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The Emotions, Coping and Social Support Perceived By NCAA Division I Athletes During Concussion Recovery: A Qualitative Study

Paige Wells
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THE EMOTIONS, COPING AND SOCIAL SUPPORT PERCEIVED BY NCAA DIVISION I
ATHLETES DURING CONCUSSION RECOVERY: A QUALITATIVE STUDY

by

PAIGE WELLS

(Under the direction of Tamerah Hunt)

ABSTRACT

Context: Concussed patients require an individualized assessment and treatment plan in order to improve the outcomes associated with their overall recovery. In considering this, the Wiese-Bjornstal model highlights pre-injury and post-injury factors affecting the recovery process including emotions, coping and social support. Understanding the emotional disturbances, coping behaviors and social support available to concussed athletes may provide valuable information for the healthcare team in management and care for the concussed athlete.

Purpose: To identify and describe the emotions, coping mechanisms and social support perceived by Division I collegiate athletes during recovery from sport concussion.

Design: Grounded theory, exploratory study.

Methods: Focus groups were conducted in the athletic training facility at a NCAA Division I University in Southeast Georgia. Seven Division I male (n=3) and female (n=4) collegiate athletes utilizing criterion sampling (previous history of a sport-concussion while participating in their Division I sport within the last 2 years, full return to learn and participation) participated in this study. Semi-structured interviews were conducted during two focus group sessions. A data triangulation method was used to establish themes associated with 1) emotions following injury 2) coping strategies and 3) social support received. Credibility and trustworthiness was established through member checks.

Results: Common themes consisted of: 1) Participants associating emotions with concussion-related symptoms; 2) Participants feeling excitement to return to play; 3) Participants exhibiting maladaptive coping strategies during the concussion recovery process; 4) Participants not seeking support, but receiving social support; 5) Participants receiving support from their families; and 6) Participants perceiving overall adequate support.

Conclusion: Following concussion, frustration was a primary emotion described by the participants. In addition, maladaptive coping strategies were employed but adequate social support was received. In conclusion, clinicians should encourage athletes to voice emotions and provide an active social support network throughout the concussion recovery process. It appears that emotions, coping strategies and social support are important factors and future research should be conducted to examine effective interventions using positive coping strategies and social support from all involved in athletics.

INDEX WORDS: Sport-related concussion, Emotions, Coping, Social support, Focus groups
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by

PAIGE WELLS

B.S., University of Cincinnati, 2014

A Thesis submitted to the Graduate Faculty of Georgia Southern University in Partial Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE

STATESBORO, GEORGIA
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CHAPTER 1

INTRODUCTION

A sport-related concussion (SRC) is a concussion sustained during sport or recreational activities, which poses a variety of complications for athletes. In 2003, the Centers for Disease Control (CDC) estimated 1.6 to 3.8 million sport-related traumatic brain injuries occur in the United States each year. Sport-related concussions are sustained in collegiate sports, with concussions accounting for approximately 5.8% of all sport-related injuries. Proper diagnosis and treatment are critical for the safety and well-being of the concussed athlete and can ultimately affect the recovery process. While most adult patients will recover within 2 to 3 weeks after injury, approximately 15 to 20% will experience a prolonged recovery. Those that experience prolonged recovery tend to have protracted cognitive, behavioral and psychological issues.

It is important for the clinician and concussed patient to understand that a concussion is unique and heterogeneous in nature. Each patient will present with different clinical signs and symptoms; the initial onset of these symptoms and the time of resolution will vary. A multifaceted concussion battery is required, as concussions may cause a combination of cognitive, behavioral, vestibular, oculomotor and/or affective symptoms. In common practice, clinicians prescribe rest until SRC symptoms begin to dissipate or resolve and will then progress the athlete back into activity. However, most times, psychological disturbances are overlooked and go entirely without treatment during the recovery process.
Psychological distress after SRC is largely unaddressed in the literature. In fact, the emotional sequelae for SRC was not even addressed in published research until 2004.\textsuperscript{12} This demonstrated that those suffering from SRC compared with healthy controls demonstrated increased depression-like symptoms, confusion and total mood disturbance.\textsuperscript{12} Currently, there are only a few published studies on acute and long-term emotional consequences of SRC.\textsuperscript{11-16} Recent research of concussed athletes has recognized psychological disturbances acutely after SRC, including elevated depression, confusion, fatigue, anger, overall mood disturbance, reduced energy and prolonged recovery.\textsuperscript{12,13} It is unknown if these psychological consequences of SRC are a result of neurological trauma or from an athlete’s psychological response to sport-injury.\textsuperscript{10}

**Theoretical Framework**

A sport injury is a major physiological and psychological stressor. After this stressor, major emotional and somatic symptoms have been reported in the literature.\textsuperscript{17} The athlete may experience fear, anger, disbelief, rage, depression, tension, upset stomach, fatigue, insomnia, and/or decreased appetite.\textsuperscript{18} The ability to predict physiological and psychological outcomes following this injury stressor has been a consideration for research since the early 1990s.\textsuperscript{17} More recently, theoretical models have been developed to explain the psychological response to sport injuries, specifically SRC.\textsuperscript{10}

Published in 2015, Wiese-Bjornstal’s model of psychological response of a SRC, was created from a previous model of psychological aspects of sport injury.\textsuperscript{17} The previous model of sport-injury was adapted to reflect sport-concussions. The goal of the model is to synthesize the current evidence and combine into multiple factors that contribute to psychological outcomes
following SRC. This model used evidence from psychology and concussion literature to define, integrate and explain the contributing factors associated with the psychological outcomes associated with SRC. This is the first model to describe the recovery of SRC using a holistic approach, taking into account several types of factors such as, personal, environmental and cognitive, behavioral and affective responses.

The model discusses pre-injury factors that may affect SRC recovery, such as a diagnosis of attention deficit hyperactivity disorder (ADHD), clinical depression, life event stress, and/or coping style. These factors may contribute to the stress response of injury and overall psychological outcomes. For example, it is evident in previous literature that those with ADHD tend to have protracted recoveries, showing prolonged cognitive and behavioral difficulties. Another example of a pre-injury factor that may affect SRC outcomes is previous life-event stress before injury. Many individuals will misattribute pre-injury life event stress with relating to their concussions, which results in greater perceptions of stress and increased emotional challenges. Pre-injury factors do play a role in psychological outcomes and should be considered, but the clinician may not be able to influence pre-injury factors after the injury has occurred. Pre-injury factors are innate factors that the student athletes or participant has that need to be understood and accounted for. It is important for the clinician to understand and recognize these pre-injury factors that may prolong recovery, however many times, the clinician does not see a patient until after an injury is sustained. Instead, clinicians may better influence attributing post-injury factors.

Since much of the rehabilitation occurs after the injury, post-injury factors may prove an important area for clinicians to understand. Post-injury factors include personal and situational
factors of the SRC; these include injury characteristics, as well as social aspects, such as positive social support or pressure from teammates or coaches, and environmental aspects such as rehabilitation environment. These factors can affect SRC recovery in many ways. For example, injury characteristics, such as history of previous concussion, increased symptom reports and symptom severity have all shown to be prognostic for prolonged cognitive deficits and long-term disabilities.\footnote{22} Another example could be a social factor of pressure from the team’s culture to be tough and play through injury. This could lead to playing with symptoms, further prolonging recovery or causing greater injury.\footnote{22} Post-injury factors may play a more significant role because the clinician may be better able to provide interventions that may influence post-injury factors in a positive way with the goal to improve outcomes.

Also, within Wiese-Bjornstal’s model are symptoms following concussion, identified as cognitive, behavioral and emotional responses. The literature supports the inclusion of these symptoms in the model because they occur post-injury and are unique to each patient in manifestation and severity.\footnote{9} Cognitive, behavioral, affective and somatic symptoms have been identified as commonly occurring following SRC in the literature.\footnotemark[9,\footnotemark{22}] Wiese-Bjornstal’s model included these factors to encompass the multifaceted responses to concussion that may lead to negative psychological outcomes such as overall mood disturbances, reduced quality of life and prolonged recovery. The researcher focused on post-injury factors relating to emotions, coping and social support because the clinician may not be able to control or impact many pre-injury factors or completely control symptoms of SRC. Clinicians can better evaluate the emotional sequelae of the concussed athlete and propose coping and social support interventions as necessary.
**Emotions and SRC**

Emotions are described as episodic mental responses of fluctuating intensities, which are critical for healthy human functioning.\(^{23}\) Capturing the emotional state of a concussed athlete currently relies on the athlete’s subjective report of symptoms, typically on a symptom checklist.\(^ {10}\) The most commonly utilized emotions on a symptom checklist are: “sadness”, “irritability” and “feeling more emotional”.\(^ {9}\) Emotional and psychological disturbances are commonly reported in athletes suffering a concussion.\(^ {11}\) Researchers have established that the emotional consequences of those suffering SRC are different from those suffering musculoskeletal or anterior cruciate ligament (ACL) injuries with the concussed group reporting greater mood disturbances and decreased vigor.\(^ {13,14}\)

Emotions are an important piece of the puzzle to examine since how a person feels affects overall well-being and happiness.\(^ {11,24}\) Concussed patients are likely to experience emotions of sadness, fatigue, anger, irritation and overall mood disturbance.\(^ {12,13}\) Concussed patients that experience emotional symptoms have prolonged recovery. Further, patients that recover within the normal two week timeframe do not suffer from prolonged emotional or psychological symptoms.\(^ {25}\)

**Coping and SRC**

Coping resources and strategies are factors influencing the psychological response to injury. Coping is defined as a “constantly changing process of cognitive and behavioral approaches designed to manage internal and external demands that exceed one’s resources”.\(^ {26}\) Sport concussions pose extremely different challenges during the recovery process compared to musculoskeletal injuries.\(^ {14}\) Effective coping strategies have been highlighted in psychosocial
literature to have positive benefits for an athlete after musculoskeletal sport injury. Common coping strategies are problem-focused, emotion-focused and avoidance coping strategies.27

Coping strategies may be valuable to the healthcare team when educating and developing treatment plans for the concussed athlete. Effective coping involves the ability to handle a new stressor in your life, like concussive injury. Effective coping strategies can ameliorate the emotions experienced after injury by addressing the original stressor.26 Effective coping strategies involve addressing the stressor by actively addressing the problem, such as problem focused coping. When patients utilize these positive coping strategies, quality of life during recovery after brain-injury has shown to increase.28 However, Wiese-Bjornstal’s model suggests that maladaptive coping strategies may be employed by concussed athletes and can lead to prolonged recovery.10,29-31

Maladaptive coping typically involves avoidance of the problem.32 Maladaptive coping strategies for sport injury tend to result in failure to address the problem or not seeking treatment. Maladaptive coping has been shown to lead increases of fear, depression, sleep problems, and cognitive difficulties.33 The consequences of a SRC may lead to social isolation, sleep disturbances or avoidance of academic work which are considered maladaptive coping.10

Social support and SRC

In conjunction with increases of emotion and/or stress and varied coping strategies, social support is also a very important component of the recovery process. Recent health-related research has identified social support as an important factor in the recovery process after sport injury.34 There have also been associations between poor social support and poor post-concussion outcomes leading to a prolonged recovery. There is evidence supporting that social
support helps to reduce negative stress associated with sport injury, therefore increasing the overall well-being of the injured athlete.\textsuperscript{35} Social support also has many other benefits such as: increasing motivation\textsuperscript{36}, rehabilitation compliance,\textsuperscript{37-40} and self-confidence.\textsuperscript{41}

Overall social support may aid in the recovery process for an athlete suffering an injury by increasing motivation and vigor. Covassin et al. identified that athletes with orthopedic injuries compared with athletes suffering SRC identify similar sources of social support, however the SRC group reported less satisfaction with social support received.\textsuperscript{42} The researchers suggested that social support for athletes suffering SRC may be lacking due to lack of knowledge or understanding of SRC by the support system.\textsuperscript{42}

It is conceivable that an improved social support system would benefit athletes recovering from SRC by overall increasing positivity and decreasing negative outcomes, such as anxiety. In the previously mentioned study, Covassin et al. also found that satisfaction with social support was a stronger predictor of lower state anxiety for concussed athletes.\textsuperscript{42} The Wiese-Bjornstal model takes into account both positive and negative social support. Positive social support, such as understanding from family members, leads to rehabilitation compliance, increased self-confidence and overall positive emotions.\textsuperscript{38} Negative social support, such as pressure from coaches, has been shown to lead to psychological based symptoms such as frustration and anger and prolonged recovery.\textsuperscript{17} In addition, it has been found that in brain injury patients, poor social support networks has been related to suboptimal emotional recoveries.\textsuperscript{43} In much of the literature, individuals receiving positive social support reported satisfaction with services; while those receiving negative social support report poor satisfaction.\textsuperscript{44}
recovering from SRC has an adequate and positive social support network may enhance recovery.

**Conclusion**

Concussions are common in sport and result in psychological, cognitive, behavioral and emotional disturbances. According to the Wiese-Bjornstal model, numerous pre-injury and post-injury factors contribute to possible poor psychological outcomes and overall recovery following SRC. An investigation of emotions, coping behaviors and social support in concussed athletes may provide valuable information for the healthcare team when working with the concussed athlete in order to establish the need for intervention. Understanding the presence of these factors may be valuable to the clinician in order to improve recovery experiences. Unfortunately, many of these factors are intertwined. An individual’s social support can influence emotions after a concussion which can then impact coping strategies and continue on a cycle. Therefore, the researcher wanted to focus primarily on emotions, coping and social support because of their relationship with each other.

**Purpose Statement**

Therefore, the purpose of this study is to identify and describe the emotions, coping mechanisms and social support perceived by Division I collegiate athletes during recovery from SRC.
CHAPTER 2
METHODS

Participants

NCAA Division I male and female athletes who suffered a SRC verified by a qualified healthcare provider were recruited for this study. The recruitment of participants was based on inclusion and exclusion criteria, as noted in Appendix A. Participants were recruited using an email and paper flyers. An email was sent to each team’s athletic trainer with a request to forward on to their teams. In addition, paper flyers about the research were posted in the athletic facilities at one NCAA division I University. Participation in the study was completely voluntary.

Prior to enrollment, participants were asked to sign an informed consent form, again stating that they understood participation in the research study was completely voluntary as well as stating that (1) interviews would be audio-recorded for future transcriptions, (2) they could refuse to be interviewed or cancel the interview at any time, (3) they would be allowed to ask questions at any time, (4) there would be no incentives (5) transcribed interviews would be sent to them for review prior to analysis, and (6) the transcribed interviews would be reviewed by the researcher and the research team for thematic identification.

Once enrolled, the participants were divided into male and female focus groups that contained 3 to 4 people. Previous literature indicates that there are gender differences in concussion recovery and psychological responses to sport injury.\(^{45,46}\) Therefore, athletes were separated by gender, as it allowed the research team to recognize gender differences during data analyses. All participants sustained a SRC while participating in Division I collegiate athletics
within the prior two years. Measures were taken by the researcher to assure confidentiality of all participants, including eliminating identifiers in the coding process as well as keeping files with identifiable information in a locked location. Participants were also informed and supplied with materials in case they decided to seek counseling services after the interview. The research study was approved by the Georgia Southern University Institutional Review Board.

The Researcher as an Instrument

In qualitative methodology the researcher is seen as the primary instrument in data collection. As the principal researcher, my biases are associated with my current role as an athletic trainer. I am an athletic trainer working with a Division I University’s men’s soccer team. I am involved in the assessment and treatment of athletes who have sustained a SRC. Many patients have disclosed concerns to me during the recovery process. Further, I have experience with patients and a friend who suffered psychological symptoms. I had firsthand experience with the frustrations and difficulties experienced. The patients voiced struggling with return-to-learn, and admitted to feelings of uncertainty, depression and isolation. Additionally, I saw psychological symptoms affect my friend in all areas of life; academically, socially and physically. Academics were a challenge, as concentration and reading lead to migraines and fatigue. Sensitivity to loud noises caused social life to suffer, as simply being around too many people lead to unrelenting headaches. The healthcare provider recommended avoiding exertional activities, limiting any exercise, which had previously been a coping strategy used to relieve stress. Enduring these symptoms inevitably leads to psychological disturbance, associated with decreased quality of life. My involvement with these athletes makes me feel strongly that the
healthcare team needs to better educate concussion patients on expectations, as well as coping strategies to help with the stress after a concussion, specifically.

As the primary investigator, I anticipated that Division I college athletes would have psychological disturbances after a sport-related concussion. I believed that they might feel fear, isolation, anger and frustration after sustaining a concussion and during the recovery process. I thought these emotions and the nature of the injury might cause them to have difficulties with coping. The environment an athlete is in may limit the coping strategies they can employ. Many athletes may want to run or lift weights in order to deal with frustrations, but during the recovery of a concussion, they are not able to do so. I am very passionate of my career and helping others improve quality of life and return to what they love to do. I hope that my research may be able to help those suffering from psychological symptoms after a concussion in the future.

**Procedures**

*Focus groups*

Interviews afforded the researchers the opportunity to create an environment that allowed the participants to explore and describe their experiences in their own terms. A semi-structured interview technique was used in the two focus groups. The semi-structured interviews lasted between 40 minutes to an hour. Each group was asked questions about their perceptions of their recovery process after having sustained a SRC. All participants were strongly encouraged to answer each question, but could choose not to. For those individuals who suffered multiple concussions, they were asked to focus on their most recent experience.

The topics included covered the event, emotions experienced, coping mechanisms and social support. Questions asked in the focus groups were based on relevant literature on SRC and
psychological impact after injury. The questions were created using Wiese-Bjornstal’s model of psychological response of a SRC. Each factor within the model was translated into appropriate questions in attempt to address the presence or utilization of strategies within each post-injury factor. This model was selected because of its evidence-based nature, as well as the additional elements and factors which may influence the emotional response of the concussed athlete.

The researcher wanted to focus primarily on emotions, coping and social support because of their relation to each other. However, in order to successfully understand and interpret valuable data, it was important to include other questions derived from the model to have a more complete understanding of each participant’s perception of their SRC recovery process. Therefore, the researcher also included questions of: personal factors and situational factors. These factors were important for the researcher to include because they may have played a role on emotions felt, coping strategies used and social support system availability and satisfaction. See Interview Protocol description for more details.

The primary researcher arrived at the focus group session with a set of pre-determined questions to guide the discussion, but the questions were followed loosely so that meaningful conversations and discussions could occur naturally. Each group was asked the same questions from the pre-determined set of questions. Probing questions were asked, based on the participant’s responses to gain a better understanding. The semi-structured interview format provided a flexible format for the participants to engage in discussion and communicate with one another about their concussion recovery experiences. The primary researcher prompted discussion with the main questions. Follow-up or probing questions were asked by the researcher to gain a better understanding and more information from the conversation. At times, the
researcher provided further detail to the questions when prompted by the participants. The researcher had to provide the definition for coping and examples in the first focus group interview and also provided these examples in the second focus group interview for consistency. This ensured that both focus groups were provided with the same supplemental information by the researcher. In addition, all focus group sessions were audio-recorded using an audio-recorder and laptop; notes were taken by the primary researcher during the conversation.

_Pilot Study:_

A pilot study was conducted to allow the researcher to gain practice in interviewing and data collection with the interview protocol as well as to test the strength of the interview protocol in exploring the themes relating to emotions, coping and social support. A replication of all methodology was used, including location of interview, audio-recordings, notes and data triangulation. The researcher interviewed three college-aged individuals who had sustained a SRC within the last two and a half years (inclusion criteria was extended due to availability of pilot participants). The following tables 1 and 2 show the participants situational and personal factors discussed. Table 3 displays the triangulated themes. The triangulation included a member check, review of transcripts, and independent coding for themes by the research team.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Sport</th>
<th>Status</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 Female</td>
<td>Cheerleader</td>
<td>Junior</td>
<td>Back-spot</td>
</tr>
<tr>
<td>P2 Female</td>
<td>Equestrian</td>
<td>Senior</td>
<td>Jumper</td>
</tr>
<tr>
<td>P3 Male</td>
<td>Football</td>
<td>Sophomore</td>
<td>Senior</td>
</tr>
</tbody>
</table>

**Table 1: Pilot Test Participants’ Situational Factors**
Table 2: Pilot Test Participants’ Situational and Personal Factors

<table>
<thead>
<tr>
<th>Participant</th>
<th>Status during SRC</th>
<th>Time of season</th>
<th>Duration of symptoms</th>
<th>Duration held from sport</th>
<th># of Concussions</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>High-school senior</td>
<td>In-season</td>
<td>3-5 days</td>
<td>10 days</td>
<td>1</td>
</tr>
<tr>
<td>P2</td>
<td>College sophomore</td>
<td>Out-of-season</td>
<td>6 days</td>
<td>2 weeks</td>
<td>3</td>
</tr>
<tr>
<td>P3</td>
<td>High-school senior</td>
<td>In-season</td>
<td>3 months</td>
<td>3 months</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 3 Pilot Test Common Themes from Interview Portion

<table>
<thead>
<tr>
<th>COMMON THEMES</th>
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<tr>
<td><strong>Participants described concussion-related symptoms rather than emotions.</strong></td>
</tr>
<tr>
<td>a. “…less energy”</td>
</tr>
<tr>
<td>b. “…nausea…”</td>
</tr>
<tr>
<td>c. “…headache…”</td>
</tr>
<tr>
<td><strong>Participants felt upset.</strong></td>
</tr>
<tr>
<td>a. “I just felt like it was like a rainy day every day.”</td>
</tr>
<tr>
<td>b. “I was upset.”</td>
</tr>
<tr>
<td><strong>Participant’s perceived family support.</strong></td>
</tr>
<tr>
<td>a. “…having family support was a big plus too.”</td>
</tr>
<tr>
<td>b. “Talking with my family comforted me.”</td>
</tr>
<tr>
<td>c. “My mom and dad…”</td>
</tr>
</tbody>
</table>

After the pilot, the interview questions were altered (see Appendix D for interview) to more accurately reflect the emotions, coping and social support perceived by the participants. Themes were not established relating to coping from the pilot focus group session. In order to address this, changes were made to the interview questions. These changes included adding definitions and examples of coping, re-wording leading questions, adding questions about the previous number of concussions and who knew the athletes had a concussion in order to know who was in social support network. A concluding question was also added, which gave the
participants the option to share any additional topics. The semi-structured interview was enhanced in hopes for the researcher to better understand and portray emotions, coping and social support perceived by the participants.

*Interview protocol*

In health services research, a qualitative approach to research is beneficial and frequently used. This allows the study participants to speak in their own voice, as opposed to conforming to specific terms on questionnaires. All participants in the study were asked the same questions in order to gain an understanding of the participants’ experiences during their recovery process after having sustained a SRC. The semi-structured interview was edited after the pilot test and the interview questions used are shared in Appendix D.

Question 1 and question 2 were asked to determine personal and situational factors based upon Wiese-Bjornstal’s model of the psychological response of a SRC. Personal factors included injury characteristics, such as history, severity, symptomology, and recovery time. Situational factors included sport, level of play and time of season. Question 3 was asked to discover more about the emotional sequelae the participants felt throughout the concussion recovery process. Additional probing questions included in the participants’ emotions when unable to practice, when returning to school and return-to-play. Questions 4 and 5 were then asked to determine what coping strategies the participants used during their SRC recovery timeline. The participants were provided with examples of coping strategies, due to a reported lack of understanding of the coping definition. Questions 6 and 7 were then asked to establish the participants’ social support network and social support they obtained. Further questions were asked to determine if the social support was perceived as positive or negative. Concluding
questions were asked to give the participants an opportunity to voice other emotions, concerns or opinions regarding their SRC recovery.

**Analyses**

A data triangulation method was used to identify and validate a comprehensive set of findings. Transcribed interviews and notes were used as data sources. The primary researcher transcribed audio recordings, which were then analyzed by the research team using content analysis to identify common themes. A member check was used to confirm transcription accuracy. All participants had the opportunity to review the transcripts and themes upon completion. After analyzing the interviews, several themes surfaced. Main questions were asked specifically about emotions, coping and social support and themes were discovered from each. These main questions with the surfaced themes are represented in the results section. The common themes were established as a collaboration and agreement by the research team. The researchers all had equal involvement and mutually agreed on the themes and outcomes of the study. All researchers had shared power, further increasing the meaning and decreasing bias of the study. Discussion and consensus among the research team on the meaning of the data reduces bias of the research and improves the evidence of the study. The primary researcher was responsible for the detailed description of data.
CHAPTER 3

RESULTS

The intention of the study was to understand the meanings and lived experiences of NCAA Division I athletes who sustained a SRC. More specifically, the study aimed to unfold the perspectives of these athletes to understand how they felt and coped with the stressors caused by a SRC. The present study used a qualitative, semi-structured interview approach to gain a deeper understanding of the athletes’ concussion recovery and rehabilitation process.

Participant characteristics

Seven participants were enrolled in the study; 4 female athletes and 3 male athletes. All data was self-reported by each participant. At the time of the focus group interviews, question 1 and question 2 were asked to determine personal and situational factors based upon Wiese-Bjornstal’s model of the psychological response of a SRC. Personal factors included injury characteristics, such as history, severity, symptomology, and recovery time. Situational factors included sport, level of play and time of season. All participants were NCAA Division I athletes. Each participants’ personal and situational factors discussed within focus groups are described in Table 4 and 5 below.

Table 4: Participants’ Situational Factors

<table>
<thead>
<tr>
<th>Participant</th>
<th>Sport</th>
<th>Status</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 Female</td>
<td>Women’s soccer</td>
<td>Junior</td>
<td>Center-back</td>
</tr>
<tr>
<td>P2 Female</td>
<td>Women’s soccer</td>
<td>Junior</td>
<td>Forward</td>
</tr>
<tr>
<td>P3 Female</td>
<td>Women’s Track and Field</td>
<td>Freshman</td>
<td>Sprint</td>
</tr>
<tr>
<td>P4 Female</td>
<td>Women’s Track and Field</td>
<td>Freshman</td>
<td>Sprint</td>
</tr>
<tr>
<td>P5 Male</td>
<td>Football</td>
<td>Redshirt Sophomore</td>
<td>Safety</td>
</tr>
<tr>
<td>P6 Male</td>
<td>Baseball</td>
<td>Redshirt Senior</td>
<td>Catcher</td>
</tr>
<tr>
<td>P7 Male</td>
<td>Football</td>
<td>Senior</td>
<td>Linebacker</td>
</tr>
</tbody>
</table>
Table 5: Participants’ Situational and Personal Factors

<table>
<thead>
<tr>
<th>Participant</th>
<th>SRC Date</th>
<th>Time of season</th>
<th>Duration of symptoms</th>
<th>Duration held from sport</th>
<th># of Concussions</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Sept, 2015</td>
<td>In-season</td>
<td>3 weeks</td>
<td>4 weeks</td>
<td>2</td>
</tr>
<tr>
<td>P2</td>
<td>Sept, 2013</td>
<td>Both</td>
<td>6 months</td>
<td>6 months</td>
<td>5</td>
</tr>
<tr>
<td>P3</td>
<td>Oct, 2016</td>
<td>Off-season</td>
<td>1 week</td>
<td>2 weeks</td>
<td>1</td>
</tr>
<tr>
<td>P4</td>
<td>Sept, 2016</td>
<td>Off-season</td>
<td>1 week</td>
<td>2 weeks</td>
<td>1</td>
</tr>
<tr>
<td>P5</td>
<td>Sept, 2016</td>
<td>In-season</td>
<td>1 week</td>
<td>2.5 weeks</td>
<td>1</td>
</tr>
<tr>
<td>P6</td>
<td>April, 2015</td>
<td>In-season</td>
<td>5 days</td>
<td>2 weeks</td>
<td>1</td>
</tr>
<tr>
<td>P7</td>
<td>Sept, 2016</td>
<td>In-season</td>
<td>5 days</td>
<td>1 week</td>
<td>1</td>
</tr>
</tbody>
</table>

Themes

The following tables (Tables 6, 7, and 8) identify the main themes and subthemes for both focus groups. Table 6 includes common themes derived from both male and female participants. Table 7 includes themes from the female focus group only. Table 8 includes themes resulting only from the male focus group. Subthemes were prominent factors extracted from the main themes in specific areas. In addition to the themes and subthemes, quotes from the participants are provided as evidence for the themes.

Table 6: Common Themes from Interview Portion

<table>
<thead>
<tr>
<th>COMMON THEMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associated emotions after a concussion with concussion or concussion-like symptoms</td>
</tr>
<tr>
<td>a. Somatic:</td>
</tr>
<tr>
<td>i. “the main things that I experienced were just sensitivity to light and I had headaches”</td>
</tr>
<tr>
<td>b. Cognitive:</td>
</tr>
<tr>
<td>i. “I know when people would have a conversation with me… I would have to tell them… to just slow down and just break things up into bits and pieces. And</td>
</tr>
</tbody>
</table>
when they would talk, I would just like be there like lala land and I wouldn’t really too much understand what they would be saying.”

c. Behavioral:
   i. “I was really tired most of the time... And just having low energy levels, didn’t want to do anything.”
   ii. “I know another thing was usually I’m a fast eater and so when I would eat any type of meal, I would eat it slow. And I was like why am I eating slow?”

d. Affective:
   i. “For me personally, I just didn’t feel like being bothered. Like sometimes I just be agitated, especially when people were always asking questions and stuff.”
   ii. “Well for me, it was kind of frustrating because it happened from my own teammate. And it was a game where we were winning 10 to zero. So it was frustrating that I got hurt in that game and it was also right before conference so I missed basically all of conference because I had a concussion so that was really frustrating.”
   iii. “I was annoyed as well with the questions… my teammates asking when I am going to get back and also messing with me saying I was like milking an injury and didn’t want to practice and that wasn’t the case at all. I was frustrated because I had just started being on the lineup every day… it happened at a really bad time I guess cause I didn’t play that much at the beginning of the season. I just started playing and that happened and I was back where I started.”

Excitement to return-to-play

a. I was excited that I got to get back in. Like she said, just watching practice is like boring. And you just feel like everyone is getting better and you are just like you know not, so I was excited to get back.”

b. “It was exciting to come back and to even run and do everything again. But at the same time, I was a little bit not scared but just worried that it would happen again or I would be running and I’d get a headache and I’d have to start all over again.”

c. “I actually scored a touchdown!”

Exhibited maladaptive coping strategies

a. “I stayed to myself... because of like loudness.”

b. “Whew. I just went to sleep.”

c. “I feel like if I wasn’t on my phone or doing Netflix like watching Netflix or anything like what would I be doing? You know? I would just be sitting there sad that I had a concussion.”
d. “I just kind of got used to it… missing games was different, because I’ve never really been, I’ve never really not traveled with the team so it was weird being here on the weekend when the team wasn’t here. But it was something that I just got used to it, I guess.”

<table>
<thead>
<tr>
<th>Did not seek support, but received support</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. “I didn’t necessarily seek it but they just reached out to me and gave it to me.”</td>
</tr>
<tr>
<td>b. “Yeah. I don’t think I really needed support from people, but I think I would have been fine on my own but I don’t know if I sought support from anyone, but everyone who did support helped…I don’t think I really needed it but you know like gave me a different outlook.”</td>
</tr>
<tr>
<td>“I don’t think I was aware of anyone else having a concussion. So I didn’t reach out to anyone if they did. If I did know, I would have reached out to them, but I didn’t know.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Received family support</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. “I got a lot of support from my sister. She is on the gymnastics team at Rutgers and she actually got a concussion before too. So, she had experience so it helped me a lot when I talked to her about it.”</td>
</tr>
<tr>
<td>b. “My family, my team, my friends I guess and my teachers worked with me really well too.”</td>
</tr>
<tr>
<td>c. “Um family, close friends, the team, coaches, athletic trainers. They all just made jokes about it. It was funny.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived overall adequate support</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. “Yeah I feel like it was adequate. It was cool…I don’t think it like did anything negative really so yeah.”</td>
</tr>
<tr>
<td>b. “I think it was good. I think the support was good and what I needed from the team…”</td>
</tr>
<tr>
<td>c. “I think it was because I was kind of had a negative attitude about it. I was kind of upset that I had to miss games and practices…I felt like I was getting worse. So them reaching out and encouraging me to do what I had to do to get better, helped me get through it.”</td>
</tr>
</tbody>
</table>
Table 7: Themes specific to female focus group

<table>
<thead>
<tr>
<th>FEMALE THEMES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Informed about concussion: family, friends, teammates, professors if necessary</strong></td>
</tr>
<tr>
<td>a. “I mean I didn’t tell everyone, but if they asked ‘how your season’ or ‘how was I doing’ then I would tell them but I didn’t tell any of my teachers. But all of my friends and everyone here knew.”</td>
</tr>
<tr>
<td>b. “I only told one of my teachers because it was jogging and I couldn’t do anything. But all of my family, friends and team knew and that was it.”</td>
</tr>
<tr>
<td>c. “Yeah … my friends and my family all obviously knew. I didn’t really tell any of my teachers because I didn’t feel like it was that serious.”</td>
</tr>
<tr>
<td><strong>Subtheme 1: talked specifically to father (“dad”)</strong></td>
</tr>
<tr>
<td>a. “My dad was a good support system.”</td>
</tr>
<tr>
<td>b. “My dad is like really into me like he loves that I play soccer and talking to him and him wanting me to get better before playing soccer again helped too I think. Because seeing that he could…you know that’s what he cared about so that made me care more I guess.”</td>
</tr>
<tr>
<td>c. “I talked to my parents. But my dad was really the one that he obviously wants me to play soccer but he was like I care about your brain more than I care about you playing soccer. I want you to be normal and be able to remember things when you’re older and things like that like I don’t care if you play soccer I want your brain to be good.”</td>
</tr>
<tr>
<td><strong>Felt lack of coach support</strong></td>
</tr>
<tr>
<td>a. “I think that my coach didn’t support very much. Because just coming back into it and he admitted he didn’t help me necessarily come back into it immediately by playing me more whatever but I don’t know. I don’t think that he did a very good job of supporting me.”</td>
</tr>
<tr>
<td>b. “I don’t even think [coach] really checked on me at all. Which is interesting, but only because the one time we did talk about it was because I told him something about it. But I kind of, I expected because of how long I was out, he would care.”</td>
</tr>
<tr>
<td>c. [In response to group question about size of team]”Not too big for a coach to not check on you… he should have, but he’s really bad about that.”</td>
</tr>
</tbody>
</table>
Table 8: Themes specific to male focus group

<table>
<thead>
<tr>
<th>MALE THEMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty with school</td>
</tr>
<tr>
<td>a. “I was behind on everything, schoolwork.”</td>
</tr>
<tr>
<td>b. “I didn’t really want to go back because like I said they were behind and mentally I was sluggish and all of that stuff and didn’t really feel like catching up and reading all of the chapters that I had to catch up with and trying to comprehend everything and be at the same spot as everybody else in my class was”</td>
</tr>
<tr>
<td>c. “Yeah, little bit yeah. I was also lost too.”</td>
</tr>
<tr>
<td>Informed about concussion: Family, friends, professors, athletic trainers</td>
</tr>
<tr>
<td>a. “I just told my family and anyone who asked why I wasn’t playing or traveling or anything like that.”</td>
</tr>
<tr>
<td>b. “I told some of my friends. I told my mom and I told my girl at the time.”</td>
</tr>
<tr>
<td>Subtheme 1: talked to mother (“mom”)</td>
</tr>
<tr>
<td>a. “I asked my mom. Pretty much. She didn’t know what to tell me though.”</td>
</tr>
<tr>
<td>b. “I just told my mom.”</td>
</tr>
<tr>
<td>Had positive coach support</td>
</tr>
<tr>
<td>a. “[Head football coach] did. He sent me a text message.”</td>
</tr>
<tr>
<td>b. “[Coaches] they made me feel good or that they cared about me pretty much.”</td>
</tr>
<tr>
<td>c. “The coaches and teammates and my family reached out to me and kind of tried to encourage me to try to get back. Made me have a positive outlook on it to do what I had to do to get better.”</td>
</tr>
</tbody>
</table>
CHAPTER 4
DISCUSSION

This study found 6 major themes that surfaced during the focus groups. The first theme was that participants associated emotions after a concussion with concussion symptoms. The second theme that arose was that participants felt excitement to return to play. The third theme showed that the participants exhibited maladaptive coping strategies during recovery. A fourth theme which arose allowed the researchers to discover that the participants did not seek support, but still received support. The fifth theme which arose was that the participants received family support. The sixth and final common theme discovered that overall the participant’s perceived adequate support throughout recovery.

Furthermore, there were several themes that arose which were gender dependent. Male participants described having difficulty with school, and also tended to disclose the injury to family, professors, friends and athletic trainers. Male participants also felt they had positive support from coaches. In contrast, female participants disclosed the SRC injury to family, friends, teammates, and professors only if necessary. Female participants also felt and described a lack of coach support. All themes are described in the discussion below, separated into sections of emotions, coping and social support.

Emotions

The surprising theme that arose during the interview process was that the participants associated the emotions they felt after a concussion with concussion symptoms. Both male and female participants were quick to equate how they felt during their recovery with concussion
symptomology. The participants almost seemed to avoid discussing emotions entirely. This was not an expected finding, as we did not predict that athletes would confuse emotions with other concussion symptoms. However, this may be due to the inclusion of emotions on common symptoms checklists used during SRC recovery. When emotions are combined on a list of concussion symptoms, athletes may confuse the differences between the two. Instead of just emotions, the participants described symptoms of somatic, cognitive, behavioral and affective nature.

The most commonly reported somatic symptoms included headache and photophobia. Affective symptoms reported include both symptoms associated with athletic injury and concussion symptoms. Similarly, these reported symptoms are reflected in Wiese-Bjornstal’s integrated model of the psychological response of SRC with categories of cognitive, behavioral and affective symptoms. These symptoms are reflected in the model as post-injury factors that may ultimately lead to negative psychological responses and recovery outcomes, because increased concussion symptoms have been shown to prolong recovery. The researcher did not ask questions about symptoms, but asked questions about emotions. Instead of reporting emotions, the participants responded with symptoms. This demonstrates that symptoms may be a key component of the psychological response to the SRC and should not be disregarded.

Common somatic symptoms of the participants in this study included headache and photophobia, with headache being most-commonly reported. Participants reported, “I was really sensitive to light. I remember being at my house and having all of the lights turned off during the day time” and ”I had a headache. But it didn’t go away but it was really bad sometimes and sometimes it was barely there.” Headache is one of the most common symptoms associated with
concussion, with approximately 75% of patients reporting a headache during the first week of recovery. 

Oftentimes, headaches and photophobia can be related. 

Additionally, some participants also described photophobia. One participant reported, “The main things that I experienced were just sensitivity to light and I had headaches”. The participants explained the light bothered them when trying to use their phone and preferring to keep the lights off at home. Approximately 36% of concussed patients will report sensitivity to light. Concussion patients are often advised to avoid phone, television and other visually stimulating devices because light sensitivity can cause headaches or worsen headaches. Some participants reported decreasing phone usage, keeping the lights off or sleeping to alleviate the visual disturbances. Supporting literature derived from the model demonstrates that somatic symptoms have been shown to lead to prolonged or hindered recovery by cascading into more severe emotional and behavioral symptoms. 

In addition to somatic symptoms, the participants reported having cognitive and behavioral symptoms. In Wiese-Bjornstal’s model, cognitive and behavioral symptoms occur after the injury and may result in symptoms lasting beyond the traditional two week recovery time. This is because a heightened severity of these symptoms (listed as personal factors: relating to psychological, demographic, and physical variables) have been shown to lead to prolonged psychological disturbances and recovery. However, it is challenging to recognize if these symptoms are results of neurological trauma or from the athlete’s psychological response to sport injury. 

Qualitative studies may help to explain the relationship, as well as identifying other factors that could be associated with the athlete’s psychological response after sustaining a
Within the model, these factors include personal and situational factors that influence the cognitive, affective and behavioral aspects of sport concussions. For example, it is suggested that if a personal factor such as anxiety is reported, this may indicate an increased likeliness of a psychological response post-SRC. Therefore, pre-injury stress disorder can add to the overall stress of injury. The clinician may then be able to equate some psychological disturbances due to stress, as opposed to a result of neurological trauma.\textsuperscript{10}

Common cognitive symptoms reported by the participants included feeling slowed down and sluggish, experiencing feeling in a fog, and having also reported difficulty concentrating when communicating with others. The participants quoted, “I just felt really slow at the beginning” and “Slow, sluggish. My thoughts were slow”. Behavioral symptoms commonly included feeling low energy levels and having unusual sleep patterns or disturbances. Examples include participants reporting, “Just having low energy levels, didn’t want to do anything” and “I just went to sleep.” The model of psychological response to SRC heavily includes concussion symptomology as a great portion of the post-injury psychological response. Within the model, injury characteristics inclusive of symptom report can be predictive of cognitive deficits, negative distress, and long-term disturbances. It is evident that concussion symptoms are important in post-injury psychological responses to SRC and throughout the recovery and rehabilitation processes.\textsuperscript{10}

Interestingly, most concussion literature is focused on neurocognitive recovery and not on emotional sequelae.\textsuperscript{14} Due to the vast amount of literature on neurocognitive function, it is likely that most evaluation and rehabilitation processes health care providers employ are largely based on the abundant neurocognitive literature.\textsuperscript{30} This may be a reason why the participants
actively engaged in discussing somatic, cognitive and behavioral symptoms. The participants often used terminology from common symptom checklists\textsuperscript{9}, such as “in a fog”, “difficulty concentrating”, “sensitive to light”, and more. The participants quoted, “Sometimes I would feel is the word, foggy?” and even recognized they were discussing symptoms, saying, “I know one constant symptom was being sensitive to light.” This may be due to familiarity with the concussion symptoms from going through the evaluation and rehabilitation process on their own.

The concussion assessment can become routine for college athletes with baseline testing and follow-up testing, that they regurgitate answers they remember from the test.\textsuperscript{6} Since emotional questioning is not currently a focal point in concussion assessment and management, athletes may feel like it is not an important aspect.\textsuperscript{14} It is also possible that the participants are just unaccustomed to being asked about their emotions and do not know how to respond as easily as when asked about other symptoms. Wiese-Bjornstal’s model integrates concussion symptoms, including possible affective and emotional sequelae.\textsuperscript{10} This is important because enduring symptoms may lead to greater emotional disturbances of sadness or frustration.\textsuperscript{17} The report of symptoms affects the clinical management of concussion, as the subjective report of symptoms guides individualized treatment plans.\textsuperscript{9} If the clinician distinguishes emotions and affective symptoms of their patient, return to health strategies can incorporate psychological care.

When asked about emotions experienced after SRC and throughout the recovery process, participants reported feeling irritated, annoyed and frustrated. Quotes from the participants included: “Just frustrated that I couldn’t play because I wanted to be able to and that was it” and “I was really irritated and kind of sad too but mostly irritated.” These symptoms may be considered psychological symptoms experienced after a concussion or emotions after an injury.\textsuperscript{11}
These symptoms are of great importance for the clinician in identifying need for potential interventions and understanding the concussed patient.\textsuperscript{10} Other qualitative studies have identified long-term struggles with a variety of emotional symptoms and responses.\textsuperscript{10,55} Mainwaring et al. has conducted several studies on emotions of SRC and has concluded that the identification and clinical management of affective symptoms early may alleviate long-term psychological disturbances.\textsuperscript{11,12,14} Wiese-Bjornstal’s model identified Mainwaring’s studies for supporting literature when recommending post-injury psychological care.\textsuperscript{10}

Fascinatingly, the participants described feeling frustrated and annoyed for various reasons, but anger was not identified. When asked specifically about anger, the participants denied this feeling, saying, “No. I wasn’t mad or angry. Just frustrated that I couldn’t play because I wanted to be able to and that was it” and “I would say I wasn’t mad, but I was annoyed.” Hutchinson et al. reported that athletes with musculoskeletal injuries experience more anger than athletes with sport concussions.\textsuperscript{13} Hutchinson suggested this may be due to the unknown timeline of a concussive injury and the lack of insight of the athlete of the nature, duration and complexity of the injury and recovery.\textsuperscript{13}

Within sport psychology literature on response to sport injury, it is well-established that anger is commonly experienced after injury.\textsuperscript{8-11} However, concussion literature demonstrates otherwise. Our results are consistent with Hutchinson’s study comparing musculoskeletal injury and SRC, demonstrating less anger in SRC participants.\textsuperscript{13} Also, Wiese-Bjornstal’s model created specifically for those suffering a SRC identified frustration, as opposed to anger on the model.\textsuperscript{10} Our results support the findings of other SRC studies demonstrating that anger is often reported in orthopedic injuries however was not reported in our study or other concussion literature.\textsuperscript{13,14}
It is possible that the participants were more concerned with brain injury compared to other injuries. One participant quoted “I feel like I care about my brain more than I care about a bunch of other things that I injure.” Another quoted “I like soccer, but I love my brain. So, I mean ... I’m okay with sitting out if it means that I’m going to get better…” Another stated “[asked if they would change anything about the length of the recovery] No, because I understand the protection of the brain…And when they say you only have one brain and only get one brain, I was like okay… I just be out.” We believe that an athlete may experience less anger when dealing with a concussive injury as opposed to other injuries because they ‘care more’ about their brain.

When asked how the participants felt about returning to school, all of the male participants described feelings of stress, such as being behind in school-work, feeling lost and barely passing tests. Some male participants reported, “I was behind on everything, schoolwork” and “I didn’t really want to go back because like I said … I was behind and mentally I was sluggish …and didn’t really feel like catching up and reading all of the chapters that I had to catch up with and trying to comprehend everything and be at the same spot as everybody else in my class was.”

Poor academic performance may be due to the lingering presence of cognitive disturbances. In addition, researchers describe that academic performance could be even more challenging during college years when school achievement is essential. As the most common treatment for SRC patients is rest, this includes temporary avoidance of schoolwork, possibly contributing to poor academic success. It is possible that these many factors, including injury characteristics of symptoms and severity and/or environmental factors of school demands, may
have led to difficulty and stress with academic performance. Also, a SRC is a stressor and academics may be an additional stressor for college students.

Overall, only a handful of emotions were discussed: frustration and irritation with the injury and recovery process, as well as excitement to return to play, and male participants feeling stressed with return to school. While only a few emotions were mentioned, these affective symptoms and responses may play an important role on recovery outcomes. The clinician should consider and evaluate the psychological symptoms that may develop unique to each athlete in hope to prevent long-term struggles of psychological nature.

Coping

The participants appeared to engage in prominently maladaptive coping strategies and behaviors throughout the concussion recovery process, possibly indicating an inability or inflexibility of coping. Conceptual models of stress and coping hypothesize that behaviors are a result of stress response patterns: stressor causes injury appraisal and appraisal causes emotions. Of our participants, all participants experienced a SRC (stressor), leading to individual appraisals possibly leading to emotions and affective symptoms experienced; all of which may have led to behaviors of maladaptive coping responses. The participants reported that they, “just dealt with it”, “just got used to it” and “just laid down” when asked how they coped with the injury. However, some of these adaptations may be due to the nature of the injury. Concussive symptoms may lead to prescribed or subconscious changes in behavior. These factors may have contributed to maladaptive coping strategies employed by the participants in this study.

Two maladaptive strategies used by participants were behavioral disengagement and social isolation. Behavioral disengagement can include sleeping more than usual and watching
television. Participants reported that they “just went to sleep”, “slept a lot”, and “just laid down”. Social isolation included staying away from others. One participant reported, “I stayed to myself… because of like loudness.” While most concussed patients are informed to rest, the patients should not sleep in excess or engage in abnormal sleeping patterns. Avoidance coping is considered maladaptive because it has been linked with poor psychological outcomes, such as acute stress disorders. Also, some literature considers avoidance coping a demonstration of the inability to cope effectively.

Patients presenting with cognitive symptoms and fatigue are advised to decrease cognitive and physical demands. These patients should also practice behavioral regulation, including a regular sleep schedule. Rest is a common recommendation given to concussed athletes, but can be maladaptive. There may be a need when educating the concussed patient to give more specific guidelines when giving this recommendation. Concussed athletes should practice good sleep hygiene and can benefit from creating an optimal sleep schedule instead of going to sleep whenever they are feeling tired or are experiencing symptoms. Fatigue that athletes experience may be due in part to oversleeping because too much sleep can lead to increased levels of drowsiness and fatigue. Considering the circumstances of a concussive injury, rest is advised, but sleep is not. Unfortunately, after SRC, behavioral responses of increased rest patterns are common and may impact the ability to cope. Many positive coping strategies, such as social interaction, may not be practical. Psychology literature describes that in concussed patients, after neurologic effects of concussion have receded, the patients may continue to have cognitive dysfunction causing fear, anxiety, depression and sleep disturbances.
It is common for an injured athlete to want to stay away from their team and team practices during the initial stages of injury.\textsuperscript{61} In a qualitative study, injured athletes admitted to wanting to avoid team events as it was a reminder that they could not play their sport.\textsuperscript{61} This phenomenon supports athletes’ use of avoidance strategies like social isolation.\textsuperscript{32,61} As with a concussive injury, the participants in this study were not at practice during the first few days, as a prescribed treatment for the concussive injury. Additionally, they were not able to travel with the team. The participants may not have been intentionally using an avoidance coping strategy, but were forced to do so because of the circumstances and rehabilitation process for the particular injury. This phenomenon is easily viewed on Wiese-Bjornstal’s model as a cycle describing that when the emotions increase, symptoms increase and have a negative effect on behavioral responses.\textsuperscript{10}

Another form of avoidance coping, used by the participants who did not suffer from visual disturbances, was watching television. One participant reported, “If I wasn’t on my phone or watching Netflix or anything, what would I be doing? I would just be sitting there sad that I had a concussion.” This type of stress coping or self-distra...
identified as a factor on the model and which has been associated with increased levels of affective symptoms and responses. Examples include experiencing fear, sleep problems and struggling cognitively. These are just a few long-term psychological disturbances that the clinician would want to avoid, as they could cause a prolonged recovery process. The injured athlete is likely to use avoidance strategies; it is possible that the concussed athlete may be more likely to use these strategies because of behavioral changes and responses.

Our finding of maladaptive coping is consistent with previous sport-concussion literature. A study by Covassin et al. on the relationship of coping and concussion symptoms concluded higher total concussion symptoms at 3 days post-injury were related to higher levels of avoidance coping behaviors. In addition, the concussed athletes reported higher levels of avoidance coping strategies at 3 days compared with 8 days following injury. It is possible that avoidance coping may be more commonly used when suffering greater symptoms. Bryant et al. suggested that cognitive impairments may predispose individuals to use more avoidance coping responses, as the impairments may limit the ability to problem solve, resulting in avoidance coping responses. If any individual, concussed or not, is suffering from an extreme headache or migraine, it is likely that the individual would avoid social settings and/or revert to sleeping, both behaviors considered maladaptive coping strategies.

There is some discrepancy in concussion literature whether avoidance coping during the acute phase of injury is negative or actually beneficial. Avoidance coping is described on Wiese-Bjornstal’s model demonstrating increased avoidance coping after SRC. Covassin et al. suggests that the athletes may feel a lack of control when suffering from a concussion due to
uncertainty of when they will recover and return to sport. This may lead to greater frustration and other adverse emotions.

However, some researchers suggest avoidance coping may actually be beneficial for the acute phases of concussive injury. Additional research has suggested avoidance coping may be helpful for injured athletes in an effort to reduce stress and increase perceived control of the injury.\textsuperscript{67} It has been suggested in previous coping literature that avoidance coping may be beneficial when situations are uncontrollable or when outcomes are short term.\textsuperscript{32} As most concussion symptoms resolve within two weeks\textsuperscript{68}, the use of avoidance coping may only be beneficial the first few days following injury, and towards the end of week as they recover and begin to return to play, no longer show value. Although there are discrepancies, there is stark clarity that long-term avoidance coping is negative and can lead to increased recovery times and other poor psychological outcomes.

In sports medicine research, positive recoveries after sport injury demonstrate nonexistent long-term psychological consequences.\textsuperscript{25} However, as described in the supporting literature of Wiese-Bjornstal’s model, protracted psychological consequences of an injury are detrimental to the athlete’s health and overall well-being.\textsuperscript{25} More research is needed to examine positive coping strategies for the concussed athlete.

Social Support

Several themes arose when the participants were discussing social support. Both male and female participants described that they did not seek support, but nonetheless they still received support. When asked about obtaining support throughout the concussion recovery process, family was commonly mentioned by both, male and female participants. When the
participants were questioned about their social support network, male and female differences were noted.

Social support was evaluated in this study, as perceived social support from friends, family, teammates, coaches and healthcare providers is shown to affect the athletes’ ability to cope. Previous research has demonstrated that those with orthopedic injuries report greater social support than concussed individuals. This may be due to the fact that you cannot see a concussive injury, while with orthopedic injuries, athletes are often on crutches or wearing splints or slings. As speculated by other researchers, when others can visually see the injury, they naturally may help and be supportive, therefore increasing social support systems. Positive social support literature shows a sundry of benefits and overall improved injury outcomes. The Wiese-Bjornstal model discusses social support as a situational factor, more specifically a social factor.

Social support is an important factor after injury because it can be positive or negative, leading to either positive or negative outcomes. Poor social support and/or lack of social support may cause negative psychological consequences, including suboptimal somatic and emotional recovery. Poor social support may include a lack of social support or poor support, such as pressure from coaches or teammates or a lack of understanding or empathy from family or friends. Poor social support may lead to negative appraisal of the SRC, leading to an increase of affective symptoms and maladaptive behavioral responses. In contrast, positive social support has shown many benefits for patients recovering from injury. A common theme was that the participants did not seek the support, but they received support. “I didn’t necessarily seek it but they just reached out to me and gave it to me” and “I
don’t think I really needed support from people, but I think I would have been fine on my own but I don’t know if I sought support from anyone, but everyone who did support helped…I don’t think I really needed it but you know like gave me a different outlook.” This finding is supported by the literature that injured athletes typically feel pressure to recover from injury unaided and view seeking help as a weakness.\textsuperscript{72} Athletes may feel this way on an individualized level, or athletes may feel pressure by team environment, represented as situational or environmental factors.\textsuperscript{10} There is supporting literature on Wiese-Bjornstal’s model to reflect that not seeking social support can lead to poor recovery outcomes. For example, in a previous study, it has been shown that seeking minimal social support and not asking for help have been associated with increased affective symptoms.\textsuperscript{10} The participants in our study were fortunate that they did not have to seek support, but readily had an adequate support network.

The female and male participants reported confiding in varying groups. Both male and female participants reported notifying family and friends about their concussion, consistent with the literature. Males reported revealing their injury to their family, friends, professors and athletic trainers. Female participants reported relaying information about their concussion to their family, friends, teammates and professors only if necessary. Professors were only informed about the concussion if the female participant was missing class or needed academic accommodations. It is well-validated in the literature that the social-support network for injured athletes typically consists of family and friends, health professionals, coaches, teammates, and other injured athletes.\textsuperscript{10,38,73,74}

When family was mentioned, the mother (“mom”) was specifically mentioned repeatedly by the males. Not surprisingly, the female group repeatedly mentioned talking specifically to
their fathers (“dad”). This appears to be a cultural phenomenon; in some cultures, mothers and fathers are tougher on children of the same sex. This causes the child to feel more comfortable with the opposite sex parent.\textsuperscript{75} Therefore, for the athletic population, fathers may be more likely to be involved with sports for their daughters and vice versa. In fact, female participants even quoted, “[my dad] he loves that I play soccer and talking to him and him wanting me to get better before playing soccer again helped too…” Another female participant quoted, “… my dad was really the one that obviously wants me to play soccer but he was like I care about your brain more than I care about you playing soccer.” These quotes indicate that the father was very supportive of their daughter’s athletic careers, but also cared more about their daughter’s brain and health.

In addition to notifying family, all participants felt they had family support during the recovery process. This was somewhat surprising. Most Division I college athletes live far from home. College years are often the first time that there is reduced parental support.\textsuperscript{74} However, family still remains a main source of social support for the injured athlete.\textsuperscript{42,44,74} It is likely that teammates, coaches and athletic trainers may become a new source of support for the collegiate athlete, when family members are not available.\textsuperscript{74}

Both male and female participants reported informing professors to some extent. This resource is not as commonly found in the sport psychology literature, and is likely due to the concussive injury affecting cognitive function. Teachers and professors should be informed of concussive injuries in order to ensure the athlete has appropriate academic accommodations made specifically for each athlete.\textsuperscript{9} The female participants reported informing professors only if necessary, meaning only if they had to miss class or an exam. The female participants
acknowledged, “only told one of my teachers because it was jogging and I couldn’t do anything”, “didn’t tell any of my teachers because I didn’t feel like it was that serious”, and “I had two tests. I didn’t go to my classes so I was missing a test the next morning, so my teachers knew”. The male group reported informing all professors about their concussion via athletic trainer or personal contact. However, the male participants still reported having difficulty with school, saying they were stressed and were just “trying to comprehend everything and be at the same spot as everybody”. There is some research to indicate that female college athletes tend to outperform male college athletes academically. This may suggest that the female participants did not feel they needed to contact professors due to higher academic performance. The male participants may have needed greater academic accommodations, due to already struggling in the classroom.

The female participants in this study also reported informing teammates, while the male participants did not. This may be due to female teams reporting higher team cohesion than male teams. During the male focus group, one male participant mentioned negative support by his teammates, reporting being teased. He reported feeling annoyed, “with my teammates asking when I am going to get back and also like messing with me saying I was milking an injury and didn’t want to practice and that wasn’t the case at all.” It is possible that due to the decreased team cohesion, male athletes do not feel as much support from teammates.

Additionally, the male participants reported telling the athletic trainer. While, female participants mentioned their athletic trainer in other portions of the interview, they did not mention going to the athletic trainer for support. In another qualitative study, injured athletes reported relying more on coaches and athletic trainers for social support after they became
injured. This was only found in the male participants in this study. Athletic trainers play a main role in the prevention, recognition, management, and rehabilitation of injuries among athletes. Athletic trainers are closely involved in treating injured athletes on a daily basis in the athletic training room. Because of their availability and easy access for the athletes, athletic trainers become a natural social support system to injured athletes.

In a survey study of concussed athletes, athletes reported relying on their family for social support 89% of the time, followed by friends (78%), teammates (65%), athletic trainers (48%), coaches (47%), and physicians (35%). This is fairly consistent with the outcomes of the current study. However, teammates were only mentioned by female athletes. Also, male athletes felt they had support from coaches, but female athletes did not. Neither male nor female participants mentioned support from physicians. This may be due to the athletic trainer’s role of acting as a liaison between the athlete and the physician.

A prevalent theme among female participants was that they did not feel they had support from their coaches. In contrast, the male participants felt they had good support from their coaches. This is consistent with Covassin’s study indicating approximately half of concussed athletes use support from coaches. Athletes should use coaches for social support, because of an extended social support network, when family may not be near. Also, some athletes feel pressured by coaches to return-to-play, but if the coach is instead, encouraging and prioritizing health, the athlete may feel relief. Wiese-Bjornstal’s model reflects that pressure from coaches may cause negative psychological outcomes, as pressure from coaches may cause an athlete to attempt to play through injury or to return to sport sooner than can be accomplished safely. For an athlete suffering from SRC, returning to play too soon can have life-threatening
consequences. Positive social support for the concussed athlete is extremely valuable for successful SRC recovery. Clinicians can have an impact by serving as a positive source of social support throughout the recovery process.

**Limitations**

This study is not without limitations. First, this qualitative study involving a series of interviews between seven individuals, resulted in a sample that was not necessarily generalizable to the entire population. All sports were not represented in our study. This study could have yielded more results and insight if more individuals had been interviewed from multiple sports and other NCAA division I school settings. However, since all participants in this study followed the same return to play protocol, the emotions and coping strategies would not be biased by changes in return-to-learn and return-to-play strategies implemented.

Second, the participants had varying recovery times. Several returned to play between 1-2 weeks, 1 did not return for a month, and another participant took 6 months to return to play. Interestingly, regardless of recovery time, similar themes emerged. This may represent that recovery time may play a limited role in the emotions, coping strategies and social support that occurs during concussion recovery. Further, psychological disturbances may vary based on recovery time. It is important to portray all responses within varying recovery times in order to adequately represent the general sport-concussed population.

Third, due to the qualitative nature of the study and time restraints of focus group, we were unable to ask all questions associated with pre-injury and post-injury factors. For example, it is unknown if the coach for each team was male or female, to know whether this played a role in the male participants reporting positive coach support and the female participants reporting
lack of coach support. For future studies, a mixed-methods design including surveys and questionnaires may be beneficial to obtain more information.

Most of the concussions occurred a few months before the focus groups took place. Therefore, the emotional responses of an athlete suffering from injury may change over time and recall bias may occur.\textsuperscript{17} At this point, the athletes are no longer feeling these emotions as vigorously, and may not report them as so. As the interview questions were broad and did not capture specific time frames during the recovery, emotions during each phase of the recovery process may not have been captured. It is also possible that some emotional experiences were not discussed because they were no longer feeling these emotions. The emotional self-regulation of the athlete, recall bias and overall mental toughness could cloud results. Individual follow-up interviews may have elicited improved results for the emotional responses.

Lastly, it is possible that the participants did not understand the meaning of each question. For future studies, the wording of some questions should be refined in order to ensure maximum understanding. Specifically, question 7 should be re-worded, by removing the word, “obtain”. Question 8 should be moved to after coping questions and re-worded to enhance understanding for the athlete.

\textbf{Conclusions and Implications for Future Research}

This is the first study that has examined specific post-injury factors on the Wiese-Bjornstal model for NCAA Division I athletes. We found that participants associated emotions with concussion-related symptoms, participants exhibited maladaptive coping strategies during the concussion recovery process, and participants received adequate social support.
Although, symptoms were discussed more heavily than emotions, one common emotion included in the model and prevalent in previous studies, was feelings of frustration. A concussed athlete is likely to experience frustration throughout the entire recovery process. However, this study’s qualitative methodology allowed the research team to discover why the athlete felt frustrated. Similar questioning could be used clinically; allowing the clinician to understand the frustration that the athlete is experiencing. Post-injury psychological care for the concussed athlete should include discovering what the athlete is frustrated with in order to have an understanding and possibly alleviate these frustrations.

The greatest area of concern and surprise which arose from this study was the use of maladaptive coping strategies by Division I collegiate athletes during their concussion recovery. Behavioral symptoms may lead to avoidance coping and cognitive symptoms may lead to an inability or inflexibility to cope. As discovered in this study, the participants commonly reported cognitive and behavioral symptoms and also tended to use avoidance coping strategies. The model proposes that these may lead to poor psychological outcomes and/or prolonged recovery. It is important to recognize that maladaptive and avoidance coping strategies are common in the concussed athlete. It is also important to recognize that a long-term use of these coping strategies can lead to prolonged recovery, affecting the athlete’s overall well-being. Post-injury psychological care should include education on positive coping strategies. Also, as suggested by Covassin et al., clinicians could administer follow-up coping assessments to help identify patients who might benefit from coping enhancement. Unfortunately, positive coping strategies for the concussed athlete have not been established in the literature. Future research
should identify positive coping strategies for the concussed athlete and how they can be integrated into management of an athlete’s concussion.

The concussed athletes’ social support network is considered a situational factor affecting the psychological recovery. Perceptions of adequate and positive social support may lead to improved outcomes. The participants in this study had a great network of support, including family, friends, teammates, coaches and athletic trainers. The participants perceived adequate social support, possibly ameliorating the effects of maladaptive coping strategies. While the participants in this study had positive social support, others may not and interventions may be necessary to improve perceived social support and recovery outcomes.

In conclusion, some maladaptive strategies the participants in the current study employed were isolating oneself, seeking minimal social support and not asking for help, which have all been associated with elevated affective symptoms and responses.

Importantly, the participants in this study demonstrated several factors and responses that could contribute to poor psychological outcomes and cause long-term disturbances. Long-term disturbances affect the overall well-being of the athlete. It is evident in the literature that those who experience positive recoveries do not suffer from lingering psychological symptoms. Also, those who experience a positive recovery after injury, often experience personal growth from the process.\textsuperscript{25} Three out of the seven participants experienced a recovery of greater than two weeks; it can be theorized that these participants may have benefited from improved post-injury psychological care. Assessment and intervention for the factors and responses demonstrated in this study are warranted. These findings support the use of a multifaceted assessment for the concussed patient, as well as individualized treatment plans.
APPENDIX A

Research questions

The following research questions were asked to determine the course this study would take:

1. What emotions do NCAA Division I feel after sustaining a concussion?
2. How do NCAA Division I athletes cope with a concussive injury?
3. What social support resources do NCAA Division I athletes who have suffered a concussion utilize? Do they perceive adequate social support?

Inclusion Criteria

- Student-athlete at a Division I NCAA member institution
- Age 18-25
- Sustained a SRC while participating in Division I NCAA athletes within last 2 years
- Diagnosed concussion by health care provider
- Returned-to-play after concussion

Exclusion Criteria

- Actively experiencing post-concussion syndrome or currently recovering from a concussion
- Self-reported history of diagnosed mental disorder (e.g., major depressive episodes, bipolar disorder, ADHD, other LD)
- Athletes who the researcher worked with during their concussion recovery
Limitations

Limitations for this study are as follows:

- This study relied on retrospective recall.
- The primary researcher of this study is an athletic trainer at the University.
- The primary researcher may have had bias as an athletic trainer.
- All non-verbal communication was lost in transcription.

Delimitations

Delimitations for this study are as follows:

- This study was delimited to NCAA Division I athletes, ages 18-25.
- This study was delimited to student-athletes from one Division I University in South Georgia.

Assumptions

Assumptions researchers made during this study are as follows:

- It was assumed that all athletes involved suffered a sport-related concussion and were accurately diagnosed by a healthcare provider.
- It was assumed that participants will openly and honestly convey their own recounts, thoughts, and feelings of their experiences after injury.

Definitions

The following definitions will be used to assist in clarification for this paper:

- Concussion: “a brain injury and is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces”

• Coping: “constantly changing process of cognitive and behavioral approaches designed to manage internal and demands that exceed one’s resources”

• Social Support: network for injured athletes to confide in to assist with coping to injury

• Sport-related concussion: concussion occurring from participation in sport or athletic event
APPENDIX B

LITERATURE REVIEW

Definition and Epidemiology of concussion

Traumatic brain injury (TBI) is an umbrella term used to describe brain injuries, ranging from mild to severe. A sport-related concussion is a concussion sustained during sport or recreational activities.¹ Currently, the most widely accepted definition of sport concussion originates from the Concussion in Sport Group. The Concussion in Sport Group describes concussion as, “a complex pathophysiological process affecting the brain, induced by biomechanical forces”.²

Sport-concussion is a common injury affecting all types of athletes from the recreationally active athlete to the elite. The Centers for Disease Control estimated 1.6 to 3.8 million sport-related traumatic brain injuries occur in the United States each year.² Sports have been found to be the second leading cause of TBI among individuals between 15-24 years old.⁸⁰ Concussions account for approximately 5.8 percent of all sports related injuries in collegiate sports.³

Concussion recovery over time

Every sport concussion is unique and heterogeneous in nature. There are a variety of signs and symptoms that may be present as a direct or indirect result of the brain injury. These associated signs and symptoms may include physical, cognitive, and/or psychological components.⁸¹ The initial onset of symptoms and the time of resolution of symptoms varies for each patient.⁹ For most patients, concussion signs and symptoms typically appear within the first
24 hours after injury and resolve between 3-7 days post-injury.\textsuperscript{68} Approximately 80\% of adult patients recover from concussion and return to sports within two to three weeks after injury.\textsuperscript{7} However, there are approximately 15\% of concussion patients who experience a prolonged recovery.\textsuperscript{5,6}

The severity and duration of symptoms may affect the patients’ emotional stability after a concussion, as research on injury has demonstrated increased severity and/or duration of an injury is associated with greater mood disturbances.\textsuperscript{82} Mainwaring et al. conducted a study comparing anterior cruciate ligament (ACL) injuries to sports concussion,\textsuperscript{14} and found concussed athletes do not report as much emotional disturbance as athletes with ACL injuries.\textsuperscript{14} There is currently not enough research to support whether persistent concussion symptoms are a consequence of the concussion\textsuperscript{83} or a result of stressors or increased anxiety during the recovery process.\textsuperscript{54,84,85}

**Psychological responses to concussion**

Concussion literature in the last twenty years has focused largely on neurocognitive deficits.\textsuperscript{14} Emotional signs and symptoms have been recognized and are included in the multifaceted concussion assessment,\textsuperscript{22} however direct observations of the emotional distress experienced after a SRC have not been well-established in the literature. The emotional sequelae for SRC was not addressed in published research until 2004.\textsuperscript{12} Recently, in 2011, Mainwaring et al. suggested emotional disturbances in concussed athletes may be due to a prolonged disequilibrium in central regulatory mechanisms.\textsuperscript{15}

Currently, there are only a few published studies on acute and long-term emotional consequences of SRC; the current studies indicate the emotional sequelae of sports concussion
may affect other areas of functioning therefore require further assessment and intervention.\textsuperscript{11-16} Psychological disturbances may influence mood, social functioning, cognitive functioning, rehabilitation compliance and the athlete’s over-all health and well-being.\textsuperscript{14} Further evaluation may indicate a great need for treatment.

Studies comparing sport concussion to musculoskeletal injuries have reported concussed athletes demonstrate increased levels of fatigue, decreased energy, elevated mood disturbance, and confusion acutely after injury when compared to athletes suffering musculoskeletal injuries\textsuperscript{13} and un-injured controls.\textsuperscript{12} Some researchers were concerned that pre-injury mood disturbances may be causing psychological symptoms. However, pre-injury mood disturbances and increases of emotional disturbances after a sport concussion were found to be unrelated in two randomized control studies with level 1B evidence.\textsuperscript{13,14}

The most-researched emotional response after concussion is depression. Depression symptomology is common after sport injuries of all nature.\textsuperscript{86,87} Depression symptoms after injury may cause depressive disorders. The Diagnostic and Statistical Manual (DSM) of Mental Disorders has established criteria to diagnosis depressive disorders.\textsuperscript{88} The DSM-IV establishes criteria for isolated depressive episodes (common after injury) as having: depressed mood, loss of interest and enjoyment in usual activities or a combination of reduced self-esteem and confidence, ideas of guilt and unworthiness, pessimistic thoughts, disturbed sleep, diminished appetite, ideas of self-harm.\textsuperscript{88} Sometimes injury can cause major depressive disorder, with depressed moods or a loss of pleasure in daily activities for more than two weeks.\textsuperscript{88} Depression disorders are common in college students, with approximately 14\% reporting a diagnosis.\textsuperscript{89}
Increased levels of psychological distress are well-known to be a predictor for depressive symptoms.\textsuperscript{90} Independently, Mainwaring and Hutchinson, have both established post-concussion depression is unrelated to removal from play and seems to dissipate on its own within two to three weeks for most concussed athletes.\textsuperscript{12,13} Post-injury depression scores have also been documented after sport concussions and compared with other injuries.\textsuperscript{13,14} When compared with minor musculoskeletal injuries, post-concussion depression scores were elevated for two weeks after head injury, but only elevated for one week in the musculoskeletal group.\textsuperscript{13} However, depression was not as severe and did not persist as long in concussed athletes compared with those with ACL injury.\textsuperscript{14}

Several researchers have also reported associations with brain injury and depression, with the bulk of the research on moderate to severe traumatic brain injury. Some believe depression symptoms may be associated with functional outcome and quality of life after injury, \textsuperscript{91} while others believe it may be associated with microstructural changes in the brain\textsuperscript{92}. Researchers have established a link with clinical depression in correlation with the number of brain injuries sustained.\textsuperscript{16,93} There is an obvious link between psychological conditions, such as depression linked with concussion; however more research is needed on sport concussion.

**Psychological response to sport injury**

Most athletes will experience psychological challenges after sport injury of all kinds.\textsuperscript{94-96} Some consequences of sport injury include emotional and somatic symptomology. There is a great amount of empirically derived evidence demonstrating that an athlete who has a sustained musculoskeletal injury will experience a depressed or negative mood.\textsuperscript{24,87,97-100} The change in
mood may be the result of several factors; for example, pain, inability to play at 100%, or other stressors may cause changes in mood.

After sport injury, major emotional and psychological outcomes have been reported in the literature. Commonly, the athlete will initially perceive the injury as a major stressor, resulting in various psychological symptoms such as shock, fear, anger, anxiety, helplessness, social isolation, disbelief, rage, depression, tension, upset stomach, fatigue, insomnia, reduced self-esteem, boredom or decreased appetite. These emotions tend to turn into positive feelings as rehabilitation and recovery progresses. However, when an athlete perceives greater severity of the injury, severe depression, anxiety and dispiritedness may occur.

**Wiese-Bjornstal psychological response of sport injury and rehabilitation**

The integrated model of response to sport injury, first proposed by Wiese-Bjornstal in 1995 and re-modeled in 1998, uses an evidence-based cyclic model to describe the athlete’s reaction to sport injury. This model is the most commonly accepted model identifying the psychological response to sport injury of an athlete. The model includes multiple components, accounting for pre-injury and post-injury factors. Each of these factors may negatively or positively affect the psychological response of the injured athlete.

Pre-injury psychological risk factors are: personality, history of stressors, stress response, coping resources and interventions. Also, the personal, environmental and situational factors influence the psychological responses of the athlete. Personal factors include elements like injury history, personality, demographics, and more. Situational or environmental factors may include the sport, playing status, time of season, access to rehabilitation, coping resources and social support. The team’s subculture can also psychologically influence the athlete and their
recovery. The team’s training culture may cause the athlete to feel pressure to show strength or toughness, encouraging the athlete to play through injury. In recent literature, this model has also been adapted for other injury.

**Wiese-Bjornstal psychological response of sport concussion injury**

Wiese-Bjornstal et al. recently created another model modified from the sport injury model previously described. This model is specifically for an athlete who has sustained a sport concussion. Wiese-Bjornstal et al. identifies many psychological, psychiatric, and psychosocial issues that may occur in patients recovering from sport concussions. Examples may include: perceived feelings of poor recovery, frustrations, depression, anxiety, or an eagerness to return to sport due to social influences. These factors influence the recovery and quality of life of a patient who suffered a sport concussion.

Psychological, psychiatric, and psychosocial features of sport-related concussion are directly caused by the injury itself or indirectly caused by the athletes’ response to the injury. Psychiatric aspects include the prevention, diagnosis, and treatment of mental illnesses associated with sport concussions, such as mood disorders. Psychosocial aspects refer to intersections of the patient with the external physical or social environment, such as perceived social support. The Wiese-Bjornstal model highlights pre-injury and post-injury factors affecting the recovery process including correlations of emotions, coping and social support. See Figure 1 for more details.

**Emotions and feelings**

The emotional correlates of concussion are often evaluated. It is important to recognize the intricacy of human emotion. Emotions and feelings are difficult to operationally define and
portray. Emotions involve multiple regulatory systems and are manifested by multifaceted episodic response to internal and external stimuli.” Emotions are critical for healthy human functioning and create motivation for instinctive survival. Emotions are episodic mental responses of fluctuating intensity, while feelings describe how a person cognitively appraises an experience. Capturing the emotional state of a concussed athlete, currently relies on the athlete’s subjective report and/or symptoms on a symptom checklist. There are other clinical tools used to determine the emotional state of the athlete.

The Profile of Mood States (POMS) is a clinical tool that has been used to assess the emotional functioning of athletes. The POMS considers the participants’ mood as a whole and within domains, successfully measuring emotional functioning and mood in concussed and athletic populations. Hutchinson et al. used the POMS to compare emotional functioning of concussed athletes to those with musculoskeletal injuries and established both groups experienced emotional disturbances, however concussed athlete’s experienced disparate emotional reactions. A study by Mainwaring et al. used the POMS and also identified emotional disturbances in athletes suffering mTBI. A later Mainwaring study used the POMS to discover the emotional responses of concussed athletes compared to athletes suffering ACL injuries and also found differing patterns of emotional reactions between groups. Wiese-Bjornstal’s model includes the emotions and feelings of an individual within injury appraisals and affective responses, such as stress, fear, sadness, frustration and irritability.

Coping

Coping is defined as a “constantly changing process of cognitive and behavioral approaches designed to manage internal and external demands that exceed one’s resources”.
Coping behaviors alter the psychological and behavioral responses to injury, as effective coping strategies have been found to moderate emotional disturbances. Therefore, adequate coping resources and positive coping strategies may be valuable to the healthcare team when educating and developing treatment plans for the athlete.

Effective coping behaviors have been found to moderate and decrease emotional disturbance in sport injuries, such as musculoskeletal injuries. There are several coping styles identified in the literature. Coping styles may be categorized into general categories of: emotion-focused coping, problem-focused coping, or avoidance coping.

Emotion-focused coping is defined as, “the regulation of distressing emotions”. Some emotion-focused coping techniques include venting emotions, seeking encouragement from social support system, and focusing on positive interpretations or reframing or use of religion. Mental disengagement may be classified as avoidance/emotion-focused under the assumption that the intent is to prevent negative feelings from arising.

The problem-focused coping strategy involves engaging in action to correct the problem causing distress. For an athlete, this strategy may be employed through injury rehabilitation. It is not a surprise that this strategy has positive effects on rehabilitation compliance. Other problem-focused coping techniques may include developing new behaviors and learning new skills. However, a problem-focused strategy may not be possible in all situations. Problem-focused coping sometimes attempts to alter environmental factors, which is not always an option. For example, an athlete may wish to speed up their rehabilitation or recovery after injury and often this is not an option and could potentially lead to further injury or damage. For an athlete
recovering from SRC, there is limited rehabilitation to be done, making it more difficult to use problem-focused coping strategies.

Cognitive coping strategies may be considered problem-focused. Cognitive coping attempts to alleviate stress by gaining a gaining knowledge and understanding of the problem. An individual using this strategy would try to become educated about the injury or seek the advice of health-care providers. This type of coping has been associated with faster rehabilitation times. This may be due to a better knowledge foundation of the injury or necessary treatment, therefore the athlete is able to comply with full effort, leading to a speedy recovery.

Lastly, there is an avoidance coping strategy. The athlete may attempt to isolate themselves from teammates, peers and others or spend time with family instead of their team or others associated with their team. Athletes try to stay busy with alternative activities not related to their sport. Sometimes denial or tolerating and playing through the pain are coping strategies used by athletes and avoiding injury as a subject of conversation. Behavioral disengagement may be categorized as avoidance or problem-focused. Avoidance coping styles have demonstrated to have poor outcomes following a concussion, linked to acute stress disorder and post-traumatic stress disorder.

More examples of coping strategies employed by injured athletes may include turning to religion, using humor or comedy or social support strategies. These coping strategies may overlap into or between problem-focused, emotion-focused, and avoidance coping strategies. There are only a few prospective studies on athletic injury and coping; among the studies of athletes coping to injury, many coping styles were utilized, the most common being active coping styles. Active coping may include problem-focused coping strategies, such
as seeking out health care or actively participating in treatment and rehabilitation hoping to improve injury outcomes. Undoubtedly, the coping strategies that athletes practice plays a role in their recovery. Some coping strategies may improve recovery times, while others may delay it.

Little research has been published to establish associations between coping and sport concussion outcomes.\textsuperscript{30,31} Kontos et al. conducted a randomized control trial and found athletes with a concussion engage in less overall coping strategies than athletes with an orthopedic injury.\textsuperscript{31} Kontos et al. theorized the concussed athlete may require different coping strategies than athletes suffering orthopedic injuries, such as increased sleep, restriction of physical activity, and proper nutrition. Emotion-focused strategies may be less effective in the athletic population. Covassin et al. compared patients with concussions to patients with orthopedic injuries. In both groups, emotion-focused coping methods resulted in increased concussion or concussion-like symptoms.\textsuperscript{30} Covassin also demonstrated that the “nature of coping” for concussion patients poses greater problem-focused difficulties. However, problem-focused coping techniques have been linked to a decreases in symptoms and mood disturbances following a mTBI.\textsuperscript{119} The few studies published on coping and sports concussion have inconsistent results.

**Social Support**

Defined in the literature, social support is the perceived exchange of resources between two or more individuals intended to enhance the well-being of the recipient.\textsuperscript{120} Social support has been emphasized in the Wiese-Bjornstal sport injury model as a coping resource that may positively influence psychological outcomes.\textsuperscript{17} Social support plays a huge role in the well-being of an injured athlete, as it has been shown to decrease negative stress occurring after sport
There is growing recognition in the sport psychology literature that social support plays a significant positive role in the way athletes cope with and rehabilitate from sport injury.\textsuperscript{24,36,38,108,121}

There is a great amount of literature showing the positive effects of social support for the athlete’s response to injury. There is evidence associating social support with the reduction of negative stress.\textsuperscript{35} Overall, social support helps in reducing stress, as it prevents stressors from being perceived as highly stressful.\textsuperscript{71,122,123} Social support has also been shown to decrease negative feelings of isolation and fear of re-injury.\textsuperscript{35} While decreasing negative consequences associated with injury, social support has also been shown to have benefits for improving other aspects. Social support has been shown to have effects for greater self-confidence,\textsuperscript{41} motivation,\textsuperscript{36} rehabilitation compliance\textsuperscript{37-40} and adapting to rehabilitation demands.\textsuperscript{69,70}

Perceiving social support and feeling satisfaction with social support received are important in order to reap the benefits.\textsuperscript{70} Green and Weinberg reported that athletes who were satisfied with their social support, demonstrated lower levels of mood disturbances following an injury as compared to those athletes unsatisfied with their social support.\textsuperscript{70} Perceptions of poor social support have been associated with decreased measures of quality of life.\textsuperscript{124} The injured athlete not only needs to have support, but also needs to be satisfied with the support they received.

There are three common types of social support that an athlete may attempt to utilize: emotional, tangible and informational support. Emotional support involves empathy. An athlete may reach out to coaches, athletic trainers or other healthcare providers to gain emotional support.\textsuperscript{36} Tangible support involves practical assistance; examples include practical treatment
for injuries. Informational support utilizes problem-solving techniques, such as using crutches to assist with ambulation.

To date, there are only two studies examining social support trends in concussed patients. Covassin et al. conducted a comparison study between orthopedic injuries and concussions, examining sources of social support and perceived satisfaction with social support of Division I athletes.\(^{30}\) All athletes identified similar sources of social support, including: family, friends, teammates, athletic trainers, coaches, and physicians. Athletes who suffered orthopedic injuries reported greater satisfaction with their social support than the concussed athletes.\(^{42}\) Concussed athletes may have experienced poorer social support because of lack of knowledge or understanding about the injury by the support system. Another randomized control trial was conducted on elite concussed athletes and demonstrated social support systems improved rehabilitation outcomes for athletes with concussions.\(^{125}\) The few studies show that improved social support systems and increased satisfaction with social support may benefit a concussed athlete.
APPENDIX C
IRB DOCUMENTS
GEORGIA SOUTHERN UNIVERSITY INSTITUTIONAL REVIEW BOARD

PROPOSAL NARRATIVE

**Personnel.** The research team includes: Paige Wells, ATC, LAT – Graduate Student/Primary Investigator, Dr. Tamerah Hunt, PhD – Georgia Southern Faculty Member/Co-Investigator (CHAIR) who has experience with similar, qualitative study using high-school student, Dr. Jody Langdon, PhD– Georgia Southern Faculty Member/Co-Investigator who is experienced with qualitative methodology and Dr. Jim McMillan, Ed.D.– Georgia Southern Faculty Member/Co-Investigator

**Purpose.** The purpose of the proposed research is to use a qualitative approach to identify and describe the psychological responses (emotions, coping mechanisms and social support) perceived by Division I collegiate athletes during recovery after sport concussion. In qualitative research, the researcher does not develop hypotheses. There will be no immediate benefit to the participants or others from this project. The findings from this study will add to the limited literature of psychological research for sport concussion. In the future, this research may indicate the need for NCAA member institutions to better aid the student-athlete in the psychological process during recovery after a concussive injury. A concussive injury poses different challenges compared to other injuries, and the athletes may warrant a greater need for psychological interventions. Ultimately, this research may identify the need for psychological aid during concussion recovery for the health and well-being for all athletes.

**Literature Review.** A sport-related concussion (SRC) is a concussion sustained during sport or recreational activities and is a common injury in Division I athletics. In 2003, the Centers for Disease Control (CDC) estimated 1.6 to 3.8 million sport-related traumatic brain injuries occur in the United States each year. A concussion is unique and heterogeneous in nature. Each patient will present with different clinical signs and symptoms; the initial onset of these symptoms and the time of resolution will vary. Concussions may cause a combination of neurocognitive, neurobehavioral, vestibular, oculomotor or psychological symptoms. In common practice, clinicians prescribe rest until SRC symptoms begin to dissipate or resolve and will then progress the athlete back into their sport. However, most times, psychological disturbances are overlooked and go entirely without treatment during the recovery process.
There is an abundance of cognitive research after sport concussion; however, psychological distress after SRC is largely unaddressed in the literature. There is a pressing need for psychological research, as consequences of concussion frequently include: elevated depression, confusion, fatigue, anger, overall mood disturbance and reduced energy.\textsuperscript{12,13} The most-researched emotional response after concussion is depression. Documented in the literature, post-injury depression symptomology scores have been found to be elevated for approximately two weeks after head injury.\textsuperscript{13,14} Researchers, Mainwaring and Hutchinson, have both established post-concussion depression is unrelated to removal from play.\textsuperscript{12,13} To imagine our athletes suffering from depression symptoms for an average of two weeks after injury, necessitates an intervention. Every patient deserves a quality and individualized plan, with psychological disturbances being addressed instead of ignored.

Published in 2015, the model of Wiese-Bjornstal’s psychological response to sport concussion injury, provides the theoretical framework for the proposed study.\textsuperscript{10} The model highlights pre-injury and post-injury factors affecting the recovery process. These processes include: emotions, coping strategies and social support.

Emotions are described as episodic mental responses of fluctuating intensities, which are critical for healthy human functioning.\textsuperscript{23} Capturing the emotional state of a concussed athlete currently relies on the athlete’s subjective report of symptoms, typically on a symptom checklist. Emotional and psychological disturbances are commonly reported in athletes suffering a concussion. Researchers have established different emotions and patterns of emotions compared with other injuries.\textsuperscript{13,14}

Concussions pose extremely different challenges during the recovery process compared to musculoskeletal injuries.\textsuperscript{14} Effective coping strategies has been highlighted in psychosocial literature to have positive benefits for an athlete after musculoskeletal sport injury.\textsuperscript{27} However, little research has been published to establish associations between coping and sport concussion outcomes.\textsuperscript{127} It can be theorized that an athlete who has sustained a sport concussion, would also benefit and have improved outcomes during the recovery process if they utilize effective coping strategies.

There is growing recognition in the sport psychology literature that social support plays an important role in the way athletes cope with and rehabilitate from sport injury.\textsuperscript{36,38,108,121} There is also evidence supporting that social support helps to reduce negative stress, therefore increasing the overall well-being of the injured athlete.\textsuperscript{35} There is limited research available on social support and concussion, however one study found that athletes who suffered orthopedic injuries reported greater satisfaction with their social support than concussed athletes.\textsuperscript{42} If improved
social support can help the overall well-being of the athlete, there is a great need for more research specifically for the concussion recovery process.

The proposed research study uses a qualitative approach to accurately describe the emotions, coping and social support utilized by NCAA Division I athletes during their concussion recovery. These research procedures have been used before in an unpublished study using high-school athletes. Similar risks were controlled for by using alternative identities during the interview and having counseling services available to the athletes if needed after the focus group concluded.

**Outcome.** The results of this study will serve as perceived psychological findings of male and female division I athletes who have sustained a concussion, specifically focusing on the time period of their recovery. These results may be useful for healthcare providers, coaches and student-athletes in Division I NCAA member institutions. Knowledge and understanding from the student-athlete perspective may be beneficial for the healthcare provider when making treatment and psychological support decisions. The results from this study may also help drive more psychological research for sport concussion.

**Describe your subjects.** The current study will include 2 focus groups consisting of 3-5 male GSU student-athletes and 3-5 female GSU student-athletes who have suffered and recovered (measured by return to participation) from a sport-concussion while participating in Division I athletics. 2 focus groups were selected to enable gender separation. While we understand the request to add an additional focus group, 10 participants from various sports at Georgia Southern University will provide robust themes representative of Georgia Southern athletes. Increasing the number of focus groups could oversaturate our data and not provide additional information. Low numbers are common in qualitative research using focus groups, as the information obtained is rich (Boyd, 2008; Lett, 2015). Information obtained in a one hour focus group requires hours of transcription, often resulting in hundreds of pages of data to sort and describe (Thomas, 1996). All participants must be student-athletes from Georgia Southern University.

**Recruitment and Incentives:** The participants will participate in the focus groups voluntarily, and there will be no reward or compensation upon completion. There are no incentives for participation. A paper flyer and email will be used for participant recruitment. The flyer will be posted in the athletics building and is attached. A draft of the email which will be sent to student-athletes at a Division I NCAA member institution in Georgia is sampled below.

**Research Procedures and Timeline:** Following IRB approval, an email will be sent out to the student-athletes at one Division I NCAA member institution in Georgia. Consent forms will be provided to the participating student-athletes. The participants will be placed in groups of 3-5
and separated by gender. Then, semi-structured interviews will be scheduled. Focus groups will be held in the primary researcher’s office, located in Hanner building at Georgia Southern. The primary researcher will be in charge of organizing and administering the focus groups. The co-investigator/CHAIR will also be listed as a contact source on all emails and the informed consent, in order to assist the primary researcher with the organization and administration of the focus groups. At the time of the focus group, the primary researcher will arrive with a set of predetermined questions to guide the discussion, but the questions will be adhered to loosely so that meaningful conversations and discussions can occur naturally. The researcher will take notes and also record the discussions using two devices. At the conclusion of the interview, the participants will be given a flyer with free resources for counseling, health services and sport psychology (attached). After the interview is completed and the transcriptions have been written, the participants will read and verify the transcriptions.

**Data Analysis:** Interviews through focus groups are the preferred method of inquiry for this study. After the focus groups have been conducted, the primary investigator will write transcriptions. Upon completion, transcriptions will be sent to the participants to verify the information, as a member check. Three researchers will then analyze transcribed notes and evaluate the focus group interviews for themes associated with psychological responses and emotional needs of the student-athlete during recovery. The researchers will also use peer debriefing by evaluating themes independently and then comparing the results. Following data analysis and interpretations, all information obtained will be stored in a secure room within a locked file cabinet for a minimum of three years before being properly and securely destroyed.

**Risk.** The participants may be at risk for experiencing discomfort in answering questions. Answering questions may remind the participant or bring up emotional experiences. The participants will be provided with information and access to free counseling through the University. If suicidal ideology arises during the interviews, the interview will end immediately and the proper personnel will be contacted. Proper personnel include the Georgia Southern counseling center and/or Georgia Southern police. The following plan can be found at the counseling center’s crisis intervention link: If needed Monday-Friday from 8am to 5pm, the primary researcher will call the Counseling Center at (912) 478-5541 and inform the receptionist that the student needs to be seen as soon as possible for a crisis screening. The researcher will transport the athlete to the Georgia Southern counseling center. If it is after counseling center hours, the Georgia Southern Campus Police will be contacted at (912) 478-5234 to arrange a meeting with an on-call counselor. 911 can also be contacted.
INFORMED CONSENT TO ACT AS A SUBJECT IN AN EXPERIMENTAL STUDY

1. Title of Project: Emotions, Coping and Social Support perceived by NCAA Division I athletes during Concussion Recovery: a qualitative study

Investigator’s Name: Paige Wells, ATC    Phone: (937) 974-9871

Participant’s Name                                      Date: ______________________

Data Collection Location: Hanner Athletic Training Room, Georgia Southern University

2. The purpose of the research study is to use a qualitative approach to identify and describe the psychological responses (emotions, coping mechanisms and social support) perceived by Division I collegiate athletes during recovery after sport concussion.

3. Participation in this study will include your participation in 1 focus group, lasting approximately 1 hour. All participants will be divided into focus groups of 3-5 individuals and separated by gender. The researcher will ask you questions based on psychology and concussion literature. Your post-concussion recovery experiences will be shared with the group. Contribution in the study is completely voluntary and at any point in the study, you may decide to end participation. If at any time you do not want to answer a question, you may simply say “pass”. My goal is to identify and describe your post-concussion experience.

4. There is minimal risk involved in the study. If at any time, you feel uncomfortable or wish to withdraw from the study or leave the focus group interview, you may do so. Additional materials will be provided to you at the conclusion of the focus group interview with information to seek counseling.

5. There are no direct benefits to you as a participant. There may be benefits regarding the research, care and outcomes of athletes who suffer sport concussions in the future. These benefits may include providing further knowledge to clinicians about how athletes feel during the recovery process after experiencing a sport concussion. This research will also help guide further research on psychological disturbances after concussion.

6. The duration of the study will be one forty-five minute to one hour focus group interview.
7. You will not be identified by name in the data set or any reports using information obtained from this study, and your confidentiality as a participant in this study will remain secure. A different name will be given to you during the focus group session to ensure confidentiality. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions. All information obtained will be stored in a secure room within a locked file cabinet for a minimum of three years before being properly and securely destroyed.

8. You have the right to ask questions and have those questions answered. If you have questions about this study, please contact the researcher named above or the researcher’s faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Office of Research Services and Sponsored Programs at 912-478-0843.

9. You will not receive any form of compensation for participation in this study. There will not be incentives for your participation.

10. You do not have to participate in this study if you do not want to. Participation in this study is completely voluntary. Even if you begin the interview, you can choose to withdraw at any time.

11. There are no penalties for removing yourself from the study or denying participation in the study.

12. You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above, please sign your name and indicate the date on the following page.

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H16224.
Title of Project: Emotions, Coping and Social Support perceived by NCAA Division I athletes during Concussion Recovery: a qualitative study

Principal Investigator:
Paige Wells, ATC

Faculty Advisor:
Dr. Tamerah Hunt, Ph.D., ATC

________________________________________________  __________________________
Participant Signature                  Date

I, the undersigned, verify that the above informed consent procedure has been followed.

________________________________________________  __________________________
Investigator Signature                  Date
APPENDIX D

Semi-structured Interview

“I first want to thank each of you for coming today and being willing to share your experiences of your concussion. Today, we will focus on your most recent concussion. We want to know more about your experience so we can identify areas of the concussion recovery which may need improvement. My expectation today is that you share your experiences and emotions with each other, not with me. I may interrupt from time to time in order to ask you more specific questions, but I want you to control the discussion. It is very important to me that I truly understand what you are expressing and conveying.

As we begin, I advise you to speak freely with your peers and share what is within your comfort zone. No one here is going to judge, and no one is going to make you answer a question that you are uncomfortable answering. In fact, feel free to say “pass” if you are uncomfortable answering a specific question. Are there any questions before we begin?”

1. Tell me about your sport participation. What is your sport, position and current year on team?
2. Since everyone has the shared experience of sustaining a concussion, let’s focus on the time period after injury. Share with the group about your experience- When was it? How long did you have concussion symptoms?
   a. Were you in-season/out-of-season?
   b. How long were you held from sport participation?
   c. How many concussions have you had?
3. After sustaining the concussion until the day you were permitted to return to activity, how did you feel?
a. What emotions did you feel?
   i. How did it feel when you were unable to practice?
   ii. What emotions did you feel about returning to school?
   iii. How did you feel about returning to play?

4. How did you deal with the concussion?
   a. How did you deal with missing practices/games?
   b. Did your healthcare provider allow you to be at team events/practices?

5. What did you do after the injury?
   a. Coping is described as an approach used to manage demands or problems that exceed one’s resources. How did you cope with the changes the injury caused?
      i. Some examples of coping strategies may be: talking to someone, asking questions and finding answers, trying to find a solution, avoiding situations, seeking support, praying, eating, distracting or staying busy, journaling, suppressing negative thoughts,

6. Who did you tell about your concussion?
   a. Who knew you had a concussion?

7. Did you obtain support during your recovery?
   a. Who did you seek support from and how did they make you feel? For examples: friends, family, peers, teammates, significant other, other injured athletes, coaches, athletic trainer, other healthcare provider
   b. Did you feel the support was adequate? Why or why not?
c. Do you feel social media, such as texting, Facebook, Twitter provided support for you? Why or why not?

8. Overall, did you feel satisfied with coping resources during your recovery? Why or why not?

9. If you could change concussion recovery guidelines, what would you suggest based upon your personal experiences?

10. Is there anything else you would like to share? Does anyone have any additional comments?
Highlighted in light blue are portions of the model this study is focusing on.
REFERENCES


