

THE LIVED EXPERIENCE PRIOR TO AND FOLLOWING SPORT-RELATED
CONCUSSIONS SUSTAINED IN HIGH SCHOOL ATHLETICS

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ABSTRACT

Background

Over 1.6 million sport-related concussions (SRC) occur annually in America, impacting the health of U.S. athletes of all ages.¹⁻⁶ To date, the majority of SRC research has been quantitative, so there is a lack of qualitative investigations of how a SRC has impacted an individual's lived experiences.

Purpose

This retrospective qualitative pilot study examined the lived experiences of former student-athletes and how sustaining SRCs impacted their lives.

Methods

Two semi-structured interviews were conducted with two individuals from Texas State University who were former athletes. Interviews were audio-recorded, transcribed verbatim, and thematically analyzed to identify emergent themes across both interviews.

Results

Two overarching themes emerged during analysis: The impact of being a student-athlete and the impact of sustaining a SRC. Both participants described how being a student-athlete helped them grow as an individual personally and socially, with four sub-themes identified (personal development, academic development, athlete identity, relationships). Additionally, five sub-themes were revealed highlighting how sustaining SRC impacted their lives (signs and symptoms, emotion, academics, interpersonal relationships, clinical care). Representative quotes for each will be presented.

Discussion

Being a student-athlete provided opportunities to develop relationships with others while learning a variety of life skills. Sustaining a SRC affected multiple aspects of life and receiving support from relevant others was shown to positively impact recovery. These findings can be applied to clinical use for the recovery process to guide how athletic trainers and other healthcare professionals treat SRC.

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ABBREVIATIONS

1. *AI*: Athlete Identity
2. *mTBI*: Mild Traumatic Brain Injury
3. *OR*: Odds Ratio
4. *RTP*: Return to Play
5. *SCT*: Social Cognitive Theory
6. *SRC*: Sport-Related Concussion
7. *TBI*: Traumatic Brain Injury

CHAPTER 1: INTRODUCTION

1.1 TBI vs. SRC

Researchers, clinicians, and governmental agencies have increased their efforts concerning sport-related concussions (SRC) and post-injury return to play (RTP) protocols over the last two decades. Traumatic brain injuries (TBI) are caused by a direct or indirect blow to the head, face, neck, or body creating an impulsive force that is transmitted to the head.^{1,2} TBIs are associated with high impact magnitudes (e.g., car accidents, falls, gunshot wounds), and injury severity (e.g. coma, death), as well as poor short-term (e.g., loss of consciousness, amnesia) and long-term (e.g., permanent structural and functional brain changes) outcomes.¹⁻¹⁵ They are often associated with significant structural and physiological damage including diffuse or multifocal injuries producing tissue deformation that directly damages blood vessels, axons, neurons, and glia (e.g. skull fractures, hemorrhages, lacerations).^{3,4} Mild traumatic brain injuries (mTBI) are associated with lower impact magnitudes, injury severity and better outcomes.¹⁶ The magnitude and injury severity are associated with SRCs are similar to mTBIs.¹⁶ The primary difference between these injuries is their mechanism of injury, TBIs can be caused by any event, while SRCs are sustained only during sport participation. mTBIs and SRCs are both caused by linear and rotational forces that can damage the neurons and blood vessels within the brain and brain stem, but they usually are not associated with structural abnormalities that are detectable via structural neuroimaging tests.^{1,2,1,9,12,13,17-19} Sustaining a sport-related concussion may affect an individual due to being withheld from a sport thus altering the way they perceive themselves as an athlete.

1.2: Athlete Identity

Student-athletes typically identify with their athletic role as many view themselves as athletes first. Athlete identity (AI) refers to how one perceives them self socially in their sport.^{20,21} It helps determines the degree/amount they identify with their athletic role.^{20,21} Thus it can be influenced by an individual's social community.²² Those with high AI are at greater risk for adjustment difficulties post-injury such as developing feelings of detachment along with trouble regulating their emotions (e.g. anxiety,

depression).^{9,20,22-24} Thus, after sustaining a SRC, feelings and thoughts of an individual's athletic role can be shifted causing dysfunction in other areas including: academics, emotion, and relationships.

1.3: Academic Dysfunction

A SRC may hinder one's full academic abilities due to the symptoms (e.g. headaches, difficulty concentrating, fatigue) and emotions (e.g. anxiety, depression) one may experience.^{9,25} Sustaining a SRC alters how the brain functions and if students return to school before their brains are fully recovered they may experience worsened or prolonged symptoms.¹³ This is because of the increased cognitive, social, and physical loads that are associated with school related activities. Females and those with multiple prior SRCs are more susceptible to endure greater academic dysfunction.^{9,25} Student-athletes who do not follow RTP policies may experience lower academic scores due to missing classes or the inability to complete assignments in a timely manner.^{9,25} Frustration, anxiety, and depression may arise as a result of their academic difficulties.^{9,25}

1.4: Emotion Dysregulation

Emotion dysregulation is the inability to regulate one's emotions leading to a variety of mental health problems including anxiety and depression.^{9,26,27} Individuals who sustain a SRC may develop emotion dysregulation as they experience alterations in their athletic and academic environments due to their injury.⁹ Throughout the recovery process, individuals also recover in these areas at different speeds. Most people fully recover, but some experience symptoms in one or all of those three areas for weeks, months, and/or years. Unlike TBIs, very little research has been conducted investigating the relationship between SRC and emotion dysregulation, however studies have identified a possible relationship with anxiety and depression.^{28,29}

1.5: Anxiety

Anxiety may occur from life events (e.g. mild TBI or SRC) which is a form of emotion dysregulation.^{9,26,27} Anxiety produces physical symptoms such as a heightened

heart rate, sweating, shakiness, muscle tension, etc. Anxiety is more commonly seen among females than males (OR = 2:1).^{28,30} Due to being withheld from sport participation, symptoms produced by SRCs can create a sense of anxiousness but they can also lead to depression.

1.6: Depression

Sustaining a SRC may alter one's hope and pleasure-seeking drive as a result of being withheld from their sport and sport-related activities (e.g. meetings, social gatherings).^{31,32} This separation can prompt the development of depression thus leading to a decrease in motivation, passive actions, and self-limiting thoughts and ideas.^{33,34} Symptoms of depression (e.g. fatigue, sadness, self-limiting attitude, loss of interest) cause mental distress.^{2,35} Those with multiple prior SRCs are 3x more likely to develop depression than those with fewer incidents or no history of SRC.^{14,36}

1.7: Qualitative vs. Quantitative Methodology

Researchers decide which methodology to utilize based upon the research question(s) being asked. Quantitative methodology (uses numbers as data) answers the “what”, “when”, or “how much” by examining the data using precise and definitive statistical analysis.³⁷ Qualitative research (uses words as data) investigates the “why” or “how” by using open-ended interview questions allowing individuals to elaborate on details through stories about their experiences.^{37,38} A phenomenological approach recognizes an individual's cognitive appraisal and may help illuminate how individuals interpret their SRC experience and how these interpretations may attribute to their short- and long-term emotional experiences. A phenomenological approach is an emergent research design afforded by qualitative inquiry.³⁹ An emergent design provides flexibility to explore formerly unexplored lived experiences, which can lead to theory development and, ultimately, lead to quantitative studies predicting an association between emotion dysregulation caused by SCRs and the alteration of AI.

1.8: Statement of the Problem

Roughly 1.6-1.9 million sport-related concussions occur every year.^{9,12,15,16,18,40} This qualitative pilot study investigates how individuals interpret their SRC experience and how these interpretations may attribute to their short- and long-term emotional experiences. From interviewing former student-athletes, this study will identify and organize recurring themes of emotion dysregulation and help further our current understanding of the relationships among SRC, AI, academic dysfunction, and emotion dysregulation. Thus, it can improve the health care and the short- and long-term outcomes of future athletes affected by SRCs. The purpose of this study is to determine reoccurring themes of emotion dysregulation of those who sustained a SRC while participating in high school athletics. The impact of being withheld from a sport may cause the development of new psychosocial induced emotions during the rehabilitation process.⁷ Information gathered from the research questions will improve health care professionals understanding and ability to treat future athletes affected by a sport-related concussion.

1.9: Research Variables

1. *Emotion Dysregulation*: was identified by words that are related to anxiety (i anxiety, nervousness, heightened awareness, jittery, etc.) and depression (depressed, sad, detachment, etc.)
2. *Athlete Identity*: was determined by related words or phrases such as sports were everything.
3. *Academic Dysfunction*: was evaluated by use of related terms such as difficulty concentrating, light sensitivity, new issues with teachers and social interactions.

1.10: Specific Aim

1. To identify how being a student-athlete impacted the participants' lives.
2. To determine the participants' experiences immediately following their sport-related concussion and during their recovery process.

1.11: Operational Definitions

Academic Dysfunction: Inability to perform at a normal academic level.²⁵

Anxiety: Recurring intense and/or sudden apprehension, fear, and terror.^{27,30,31}

Athlete Identity (AI): The degree to which a person identifies with their athletic role due to sport socialization that creates their social identity as athletes.^{20,21}

Depression: Long-term diminished interest or pleasure.³⁰

Emotion Dysregulation: The reshaping of emotions prospectively to the organization and quality of thoughts, actions, and interactions.²⁷

Mild Traumatic Brain Injury (mTBI): Head injury cause by an external mechanical force producing tissue damage (white matter structure and functions) at the time of injury with direct damage to blood vessels, axons, neurons, and glia.^{2,3,12}

Qualitative Research: Uses words as data.³⁸ It is used to understand how individuals interpret their experiences and the meaning they assign to their experiences.^{37,41}

Quantitative Research: Uses numbers as data. It is used to make associations between variables by using methods which allow for numbers to be produced and analyzed.³⁷

Sport-Related Concussion (SRC): Form of traumatic brain injury. Sustained in sports by collision and/or contact, from linear (acceleration/deceleration) and rotational forces (pivot) that can damage the neurons and blood vessels within the brain and brain stem thus altering the brain's membrane permeability.^{1,9,12,13,17-19}

Traumatic Brain Injury (TBI): While SRC falls under the broader definition of TBI. For the purpose of this study, TBI referred to all non-sport-related head injuries. It encompasses a range from mild to severe in nature. These injuries commonly result in the following reductions in the patient's Glasgow Coma Scale scores: mild TBI (mTBI) 13-15, moderate TBI: 9-12, Severe TBI: < 8.⁴²

1.12: Assumptions

1. The interview questions were valid methods for gathering data related to and confirming the lived experience of the participants.
2. Participant responses accurately describe their SRC experiences.
3. All responses to the interview questions are truthful and accurate.

1.13: Delimitations

1. The current study is restricted to those who experienced a sport-related concussion in high school.
2. The current study is restricted to only those who voluntarily agreed to participate throughout the entire interview process.

1.14: Limitations

1. This study was conducted with individuals who, at the time, are staff and faculty members of Texas State University in the Department of Health and Human Performance.
2. A small sample size of two will affect the generalizability of our findings.

1.15: Significance of the Study

There is a dearth of qualitative research currently involving SRC related to athlete identity, academic dysfunction, and emotion dysregulation. Prior research has extensively explored the relationships between mTBI and emotion dysregulation and academic dysfunction, but inadequate literature exists investigating the relationship between SRC and emotion dysregulation after injury. The impact magnitude applied to the brain during a mTBI (most common) and a SRC produce analogous signs and symptoms, including emotion dysregulation.^{1-14,43} Sustaining a SRC may negatively affect student-athletes who have strong AI associations due to separation or being withheld from sport-related activities. In addition, due to their identity challenges as well as their injury related symptoms their academic performance may also be negatively affected. This study is aimed at identifying the lived experiences associated with athlete identity, academic dysfunction and emotion dysregulation after sustaining a SRC.

CHAPTER 2: LITERATURE REVIEW

2.1: Introduction

Researchers, clinicians, and governmental agencies have increased their efforts concerning sport-related concussions (SRC) and return to play protocols post-injury over the last two decades as it has become a major public health concern in the United States.⁴⁴ For example, American football has increased their efforts to prevent sport-related concussion as researchers have identified the possible negative outcomes associated.⁴⁵ SRCs are similar to mild traumatic brain injuries (mTBI) as they are caused by a direct or indirect blow to the head, face, neck, or elsewhere on the body creating an impulsive force which is transmitted to the head.^{1,2} SRCs and mTBIs share analogous signs and symptoms that continuously change throughout the recovery process indicating multiple functional disturbances including: sleep/wake disturbances, cognitive impairment (significantly identifiable within the first 2 weeks post-injury), behavioral change, and balance impairment.^{1-14,43} Mild-TBIs and SRCs differ on multiple levels, but both are considered brain injuries. The low impact magnitude applied to the brain during a mild-TBIs (the most common) and SRCs is similar (e.g. falling, low speed car accident) compared to those associated with severe TBI (e.g. falling from a roof, ejected through the windshield in a car accident).^{7,15} An injury is not only a physical battle but a mental one. It places additional stress on the mind and, in turn, alters the way the brain perceives and processes feelings. As there are numerous studies on the relationship between a TBI and associated emotions post-injury, the purpose of this study is to determine reoccurring themes of emotion dysregulation of those who sustained a SRC while participating in high school athletics.

2.2: Mild Traumatic Brain Injuries

Mild-TBIs are commonly seen in the general population comprising 80-95% (~1.3 million) of all traumatic brain injuries.^{7,10,11,33,35} They can occur in any setting, including sports, but most are prevalent from falls and motor vehicle collisions.^{7,28,33} Roughly 18% of those who endure a mTBI from a fall or an accident will make a suicide attempt.³³ The suicide attempts may be attributed to the injured brain areas endured by the fall or accident.³³ Children 0-4 years, adolescents 15-19 years, and adults 65+ years

are the most prevalent age groups to sustain a mTBI, which is seen more commonly among men at a risk of 1.4-2.1.^{7,33,42,46,47} Mild traumatic brain injuries typically affect the frontal, prefrontal, and orbitofrontal lobes.⁸ They are often associated with more significant structural and physiological damage including diffuse (affecting white matter structure and function) or multifocal injuries (e.g. skull fractures, hemorrhage, lacerations) producing tissue deformation that directly damages blood vessels, axons, neurons, and glia.^{3,12,28,48} These pathophysiological changes alter the brain's level of responsiveness, innervation, and neurotransmitter activity resulting in temporary neurological and cognitive deficits and adjustments in personality.^{3,28,42,49} Prevalent signs and symptoms includes: fatigue, headache, balance issues (dizziness), sleep disturbance (increased need for sleep or trouble sleeping through the night), noise and light sensitivity, soreness in upper extremities (neck), impaired cognitive function (learning, memory, attention, concentration and processing speed), and emotion dysregulation (anxiety, depression, etc.).²⁻¹¹ The mental distress associated with a mTBI triggers symptoms of emotion dysregulation, such as low self-esteem and stress associated with anxiety and depression.^{2,9,35,50} Individuals who sustained a mTBI scored higher (e.g. 5% for anxiety) on emotional disturbance measures compared to those who had sustained no or a severe TBI.^{35,51} These individuals may score worse because individuals are more cognizant of the symptoms they are experiencing compared to those with more severe injuries.²⁸ The impact forces associated with a mTBI and a SRC are similar as are the recovery timelines, therefore it is plausible that the emotion dysregulation evoked by a SRC will be similar to what is experienced following mTBIs.

2.3: Sport-Related Concussions

Roughly 1.6-1.9 million sport-related concussions occur every year, with high school and collegiate age groups (ages 16-34) constituting the majority of SRC injuries.^{9,12,14-16,18,40} Sport-related concussions are a form of traumatic brain injury, but are sustained generally during high impact sport participation, involving collision and/or contact, from linear (acceleration/deceleration) and rotational (pivot) forces which can damage the neurons and blood vessels within the brain and brain stem thus altering the brain's membrane permeability.^{1,9,12,13,17-19} SRCs are usually not associated with

structural abnormalities detectable via structural neuroimaging tests.¹ While an isolated SRC may not always carry the same negative structural consequences as a TBI, is no less important and necessitates a thorough evaluation and treatment plan.

Symptoms may include headache, fogginess, fatigue, amnesia, neurological deficit, vision and balance impairment, vomiting, emotion dysregulation inducing behavioral alterations (anxiety, depression, substance abuse, etc.), academic difficulties, cognitive and sleep disturbances, and increased sensitivity to light and noise.^{1,9,12-14} Typically, most symptoms subside within 7-10 days post-injury in adults, but may persist years later.^{1,12,15,18} Those who present with more symptoms and memory problems (24 hours post-injury) risk a longer duration of symptoms.¹² Females collegiate and high school athletes usually report more symptoms than their male counterparts.⁵⁰ High school athletes often take longer to recover compared to adults because their brains are still developing.¹² Athletes who sustain a SRC may not report their symptoms, or may be allowed to return to sports before they have fully recovered due to them minimizing their symptoms, or lack of appropriate supervision, testing, and/or trained healthcare providers. According to Valovich McLeod's study one athlete stated, "I do not want to accept the fact that I'm not okay." Therefore, many will minimize or mask their symptoms to return to play before they have fully recovered to decrease the potential shifting of their athlete identity (AI) which may stimulate mental fatigue, stress, anxiety, and depression.^{9,50}

2.4: Athlete Identity

Athletes who endure a SRC may alter their perceived identity within their sport. Athlete identity is the degree to which a person identifies with their athletic role due to sport socialization creating their social identity as student athletes.^{20,21} Additionally, parents, coaches, teammates, and the media influence an athletes perception of their identity.²² Those with a high AI, summed by the statement "when I'm not playing sports, I don't really do anything else because that's all I do", are at a greater risk for adjustment difficulties post-injury.^{9,24} Thoughts and feelings of detachment and disruption of team cohesion generally occur during the rehabilitation process as they are inhibited from engaging in their physical role regarding various life activities (daily living, sports, school, social events).^{9,20,22,23} in a previous study the recovery process was described as

an “emotional rollercoaster”.⁹ These individuals normally view themselves as athletes first. Therefore, injuries removing them from participating in sports, social interactions, and social media may be viewed as punishment impacting their emotion regulation causing dysregulation.^{9,12,24,52}

2.5: Academic Dysfunction

Academics are an important aspect in student-athletes’ lives. While the stereotype is often that they are dumb jocks, many excel in their classes and go on to earn post-graduate degrees. Even for those that do not, it is important that student-athletes strive to do their best in their classes because their athletic eligibility is constrained by their academic performance. Student-athletes who perform poorly in class are not allowed to continue athletic participation until their performance improves to the minimum level set by their institution.

A SRC can increase student-athletes’ the difficulty in regulating their emotions, which in turn, can negatively affect their school performance.⁹ Academic dysfunction is the inability to perform at a normal academic level and is heightened in those with multiple prior SRC and in females.²⁵ Symptoms produced by a SRC are associated with poor academic performance, thus impairs a student’s ability to perform at their maximum academic potential.⁹ Student-athletes may experience difficulty concentrating, headaches, fatigue (increasing throughout the day), become easily side-tracked, thus increasing the amount of effort they must put forth following a SRC.^{9,25} In a previous qualitative study one individual reported “I really have to force myself to lock in and pay attention to what the teacher is saying or during homework”.⁹ Typically, students with a SRC return to school within a week after injury before their brains are fully recovered. Of those student-athletes who sustained a SRC 27-90% experience lower grades due to missing class or the inability to complete assignments.^{9,25} Another individual from the same qualitative study stated “My grades really started going downhill. Straight-A honor student and started getting Ds and Cs”.⁹ Up to 73% of students with a SRC receive various academic adjustments (e.g. curriculum modifications) based on their limitations.²⁵ The Valovich McLeod’s et al. participants explained they had to study twice the amount but only retained half of the information.⁹ Difficulties with school heightened symptoms to be

more severe and prolonged as an indirect consequence of cognitive rest. The perceived sense of falling behind raised the anxiety levels felt by those who sustained a SRC. Others experienced depression from the inability to participate in their sport, difficulty with maintaining their grades, and other academic related functions. Friends, teammates, and peers may exacerbate one's emotional dysregulation as they may view the injury as means to get out of school assignments. ⁹

2.6: Emotion Dysregulation

The effects from sustaining a SRC differs between individuals as they experience a variety of alterations in their emotions and identity as an athlete.⁹ The difficulty student-athletes have adjusting to their emotions to their new circumstantial demands can affect their ability to control their emotional arousal regarding the organization and quality of thoughts, actions, and interactions.²⁷ The impact of being withheld from a sport in addition to their injury may cause the development of new psychosocially induced negative emotions during the rehabilitation process.²⁶ Emotion dysregulation is defined as the reshaping of emotions prospectively to the organization and quality of thoughts, actions, and interactions. The time needed to physically recover may be quicker than to recover mentally.²⁶ The prevalence of emotion dysregulation may lead to a variety of mental health problems, including anxiety and depression.^{2,9,27}

2.6.1: Anxiety

Anxiety is characterized by a lack of self-confidence, inability to relax, and timid feelings producing unrealistic, persistent worries and fears.²⁷ The intensity, duration, and/or frequency of this emotional reaction is out of proportion to the impact of the anticipated compared to other individuals.^{30,31} Damage to the brain's left-hemisphere instigates over-sensitivity, excessive cautiousness, and exaggerated judgement of one's own impairment.²⁸ Other damaged areas contributing to the onset of anxiety include: anterior thalamus, prefrontal cortex, and cingulate cortex. In addition, researchers discovered an association between the right orbital cortex, left occipital lobe and temporal injuries to the onset of anxiety.²⁸ Some symptoms include: alteration of body functions (expediting heart rate and sweating) which can produce muscle tension

(trembling, twitching, shakiness, aches/soreness), becoming fatigued regularly (nausea, dizziness, shortness of breath, tiredness), feeling of the mind going blank, sleep disturbance (difficulty falling/staying asleep, restless) causing distress or impairment with social (job), cognitive (concentration), and behavioral (irritability) functioning reducing one's quality of life.^{28,30} Anxiety is most prevalent in mid adulthood and declines across time.³⁰ Females are twice as likely to develop anxiety than males.³⁰

Of those who endure a mTBI, 24-27% experience symptoms of anxiety by causing neuronal excitability within the Basolateral Amygdala.⁴⁴ Compared to moderate TBIs, experiencing a mild TBI increases the chances of developing anxiety by 75%.²⁸ In addition, those who sustained a mTBI are at two times the risk than that of the general population.²⁸ Researchers believe this increase in individuals who sustain mTBIs compared to those who sustain more severe head injuries is due to their ability to keep their cognitive functions intact, allowing them to acknowledge their deficits caused by the trauma.²⁸ This is also true when an athlete sustains a SRC as the individual is typically fully aware of the situation and the surrounding environment thus it may present feelings of apprehension and fear which can negatively impact an individual's rehabilitation outcomes, interpersonal relationships and employment outlook.²⁸

Athletes suffering from a SRC risk developing anxiety related symptoms. Athletes regularly associate the forced resting of the brain as punishment producing increased stress and anxiety.⁹ Consequently, it increases the risk for slower or reverse progress during the recovery phase.¹² However, coaches, parents, and teammates can create an environment that reduces one's anxiety through their attitude and behavior.²² SRCs can induce anxiety related signs and symptoms but as well as or in conjunction with depression related signs and symptoms.²⁸

2.6.2: Depression

Depression displays a diminished pleasure-seeking drive in individuals triggered by either life events (neglect, death, life stress), medical condition(s), disturbance of the brain's functional and regulatory patterns, or inherited through genetics.^{31,32} Depression

is characterized by the loss of interest and/or pleasure in life activities along with associated feelings of empty and hopelessness, fatigue, sadness, self-limiting attitude, neglect, appearing tearful, dysregulated sleep patterns, loss of appetite, and have thoughts of self-harm or suicide.^{14,30-32} Important brain areas involved are the frontal and prefrontal cortex, which damage can produce passive and self-limiting thoughts and ideas and a decrease in motivation.^{33,34} Specifically, the dorsolateral and ventromedial sectors including the hypothalamus, amygdala, and periaqueductal gray. These areas are associated with emotional and cognitive functions. Research found an association between a hyperactive ventromedial and hypoactive dorsolateral to the onset of depression.³⁴ Thus, repeated damage to the brain can cause long-term effects.¹¹

Numerous studies have found a linear correlation between higher frequencies of mTBIs and worse cognitive and executive functioning and symptoms using baseline symptom scores as independent predictors of long-term of depression.^{11,12,35,36} Similarly, the same positive linear relationship was found among number of SRCs and the prevalence of depression symptoms.³⁶ Athletes who suffered 1 to 2 sport-related concussions have 1.5 times the risk of developing depression, while those who sustained 3 or more have 2-3 times the risk compared to those with no SRC history.^{14,36} Depression among athletes after SRC is equally prevalent to that of the general population (19.2-23.6%); predominantly seen between the ages of 18-34 years.^{14,44} When describing their lived experiences following a SRC, student-athletes in past qualitative studies said “it’s depressing sometimes” and “I’m sad all the time about not playing or being able to see my friends” due to their restriction protocol following a SRC.^{9,12} Depression may affect other areas of an individual’s life not just athletically but academically and socially.

2.7: Conclusion

Prior research has extensively explored the relationships between mTBIs and emotion dysregulation, however, inadequate literature exists investigating the relationship between SRCs and emotion dysregulation. As mentioned, TBIs and SRCs differ on multiple levels, but both are considered brain injuries. The impact magnitude applied to the brain during a mild-TBI (most common) and a SRC produce analogous signs and symptoms. Previous research has concluded anxiety and depression are most prevalent in the period of adolescent to mid-adulthood, which includes high school and college student-athletes.^{9,30} The use of a qualitative methodology –specifically a phenomenological approach– will help determine how individuals interpret their SRC experience and how these interpretations may attribute to their short- and long-term emotional experiences because of the emergent research design afforded by qualitative inquiry.^{37,39} An emergent design provides flexibility to explore formerly unexplored lived experiences, which can lead to theory development and, ultimately, lead to quantitative studies predicting an association between emotion dysregulation caused by SRCs and the alteration of AI.^{24,38} The application goal is to improve the health care and the short-and long-term outcomes of future athletes affected by SRCs.

CHAPTER 3: METHODS

3.1 Research Design

Given the lack of knowledge about how sustaining a SRC impacts student-athletes' daily lives, this study explored the utility of qualitative methodology for understanding their SRC-related lived experiences. Specifically, this naturalistic, qualitative research study uses a phenomenological approach to interpret how individuals recall their SRC emotional experience and allows us to seek the meaning that they associated with their recovery process. Participants answered open-ended questions during semi-structured, one-on-one interviews related to how they viewed themselves as student-athletes and their SRC(s) pre- and post-injury by telling stories of their experience. The phenomenological design allows for the exploration of the participants' lived experiences related to SRC.

3.2 Instrumentation

A semi-structured interview protocol was utilized to conduct one-on-one interviews (Appendix 1). The interview protocol included a variety of questions about the participants' sport-related concussive injury and their lived experience related to the injury. The questions were open-ended to encourage participants to tell their story and follow-up prompts were employed to encourage elaboration when needed. The first few interview questions asked participants to share their experiences as a student-athlete. For example, one question asked, "Can you tell me about your time as a student-athlete?" The next few questions were interpretation-based questions in attempt to encourage the participant to reflect upon their own SRC experience. For example, one question asked, "Describe to me your most significant sport-related concussion and why do you think it was the most significant?" Follow-up questions were asked if the interviewer determined more detail was necessary to fully understand the participant's experience. The protocol was developed by the researcher for the current study and was informed by current concussion literature. Two practice interviews were conducted and edits made to the protocol to improve the flow and clarity of interview questions and one additional question was added to elicit participant stories of events following their sport-related concussion (Appendix 1, Question 7). The revised interview protocol was then used to interview two participants to pilot test the instrument.

3.3 Sampling and Recruitment

We used a purposeful sampling approach to identify eligible participants. We recruited students and faculty of Texas State University (TXST) in the Health and Human Performance Department. The eligibility criteria included (1) Most recent SRC occurred 1+ years ago (2) the SRC occurred during a college or high school practice, game or scrimmage (3) sport participation was withheld for 7+ days due to their SRC (4) recovery took < 3 months. Three potential participants volunteered to participate; two met the study inclusion criteria and participated in an interview (1 female, 1 male). The participants gave informed consent prior to their interview to participate and to be audio recorded by signing an informed consent form. Participants provided their age and gender at the time of the interview. To protect the identity of our participants, no names were used in the dissemination of our data and all identifiable data were stored on a secured TXST network.

3.4 Data Collection

Data were collected through an in person, one-on-one, semi-structured interview lasting, on average, approximately 25 minutes. The interviews took place at TXST in January of 2019. The interview team consisted on one interviewer and one note-taker. The interviewer asked the questions according to the interview protocol while the note-taker recorded field notes focused on non-verbal cues. Two practice interviews and transcriptions were conducted as a part of the interviewer's training prior to the data collection for this study. Eligible individuals provided their age and gender at the time of the interview

3.5 Data Analysis

Descriptive phenomenological analysis identifies the descriptive themes of the experiences collected from the participants. It, in detail, describes the relationships among all variables and participants as it takes their exact words without assigning additional meaning.⁵³ Interpretive phenomenological analysis examines how individuals make sense of their SRC and their experience. It helps provide insight of the participants viewed their SRC experience.⁵⁴

There were three people on the data analysis team. The data were organized by themes of those who sustained a SRC while participating in high school and/or college athletics through a descriptive phenomenological, and interpretive phenomenological analysis of the interview data. Specifically, a thematic analysis was conducted.

The stages of analysis were outlined by Frost.⁵⁴ In the first phase, the interviewer transcribed all interview audio files into verbatim transcriptions. The data analysis team read through the transcriptions and field notes in full multiple times to become acclimated with the data. A detailed textual analysis followed, including writing notes and commenting on the transcripts focusing on the content and use of language along with the examiners' reflections and interpretive comments. A code book was drafted to highlight developing themes and sub-themes. Multiple data analysis meetings were held to refine the code book and themes. The code book was revised throughout the analysis process by grouping thoughts and ideas of the interviewees SRC(s) based on correlation of patterns.⁵⁴ The next phase transformed the interpretations into emerging themes and sub-themes. These themes were recorded in a code book. The third phase continued to examine the transcriptions and the emerging themes by grouping them together based on patterns of similarities. The final phase finalized the code book resulting in final overarching themes and sub-themes.⁵⁴ This process allowed the identification of the impact of being a student-athlete and the impact of the sport-related concussion and the relationships, if any, among sport-related concussion, athlete identity, academic dysfunction, and emotion dysregulation.

3.6 Trustworthiness

The interview questions were open, expansive, and designed to avoid leading the participant towards any particular responses. The data were analyzed through a multi-perspective analysis. Inclusion of three people on the analyses team helped limit the impact of assumptions and limitations any one person may have. The use of two types of analysis (descriptive phenomenological, interpretative phenomenological) and the creation of a code book increased the trustworthiness (e.g., similar to reliability in quantitative methodology) and confidence of the results.⁵⁵ During the development of the code book, the data analysis team was guided by a published qualitative researcher, Dr.

Mary Odum. Discrepancies among coders were discussed until agreement of each overarching theme and sub-themes was reached.

3.7 Triangulation

Triangulation is a validity process among the named sources of information to form emerging themes. This was used in three different ways: methods (e.g., interviews, field notes), and a multi-member data analysis team.⁵⁶ Descriptive phenomenological and interpretative phenomenological analyses were integrated into the research process to “triangulate” the themes of interest: impact of being a student-athlete and the impact of the SRC. Triangulation identified and described similar, contradictory, or absent relationships compared to prior reviewed literature. The use of two types of analysis counter biases and assumes one method alone may not be able to eliminate, in context, differences between analyzers. In addition, it offers a more conclusive insight to the experiences an individual experiences from being a student athlete- and the effects of the SRC and how it can affect one’s internal and external worlds.⁵⁴ The data analysis team continuously discussed any discrepancies until consensus was reached.

3.8 Social Cognitive Theory (SCT)

Social Cognitive Theory posits that learning occurs in a social context with a dynamic and reciprocal interaction of the person (e.g. cognitive abilities, physical characteristics, beliefs and attitudes), environment (e.g. physical surroundings, family and friends, other social influences), and behavior (e.g. motor responses, verbal responses, social interactions).⁵⁷ Using SCT allows us to identify what relationships exist between our variables of interest and how these factors interact in various situations.

CHAPTER 4: MANUSCRIPT

The Lived Experience Prior to and Following Sport-Related Concussions Sustained in High School Athletics

Background: Over 1.6 million sport-related concussions (SRC) occur annually in America, impacting the health of U.S. athletes of all ages. To date, the majority of SRC research has been quantitative, so there is a lack of qualitative investigations concerning how a SRC has impacted an individual's lived experiences following SRC.

Methods: Two semi-structured interviews were conducted with two individuals from Texas State University who were former student-athletes (1 female; 1 male). A thematic analysis was used to identify emergent themes and to pilot test the interview protocol and inclusion criteria.

Results: Two overarching themes emerged during analysis: The impact of being a student-athlete and the impact of sustaining a SRC. Both participants described how being a student-athlete helped them grow as an individual personally and socially, with four sub-themes identified (personal development, academic development, athlete identity, relationships). Additionally, five sub-themes were revealed highlighting how sustaining SRC impacted their lives (signs and symptoms, emotion, academics, interpersonal relationships, clinical care). Representative quotes for each will be presented.

Discussion: Being a student-athlete provided opportunities to develop relationships with others while learning a variety of life skills. Sustaining a SRC affected multiple aspects of life and receiving support from relevant others was shown to positively impact recovery. These findings can be applied to clinical use for the recovery process to guide how athletic trainers and other healthcare professionals treat SRC.

Key Words: athlete identity, academic dysfunction, emotion dysregulation, mild traumatic brain injury

Introduction

Sport-related concussions (SRC) are believed to occur at a rate of about 1.6-1.9 million, but are likely to be under reported or misdiagnosed indicating that these numbers may be gross underestimations.^{9,12,15,16,18,40} A SRC represents “the immediate and transient symptoms of traumatic brain injury induced by biomechanical forces”.¹ Researchers, clinicians, and government agencies have expanded their efforts in examining the effects that SRCs may produce. These groups have explored the relationships between SRCs, athlete identity (AI), academic dysfunction, and emotion dysregulation and consistently reported a positive association between these variables.

Mild traumatic brain injuries (mTBIs) can occur in any environment, while SRCs are sustained only during sport participation, but both are considered brain injuries. A SRC may influence one’s athletic identity, which is the degree to which a person identifies with their athletic role due to sport socialization creating their social identity as an athlete.^{20,21} How a person identifies with their athletic role can shift an individual’s thoughts and feelings which can cause dysfunction in other areas including: academic, emotion, and relationships.^{9,20-22}

Academic dysfunction may occur if students return to school before their brains are fully recovered.¹³ Student-athletes who have sustained a SRC may experience lower academic scores due to missing classes or the inability to complete assignments in a timely manner.^{9,25} This is because of the increased cognitive, social, and physical loads that are associated with school related activities. Thus, frustration, anxiety, and depression may arise as a result of their academic difficulties.^{9,25}

Anxiety and depression are forms of emotion dysregulation. Emotion dysregulation is the reshaping of emotions prospectively to the organization and quality of thoughts, actions, and interactions and can arise as individuals are likely to remember their SRC experience.^{9,26-28} Currently, emotion dysregulation research with SRC injuries is lacking. Since mTBI and SRC injuries possess similar signs and symptoms and impact of magnitude, the emotion dysregulation evoked by a SRC may be like those found in

mTBIs.^{1-15,26} This qualitative study investigates how individuals interpret their SRC experience and how these interpretations may attribute to their short- and long-term emotional experiences.

Qualitative research (uses words as data) investigates the “why” or “how”.^{37,38} Importantly, no qualitative information has been published investigating the relationships between SRC history, athlete identity, academic dysfunction, and emotion dysregulation. This study investigates reoccurring themes of how individuals interpreted their SRC experience and how these interpretations may attribute to their short- and long-term lived experiences.

Methods

Participants

Two individuals from Texas State University (TXST) who were former student-athletes who sustained a SRC in high school athletics were recruited for this pilot study. Both individuals gave consent prior to their enrollment in the study. Inclusion criteria included: their most recent SRC must have occurred over a year ago during a high school practice, game, or scrimmage excluding intermural and recreational activities, they were withheld from their sport participation for a minimum of seven days, and they had fully recovered from their SRC within three months of the injury.

Research Design

This naturalistic, qualitative pilot study used a phenomenological approach. Participants answered open-ended questions during one-on-one, semi-structured interviews encouraging them to tell their stories and share their experiences about their SRC pre- and post- injury. To ensure the individuals were protected and not identifiable, no names were used in the dissemination of data.

Instrumentation

The semi-structured interview protocol was developed by the research team utilizing the current literature on SRCs to identify gaps in knowledge. The questions included a mixture of descriptive and interpretation-based, open-ended questions along

with follow-up probes to encourage participants to elaborate in detail about their sport-related concussive injuries and their lived experience before and after their injury.

Recruitment

We recruited two participants (1 female, 1 male) through purposeful sampling. Potential participants volunteered. Three potential participants volunteered to participate; two met the study inclusion criteria and participated in the interview.

Data Collection

Two practice interviews and transcriptions were conducted as a part of the interviewer's training prior to the data collection for this study. Eligible individuals provided their age and gender at the time of the interview. Participants also signed an informed consent form agreeing to participate in the interview process and to be audio recorded. Data were collected through in-person, semi-structured, one-on-one interviews lasting an average of 25 minutes. The interview team—one interviewer and one note-taker—was trained by a published qualitative researcher. The interviewer lead the conversation, while the note-taker made field notes on verbal and non-verbal cues.

Data Analysis

Three people comprised the data analysis team. Data were organized by themes using a descriptive phenomenological, and interpretative phenomenological analysis of the interview data. The stages of analysis were outlined by Frost.⁵⁴ To begin, the interviewer transcribed all audio interviews verbatim. The data analysis team read through the transcriptions numerous times to become acclimated with the data. A code book was drafted to highlight emerging themes and sub-themes. Multiple data analysis meetings were held to refine the code book and themes. The code book was revised throughout the analysis process by grouping thoughts and ideas of the interviewees SRC(s) based on correlation of patterns.⁵⁴ This process established relationship, if any, among sport-related concussion, athlete identity, academic dysfunction, and emotion dysregulation. The emerging overarching themes with its sub-themes were continuously analyzed by the research team until a consensus was met.

Trustworthiness

While the interview questions were open and expansive, they were outlined to avert leading the participants towards a particular response. Data were analyzed through

multiple perspectives analysis (e.g. multiple researchers and multiple theoretical lenses) in attempt to reduce the impact of assumptions and limitations. The formation of a code book increased trustworthiness and confidence of the results. Discrepancies among coders were discussed until consensus was reached.

Triangulation

Triangulation was used in three different contexts: emerging themes, methods (e.g. interviews, field notes), and a multi-person data analysis team. We used descriptive phenomenological, and interpretive analysis to aid in identifying relationships among the many areas of interest: impact of being a student-athlete and the impact of their sport-related concussion. Triangulation identified and characterized similar, contradictory, or absent relationships compared to prior reviewed literature.⁵⁴

Social Cognitive Theory (SCT)

Social Cognitive Theory posits that learning occurs in a social context with a dynamic and reciprocal interaction of the person (e.g. cognitive abilities, physical characteristics, beliefs and attitudes), environment (e.g. physical surroundings, family and friends, other social influences), and behavior (e.g. motor responses, verbal responses, social interactions).⁵⁷ Using SCT allows us to identify what relationships exist between our variables of interest and how these factors interact in various situations.

Results

During thematic analysis, the data revealed two major themes: impact of being a student-athlete and impact of the concussion. Each theme, with emergent sub-themes were supported by representative quotes from the participants.

Theme 1: Impact of Being a Student-Athlete

Participants' perceptions of how being a student-athlete impacted their lives was an emergent theme. Participants identified mostly positive impacts of their student-athlete status, noting how being an athlete positively impacted their personal and academic development. Four categories emerged during the data analysis regarding the perceptions of former student-athlete's lived experiences: personal development, academic development, athlete identity, and relationships.

Sub-Theme 1: Personal Development

The participants identified various life skills they learned from being a student-athlete. Both participants reported that being a student-athlete allowed for the opportunity to grow as an individual. Participant 1 commented on how being a student-athlete propelled their drive to better themselves in environments outside of sports. Together, both participants emphasized communication and how to appropriately interact with others.

"I think it took me out of my shell more. [...]. It really propelled me and going out of my own way to speak with people more and put myself out there. Not just with my peers, but also with adults, teachers, professionals. It made me kind of develop social skills that allows me to speak to people and think on my feet and pursue a lot more because I saw what I was capable of in high school. [...]. Along with increasing my communication skills and social skills I was really pushing myself to be like well you could do more with your life. What do you want to do? What, what I am I great at? What am I not really trying to do that I should really give it more effort? Things like that."

Participant 2 concentrated on communication as being the most important aspect they took away from being a student-athlete as well as how to empathize with others.

"You have to be able to communicate on a lot of different levels whether that's on the field, and off the field. The second one probably is how to empathize with people. [...]. It really taught me how to not just sympathize with people but really how to empathize."

When responding to the question "What did you learn from sports?" Participant 2 listed an array of other life skills they learned as student-athlete.

"Oh teamwork. How to be a team player was probably the first thing. How to interact with people socially, how to be a good friend, how to be a good person, how to communicate, how to empathize. Confidence, diligence, those were the things that come to mind."

Sub-Theme 2: Academic Development

The participants described how being a student-athlete impacted their academic and professional journey. Participant 1 expressed how his concussive experience influenced him to enter the health professions field:

"Having undergone the two concussions I think it is why one of the big reasons why I got my undergrad in exercise and sports science because I felt like it was something that I could understand a lot better than somebody who read a book. I knew proper protocols and typical symptoms because I don't think that I had typical symptoms. So, it did help shape what I want to do."

Similarly, Participant 2 described how being a student-athlete prompted her to find her passion for her profession, as a student-athlete must maintain grades to participate in sports.

"I didn't really become a student, to be honest, like a true student until probably my sophomore, end of my sophomore year of college. That's when I kind of found athletic training and I fell in love with that. So, it gave me motivation to... really, I guess, be a student."

Sub-Theme 3: Athlete Identity

Student-athletes often identify strongly with their athletic role. Both participants made several comments about the importance of their identities as student-athletes:

"When I got into high school I primarily focused only on baseball."

"Sports were way more important to me than any type of academics growing up."

"I was an athlete. That was my number one. At that time in my life nothing else mattered. Sports mattered to me."

Sub-Theme 4: Relationships

Participants identified adult figures being the primary influences in their lives, specifically, adults who acted as guardians. Not only did these adult role models give them hope and inspiration, but they also encouraged them to live to their fullest potential. Participant 1 conveyed the numerous ways his mom gave them that push to become the person they are today.

"It was definitely my mom. There was a lot of pushing and pulling. My dad was very social. He wanted me to be more that of that and I didn't want to. My mom was like no...like don't be like me. You need to be outgoing. Don't, don't be like me because of a lot of things that I wish I could have done when I was your age that I don't want you to go through. So, she was like it's very important. You need to be social. You need to create those friendships and those relationships. You're going to miss out on so much if you don't go out there, push yourself out there, and be different. She was like always be different. You don't want to be good at one thing. You want to be like good at all these different things because more people will respect you. It was her not wanting me to be something that pushed me out to really be that thing."

Participant 2 portrayed one of her coaches as being the most influential person in her life when she was a student-athlete.

"I thought of her (the coach) as a second mother. Just always there for me. Always encouraged me. [...]. She's the one that kind of affected me the most just by encouraging me and being there for me."

Theme 2: Impact of the Sport-Related Concussion

The second emergent theme was the perceived impact of the SRC on the participant's life. During data analysis, themes emerged focused on how participants recalled experiencing a SRC impacted their lives immediately following the SRC. Impacts of the SRC were organized into five sub-themes: (1) signs and symptoms, (2) emotional impacts, (3) academics impacts, (4) interpersonal relationships, and (5) clinical care.

Sub-Theme 1: Signs and Symptoms

The impact of the sport-related concussion produced an array of symptoms. Collectively, both participants experienced some sort of light sensitivity and headaches. Participant 1 mentioned that even some of his symptoms still linger today.

"I didn't have any nausea. I think the biggest ones are frequent headaches, a shifted vision so sometimes I still have them today. They are lingering but they are not as frequent. I'll have the very strong shift in my horizons. My head will fall, dramatically, one direction but it's almost like my eye sight is not lined up with that. It is still going in the opposite direction. I try to compensate for it. At the time, they were more frequent and a little scary because I couldn't control my motor function and I just I couldn't comprehend where I was, where my equilibrium was. [...]. But now, if I'm driving it will happen. I will have that dramatic shift. My head will tilt one direction and I recognize it now. It's not something that I am able to foresee or kind of anticipate. So, I just know in that moment don't move your arms, don't shift the steering wheel. That usually lasts a couple of seconds."

Participant 2 also experienced common symptoms following her SRC.

"Decreased in appetite, dizziness. When it first happened very nauseous, disoriented, sensitive to light, not so much noise but light. [...]. I remember having some difficulty concentrating in some of my classes."

Sub-Theme 2: Emotional Impacts

The participants felt various emotions from being withheld from their sport. As Participant 1 describes his emotions as they began to return to play:

"I've never had anything that traumatic. So frightened. And coming back into it: hesitation with the sport because there's always a ball coming towards you at some point. [...]. So, the fear that happening again was definitely strong. I had some reservations about what I was going to be doing. [...]. I think maybe if, if it affected me a little more than what I thought because some of the symptoms were still there and just not wanting to have to go through that again."

On the other hand, Participant 2 was not thrilled from being withheld.

"They didn't start me right away. So that upset me because I had been a starter. [...]. I was bitter. I was bitter about that."

Participant 2 expressed their emotions from being withheld but also, how they mentioned that they could quickly return to their sport by downplaying their symptoms.

"So, she didn't want me to go to school, to school at all. I was like "mom I don't wanna... I'm not that, I'm fine." [...]. There was nothing that I couldn't get through the day."

"I wanted to get back as quickly as I could... under the scope that they let me."

Sub-Theme 3: Academic Impacts

Even though the participants reported that their SRC had little impact on their academic performance, it is clear from the symptoms that they were experiencing that the effect of their SRC on their academic performance was greater than they believe.

Participant 1, when responding to the question regarding his sport-related concussion, "Did it make school work or focusing any harder?" answered that it had no effect:

"No..., no..., thankfully no. Nothing like that. Just the ocular migraines or the flashing lights and blurred vision and the occasional head tilting shifts."

Participant 2 responded that she had minimal trouble, but lacked empathy from her teacher, which impacted her comfort in the classroom:

"I wanted to wear sunglasses because I wasn't having noise issues but, I was having sensitivity to light. And, my English teacher just wasn't having it. She didn't understand why I needed it. She wasn't empathetic to the fact that I had undergone this sports-related concussion"

Even though the participants experienced some difficulties, that did not stop them from wanting to go to school:

"I kept telling my mom that I was fine and that I wanted to keep going to school."

Sub-Theme 4: Interpersonal Relationships

Having a support system is very important in the recovery process following a sport-related concussion. Both participants mentioned that their coaches and teammates never neglected them. Instead, they were there for them and still made them feel included as a part of the team:

"I sustained this injury and I had to recover from it. And, actually people, in my experience were pretty supportive of that."

"A lot of it was self, self-perceived. I don't want people to think I just don't want to play."

"No one ever said that to me. It was all coming within inside of my own, you know, emotions and head."

Coaches were understanding of the injury and accommodated the participants along the way. Participant 1 mentioned:

"My coach was very, very hands on. Any kind of practice that we had would gravitate towards me and just keep track of me. He would follow up and he would call my parents. He would check in on me more frequently when we had workouts especially anything that had to do with like shifts and movement or weight lifting: which would be laying down doing bench. And... you know giving up. Whatever we were doing that he would need to accommodate me and kind of looked after me. So, it was actually really smart on his part."

Both participants had no feeling of segregation from their team.

"At no point in time did I feel isolated from the team."

Likewise, Participant 1 voiced:

"Teammates it was more so just kind of hazing and joking around with me. Because after the second incident were I actually got hit in the eye it was so bad it became war story that they joked about."

Sub-Theme 5: Clinical Care

At the time of both participants' injuries (~ 15-17 years ago), a thorough clinical understanding of sport-related concussions was lacking compared to today's knowledge and treatment. When asked if there was a rehabilitation process after their SRC, a participant responded, "Not really. No."; "The rehab process was so short and minimal." However, for the time being, they believed they received the best care available at that point in time:

"They did some static balance testing on me. They didn't do any neurocognitive things on me at all. Yeah just kind of went back."

"They had me do a few sessions of PT because of my equilibrium. They just recommended that I go into physical therapy and work on balance training and how to improve my equilibrium and different exercises that I could do at home [...]. It was just sitting in a chair and working on head tilting and closing my eyes, working on the same rotations."

Knowing what the participants know now, due to their degrees in the health profession field, they wished they would have received more quality and quantity of care following their respective SRCs:

"I did not get the care. [...]. I should've gone through some more strenuous testing before just putting me back onto the field."

"There was nothing that said because you've suffered a concussion these are your do's and don'ts."

"I also don't remember the athletic trainer following up with me either."

Discussion

Both participants agreed that after sustaining a sport-related concussion it affected their life more than they anticipated. We found two overarching themes each with sub-themes (1) impact of being a student-athlete and (2) impact of the sport-related concussion.

Impact of Being a Student-Athlete

Given the importance of their identities as student-athletes it is not surprising that their SRC has impacted various aspects of their lives allowing the individuals to grow and gain skills that can be applied to environments outside of sports. Social skills such as how to communicate and appropriately interact with others was reported as being a benefit of sport participation. Being a student-athlete strengthened their relationships with others as they learned life lessons from others (parents, coaches, teammates) through interactions. Participants recognized that the student-athlete environment (sports and medical) steered their interests towards health profession careers.

Impact of the Sport-Related Concussion

Sustaining a SRC has impacted the participants in various ways. Although it appears that the participants were conscious of the signs and symptoms following their sport-related concussion, they were unaware that the effects can linger for weeks, months, and even years. Not only can a sport-related concussion impact student-athletes physically but emotionally as well. It can create anxiousness from being withheld from their sport. In addition, after sustaining a SRC, the signs and symptoms an individual may experience can hinder their academic potential thus not allowing them to perform to their maximum level. However, during our study Participant 2 voiced they experienced academic dysfunction while Participant 1 stated that they had no side effects at all. Despite how the participants interpreted their SRC and the effects on their academics it is clear from the signs and symptoms they experienced more academic dysfunction than they believed. However, it was interpreted by the research team that at no point did the participants feel neglected from the team while they were recovering from their injury. Our participants' athlete identity had little to no alteration following their SRC. At the time the participants sustained their sport-related concussion there was minimal research on proper protocols to follow before returning to their activities. Both participants noted that knowing what they know now they wished they would have received more care and information regarding the recovery process. Overall, their SRCs had a greater impact on their lives more than they believed.

Limitations

Despite this study's strengths, it has limitations that should be considered when interpreting findings. First, our sample was small (n=2), consisting of only Texas State University faculty and staff. Other limitations include: both of our participants recovered within 10-14 days. While this recovery time is normal, it also may have reduced the number of negative experiences they may have had compared to someone who took 2-3 months to recover. Our participants' injuries were both several years ago. This time lapse may have affected their memory of the injury and recovery. This is a common issue with retrospective data collection and would be reflected in other similar studies as well. A limitation to using a phenomenological approach is the participants must be able to

effectively communicate their thoughts and feelings. Since a qualitative study involves the interpretation of words, biases, assumptions, and pre-conceived ideas by the data analysis team can influence the accuracy of the study. We do not feel that this was an issue, however since we included three individuals with varying levels of concussion knowledge on the data analysis team. Additionally, the qualitative nature of the study is not generalizable to all current and former student-athletes' lived experiences. Our findings are only representative of our participants' experiences. However, anecdotally, we believe that many athletes experiences are similar in nature. These limitations should be further investigated to support the current literature.

Clinical Application and Future Directions for Research

Our findings provided new insights when examining the impact of being a student-athlete and the impact of the SRC through various emerging themes and sub-themes. Future qualitative studies should involve a greater number of participants with a wider range of symptoms (number and severity) and recovery times. This will help improve our understanding of how symptoms and the length of recovery may affect student-athletes' lived experiences following SRC. An investigation of how sex influences these same outcomes would also be beneficial considering the general sex-related concussion reporting, emotion, and behavioral differences that have previously been reported.⁵⁸ Further investigation of these topics would aid clinicians significantly during the recovery process to better understand the complexities of SRC recovery as everyone has a different response to this injury.

REFERENCES

1. Valovich McLeod TC, Wagner AJ, Bacon CEW. Lived Experiences of Adolescent Athletes Following Sport-Related Concussion. *Orthop J Sports Med.* 2017;5(12):2325967117745033.
2. Langlois JA, Rutland-Brown W, Wald MM. The Epidemiology and Impact of Traumatic Brain Injury: A Brief Overview. *The Journal of Head Trauma Rehabilitation.* 2006;21(5):375-378.
3. Cancelliere C, Hincapie CA, Keightley M, et al. Systematic review of prognosis and return to play after sport concussion: results of the International Collaboration on Mild Traumatic Brain Injury Prognosis. *Arch Phys Med Rehabil.* 2014;95(3 Suppl):S210-229.
4. Munia TT, Gendreau JL, Verma AK, et al. Preliminary results of residual deficits observed in athletes with concussion history: combined EEG and cognitive study. *Conf Proc IEEE Eng Med Biol Soc.* 2016;2016:41-44.
5. Munia TTK, Haider A, Fazel-Rezai R. Evidence of brain functional deficits following sport-related mild traumatic brain injury. *Conf Proc IEEE Eng Med Biol Soc.* 2017;2017:3212-3215.
6. Ianof JN, Freire FR, Calado VTG, et al. Sport-related concussions. *Dement Neuropsychol.* 2014;8(1):14-19.
7. McCrory P, Meeuwisse W, Dvorak J, et al. Consensus statement on concussion in sport-the 5(th) international conference on concussion in sport held in Berlin, October 2016. *Br J Sports Med.* 2017;51(11):838-847.
8. Sindik J, Furjan-Mandić G, Zenić N, et al. Comparison of psychological skills, athlete's identity, and habits of physical exercise of students of faculties of sport in four Balkan countries. *Montenegrin Journal of Sports Science and Medicine.* 2017;6(1):13-28.
9. Lininger MR, Wayment HA, Huffman AH, Craig DI, Irving LH. An Exploratory Study on Concussion-Reporting Behaviors From Collegiate Student Athletes' Perspectives. *Athletic Training & Sports Health Care.* 2017;9(2):71-80.
10. Cusimano MD, Ilie G, Mullen SJ, et al. Aggression, Violence and Injury in Minor League Ice Hockey: Avenues for Prevention of Injury. *PLoS One.* 2016;11(6):e0156683.
11. Kontos AP, Elbin RJ, Newcomer Appaneal R, Covassin T, Collins MW. A comparison of coping responses among high school and college athletes with concussion, orthopedic injuries, and healthy controls. *Res Sports Med.* 2013;21(4):367-379.
12. Wasserman EB, Bazarian JJ, Mapstone M, Block R, van Wijngaarden E. Academic Dysfunction After a Concussion Among US High School and College Students. *Am J Public Health.* 2016;106(7):1247-1253.
13. Turner S, Langdon J, Shaver G, Graham V, Naugle K, Buckley T. Comparison of Psychological Response between Concussion and Musculoskeletal Injury in Collegiate Athletes. *Sport Exerc Perform Psychol.* 2017;6(3):277-288.
14. Cole PM, Michel MK, Teti LO. The development of emotion regulation and dysregulation: a clinical perspective. *Monogr Soc Res Child Dev.* 1994;59(2-3):73-100.

15. Sharma A, Sharma A, Jain A, Mittal R, Gupta D. Study of Generalized Anxiety Disorder in Traumatic Brain Injury. *British Journal of Medicine and Medical Research*. 2015;10(12):1-8.
16. Carroll LJ, Cassidy JD, Cancelliere C, et al. Systematic review of the prognosis after mild traumatic brain injury in adults: cognitive, psychiatric, and mortality outcomes: results of the International Collaboration on Mild Traumatic Brain Injury Prognosis. *Arch Phys Med Rehabil*. 2014;95(3 Suppl):S152-173.
17. de Koning ME, Gareb B, El Moumni M, et al. Subacute posttraumatic complaints and psychological distress in trauma patients with or without mild traumatic brain injury. *Injury*. 2016;47(9):2041-2047.
18. McInnes K, Friesen CL, MacKenzie DE, Westwood DA, Boe SG. Mild Traumatic Brain Injury (mTBI) and chronic cognitive impairment: A scoping review. *PLoS One*. 2017;12(4):e0174847.
19. Seal KH, Bertenthal D, Samuelson K, Maguen S, Kumar S, Vasterling JJ. Association between mild traumatic brain injury and mental health problems and self-reported cognitive dysfunction in Iraq and Afghanistan Veterans. *J Rehabil Res Dev*. 2016;53(2):185-198.
20. Silverberg ND, Panenka WJ, Iverson GL. Work Productivity Loss After Mild Traumatic Brain Injury. *Arch Phys Med Rehabil*. 2018;99(2):250-256.
21. Starkey NJ, Jones K, Case R, Theadom A, Barker-Collo S, Feigin V. Post-concussive symptoms after a mild traumatic brain injury during childhood and adolescence. *Brain Inj*. 2018;32(5):617-626.
22. St Pierre ME, Parente R. Efficacy of legal judgments for defendants with traumatic brain injury. *NeuroRehabilitation*. 2016;39(1):125-134.
23. Epstein DJ, Legarreta M, Bueler E, King J, McGlade E, Yurgelun-Todd D. Orbitofrontal cortical thinning and aggression in mild traumatic brain injury patients. *Brain Behav*. 2016;6(12):e00581.
24. Theadom A, Starkey N, Barker-Collo S, et al. Population-based cohort study of the impacts of mild traumatic brain injury in adults four years post-injury. *PLoS One*. 2018;13(1):e0191655.
25. Du Preez EJ, Graham KS, Gan TY, Moses B, Ball C, Kuah DE. Depression, Anxiety, and Alcohol Use in Elite Rugby League Players Over a Competitive Season. *Clin J Sport Med*. 2017;27(6):530-535.
26. Rutberg S, Bouikidis CD. Exploring the Evidence. Focusing on the Fundamentals: A Simplistic Differentiation Between Qualitative and Quantitative Research. *Nephrology Nursing Journal*. 2018;45(2):209-213.
27. Braun V, Clarke V. *Successful qualitative research : a practical guide for beginners*. Los Angeles: SAGE; 2013.
28. Frost N. *Qualitative research methods in psychology : combining core approaches*. Maidenhead ; New York : Open University Press, 2011.; 2011.
29. LaMorte WW. The Social Cognitive Theory. 2018. Accessed February 26, 2019.
30. Baker JG, Leddy JJ, Darling SR, Shucard J, Makdissi M, Willer BS. Gender Differences in Recovery from Sports-Related Concussion in Adolescents. *Clinical Pediatrics*. 2016;55(8):771-775.

APPENDIX 1: Interview Script

“Thank you for agreeing to speak with me today”

“The purpose of this interview is to gain your perspective on what it was like when you had a sport-related concussion. Specifically, we want to know how your life was before injury, during the recovery process, and post recovery.”

“If at any point in the interview you do not feel comfortable answering a question, please let me know and we will continue to another question.”

“We’d like to remind you that to protect the privacy of the interviewees, all transcripts will be coded with pseudonyms, or fake names.”

“The interview will last about 1 hour and we will audiotape it to make sure that it is recorded accurately. Once the audio is in a typed format, we will email the interview to you to make sure that what we have recorded is what you intended to say so that we ensure that you are accurately represented in this study.”

“I will be taking notes during the interview to help me later in the research process.”

“Do you have any questions before we begin?”

1. Can you tell me about your time as a student-athlete?
 - a. What sport(s) did you play?
 - b. Did you play [insert sport name] in high school and/or college level?
 - c. For how many years did you play [insert sport name] at the [high school and/or college] level?
 - d. How did playing [insert sport name] impact you as a student athlete?
2. Why did you choose [insert sport name]?
 - a. Can you describe to me the environment of [insert sport name]?
 - b. Can you please explain your relationships between you and your coach and/or teammates?
 - c. Can you describe the intensity of [insert sport name]?
 - d. Can you please describe how you (emotionally) react to a win vs a loss?
3. What are some of the primary skills needed in playing [insert sport name]?
 - a. What makes these skills the most important for [insert sport name]?
4. How many sport-related concussions have you had?
 - a. How many were clinically diagnosed vs self-diagnosis?
 - i. What indications helped you diagnose it as a sport-related concussion?
 - b. How far apart between were each sport-related concussion?
 - c. Did having multiple SRCs impact you further in life? Please explain.
 - d. Did you have a musculoskeletal injury with any of your concussions?

5. Describe to me your most significant sport-related concussion and why do you think it was the most significant?
 - a. What happened?
 - b. How old were you?
 - c. At what level?
 - d. What was the severity?
 - e. How long were you out of game play?
6. What skills were affected when you sustained your sport-related concussion?
7. Still thinking about the most significant concussion, at the time of injury, first couple of days out, and just before return to play...
 - a. What were some of the signs and symptoms that you can remember feeling?
 - i. At any time, did you mask or down play your symptoms?
 - b. What were your thoughts?
8. Please describe to me, outside of sports, how were different aspects of your life affected when you sustained your sport-related concussion?
 - a. School?
 - b. At home?
 - c. Friends and teammates?
9. Please describe to me your recovery path of your most significant sport-related concussion
 - a. Did you have any limitations, rules, restrictions either self-imposed or by the coach, athletic trainer and university?
 - i. If so, can you please describe to me what they were?
 - b. Tell me about the support you received from others during your most significant sport-related concussion.
 - i. What support did you have and from whom?
 - ii. Do you feel as though you received the proper care after your sport-related concussion?
 - a. Was it right away, or delayed?
 - b. If delayed, what reasons made you believe it was delayed and how did it affect your recovery process?
10. Is there anything else that you would like to tell me that you think is important and I did not ask?

REFERENCES

1. McCrory P, Meeuwisse W, Dvorak J, et al. Consensus statement on concussion in sport-the 5(th) international conference on concussion in sport held in Berlin, October 2016. *Br J Sports Med*. 2017;51(11):838-847.
2. de Koning ME, Gareb B, El Mounni M, et al. Subacute posttraumatic complaints and psychological distress in trauma patients with or without mild traumatic brain injury. *Injury*. 2016;47(9):2041-2047.
3. McInnes K, Friesen CL, MacKenzie DE, Westwood DA, Boe SG. Mild Traumatic Brain Injury (mTBI) and chronic cognitive impairment: A scoping review. *PLoS One*. 2017;12(4):e0174847.
4. Seal KH, Bertenthal D, Samuelson K, Maguen S, Kumar S, Vasterling JJ. Association between mild traumatic brain injury and mental health problems and self-reported cognitive dysfunction in Iraq and Afghanistan Veterans. *J Rehabil Res Dev*. 2016;53(2):185-198.
5. Silverberg ND, Panenka WJ, Iverson GL. Work Productivity Loss After Mild Traumatic Brain Injury. *Arch Phys Med Rehabil*. 2018;99(2):250-256.
6. Starkey NJ, Jones K, Case R, Theadom A, Barker-Collo S, Feigin V. Post-concussive symptoms after a mild traumatic brain injury during childhood and adolescence. *Brain Inj*. 2018;32(5):617-626.
7. Carroll LJ, Cassidy JD, Cancelliere C, et al. Systematic review of the prognosis after mild traumatic brain injury in adults: cognitive, psychiatric, and mortality outcomes: results of the International Collaboration on Mild Traumatic Brain Injury Prognosis. *Arch Phys Med Rehabil*. 2014;95(3 Suppl):S152-173.
8. St Pierre ME, Parente R. Efficacy of legal judgments for defendants with traumatic brain injury. *NeuroRehabilitation*. 2016;39(1):125-134.
9. Valovich McLeod TC, Wagner AJ, Bacon CEW. Lived Experiences of Adolescent Athletes Following Sport-Related Concussion. *Orthop J Sports Med*. 2017;5(12):2325967117745033.
10. Epstein DJ, Legarreta M, Bueler E, King J, McGlade E, Yurgelun-Todd D. Orbitofrontal cortical thinning and aggression in mild traumatic brain injury patients. *Brain Behav*. 2016;6(12):e00581.
11. Theadom A, Starkey N, Barker-Collo S, et al. Population-based cohort study of the impacts of mild traumatic brain injury in adults four years post-injury. *PLoS One*. 2018;13(1):e0191655.
12. Cancelliere C, Hincapie CA, Keightley M, et al. Systematic review of prognosis and return to play after sport concussion: results of the International Collaboration on Mild Traumatic Brain Injury Prognosis. *Arch Phys Med Rehabil*. 2014;95(3 Suppl):S210-229.
13. Kontos AP, Elbin RJ, Newcomer Appaneal R, Covassin T, Collins MW. A comparison of coping responses among high school and college athletes with concussion, orthopedic injuries, and healthy controls. *Res Sports Med*. 2013;21(4):367-379.
14. Du Preez EJ, Graham KS, Gan TY, Moses B, Ball C, Kuah DE. Depression, Anxiety, and Alcohol Use in Elite Rugby League Players Over a Competitive Season. *Clin J Sport Med*. 2017;27(6):530-535.

15. Munia TT, Gendreau JL, Verma AK, et al. Preliminary results of residual deficits observed in athletes with concussion history: combined EEG and cognitive study. *Conf Proc IEEE Eng Med Biol Soc.* 2016;2016:41-44.
16. Ianof JN, Freire FR, Calado VTG, et al. Sport-related concussions. *Dement Neuropsychol.* 2014;8(1):14-19.
17. McCrea M, Powell MR. Biomechanics and Pathophysiology of Concussion. *Pediatric and Adolescent Concussion*2012:29-53.
18. Munia TTK, Haider A, Fazel-Rezai R. Evidence of brain functional deficits following sport-related mild traumatic brain injury. *Conf Proc IEEE Eng Med Biol Soc.* 2017;2017:3212-3215.
19. Valasek AE, McCambridge TM. Sports-Related Concussion. *Pediatric and Adolescent Concussion*2012:21-27.
20. Lininger MR, Wayment HA, Huffman AH, Craig DI, Irving LH. An Exploratory Study on Concussion-Reporting Behaviors From Collegiate Student Athletes' Perspectives. *Athletic Training & Sports Health Care.* 2017;9(2):71-80.
21. Sindik J, Furjan-Mandić G, Zenić N, et al. Comparison of psychological skills, athlete's identity, and habits of physical exercise of students of faculties of sport in four Balkan countries. *Montenegrin Journal of Sports Science and Medicine.* 2017;6(1):13-28.
22. Cusimano MD, Ilie G, Mullen SJ, et al. Aggression, Violence and Injury in Minor League Ice Hockey: Avenues for Prevention of Injury. *PLoS One.* 2016;11(6):e0156683.
23. Murphy GM, Petitpas AJ. Identity Foreclosure, Athletic Identity, and Career Maturity in Intercollegiate Athletes. *Sport Psychologist.* 1996;10(3):239-246.
24. O'Rourke DJ, Smith RE, Punt S, Coppel DB, Breiger D. Psychosocial correlates of young athletes' self-reported concussion symptoms during the course of recovery. *Sport, Exercise, and Performance Psychology.* 2017;6(3):262-276.
25. Wasserman EB, Bazarian JJ, Mapstone M, Block R, van Wijngaarden E. Academic Dysfunction After a Concussion Among US High School and College Students. *Am J Public Health.* 2016;106(7):1247-1253.
26. Turner S, Langdon J, Shaver G, Graham V, Naugle K, Buckley T. Comparison of Psychological Response between Concussion and Musculoskeletal Injury in Collegiate Athletes. *Sport Exerc Perform Psychol.* 2017;6(3):277-288.
27. Cole PM, Michel MK, Teti LO. The development of emotion regulation and dysregulation: a clinical perspective. *Monogr Soc Res Child Dev.* 1994;59(2-3):73-100.
28. Sharma A, Sharma A, Jain A, Mittal R, Gupta D. Study of Generalized Anxiety Disorder in Traumatic Brain Injury. *British Journal of Medicine and Medical Research.* 2015;10(12):1-8.
29. Yrondi A, Brauge D, LeMen J, Arbus C, Pariente J. Depression and sports-related concussion: A systematic review. *Presse Medicale (Paris, France: 1983).* 2017;46(10):890-902.
30. American Psychiatric Association., American Psychiatric Association. DSM-5 Task Force. *Diagnostic and statistical manual of mental disorders : DSM-5.* 5th ed. Washington, D.C.: American Psychiatric Association; 2013.

31. D'Agostino A, Covanti S, Rossi Monti M, Starcevic V. Reconsidering Emotion Dysregulation. *Psychiatr Q.* 2017;88(4):807-825.
32. Singh P, Mastana S. *Depression : A Silent Culprit in Health and Disease.* Sharjah, U.A.E: Bentham Science Publishers; 2015.
33. Hooley JM, Butcher JN, Nock M, Mineka S. *Abnormal psychology / Jill M. Hooley, Harvard University, James N. Butcher, University of Minnesota, Matthew K. Nock, Harvard University, Susan Mineka, Northwestern University.* Seventeenth edition. ed. Boston: Pearson; 2017.
34. Koenigs M, Grafman J. The functional neuroanatomy of depression: distinct roles for ventromedial and dorsolateral prefrontal cortex. *Behav Brain Res.* 2009;201(2):239-243.
35. Vynorius KC, Paquin AM, Seichepine DR. Lifetime Multiple Mild Traumatic Brain Injuries Are Associated with Cognitive and Mood Symptoms in Young Healthy College Students. *Front Neurol.* 2016;7:188.
36. Finkbeiner NW, Max JE, Longman S, Debert C. Knowing What We Don't Know: Long-Term Psychiatric Outcomes following Adult Concussion in Sports. *Can J Psychiatry.* 2016;61(5):270-276.
37. Rutberg S, Bouikidis CD. Exploring the Evidence. Focusing on the Fundamentals: A Simplistic Differentiation Between Qualitative and Quantitative Research. *Nephrology Nursing Journal.* 2018;45(2):209-213.
38. Braun V, Clarke V. *Successful qualitative research : a practical guide for beginners.* Los Angeles: SAGE; 2013.
39. Lincoln YS, Guba EG. *Naturalistic inquiry.* Beverly Hills, Calif.: Sage Publications; 1985.
40. Langlois JA, Rutland-Brown W, Wald MM. The Epidemiology and Impact of Traumatic Brain Injury: A Brief Overview. *The Journal of Head Trauma Rehabilitation.* 2006;21(5):375-378.
41. Grabb LL, McElroy OH. *Merriam-Webster's Spanish-English medical dictionary = Diccionario médico Español-Inglés Merriam-Webster.* Springfield, Mass. : Merriam-Webster ; Enfield : Publishers Group UK [distributor], 2012.; 2012.
42. Salottolo K, Levy AS, Slone DS, Mains CW, Bar-Or D. The effect of age on Glasgow Coma Scale score in patients with traumatic brain injury. *JAMA Surg.* 2014;149(7):727-734.
43. McCrory P, Feddermann-Demont N, Tarnutzer AA, et al. What is the definition of sports-related concussion: A systematic review. *British Journal of Sports Medicine.* 2017;51(11):877-887.
44. Almeida-Suhett CP, Prager EM, Pidoplichko V, et al. Reduced GABAergic inhibition in the basolateral amygdala and the development of anxiety-like behaviors after mild traumatic brain injury. *PLoS One.* 2014;9(7):e102627.
45. Mannix R, Meehan WP, III, Pascual-Leone A. OPINION Sports-related concussions - media, science and policy. Vol 122016:486-490.
46. Centers for Disease C, Prevention. CDC grand rounds: reducing severe traumatic brain injury in the United States. *MMWR Morb Mortal Wkly Rep.* 2013;62(27):549-552.
47. Cassidy JD, Carroll LJ, Peloso PM, et al. Incidence, risk factors and prevention of mild traumatic brain injury: results of the who collaborating centre task force on

- mild traumatic brain injury. *Journal of Rehabilitation Medicine (Taylor & Francis Ltd)*. 2004;36:28-60.
48. Tsao JW. *Traumatic brain injury : a clinician's guide to diagnosis, management, and rehabilitation*. New York ; London : Springer, 2012.; 2012.
 49. Bodin D, Yeates KO, Klamar K. Definition and Classification of Concussion. *Pediatric and Adolescent Concussion*2012:9-19.
 50. Balasundaram AP, Athens J, Schneiders AG, McCrory P, Sullivan SJ. The Influence of Psychological and Lifestyle Factors on the Reporting of Postconcussion-Like Symptoms. *Arch Clin Neuropsychol*. 2016;31(3):197-205.
 51. van der Horn HJ, Spikman JM, Jacobs B, van der Naalt J. Original article: Postconcussive Complaints, Anxiety, and Depression Related to Vocational Outcome in Minor to Severe Traumatic Brain Injury. *Archives of Physical Medicine and Rehabilitation*. 2013;94:867-874.
 52. Hutchison M, Mainwaring LM, Comper P, Richards DW, Bisschop SM. Differential emotional responses of varsity athletes to concussion and musculoskeletal injuries. *Clin J Sport Med*. 2009;19(1):13-19.
 53. Giorgi AP, Giorgi BM. The descriptive phenomenological psychological method. *Qualitative research in psychology: Expanding perspectives in methodology and design*.2003:243-273.
 54. Frost N. *Qualitative research methods in psychology : combining core approaches*. Maidenhead ; New York : Open University Press, 2011.; 2011.
 55. Koslowsky M, Bailit H. A Measure of Reliability Using Qualitative Data. *Educational & Psychological Measurement*. 1975;35(4):843.
 56. John W. Creswell a, Dana L. Miller a. Determining Validity in Qualitative Inquiry. *Theory Into Practice*. 2000(3):124.
 57. LaMorte WW. The Social Cognitive Theory. 2018. Accessed February 26, 2019.
 58. Baker JG, Leddy JJ, Darling SR, Shucard J, Makdissi M, Willer BS. Gender Differences in Recovery from Sports-Related Concussion in Adolescents. *Clinical Pediatrics*. 2016;55(8):771-775.