Status: Approved
Principal Investigator: Craig Hermans
Review Board: Research Ethics Office
Sponsor:

Study History

Submission Type Initial	**Review Type** Exempt	**Decision** Exempt

Key Study Contacts

Member Craig Hermans	**Role** Principal Investigator	**Contact** [redacted]
Member Craig Hermans	**Role** Primary Contact	**Contact**
Member Justin Kilian	**Role** Co-Principal Investigator	**Contact**

Appendix B: Interview Questions

- Does your high school have a full-time AT? How many?
- Does your high school have a full-time S&C? How many?
- Does your high school have both a full-time AT, and S&C?
- How did you begin to work with student populations?
- Prior to attaining your professional license, what was your opinion on student-athlete injuries and school-run programs? Did it appear to you to have any type of breakdown?
- Upon receiving your license, what types of injuries did you see to be most common?
- Do you feel like these types of injuries are a student-wide issue, or would your experiences possibly be outliers to a larger issue for injuries?
- In your experience, do you believe that many of the injuries you saw were preventable had their strength program consisted of exercises or opportunities to quickly identify imbalances or weaknesses?
- How would you describe the communication and interactions between professionals (including ATs, PTs, S&Cs, etc.? that are involved in RTP protocol?
- Have you seen ATs and S&Cs with the same certifications?
- Have you seen ATs and S&Cs with similar education?
- Do you believe that the PT/AT/S&C coach relationship may be improved; where do, we begin?
- How would you imbed this stronger relationship in a school setting? What about in a situation where the school has limited funding?
- Ok, but how do we address schools with limited financial resources? Here is where the discussion tends to lend in most cases with adversity.

- How do you believe implementing AT-based exercises or measurements into the S&C program would affect sports performance?

Appendix C: Site Permission Letter

HEALTH SCIENCES STUDENT PRACTICUM AGREEMENT

This Practicum Agreement ("Agreement") is entered into this 25th day of November, 20 22 between Craig Hermans (the "Student") and Liberty University, Inc. ("Liberty").

WHEREAS, the Student is enrolled in a course of study at Liberty leading to a degree in the field of health sciences; and

WHEREAS, as part of said course of study, the Student desires to partake in a practicum with the Organization designated in the Addendum to this Agreement (the "Organization") for academic credit,

THEREFORE, in consideration of the foregoing and the mutual covenants, conditions, and terms stated in this Agreement, Liberty and Student agree as follows:

I. Obligations of the Parties

A. Liberty's Duties and Obligations.

a. Liberty shall designate a Faculty Advisor to assist the Student and Organization during the practicum. The Faculty Advisor shall establish the criteria and expectations the Student must fulfill in order to earn academic credit for the practicum. The Faculty Advisor should coordinate with the Student and Preceptor to ensure the practicum duties and objectives delineated in the Addendum meet the criteria and expectations. The Faculty Advisor shall have the final say as to whether the Student has fulfilled the requirements of the practicum and earned academic credit.

b. The Faculty Advisor shall award academic credit to the Student for the practicum upon successful and satisfactory completion of the duties and assignments delineated in the Addendum.

c. The Faculty Advisor shall be reasonably available to the Student and Preceptor should any questions arise under this Agreement.

d. The Faculty Advisor shall provide to the Student the student evaluation forms to be given to the Preceptor. The student evaluation forms will be provided prior to the end of the practicum by Canvas.

B. Student Duties and Obligations. As a representative of the University, the Student shall at all times conduct themselves with excellence and in a professional manner. At all times during the practicum, the Student shall remain in good standing with the University.

a. Conduct. During the duration of the practicum, the Student assumes the role of student intern, which is a cross between a student and an employee. As such, the Student is required to:

i. Abide by the Liberty Way at all times during the practicum;
ii. Adhere to the policies, rules, and regulations and dress code of the Organization;
iii. Maintain the confidentiality of the Organization;and
iv. Complete all tasks and assignments to the satisfaction of the Preceptor.

b. Academic Requirements. In order to receive academic credit for the practicum, the Student shall satisfactorily complete the academic assignments, academic tasks, and other academic projects associated with the practicum as established by the Faculty Advisor. The Student is also required to keep an accurate log of the hours worked during the practicum. ***The hours required to complete the practicum must be started and finished during the semester for which academic credit is sought.*** In order to receive academic credit, the Student must satisfy all requirements of the practicum as delineated in this Agreement, including turning in a record of the hours worked, to the Faculty Advisor no later than the final week of the practicum course. Should the Faculty Advisor require the Student to submit a journal or other document describing the Student's experience during the practicum, the Student must turn it in by this date, as well.

c. Transportation. Student shall provide his/her own transportation to and from the practicum location.

d. Early Termination. In the event Student wishes to terminate the practicum, the Student shall provide the Faculty Advisor and Preceptor with five-day notice of desire to terminate. In the event of such termination, Student will not earn academic credit and will not be entitled to a refund of any money paid to Liberty related to the practicum, including any tuition or internship application fees.

In the event the practicum is terminated by the Organization for unsatisfactory work or by Liberty for student misconduct, the Student will not earn academic credit and will not be entitled to a refund of any money paid to Liberty related to the practicum, including any tuition or internship application fees.

In the event the practicum is terminated by the Organization for convenience, the Student may complete the required hours with another Organization approved by Liberty.

II. Miscellaneous Provisions

A. Practicum Term. The practicum will start and end on the dates designated in the Addendum.

B. Employment Status of the Student. The Student will not be an employee of the Organization or Liberty. Accordingly, the Student will not be covered under the Organization's or Liberty's Worker's Compensation, social security, or unemployment compensation programs. The Student will be in a learning situation and the primary purpose of the placement is for the Students' learning. The Student shall not at any time replace or substitute for any Organization paid employee. Nor shall Student perform any of the duties normally performed by a paid employee of the Organization except such duties as are a part of their training and are performed by the Student under the direct supervision of an Organization employee. This paragraph does not apply if the Student is paid by the Organization during the course of the practicum, in which case Student will not be an employee of Liberty and will not be covered under Liberty's Worker's Compensation, social security, or unemployment compensation programs.

C. Confidentiality. The parties may, throughout the course of the practicum, be provided information not known to the public relating to the Organization's business. Student shall take reasonable measures to protect the confidentiality of such information.

D. Effectiveness of Agreement. This Agreement will only become effective upon Liberty's acceptance of Student's application for the program. Student's application will be deemed accepted when the Faculty Advisor signs this Agreement.

E. Indemnity. The undersigned Student (or parent(s) and/or legal guardian(s) in the case of a minor Student), jointly and severally, hereby agrees to indemnify, defend, and hold harmless, Liberty University and all of its subsidiaries and other related entities, and its and their respective officers, trustees, employees, and insurers (hereinafter jointly referred to as the "Indemnitees") from any and all actual or alleged claims or causes of action by third parties for any losses, damages, property damage, property loss or theft, costs, expenses (including attorney's fees and opinion witness fees), complaints, personal injury, death or other loss arising from or relating to the Student's participation in the program, including without limitation, the Student's travel to, from and during the practicum.

F. Agreements Not Limited by Actions of Liberty University. The obligations of Student (or parent(s) and/or legal guardian(s) in the case of a minor Student) as set forth in the preceding paragraph shall not be limited or reduced in any way by any losses, damages, property damage, property loss or theft, costs, complaints, personal injury, death or other loss, including those resulting from the Student's illness, injury, and/or death, that arise or result, in whole or in part, from the negligence of, or breach of any express or implied warranty or duty of, Liberty University, or any of its subsidiaries and other related entities, or its or their respective officers, trustees, employees, and insurers.

G. Entire Agreement; Modifications; Severability. This document represents the entire agreement between the parties. This Agreement may only be modified in a writing signed by both parties. If any portion of this Agreement is found to be invalid, unenforceable, waived or otherwise deficient, it will be severable from the remaining provisions and all other provisions will remain in full force and effect.

H. Governing Law. This Agreement will be governed by the laws of the Commonwealth of Virginia, without regard to its choice of law provisions.

By signing below, the persons signing agree to be bound by the terms and conditions as expressed in this Agreement.

Student Intern: I have read this Agreement carefully before signing it.

Craig Hermans 11/25/2022

Student Signature **Date**

Parent/Legal Guardian (*if student is under 18*): I am the parent or legal guardian of the Student and have read this Agreement in its entirety and agree to be legally responsible for the obligations and acts of the Student and bound by the terms of this Agreement.

Parent/Legal Guardian Signature (if student is under 18) **Date**

Faculty Advisor: I have read this Agreement and approve of the duties and objectives described herein and agree that the duties and objectives are sufficient to fulfill the requirements for academic credit.

Faculty Advisor Signature **Date**
On behalf of Liberty University, Inc.

Appendix D: Preceptor Agreement

Preceptor Agreement

The Preceptor is an integral part of the program and is crucial to the student's experience. The Preceptor is the Student's most important contact during the duration of the practicum. Therefore, there are certain duties required of the Preceptor to ensure the practicum is beneficial both to the Student and the Organization. The Preceptor will:

1. Consult with the Student and Faculty Advisor in planning practicum opportunities that will satisfy the practicum requirements and objectives;
2. Brief the Student on the Organization's rules, regulations, policies, and procedures;
3. Make available any equipment, systems, and other supplies to enable the Student to perform any tasks assigned as well as provide training on the proper use of such equipment, systems, and supplies;
4. Supervise the Student, or delegate other employees to supervise the Student, at all times during the course of the practicum.
5. Verify in writing all hours and dates worked by the Student with a signature on a document for the Student to provide to the Faculty Advisor (i.e., the log sheet the Student is required to maintain throughout the course of the program);
6. Provide guidance and feedback to the Student throughout the practicum;
7. Protect the confidentiality of any Student information or academic records obtained during the course of the practicum;
8. In the event of termination by the Organization, provide five days' notice to the Student and Faculty Advisor with reason for termination (unless the reason for termination involves performance deficiencies or conduct that make Student's continued presence at the practicum site or continued work in the program inappropriate under the circumstances);
9. Complete a final evaluation of the Student's performance and forward it to the Faculty Advisor within 10 days of the Student's last day of work; and
10. Review the content of such evaluations with the Student.
11. **Only if discussed and approved prior by the practicum director: If the field preceptor does not possess the required public health background then the field preceptor agrees to work with the MPH appointed professor to supervise the student's work.**

If the Preceptor has any questions, comments, or concerns about the Student or the program, he/she should contact the Doctoral Support Team at (434) 592-6163 or by email at SHSDocReview@liberty.edu.

Preceptor: I have read and understand the duties and responsibilities of the Student in the MPH Student Practicum Agreement and I concur with the Student's duties/assignments and learning objectives. I have read and understand the duties and responsibilities contained in the Preceptor Agreement regarding the role of the Organization and Preceptor in the program. By signing below, I agree to execute my duties and meet my responsibilities as the Preceptor that are set forth above in order to help the Student satisfy the learning objectives and other requirements of the DHSc Student Practicum Program.

[redacted] 12/1/22

Field Preceptor Signature **Date:**

DHSc Supervisor/Preceptor Signature **Date**

Appendix E: Participant Recruitment Letter

Dear [Recipient]:

As a doctoral student in the School of Health Sciences at Liberty University, I am conducting research to better understand the communication and relationship between high school athletic trainers, and strength and conditioning coaches. The purpose of my research is to determine if there is a breakdown in communication, and if there is a possible correlation between schools that face these challenges with the rate of injury and reinjury among athletes. I am writing to invite eligible participants to join my study.

Participants must be 18 years of age, working, or have worked in the high school setting, and in a professional position as an athletic trainer, or strength and conditioning coach. Participants, if willing, will be asked to select and complete a digital survey by answering a series of questions, with a list of potential answers. It should take approximately 10 to 15 minutes to complete the procedure listed. Participation will be completely anonymous, and no personal, identifying information will be collected.

To participate, please complete the attached emailed link to Survey Monkey.

The consent document contains additional information about my research. Because participation is anonymous, you do not need to sign and return the consent document unless you would prefer to do so.

Sincerely,

Craig Hermans, Doctoral Candidate

Doctoral Candidate, Head of Sports Performance at Southwest Christian School

[redacted]

Appendix F: Participant Consent Form

Consent

Title of the Project: Using Interprofessional Collaboration to Bridge Athletic Training and the Strength and Conditioning Programs in High School Settings to Reduce Injuries

Principal Investigator: Craig S. Hermans, Doctoral Candidate, School of Health Sciences, Liberty University

Invitation to be part of a Research Study

You are invited to participate in a research study. To participate, you must be 18 years of age, working, or have worked in the high school setting, and in a professional position as an athletic trainer, or strength and conditioning coach. Taking part in this research project is voluntary. Please take time to read this entire form and ask questions before deciding whether to take part in this research.

What is the study about and why is it being done?

The purpose of the study is to better understand the communication and relationship between high school athletic trainers, and strength and conditioning coaches. The purpose of my research is to determine if there is a communication breakdown, and if there is a possible correlation between schools that face these challenges with the rate of injury and reinjury among athletes.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following:

1. Follow the attached link to a Survey Monkey page which will take you to the research.

2. The survey contains a series of 16 questions that will take approximately (10 minutes) in total to complete.

How could you or others benefit from this study?

Participants should not expect to receive a direct benefit from taking part in this study. Benefits to society include a suggested platform that may be used to create improvements within the interprofessional communication amongst the high school sports performance/medical team. The research shall also include suggested certifications that may benefit the common language.

What risks might you experience from being in this study?

The expected risks from participating in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

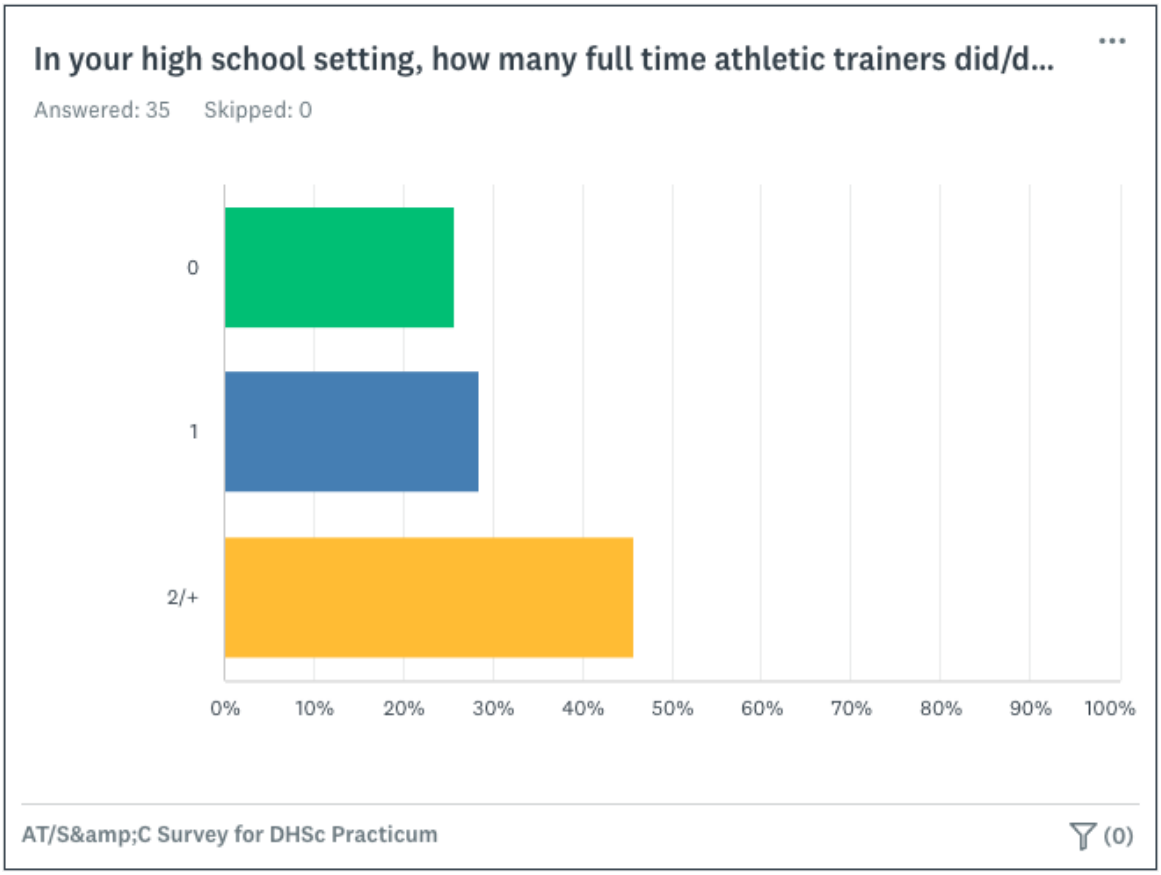
The records of this study will be kept completely anonymous. No Identifying information of information of respondents will be kept, collected, nor identified to any capacity.

- Participant responses will be anonymous.
- Data will be stored on a password-locked computer/in a locked drawer. After three years, all electronic records will be deleted.

Appendix G: Survey Question Figures

Figure 1. Survey Question 1 Responses

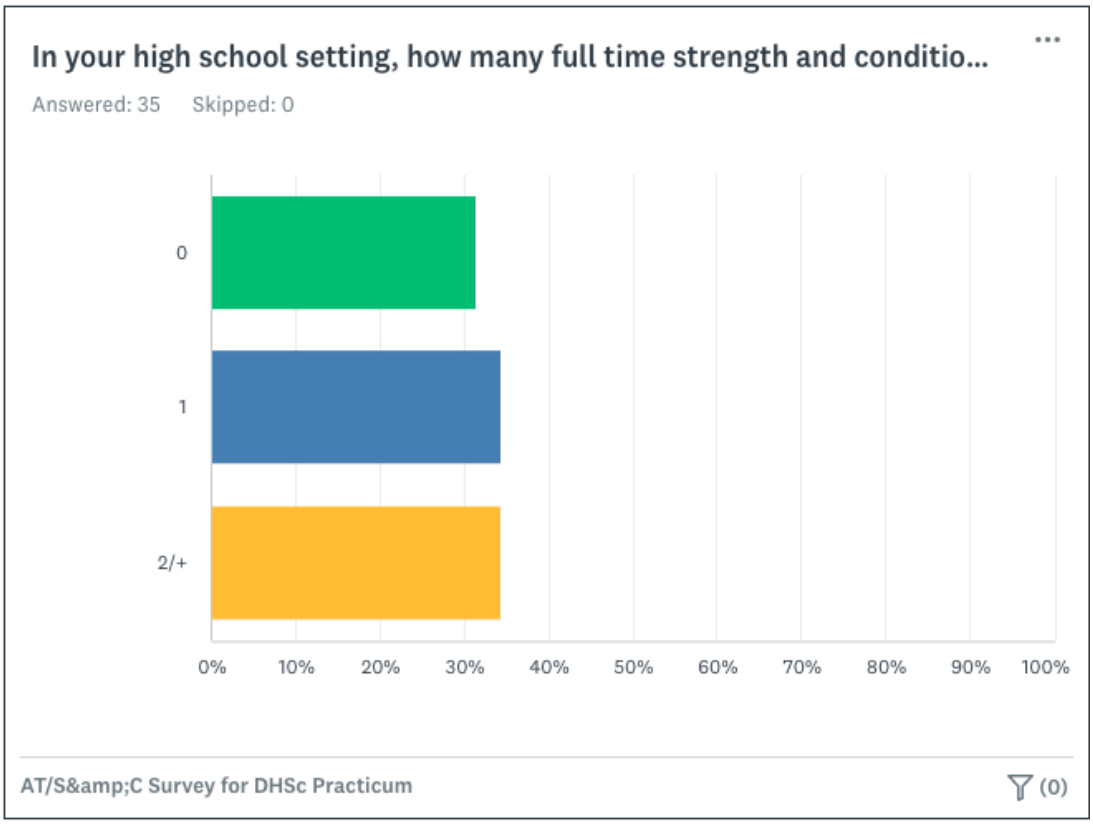
In your high school setting, how many full-time athletic trainers did/do they have?



*This initial question was used to gauge a baseline about AT staffing.

Figure 2. Survey Question 2 Responses

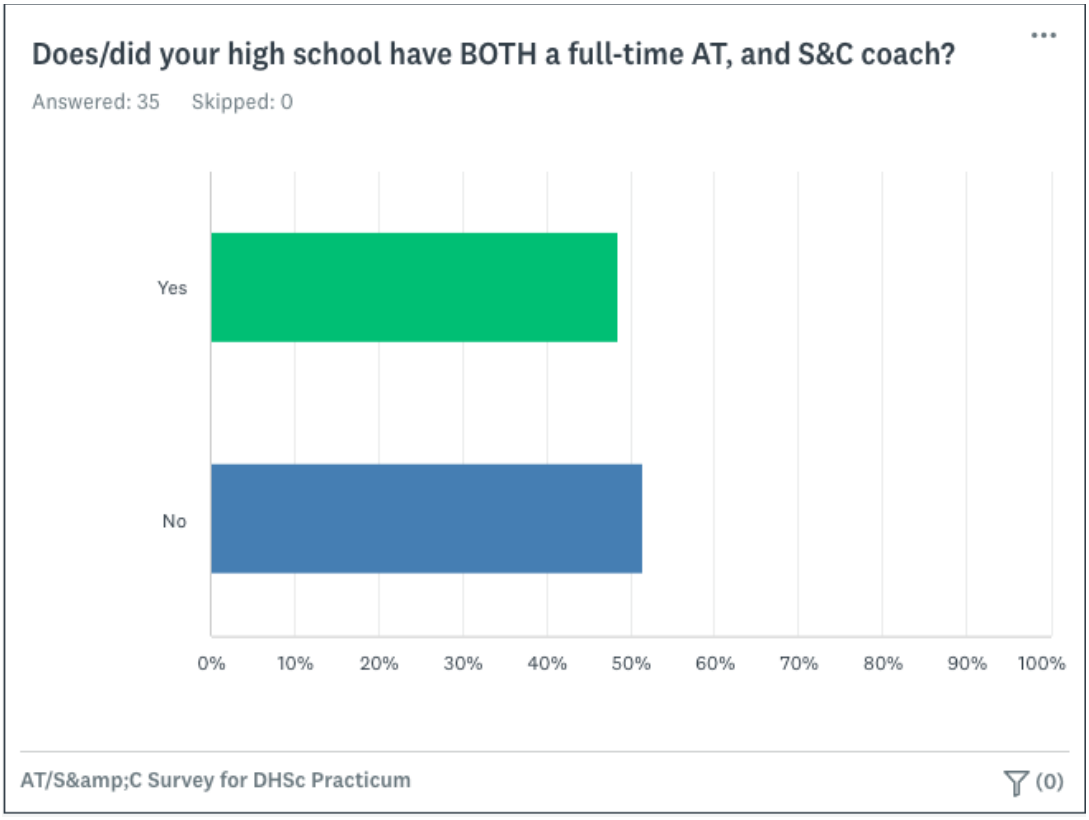
In your high school setting, how many full-time strength and conditioning coaches did/do they have?



*This question was used to identify a baseline about the S&C coach staffing.

Figure 3. Survey Question 3 Responses

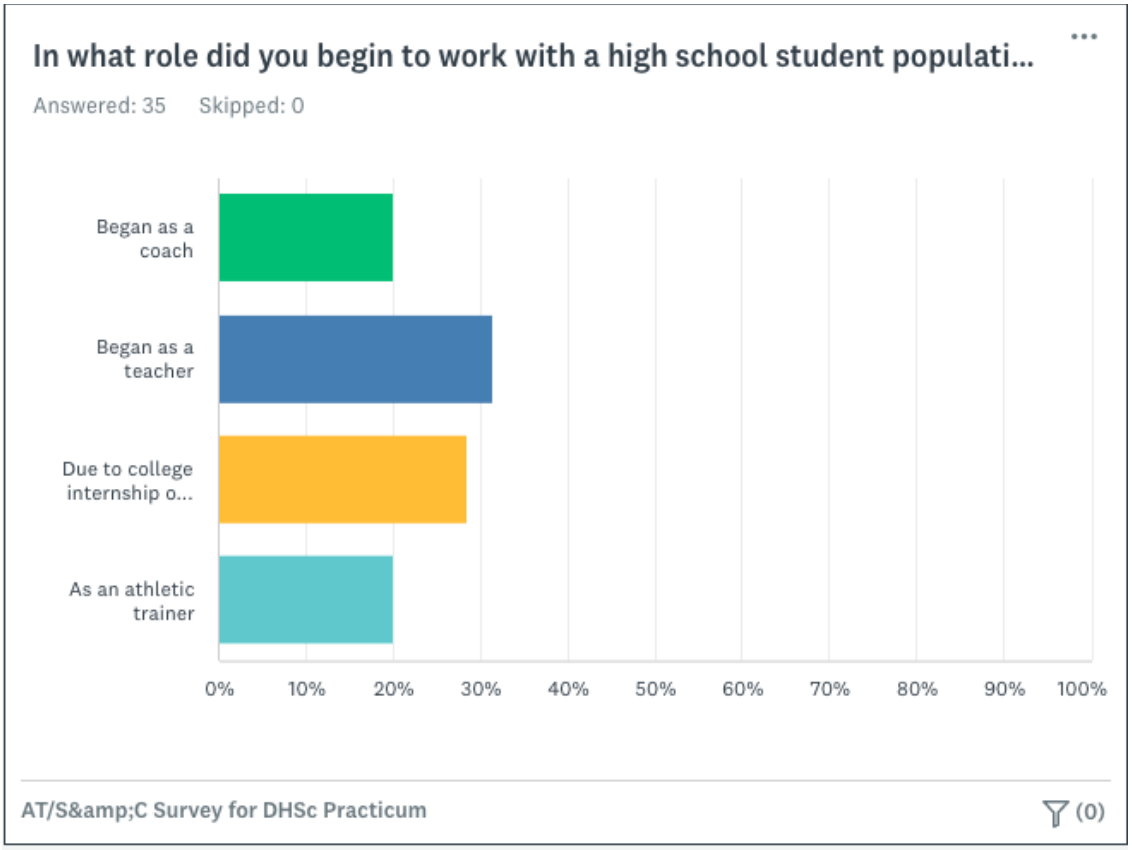
Does/did your high school have BOTH a full-time AT, and S&C coach?



*This question was used to identify minimum staffing from each field on the team.

Figure 4. Survey Question 4 Responses

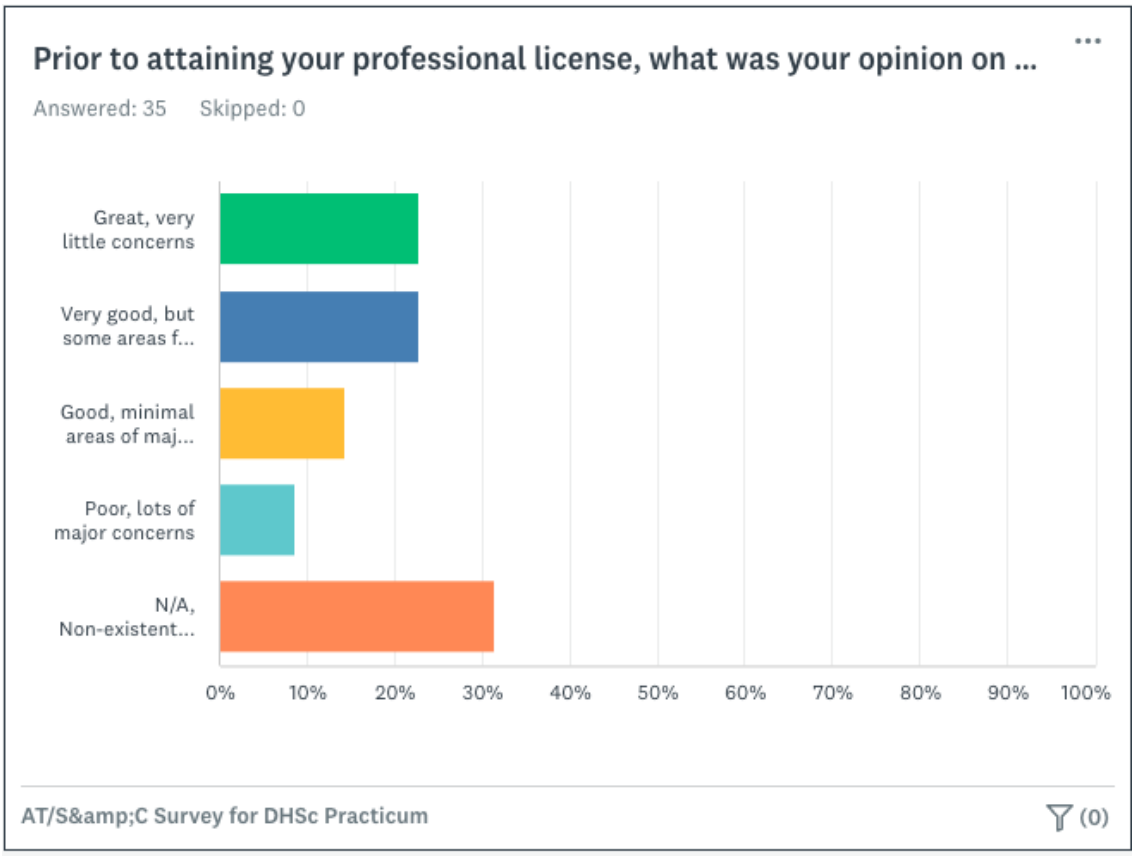
In what role did you begin to work with a high school student population?



*This question was added to determine any preconceived opinions based on if the respondent had not begun their career in the current role. Their opinion may be affected had they not attended a college program specifically for AT or S&C as they may lack knowledge as a result.

Figure 5. Survey Question 5 Responses

Prior to attaining your professional license, what was your opinion on student-athlete injuries and school-run programs?



*This question was built to gauge for preconceived opinions that may have impacted the study. This question is intentional to determine level of concern in comparison with a following up question asking the same opinion, though after their own licensing/certifying process as a practitioner.

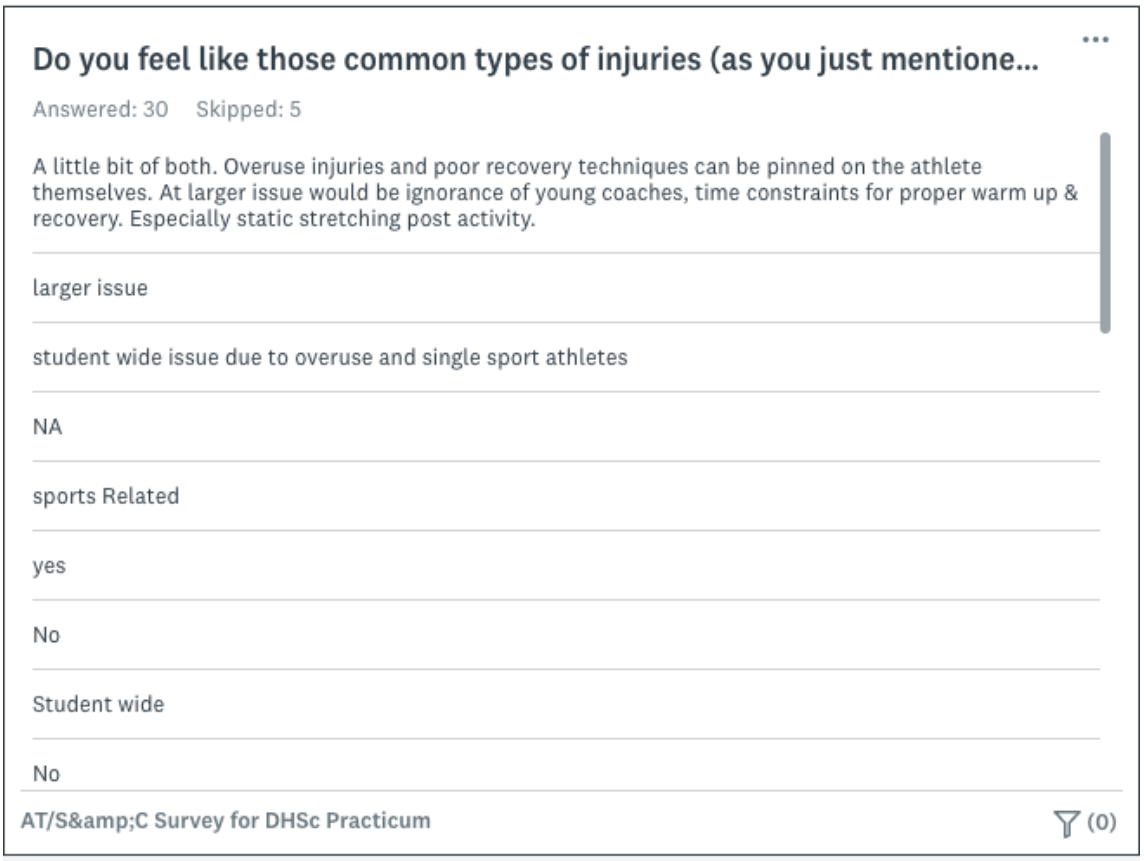
Figure 6. Survey Question 6 Responses

Upon receiving your professional license, what type of injuries (of your athletes) did you see to be the most common?

*This question was designed to determine common injuries observed to provide groundwork into researching current literature regarding those types of injuries. Further study went into evaluating the mentioned injuries to establish if they may have been preventable.

Figure 7. Survey Question 7 Responses

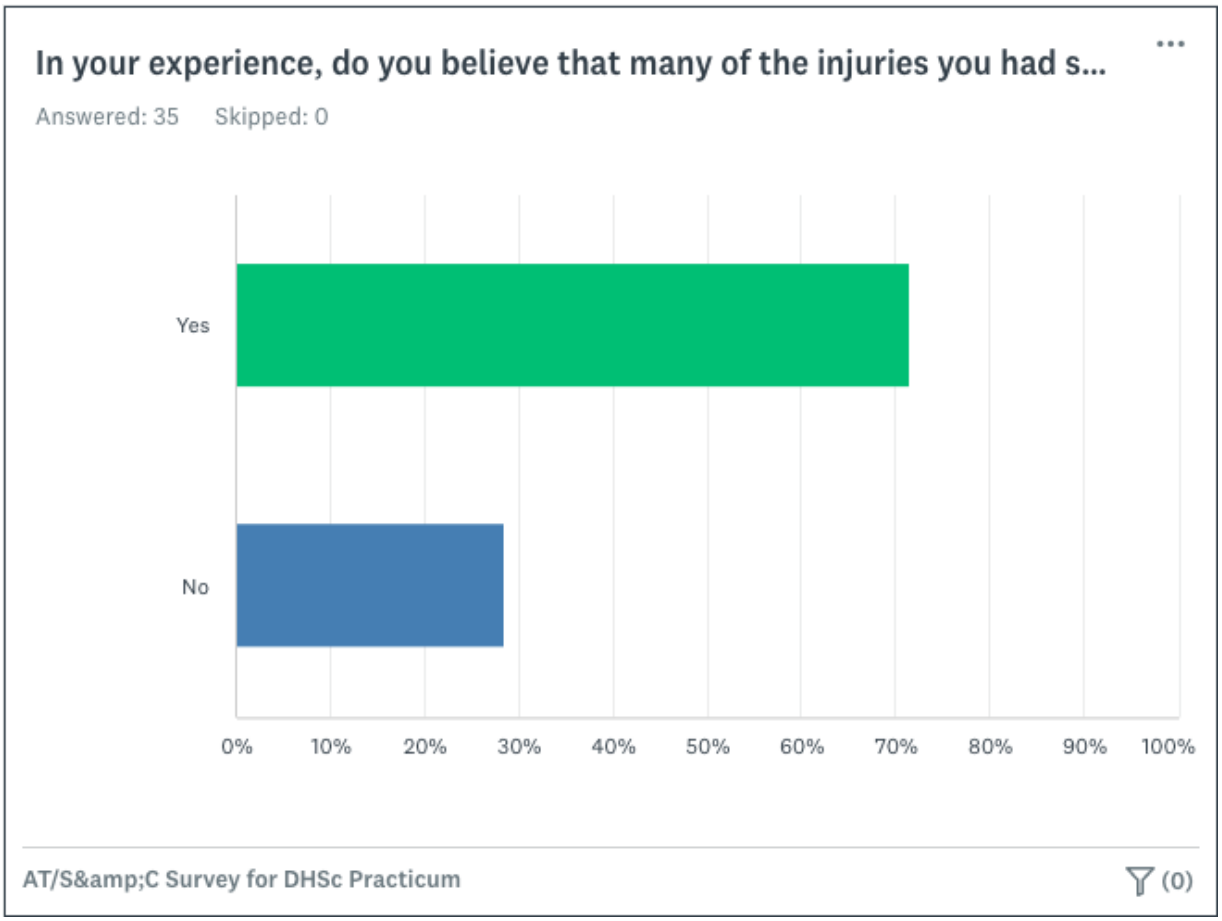
Do you feel like those common types of injuries (as you just mentioned) are a student-wide issue, or would your experiences possibly be outliers to a larger issue for injuries?



*This question was included to account for a large variation in settings, players, available resources, etcetera.

Figure 8. Survey Question 8 Responses

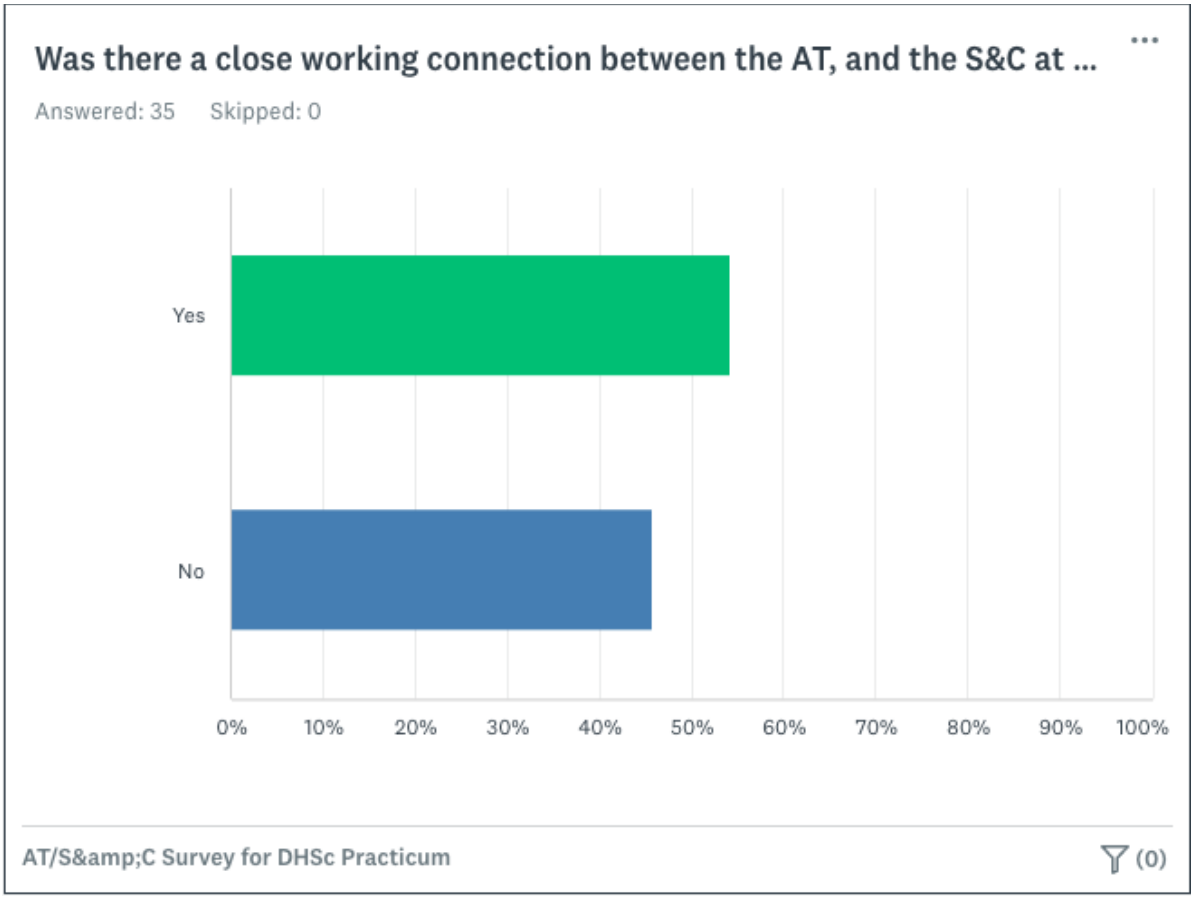
In your experience, do you believe that many of the injuries you have seen were preventable had their strength program consisted of exercises or opportunities to quickly identify imbalances or weaknesses?



*This question sought to determine if the S&C coach added value to injury prevention and identification. If a possibility exists here, this question will initiate a discussion for partnership with the AT as well.

Figure 9. Survey Question 9 Responses

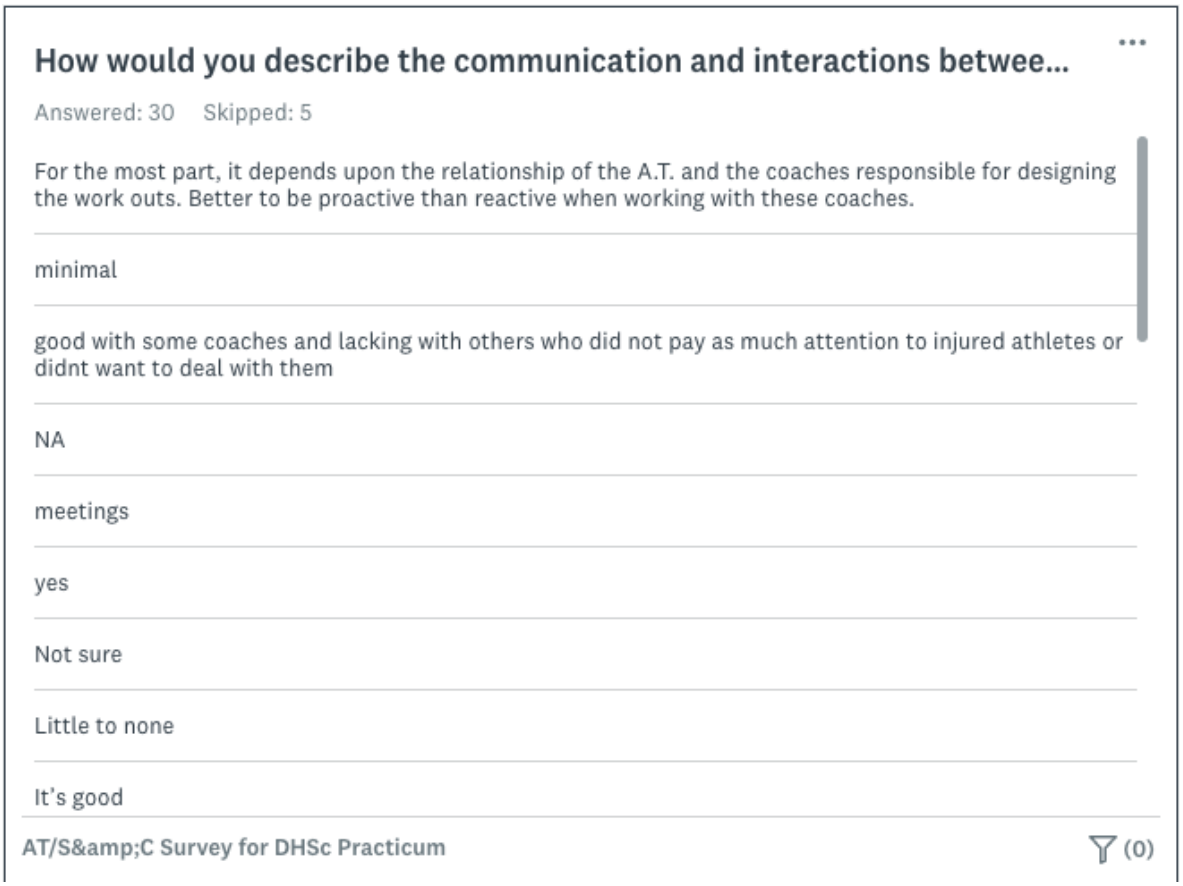
Was there a close working connection between the AT, and the S&C at your high school?



*Following the purpose of the research, this question sought to determine potential breakdowns in communication between the AT and S&C.

Figure 10. Survey Question 10 Responses

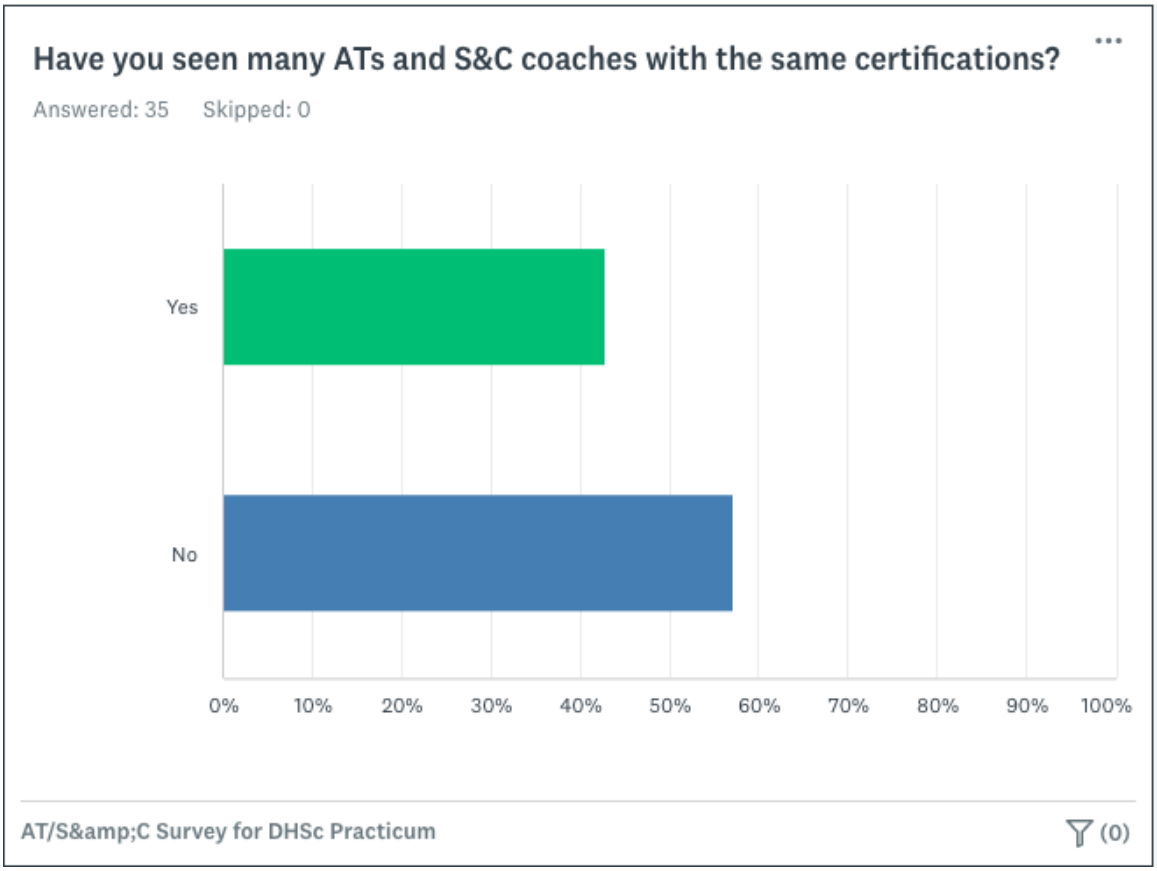
How would you describe the communication and interactions between professionals including Ats, PTs, S&Cs, etc. that are involved in RTP protocol?



*This question was to further identify the potential breakdowns in communication existing among the sports performance teams.

Figure 11. Survey Question 11 Responses

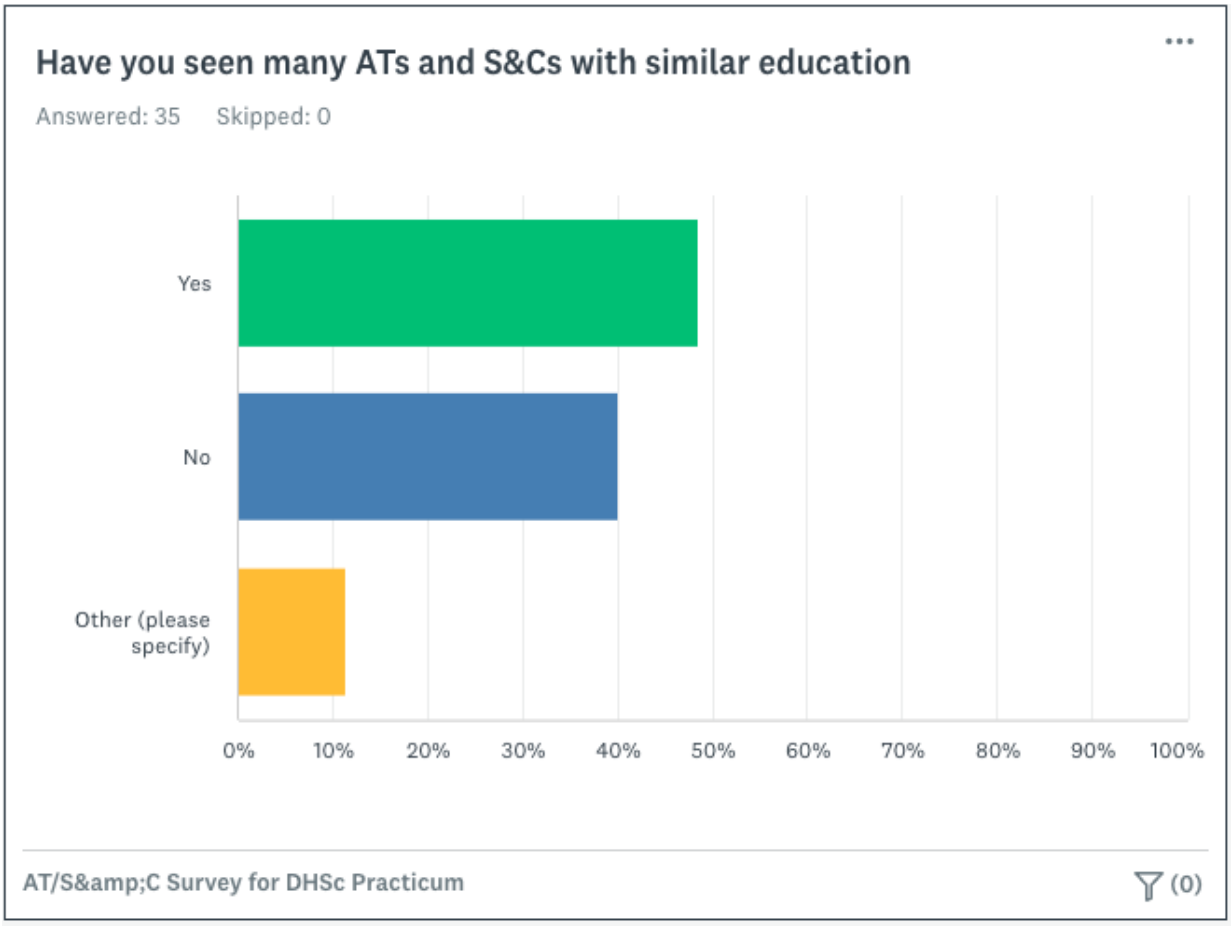
Have you seen many ATs and S&C coaches with the same certifications?



*This question is included to further identify cross-over in certifications among the AT and S&C, then compared with the previous responses in communication efficiency as a potential roadblock should a relationship exist.

Figure 12. Survey Question 12 Responses

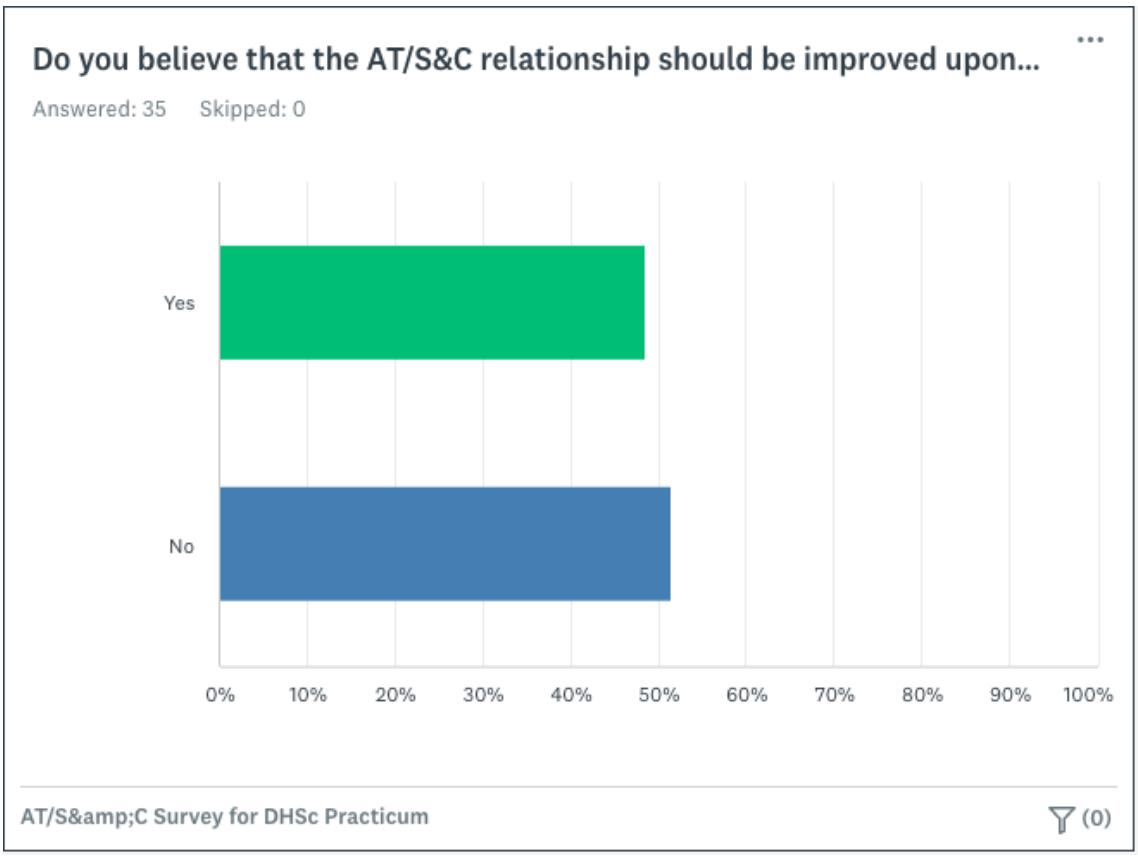
Have you seen many ATs and S&Cs with similar education?



*This question furthers Figure 11 in seeking to identify potential benefits or roadblocks within communication considerations.

Figure 13. Survey Question 13 Responses

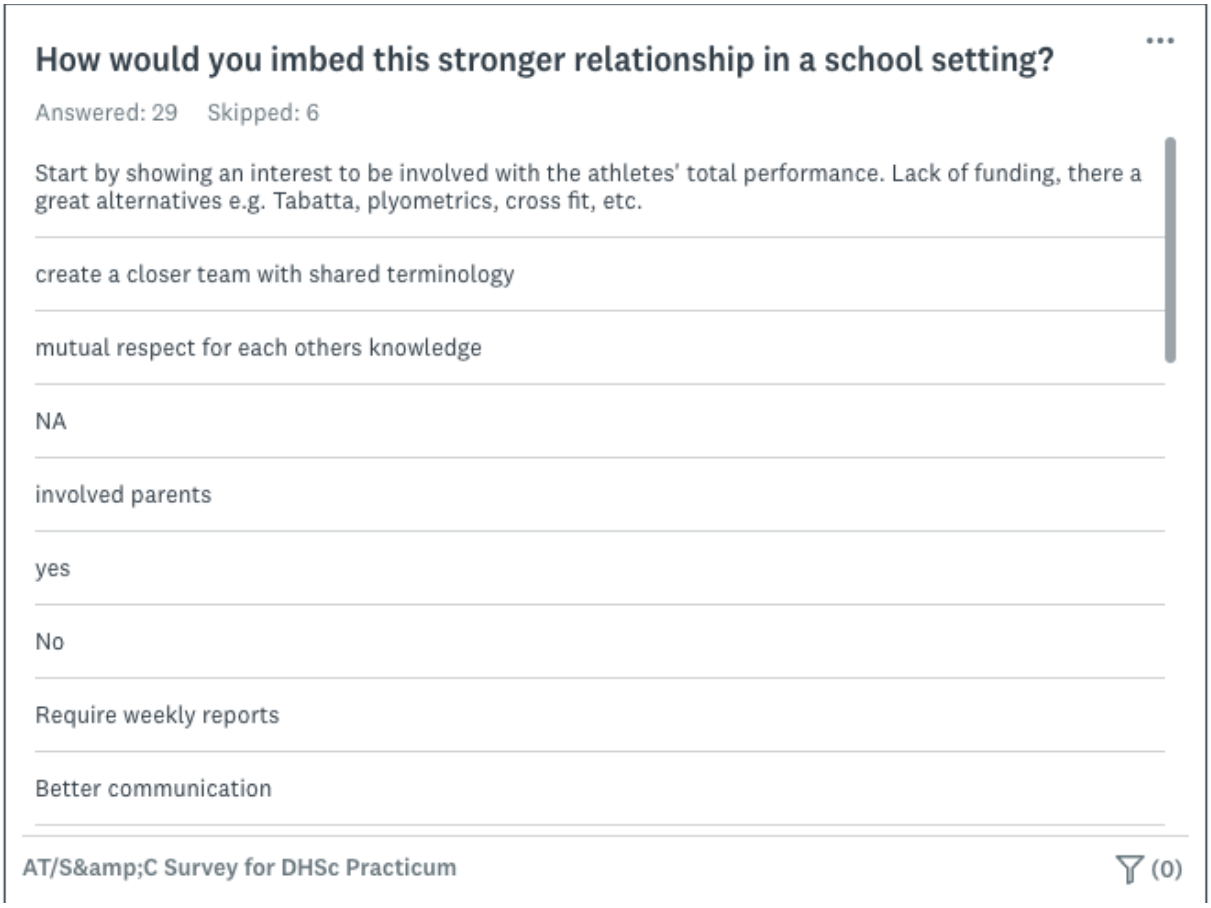
Do you believe that the AT/S&C relationship should be improved on? If so, where would you begin?



*This question is designed to further expand the personal experience of respondents and afford their input following reflection of the prior questions seeking to understand what, if any overlap occurs between the AT and S&C for education and certification.

Figure 14. Survey Question 14 Responses

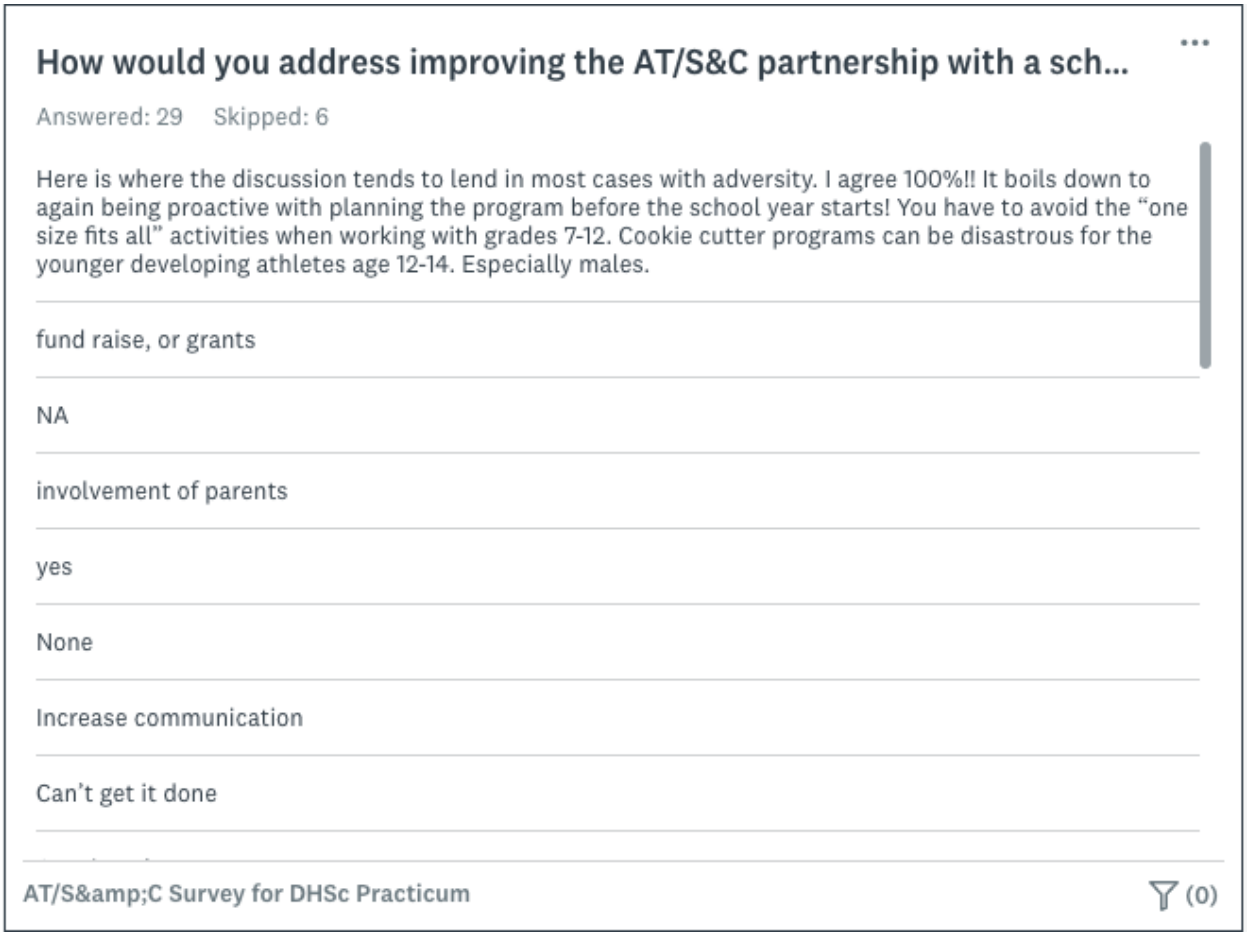
How would you imbed this stronger relationship in a school setting?



*This question sought to open-endedly identify where practitioners felt were opportunities in which the sports performance team may improve. The identifying responses were then used to build out subtopics to explore related concepts.

Figure 15. Survey Question 15 Responses

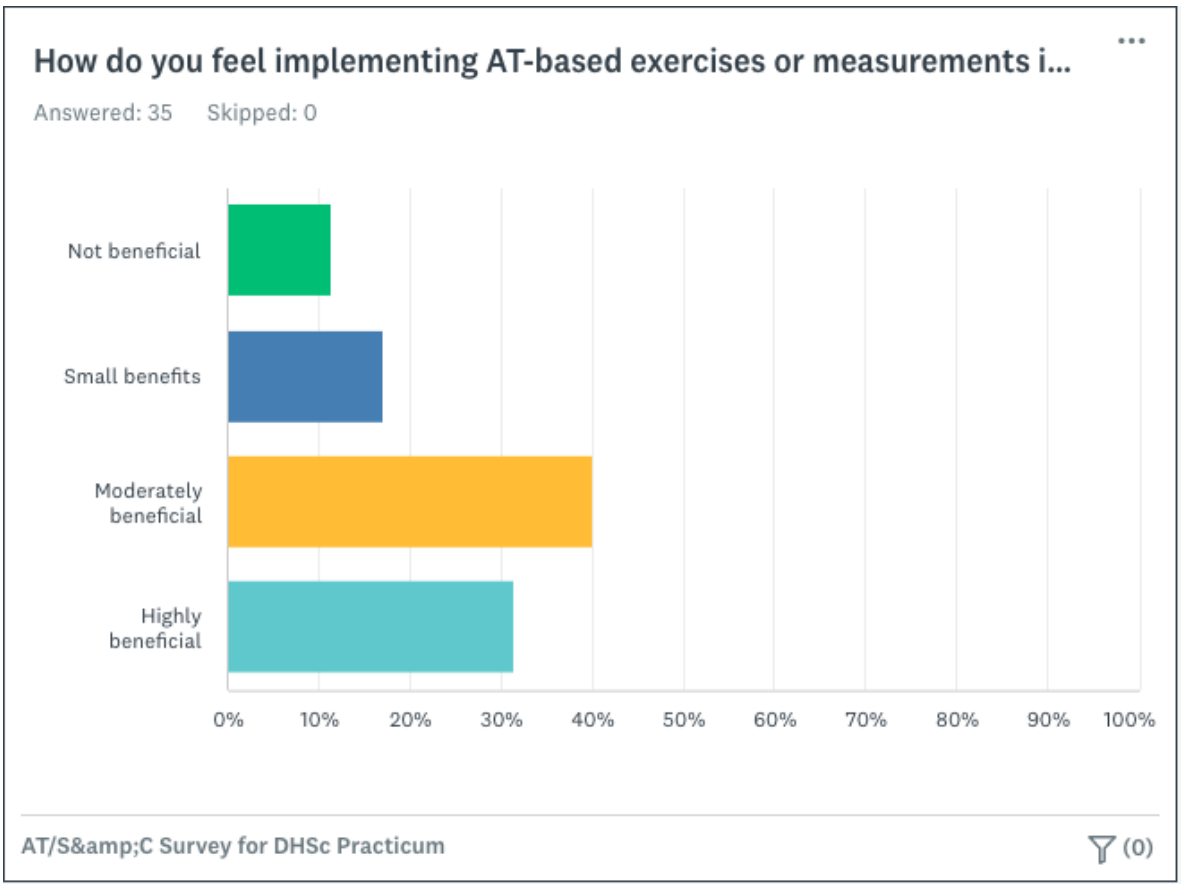
How would you address improving the AT/S&C partnership with a school with limiting funding?



*This was an open-ended question of how to improve upon funding concerns for a school while improving the AT/S&C relationship. The included responses were then used to research the opportunity to capitalize on the ideas.

Figure 16. Survey Question 16 Responses

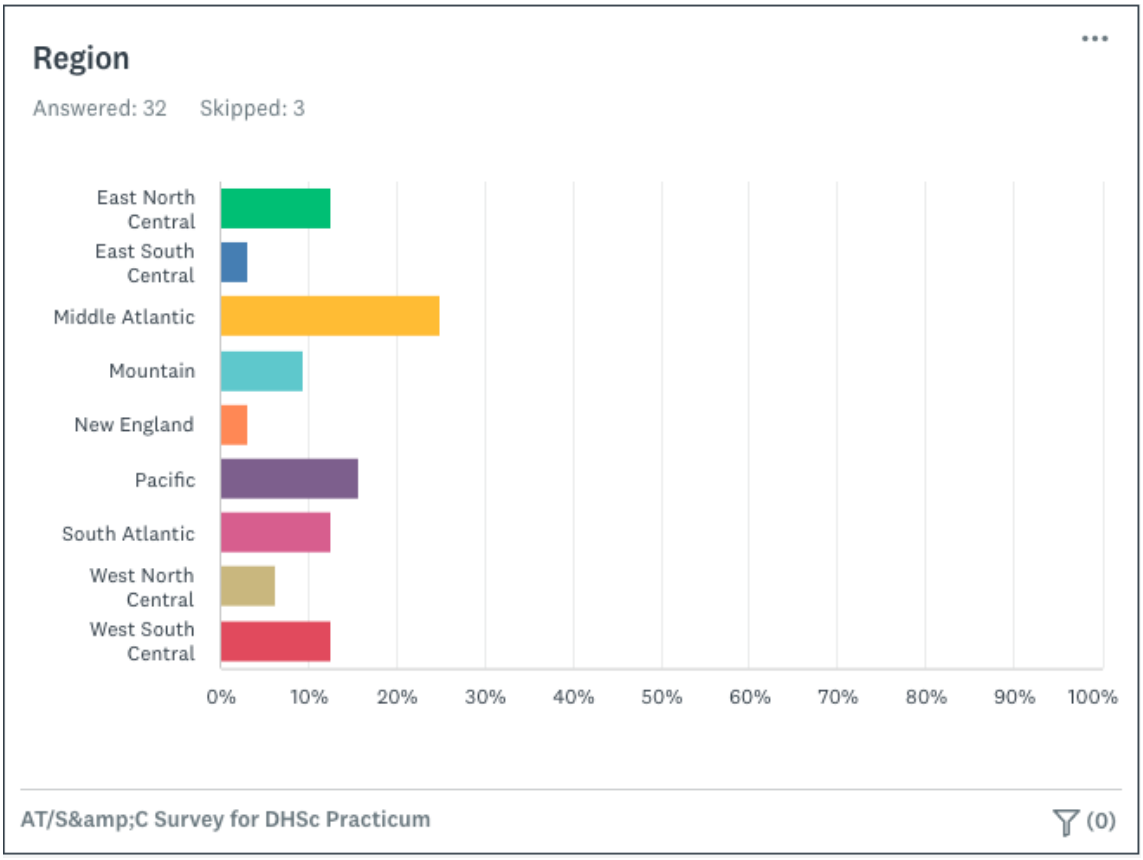
How do you feel implementing AT-based exercises or measurements into the S&C program would affect sports performance?



*This question sought to explore concepts that were identified in the literature regarding potential benefits of AT exercises within the S&C space.

Figure 17. Survey Question 17 Responses

Region of origin within the U.S. of the respondent.



*SQ17 was incorporated to reflect the nationwide audience as respondents.