CONCUSSION, LEARNING, ACADEMICS, AND STUDENT SUCCESS: A SURVEY STUDY OF HIGH SCHOOL RETURN TO LEARN EXPERIENCES (HS-CLASS)

by

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Under the Direction of Katy H. O'Brien

ABSTRACT

Concussions are common injuries for high school student-athletes. However, academic re-entry following a concussion is lacking research, which creates significant variation in student experiences as they Return to Learn (RTL). The purpose of this study was to explore the perspectives of high school students about their RTL experiences after a concussion. High school students with concussion completed a survey about their injury and RTL experience. Results from 58 students revealed diverse student experiences with RTL, specifically regarding medical care, school processes, academic adjustments, and support. Initial and persisting academic problems following concussion were endorsed by students. Students reported returning to school soon after injury, experiencing extended recovery times, and carrying the burden for managing communication among professionals involved in their recovery. Student recommendations for RTL included improved professional education, increased information about and planning for RTL, usage of self-advocacy during recovery, and greater trust and understanding between students and others.

INDEX WORDS: Concussion, mild traumatic brain injury, head injury, brain injury, return to school, return to learn, return to play, postconcussion, high school

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TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION

Concussions or mild traumatic brain injuries (mTBI) account for 13% of all injuries among high school student athletes (Marar, McIlvain, Fields, Comstock, 2012). The most common models of concussion care for students with a head injury are driven by "Return to Play" (RTP) legislation, which outlines the steps for student-athletes to make safe transitions back to their sport, slowly increasing activity levels while monitoring symptom exacerbation (McCrory et al., 2017). Although this legislation is now present in all 50 states, most do not address the need for a consistent and progressive return to cognitive activity and participation in school, a concept coined "Return to Learn" (RTL). RTL policy is sparse and protocols that do exist are highly variable in implementation, allowing for inconsistent student experiences with academic reentry postconcussion (Thompson et al., 2016).

Literature around concussion frequently examines knowledge and management styles of educational and medical professionals working with students who sustain concussion. However, few, if any, research examines student perspectives and experiences regarding returning to school after sustaining a concussion. Little is known about student perspectives during the RTL process, student involvement in concussion management, or student awareness of involvement of other people on RTL management teams. In order to fill this gap in the literature to eventually create systems that better serve students with concussion, it is paramount to engage with and analyze student perspectives around returning to learn after a concussion.

CHAPTER 2

LITERATURE REVIEW

Due to ongoing brain development, young athletes are more susceptible to concussions than adults (Patel, Shivdasani, & Baker, 2005). Approximately 1.1 to 3.8 million sport- and recreation-related concussions occur annually in children and adolescents in the United States (Bryan, Rowhani-Rahbar, Comstock, & Rivara, 2016; Langlois, Rutland-Brown, & Wald, 2006). The International Conference on Concussion in Sport describes a sport-related concussion as a traumatic brain injury (TBI) caused by biomechanical forces often characterized by a direct blow to the head, neck, face or elsewhere with a force transferred to the head; impairment in neurological function; neuropathological changes that affect brain function rather than structure; and clinical signs or symptoms that may include a loss of consciousness that cannot be explained by other injuries or use of drugs, alcohol, or medication (McCrory et al., 2017). In rare cases, people with a concussion may experience loss of consciousness (8-19% of people) or physical signs of the injury may appear on brain imaging technology (roughly 10% of people); however, this is not the experience for a majority of people with concussion (Langlois et al., 2006).

Symptoms and recovery

Students with concussion can experience an immediate or delayed combination of impairments in multiple domains according to a clinical report conducted by Halstead and Walter (2010; see Table 1 for list of domain and possible presentations). Although most expect symptom recovery within 10-14 days (Halstead & Walter, 2010), recent studies challenge this timeline, such as a 2016 study that found athletes with an “uncomplicated recovery” from a

sports-related concussion took an average of 22 days to be symptom-free (Elbin et al., 2016). Most recent guidelines state that adolescents may take up to a month for symptoms to resolve (McCrory et al., 2017), or that parents may expect children to not "show significant difficulties that last more than 1 to 3 months after injury" (p. 5, Lumba-Brown et al., 2018). To examine the timeline of cognitive dysfunction induced by concussions, a longitudinal study compared the performance of a group of high school student-athletes with concussion and healthy controls on two laboratory-based measures of attention and executive function (Howell, Osternig, Van Donkelaar, Mayr, & Chou, 2013). The Attentional Network Test and the Task-Switching Test were administered to students with concussion within 72 hours postinjury with repeated assessments at one week, two weeks, one month, and two months. Results revealed that for up to two months, postinjury students with concussion demonstrated slower reaction times compared to their healthy counterparts. These results suggest deficits in attention and executive function abilities for a considerable amount of time postinjury.

An investigation of the perceptions of students with concussion and their parents regarding students' health-related quality of life (HRQOL) one year postconcussion also indicated prolonged effects of the injury for some students. Two out of the seven participating students continued to report headaches from three months up to one year after their injury (Iadevaia et al., 2015). Participants indicated that lasting physical symptoms were the most debilitating to emotional and academic function.

Students with sports-related concussions experienced recurrent or worsening symptoms following premature RTL (48% of students) and premature RTP (44% of students) as determined by medical records of a sports medicine physician (Carson et al., 2014). Students with a history of more than one concussion also required more physical rest postinjury than students without a

history of concussion. In addition to inadequate cognitive and physical rest, barriers to full recovery after a concussion include a weak understanding of cognitive rest, lack of adherence to concussion management plans, and inadequate knowledge of sport-related concussion management in treating physicians and school professionals.

Current Management Practices and Implications

Current Legislation. The prevalence rates and implications of sports-related concussions have yielded RTP legislation in all 50 states ("Sports Concussion Policies and Laws," 2015). RTP guidelines are in place so that students experience a slow reintegration to physical exertion to reduce the likelihood of prolonged recovery, including the development of postconcussion syndrome (PCS) or second-impact syndrome—a severe injury resulting from sustaining a second head injury before the first has healed completely (Carson et al., 2014; Halstead & Walter, 2010; McGrath, 2010). Although RTP management is mandated through the schools, its primary objective is resumption of sport practice and game activity; RTP does not consider a student-athlete's *academic* performance postconcussion (McCrory et al., 2016; McGrath, 2010). Though there are national and international guidelines about the slow reintroduction of student-athletes to the playing field, limited legislation exists for the reintroduction of students to the classroom, despite an injury to the organ that facilitates learning.

Thompson and colleagues (2016) found that RTL legislation is present in just eight states (see Table 2). Among those states, variation exists between the entities responsible for implementation (e.g., school, district, or state), RTL education requirements, entities responsible for establishing RTL policy (schools, districts, state Boards of Education, state commissioners), specific protocol standards, team coordinator establishment, and students who are eligible for

RTL policy. Only one state's policy was developed based on evidence-based practice that is consistent with the Centers for Disease Control and Prevention (CDC) recommendations.

Since Thompson and colleagues' (2016) review, one new state has adopted RTL legislation – Oklahoma (NCSL, "Return-to-Learn State Laws for Students with Traumatic Brain Injuries," 2017). Information about the specifics of the Oklahoma bill are unclear, but the National Conference of State Legislature's website indicates that the bill does not require education for academic personnel and does not require RTL protocols to be evidence-based.

Variation in RTL could be influenced by the variation in knowledge and experience around concussion, concussion symptoms, and concussion care by students, teachers, academic professionals, and medical professionals. Each of these entities are necessary to craft a consistent and successful RTL program. Current research around student perspectives primarily investigates concussion knowledge or symptom reporting, but no studies examine student perspectives exclusively around the RTL process postconcussion. Information from student perspectives will help drive the development of a meaningful solution to the issues related to RTL and academic dysfunction in students with concussion.

Student Experiences and Influence on Academics. Several qualitative and survey studies have described the problems that students have returning to academics after a concussion. Students report issues like trouble concentrating, confusion, and feelings of forgetfulness (Iadevaia et al., 2015). Using a structured questionnaire, Ransom and colleagues (2015) found that students with concussion described diminished academic performance – e.g., difficulty taking notes, needing more time to complete homework, and problems studying – and that these academic effects were most pronounced in students with the highest symptom burden. This same

study discovered nearly all students with concussion students believed they had trouble with more than one class and almost a third of students reported a decrease in grades.

In another study of academic effects of concussion, 70 high school and college students with concussion and 108 students with extremity injuries completed telephone surveys about their school experiences. For both groups of students, academic dysfunction was assessed at one week and one month postinjury. Students with concussion reported greater academic dysfunction one week postinjury with some students reporting lingering issues at one month postinjury (Wasserman, Bazarian, Mapstone, Block, & Van Wijngaarden, 2016). Prolonged effects were more likely to be present in female students and students with a history of multiple concussions. Students in the concussion group also required more time to recover, taking almost twice as long to return to school than the students with extremity injury. Though most issues resolve by one month, students in this study demonstrated a need for academic adjustments (AA) and other supports while returning to school after a concussion, and some students may be at risk for prolonged recoveries.

A similar study conducted follow-up telephone interviews with 91 student-athletes with concussion that sought care in a concussion clinic in order to identify problematic concussion symptoms in school settings. Concussion severity, described by recovery length and number of symptoms recorded at first clinic visit, were factors associated with the most difficulties during academic reentry (Baker et al., 2015). Of the 91 students surveyed, 38.5% of students reported difficulties with school postconcussion. Most commonly reported issues included headache, fatigue, reduced memory, and difficulty concentrating. These complaints map to categories such as physical dysfunction, cognitive dysfunction, and overall academic dysfunction, which have been noted across various populations of students with concussion.

A group of college students with and without TBI were administered of *The College Survey for Students with Brain Injury* (CSS-BI) in order to determine the psychometric properties of this assessment. The CSS-BI contains subsets of items around general health effects and college challenges. The injuries sustained by the students in the experimental group represented a variety of severities (i.e., mild, moderate, and severe TBI). A group of students with TBI also participated in a follow-up interview. Students with TBI endorsed more college challenges (e.g., having to review material more, forgetting what is said in class, difficulty understanding instructions, etc.), cognitive-behavioral effects (e.g., memory issues, difficulty with academics, and organization problems), psychosocial issues (e.g., anger, depression) than healthy controls (Kennedy, Krause, & O'Brien, 2014). Although results were not stratified by severity of injury, these results support the notion that students with a history of TBI are more likely to experience academic challenges than uninjured peers.

In contrast, a recent review found concussion had minimal impact on grades or national exam scores, although students do miss school after a concussion (Rozbacher, Selci, Leiter, Ellis, 2017 & Russell et al., 2016). In the three studies included in the review that examined changes to grade point average (GPA) for students with concussion as compared to their healthy counterparts, few effects were found. One study demonstrated a decrease following concussion, but those effects were specific to foreign language classes (Laubscher, Dijkstra, Strydom & Peters; 2010) while a second found a decrease in social studies only (Russell et al., 2016). No other courses were affected. Similarly, there was no effect of concussion on national exam scores in the three studies that used this metric. Four studies considered school absences and early departures from school. On average, students with concussion missed between 1.5 to 5.4 days of school, and absences increased if the student developed PCS (Grubenhoff, Deakyne, Comstock,

Kirkwood, & Bajaj, 2015; Babcock et al., 2013; Thomas et al., 2011; Wasserman et al., 2016) The review authors note, though, that these measures are limited in their generalizability to individual students, and describe long-term successes following concussion, rather than problems that may be experienced as students are transitioning back to learning.

In fact, Iadevaia and colleagues (2015) found that even though students with concussion were performing at baseline academic levels in school after their return, academic effort caused symptom exacerbation in some cases. For example, one student reported ‘‘when I was diagnosed with a concussion, I tried to go to school that afternoon, and I took a science test. After the science test, I had to go home because I couldn’t handle it anymore’’ (p. 1186). In effect, students’ academic dysfunction led to increased effort, which triggered symptom recurrence, but grades were maintained despite this cost. Performance on school assignments may appear unchanged, but student experiences could be quite challenging.

Return to Learn Team Members

Specific needs of adolescent students recovering from mTBI include the need for professionals to address them directly regarding their injury, autonomy over some of the decision making in their recovery, adequate information from healthcare professionals to make decisions, and improved communication between healthcare and educational professionals regarding their return to school (Gagnon, Swaine, Champagne, & Lefebvre, 2008). Gagnon and colleagues (2008) found parent and student perspectives indicated that school professionals lacked appropriate knowledge in mTBI and its effects due to the lack of AA and other supports to facilitate a smooth return to school. Despite communication attempts, students still felt that their injury and needs were not taken seriously at school.

According to a recent review of systems levels needs for return to learn, there are five key components to crafting a RTL policy for students with concussion: 1) identifying and training of an interdisciplinary school team; 2) professional development for medical and academic professionals; 3) protocols for identification, assessment, and progress monitoring; 4) a dynamic set of intervention strategies for students' recovery needs; and 5) coordinated communication between medical and academic members (Gioia, Glang, Hooper, & Eagan Brown, 2015). The interdisciplinary team should consist of medical members (e.g., physicians, school nurses, athletic trainers), academic members (e.g., counselors, psychologist, SLP, teachers, school nurse), and the student/family members.

Medical members monitor health status and modify academic supports. Academic members monitor learning challenges, academic performance, in-class behaviors, and symptom manifestations throughout the school day. The student and parents share symptom manifestations, sleep patterns, and any school-related effects from the concussion. One academic member needs to also serve as the academic coordinator to oversee the academic reentry process and initiate communication regarding academic performance and health status to team member to implement AA. All members effectively share information in order to make decisions regarding the student's participation in recess, class, academic activities, and sports or physical education.

Teachers. When asked about classroom management for students with concussion, teachers are inconsistent in their experience, practices, and education (Dreer, Crowley, Cash, O'Neill, & Cox, 2017; Kasamatsu, Valovich Mcleod, Register-Mihalik, & Welch Bacon, 2017). Teachers lack confidence in their abilities to recognize concussion symptoms and behaviors in the classroom although when asked, teachers are able to identify general concussion symptoms.

Concussion symptoms related to emotional dysfunction or prolonged recovery were often overlooked. Some teachers report that concussions could impact student performance on academics, while others did not identify this as a possible effect from concussion. One study revealed that very few teachers (37.5%) had previously taught a student with concussion (Dreer et al., 2017). Another survey indicated most teachers (71.6%) have taught a student with concussion and approximately 70% of teachers indicated that they had witnessed a decline in academic performance in a student with concussion (Kasamatsu et al., 2017).

These two studies determined most teachers did not have an established concussion management team at their school and were unsure whose responsibility it was to report student concussions to academic personnel (Dreer et al., 2017; Kasamatsu et al., 2017). Kasamatsu and colleagues asserted teachers were more likely to implement AA for students with concussion if they received formal concussion education or personally witnessed academic decline in students postconcussion. Most teachers report they have not received formal concussion education training, although most express a desire to learn more about concussion to create better concussion management strategies in the classroom. What these surveys lack is an insight about how the student's involvement working with teachers to make decisions about their recovery as equal members of a concussion management team or the student's awareness of the extent of the teacher's education and experiences around RTL after concussion.

Athletic Trainers. Survey studies reveal that ATs self-report being the coordinator in the recovery of students with concussion, although they are unfamiliar with AA and believe that monitoring academic progress should be delegated to a school counselor (Kasamatsu et al., 2016; Williams, Welch, Parsons, & McLeod, 2015). Nevertheless, ATs understand that concussions can impact school performance and 41% students with concussion managed by an AT received

AA (Williams et al., 2015). In that survey, less than half of the ATs worked in schools that had an established RTL policy for students with concussion or that used formal concussion management teams.

Interdisciplinary communication was the strongest predictor of an established RTL policy (Kasamatsu et al., 2016). However, there were variations in the perceptions of responsibilities of members of a concussion management team. ATs recommendations for RTL policy include more frequent communication between members of a concussion management teams, increased education for academic professionals, and an established coordinator to monitor the health status and academic progress of students with concussion.

Current Study

Although academic dysfunction following concussion has been described in several studies, very few have examined the RTL processes which may support a student transitioning back to learning. Just one study examined the perspectives of adolescents and their parents about service needs after concussion, with RTL addressed as a small part of the larger context of recovery (Gagnon et al., 2008). Other studies have not investigated the student experiences of RTL, including the student role as part of an RTL team, specific supports received, or the presence of RTL procedures in providing a successful return to academics. The current survey study bridges the gap between what we know about academic challenges following concussion and the RTL experiences of students.

Table 1

Concussion Symptom Examples

Domain	Manifestation Examples
Physical functions	Headaches, dizziness, nausea, balance impairment, vision impairment
Cognitive functions	Difficulty concentrating, forgetfulness, slower reaction times, feeling mentally "slowed down," confusion
Emotional function	Irritability, nervousness, sadness, more emotional than normal, feeling like no one understands them
Sleep behaviors	Drowsiness, sleeping more than usual, sleeping less than usual, difficulty falling asleep

Table 2

RTL Legislation

State	Who creates RTL policy?	Is RTL education required for school personnel?	Is there are required RTL policy established?	Does the RTL protocol have specified standards?	Are there other requirements related to RTL?	Does RTL policy apply to all students?
Illinois	School and district	No	Yes - established by schools	Yes - protocol created by peer-reviewed scientific evidence and comply with CDC guidelines	Schools will establish concussion oversight team with a RTL coordinator	Yes - applies to all students regardless of concussion mechanism or setting
Massachusetts	School and district	No	Yes - established by schools and districts	Yes - protocol includes physical and cognitive rest "as appropriate" and includes a plan for communication between school, healthcare providers, and family	Schools must establish an RTL coordinator. For each student, a written academic reentry plan must be developed by school personnel and health care provider	No - only applies for student athletes
Maryland	State	Yes - school coaches only	Yes - established by the state Department of Education	No	No	Yes - scope not clearly described, but seems to apply to students with diagnosed head injury
Maine	School and state	No	Yes - established by state Commission	No	No	Unclear if mechanism of injury would be considered.

			er of Education			As written, policy mandates management of concussive and other head injuries in school activities and athletics
Nebraska	School	No	Yes - established by schools	Yes - students may require formal and informal academic adjustments, monitoring by academic or medical staff	No	Unclear - written for "students" within a context of a section about student-athletes
New York	School and state	Yes - coaches, nurses, school athletic personnel	Yes - established by state Commissioners of Education and Health	No	Schools and state departments of education and health must provide access to RTL guidelines	Yes - applies to all students regardless of concussion mechanism or setting
Virginia	District and state	No	Yes - established by school districts and state Boards of Education	Yes - schools must accommodate gradual re-entry based on primary health care providers' recommendations	No	No - only applies for student-athletes
Vermont	School	No	Yes - established by schools	No	No	No - only for student athletes

CHAPTER 3

METHOD

All research activities were conducted with the approval of the University of Georgia Institutional Review Board. This study was a part of a larger study comparing the RTL experiences of high school students with concussion, orthopedic injury, and hospitalization to the academic experiences of a healthy control group. The current study includes the responses of students with concussion only.

Survey

The survey is divided into sections, called "blocks," that address topics relevant to the RTL experiences of students with concussion. Blocks in the High School – Concussion, Learning, Academics, and Student Success (HS-CLASS) survey include *Demographics, Academic History, Injury History, Use of an AT, Academic Effects,* and *RTL Experience*, but for the purposes of this study only *Demographics, Injury History, Academic effects,* and *RTL Experience* were analyzed. Overall survey flow and question types within each block are provided in Table 3. The complete survey is provided in Appendix A.

Responses were collected using Qualtrics, an online survey tool, through the University of Georgia (UGA). A draft of the survey was distributed to graduate and undergraduate student research volunteers in the UGA Cognitive-Communication Rehabilitation Lab (CCRL) without history of concussion to test the survey and data collection procedures. Feedback about the survey indicated that the survey questions, flow, and length were clear and appropriate. Revisions to typographical errors and logic sequences were applied given feedback. This preview testing indicated the survey took approximately 25 minutes to complete. In accordance

with UGA Institutional Review Board recommendations, none of the questions in the survey were forced response, except for the consent. Therefore, only responses that completed half or more items in the *Demographics, Injury History, Academic Consequences,* and *RTL Experience* blocks were analyzed. The survey concludes with an optional link for students to enter themselves for a drawing of a $10 Visa gift card. Because all survey questions were optional, participants were not required to completed all questions to enter the gift card drawing. UGA's Department of Communication Sciences and Special Education funded participant incentives.

Question types varied by the information being gathered. In *Demographics*, students encountered 17 single-answer and multiple-answer questions regarding age, gender, location, school type, grade when concussion was sustained, and school workload when concussion was sustained. Similarly, students responded to 6 single-answer or multiple-answer questions in *Academic History* about their academic assistance and performance prior to sustaining a concussion. In the *Injury History* block, students encountered 17 questions about how they sustained their concussion, signs and symptoms of concussion following their injury, previous concussions or brain injuries, medical care provided, other injuries sustained at the same time, and recovery length. Question types included single-answer, multiple-answer, and open-ended.

Academic Effects presented students with 15 items in a series of 3 questions that posed potential academic problems (e.g., "Studying makes me tired.") for which the student would answer a one-answer question (i.e., Did you experience this problem?). If the student responded yes, they also completed a Likert measure indicating how often they encountered this problem from almost never to almost all the time or all the time. Additionally, if students reported they sustained an additional injury at the time of their concussion (e.g., broken bone), they were then

asked in an open-ended question to describe academic problems they faced because of that other injury.

In the final block, *RTL Experience*, students answered 33 questions about AA, time returning to school, professionals involved in their recovery, support they received, RTL reflections, and recommendations for RTL improvement. A variety of question types including single answer, multiple answer, visual analog scales, and open-ended were used in this section.

Participants

The researchers recruited current and recent high school students with a history of concussion. To be included, students must have sustained their concussion during high school, sustained their concussion within the last five years, and returned or attempted to return to school after their injury. Participants also must have completed at least half of the *Demographics, Injury History, Academic Effects,* and *RTL Experience* blocks to be included in data analysis. A variety of recruitment platforms were used including social media, email blasts, word of mouth, information posted on the UGA CCRL website, and flyers distributed through healthcare facilities and sports organizations. Out of the 253 total responses, 195 were excluded either due to incomplete blocks, off-target responses (e.g., "Have you ever heard of the tragedy of Darth Plagueis the Wise?" when prompted to describe how other injuries impacted academics), or the concussion was more than five years removed. Therefore, responses from 58 participants were included in this study.

Measures

The goal of this research study was to describe student experiences of concussion and identify student recommendations for RTL improvement. For this report, data obtained from the *Demographics, Injury History, Academic Effects, and RTL Experience* blocks was considered.

Because the goal of this project was to describe these experiences, this was not a hypothesis driven study. Instead, we hope to further understand students' experiences with RTL postconcussion and identify general trends in their recommendations for improvement.

Data Collection and Analysis

Data were analyzed descriptively. Participants were asked optional open-ended questions and responses to these questions were included in the results. Qualitative data collected from open-ended questions will be grouped into themes and then interpreted based on number of similar responses. Responses to open-ended questions also provided information about the validity of responses and descriptions of the RTL process for students with concussion. Data analysis was completed by both authors. Reliability checks about open-ended responses were completed and no errors existed throughout analysis.

Table 3

HS-CLASS Survey Blocks

Block	Information to be obtained
*Demographic Information**	Age Ethnicity State Parent Education High School Enrollment School Setting Class Type
Academic History	Previous learning difficulties or disorders Overall student performance
*Injury History**	How concussion was sustained Number of previous concussions Symptoms experienced Medical care provided Approximate recovery length
Use of an Athletic Trainer	Presence of AT during recovery AT availability Frequency of AT contact
*Academic Effects**	Symptoms experienced due to concussion Current status of concussive symptoms
*Return to Learn Experience**	Utility of AA Structure of academic reentry Communication between professionals Supportiveness from relationships Experience with school policies Implications on academic performance Recommendations for RTL improvement

Note: Items marked with an asterisk are included in the current report.

CHAPTER 4

RESULTS

Demographic Information

Participant demographic information is summarized in Table 4. Participants represented a variety of U.S. states and geographical regions, with the largest groups representing New York and Georgia. Our sample included more females with concussion (*n* = 37) than males (*n* = 21). On average, students were 17.7 years old (2.5 SD) when they completed the survey. The majority of participants were public school students (*n* = 48) followed by several private school students (*n* = 8), and alternative and homeschool settings with one representative each. Nearly half of participants were in their freshman year (*n* = 24) at the time they sustained their concussion, closely followed by sophomore and junior year with equal representatives (n = 13). Individuals who sustained their concussion during senior year were the smallest group of participants in this sample (*n* = 5). Students in this sample represented a variety of demographics categories including states, school settings, and grades.

Injury

Injury information is summarized in Tables 5-7. Concussion etiology favored athletic events and recreational activity, which included informal pick-up sports or outdoor activities. Students were likely to sustain a concussion playing football (*n* = 12), soccer (*n* = 9), or basketball (*n* = 5). Surprisingly, some non-contact individual sports, including swimming (*n* = 1) and running (*n* = 3), were reported by students as well. Following their injury, most participants (*n* = 53) sought medical care. Of those who sought medical care, many report doing so

immediately (*n* = 20). Receiving medical care within days, was the second highest reported (*n* = 17). Students sought medical care in a variety of settings including primary care physician (*n* = 33), more than one entity (*n* = 30), parents (*n* = 16), emergency department physician (*n* = 15), and others. Roughly half of students reported visiting an athletic trainer during their recovery (*n* = 30). Forty percent of students in this sample reported a history of concussion with a mean of 1.4 (2.3 SD) previous concussions sustained. Students completed the survey at an average of 2.6 (1.9 SD) years after sustaining their concussion. Overall, students sustained their concussion in sports that are typically associated with head injuries and are generally seeking care after injury. Many students received medical care from appropriate healthcare professionals (e.g., physicians, neurologist, concussion clinics), but other reported seeing other professionals (e.g., parents, physical therapist, message therapist) for care after their injury. A large number of our sample reported a history of multiple concussions.

Academics

Table 8 summarizes the reported academic consequences of concussion. Students were presented 15 academic consequences (e.g., "The lights are too bright.") and indicated if they experienced this problem. If students experienced this problem, they could select "experienced and no longer experiencing" or "experienced and *still* experiencing." Initial or resolved problems were calculated as mean number of academic consequences that were marked as "experienced but no longer experiencing." Persisting problems were calculated as mean number of academic problems marked as "experienced and *still* experiencing." When students experienced academic problems, they also rated how often it was a problem for them from *almost never* to *all the time* or *almost all the time*. Each increment (e.g., *almost never, sometimes, often,* etc.) was assigned a number between 1 and 5, with one representing *almost never* and five representing *all the time* or

almost all the time. There were 15 academic consequences and a possible severity rating up to five for each. The mean severity of all academic problems across participants was reported as 33.9 (21.3 SD). This was calculated by adding each severity score (one through five) for all 15 academic consequences, meaning the highest severity score possible would be 75.

Table 8 reveals students endorsed a mean of 9.4 out of 15 academic problems with a mean of 5.3 problems students never experienced, 5.7 problems that resolved, and 3.6 persisting problems. On average, 30.6% of academic consequences did not resolve. The mean severity rating across participants was 33.9 out of a possible 75.

Figure 1 shows academic consequences and how many students initially experienced these problems, continue to experience these problems, or who never experienced these problems. Commonly reported initial problems that later resolved included light sensitivity (68.4%), reading difficulty (60.7%), and an increase in distractibility during school (51.8%). Most frequently reported persisting problems included forgetfulness of school information (37.5%), drowsiness with studying (36.8%), and needing to review information more (33.3%). Exactly a quarter of students reported getting upset about grades or schoolwork as a persisting problem that started after their concussion.

Figure 2 shows the ratings of severity of academic consequences based on how often students experienced each problem. For example, light sensitivity was a problem *sometimes* for 17.0% of students, *often* for 44.7% of students, and *all the time* for 19.1% of students. Academic problems that students most frequently rated they encountered *all the time* include difficulty reading (29.2%) and needing instructions repeated (26.3%). The academic problems most experienced *often* were drowsiness with studying (37.5%) and needing to review school material more often (37.5%). The academic problems most experienced *sometimes* were needing frequent

breaks (31.7%) and difficulty with tasks that used to be easy (31.7%). Academic problems that most students reported they encountered *rarely* forgetting information (23.1%) and taking more time to study (23.1%). The academic problems most experienced *almost never* were being more sad (29.7%) and being more upset about school work (28.6%). In sum, students reported academic difficulties following their concussion, many of which resolved over the course of their recovery, but a substantial subset of which have continued to be different, and more problematic, than before their injury occurred. Physical problems tended to resolve, whereas cognitive and sleep problems tended to persist.

Return to Learn

RTL Descriptors. Tables 11-13 describe students' perceptions of the RTL experience. Participants used a visual analog scale to report positive and negative aspects of their RTL on a scale from 0 to 100, with higher numbers indicating more of that construct. The median rating for smoothness was 59.5, with 0 representing a very rough transition and 100 representing a very smooth transition and no problems. Students were also asked how burdensome it was managing the responsibilities of their RTL, including aspects such as self-advocacy, communication with teachers or doctors, and managing documentation. Student responses were equivocal, with the median landing nearly the in the middle at 50.5 with 0 representing no burden at all and 100 representing very burdensome. Similarly, 50 was the median rate for how much students considered themselves to be academically struggling during their RTL, with 0 representing no struggle at all and 100 representing really struggling and having a difficult time managing. Overall, students reported relatively moderate levels on both positive and negative scales leaving little to conclude from these results.

Academic Adjustments. Table 12 explains what documentation was required for the student to receive AA. Of our participants, 70.0% (n = 40) students reported using AA. Nearly half of those students (*n* = 19) indicated that a note from a physician was sufficient, followed by a note from an AT (*n* = 6). Few students received formal academic accommodations as part of a 504 plan or an Individualized Education Plan (IEP; *n* = 5 and *n* = 2, respectively). For a small number of cases (*n* = 5), no documentation was required for the student to receive AA. One student reported, "My school is a small private school. My mom always kept them well informed."

Table 13 summarizes the types of AA students reported receiving. Fifteen AA were included in the multiple response question, in addition to *none* and *other*. If students selected other, a free text box prompted elaboration. All of these options were selected by at least one student. The most frequently selected AA were *extended time to complete tests and quizzes* and *extended deadlines to submit assignments* (both *n* = 24) followed by *reduced workload* and *reduced screen time* (both *n* = 19). The third most frequently selected response to this item was *none*, so that 31% (*n* = 18) of the sample reported having no adjustments during the return to learn period. Additional AAs reported including leaving class early, preferential seating, alternative testing format, and in just one case, access to audio recorded lectures. *Other* adjustments included missing a year of school, dropping an elective class, spending time with teachers after class, and working on coursework at home. Students typically had to provide documentation like letters from physicians or ATs in order to receive AA, but a small number of students reported the school took their word for it. Most students reported receiving some academic adjustments and the most common academic adjustments were extensions to complete tests and submit assignments.

RTL Teams. Once in school, students reported working with a variety people on their RTL teams, including teachers, ATs, school nurses, and counselors (See Figure 1). However, the most frequently reported team member was a parent. Eleven different types of people were involved in students RTL process with parents (n = 40), teachers (n = 25), physicians (n = 22), and ATs (n = 17) being the most frequent resources for students. An average of 3.0 professionals were involved in each student's RTL process.

Students also identified which person served as the "RTL Team Coordinator," responsible for initiating and managing the communication about their health status and academic progress to parents, medical facilities, and academic professionals. Students rated themselves (n = 25) and parents (n = 22) as the most frequent people fulfilling the responsibilities of RTL Coordinators; far less frequently reported were teachers (n = 8), physicians (n = 7), and other academic professionals. Speech-language pathologists were endorsed by no students as a point person or member of the RTL team. Overall, students are reporting working with a variety of people during their recovery, however, students and parents were the people who were most responsible for maintaining communication between all people involved in the student's recovery.

RTL Timelines. Figure 2 compares timelines related to RTL – time to recover and time to return to school. Recovery time, the period that passed until students were no longer symptomatic or required AA, varied widely. Few students recovered in less than one week (n = 10) with the majority taking several months (n = 14). One week and two-to-three weeks were the second most common recovery periods (n = 11). Then, students indicated how soon after their concussion they returned to school using provided time frames ranging from same day to

multiple months. The majority of students (n = 18) returned to school the day after their injury with a decreasing trend to one month and multiple months as the least endorsed (both n = 3).

Figure 3 portrays how long students used AA, which varied from one day to several months. Out of 47 students who responded to this question, many students reported using academic adjustments from 1 day to 2-3 weeks. The majority of students (n = 13) indicated using AA for up to one month or for more than one month (n = 9). Most students recovered in longer than two weeks and many required more than one month. Students also reported returning to school soon after their injury, with the majority of students returning the following day. Students were offered AA for varying periods of time, with one month being the most frequently endorsed. About a third of students in this sample were not offered AA during their RTL.

Student Reported Needs and Recommendations

To conclude the survey, students were asked the following free-response question. "From your experience, what is something you want researchers, medical professionals, and academic professionals to know about students returning to school following a concussion? For example: What was most helpful in your experience? What did you not have that you wished you did? If your friend had a concussion, what would you tell them to help them transition back to school?" A number of students provided answers to this prompt. Textual analysis resulted in four primary themes – recommendations for teacher/professional education, recommendations for information and plan for RTL, recommendations for self-advocacy during recovery, and wanting trust and understanding with their experiences.

Teacher/professional education. Students reported some positive experiences with teachers and school professionals, but more often expressed frustration with teachers, coaches, and administration for not understanding and accommodating their needs. Specifically, students

wanted teachers to understand concussion symptoms and the effects on academic performance, then employ AA to support them while they are symptomatic. Some students described in detail the need for expanded education and awareness of concussion symptoms and academic consequences following concussion, recalling experiences like the following, "[Teachers] were more focused on me just getting my work done and not distracting anyone else because I was still considered concussed. But they weren't as supportive as they should be and they just wanted me to get the test and the quizzes done as quickly as I can."

Teachers who were understanding and organized during RTL eased the burden for students transitioning back to school. One student reported, "What was most helpful in my experience was that a lot of my teachers were very prominent with the accommodations that needed to be made." Another wrote, "Most teachers were understanding if I struggled with an assignment and would work with me on the assignment." Others expressed differing levels of support: "Some teachers were more knowledgeable than others about concussions, and as such, were able and willing to work with me more." Students also wanted more information about concussion in the hands of teachers. "I think teachers need to be more educated on the effects of concussions. I was constantly struggling with most of the side effects on the worse side of the spect[r]um. They thought I was just using it as an excuse to get out of work."

Information and plan for RTL. Students expressed a desire for more information about concussion symptoms and academic consequences for themselves and their parents. This way, students expressed hope that parents would understand these problems were real, likely temporary, and could share possible strategies to help in the meantime. One student reported, "Once [my mom] took my symptoms seriously and realized it was a concussion, my mom was very helpful and involved in helping me to manage the workload and talk to teachers to work out

accommodations." Several students shared experiences with a premature RTL. One reported, "My parents think I went back to school too soon because they didn't know what they were doing." Another student remembers, "Returning before my symptoms were gone caused me to always feel confused and lost. This created so much stress and exacerbated the headaches and depression."

Several students emphasized the importance of returning to school with a strategic plan. One student wrote, "An outlined plan. Make a plan and take the time needed to recover." In agreement, another student mentioned, "I would tell my friend that they should rest for a few days but that they need an active recovery plan." Students encouraged others to prepare for their RTL. Advice included, "Maybe a daily checklist for me and my teachers to monitor problems that might come up a little better. Some stuff to read about what to lookout for without completely scaring my parents!" Students wanted more planning as to how to return safely, and information around what to expect when returning to learn.

Self-advocacy during recovery. Students encouraged others to speak up for themselves when they are not feeling well and rest rather than push through their symptoms. Students advised allowing time for recovery too. One student reported, "I would [have] transitioned more gradually. Jumping back into things was stressful and didn't help symptoms." Another student recommended, "Seeing doctors and taking time off to rest when needed. More time off to sleep."

Communication with teachers was a big part of self-advocacy from student reports. This requires a knowledge and awareness that their symptoms are related to their injury, which intersects with the need for more education for students and parents. One student encouraged others, stating, "Just tell the teacher about how you[r] head feels and let them know when you're struggling." Others offered advice including, "To a friend, I would say to give yourself grace and

don't expect it to get better immediately. Take naps when you need them, stay off computer and phone as much as possible, and be honest with teachers and your parents when you just can't focus or do what's being asked. I wish I knew sooner to do those things or something that would've helped the healing faster." Students wished they had listened to their bodies and spoke up for when they needed more support during recovery.

Trust and understanding. Students expressed a strong desire to feel trusted in their experiences. When students reported their symptoms or asked for support, they wanted to be met with willingness and understanding. "Teachers should be better educated in concussions. Wished they understood," a student said. Many student experiences were characterized by doubt and frustration. One student mentioned, "Some people have told me that I just need to get over it. Lots of people just don't understand. I feel alone." This lack of trust and understanding was also reported as isolating for students, especially those who experienced a prolonged or complicated recovery. One student explained, "People just don't know about concussions at all. Teachers, friends. everyone. Please keep working to get the word out. People can't see the injury so they don't think it is real."

Without trust, students felt as if their concussion symptoms were perceived as lazy or lying. One student reflected, "The majority of my teachers saw it as an excuse not as a severe brain injury." Another student stated, "Wish I would have gone to administration about the teachers who made me do things the doctor clearly said I was not supposed to do." Like other aspects of RTL, trust and understanding were variable. "Some teachers understood and some did not work with us at all," according to one student. Students believed concussion education increased understanding and cooperation. Others offered advice for professionals working with students with concussion, "They need to be supportive, understanding, and educated on all

aspects [of concussion].” When asked what was most helpful during their recovery, one student stated, “People just giving me time and understanding what was going on.” Students wanted time, trust, and understanding as they recover from concussion and re-acclimate to academic demands.

Table 4

Participant Demographics

	Mean (SD)
Age (years)	17.7 (2.5)
Gender	*n* = 58 (%)
Female	37 (63.79%)
Male	21 (36.21%)
State	
New York	22 (37.9%)
Georgia	16 (27.6%)
Michigan	4 (6.90%)
Florida	3 (5.17%)
Ohio	2 (3.45%)
California	2 (3.45%)
Washington	2 (3.45%)
Pennsylvania	2 (3.45%)
Arizona	2 (3.45%)
North Carolina	1 (1.72%)
South Dakota	1 (1.72%)
Maryland	1 (1.72%)
School Setting	
Public	48 (82.76%)
Private	8 (13.79%)
Alternative	1 (1.72%)
Homeschool	1 (1.72%)
Grade (*n* = 55)	
Freshman	24 (43.36%)
Sophomore	13 (23.63%)
Junior	13 (23.63%)
Senior	5 (9.09%)

Table 5

Concussion Etiology

Etiology	*n* = 58 (%)
Athletic Event	40 (69.0%)
Recreational Activity	9 (15.5%)
Other	5 (8.6%)
Fall	4 (6.9%)
Sports	*n* = 48 (%)
Football	12 (25.0%)
Soccer	9 (18.8%)
Other	5 (10.4%)
Basketball	5 (10.4%)
Volleyball	4 (8.3%)
Cheerleading	4 (8.3%)
Running	3 (6.3%)
Lacrosse	3 (6.3%)
Swimming	1 (2.1%)
Rugby	1 (2.1%)
Softball	1 (2.1%)

Table 6

Injury Information

	n = 58 (%)
History of multiple concussions	24 (41.4%)
Received care from an AT	30 (51.7%)
Received medical care	53 (91.4%)
	Mean (SD)
Time Post Onset (years)	2.6 (1.9)

Table 7

Care following Concussion

	n = 58 (%)
Received medical care after concussion	53 (91.4%)
Medical Care Provider	
Primary Care Physician	33 (56.9%)
More than one entity	30 (51.7%)
Parent	16 (27.6%)
Emergency Room Physician	15 (25.9%)
Coach	10 (17.2%)
Urgent Care	9 (15.5%)
Skilled Facility or Concussion Center	8 (13.8%)
Physical Therapist	8 (13.8%)
Other	4 (6.9%)
No Medical Care	2 (3.4%)
Timeline to Care	
Immediately	20 (34.5%)
Within hours	14 (24.1%)
Within days	17 (29.3%)
Within weeks	2 (3.4%)
Did not seek care	5 (8.6%)

Table 8

Academic Problems

	Mean (SD)
Total number of problems (out of 15)	9.4 (4.8)
Problems students did not experience	5.3 (4.7)
Problems that resolved	5.7 (4.1)
Problems that persisted	3.6 (4.6)
Mean severity of problems (out of 75)	33.9 (21.3)

Note. The means in this table represent the average number of problems students endorsed following their concussion out of a list of 15. Some academic consequences were not a problem for some students, while others were an initial problem that resolved or a persisting problem they were continuing to experience. Severity was calculated by adding Likert scale numbers associated with frequency of reported problems (e.g., *almost never* = 1, *rarely* = 2, *sometimes* = 3, *often* = 4, *all the time* = 5). With 15 problems, and a rating of up to 5 for each, the maximum possible was 75.

Table 9

Ratings of RTL Descriptors

	Median
Academically struggling	50
Smoothness	59.5
Burden	50.5

Table 10

Documentation for Academic Adjustments

	n = 41 (%)
Doctor's note	19 (46.3%)
Letter from AT	6 (14.6%)
504 Plan	5 (12.2%)
Nothing	5 (12.2%)
Other	4 (9.8%)
IEP	2 (4.9%)

Table 11

Academic Adjustments

	n = 58 (%)
Extended time	24 (41.4%)
Extended deadlines	24 (41.4%)
Reduced workload	19 (32.8%)
Reduced screen time	19 (32.8%)
None	18 (31.0%)
Leave class early	13 (22.4%)
Leave school early	12 (20.7%)
Break down assignments	11 (19.0%)
Access to notes	11 (19.0%)
Wear sunglasses	10 (17.2%)
Quieter area	9 (15.5%)
Preferred seating	8 (13.8%)
Allotted breaks during class	7 (12.1%)
Other	5 (8.6%)
Alternative test format	4 (6.9%)
Audio books	2 (3.4%)
Audio record lectures	1 (1.7%)

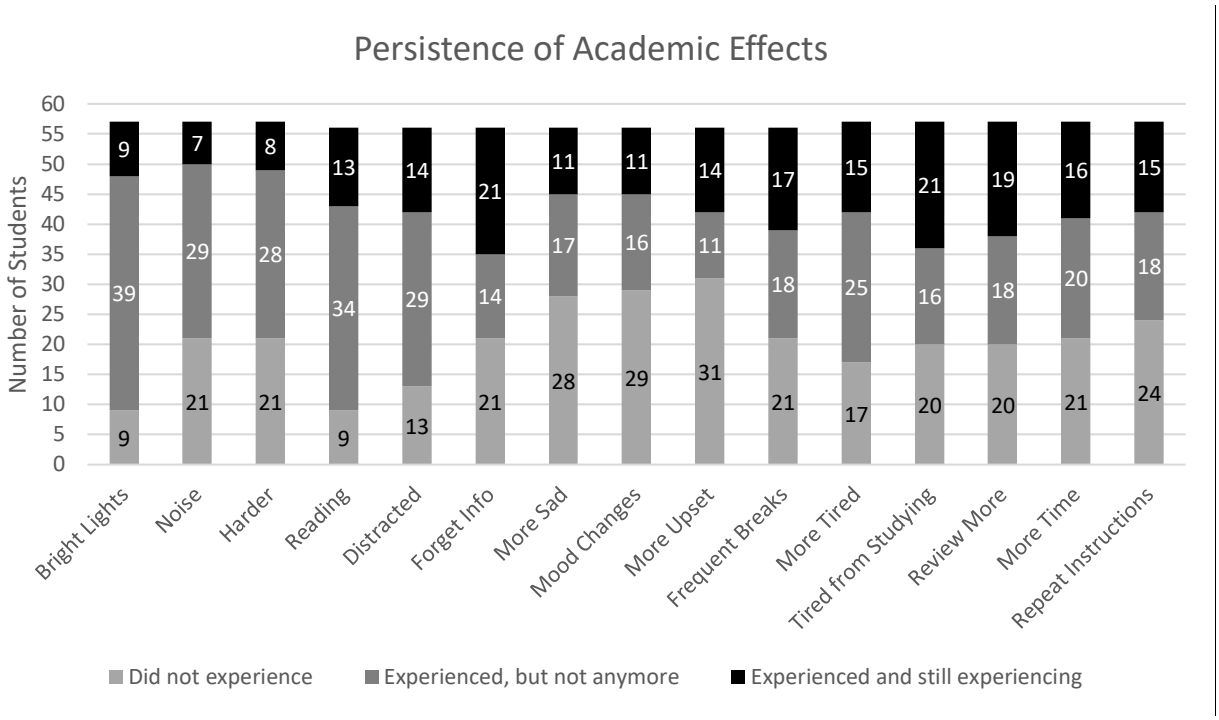

Figure 1. Persistence of academic effects. This figure illustrates students experience with academic effects from their concussion.

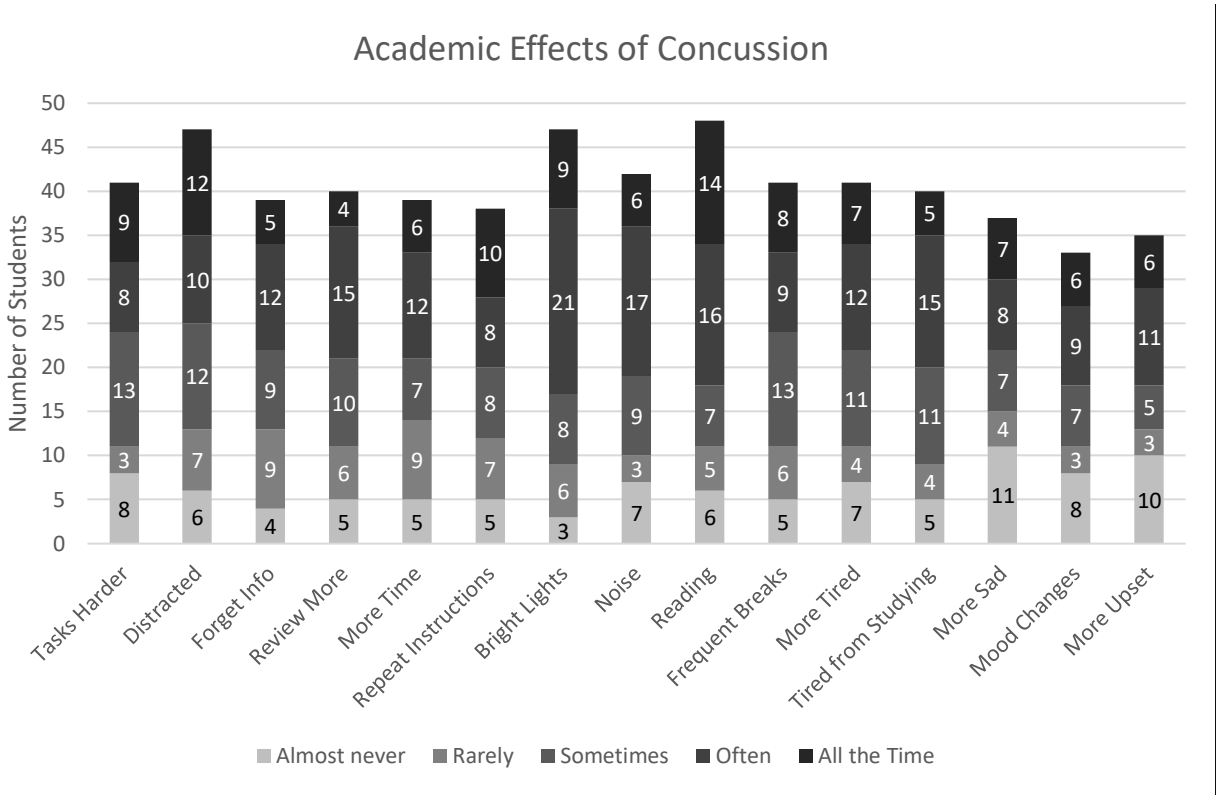

Figure 2. Academic effects of concussion. This figure depicts how often each academic effect was a problem for students.

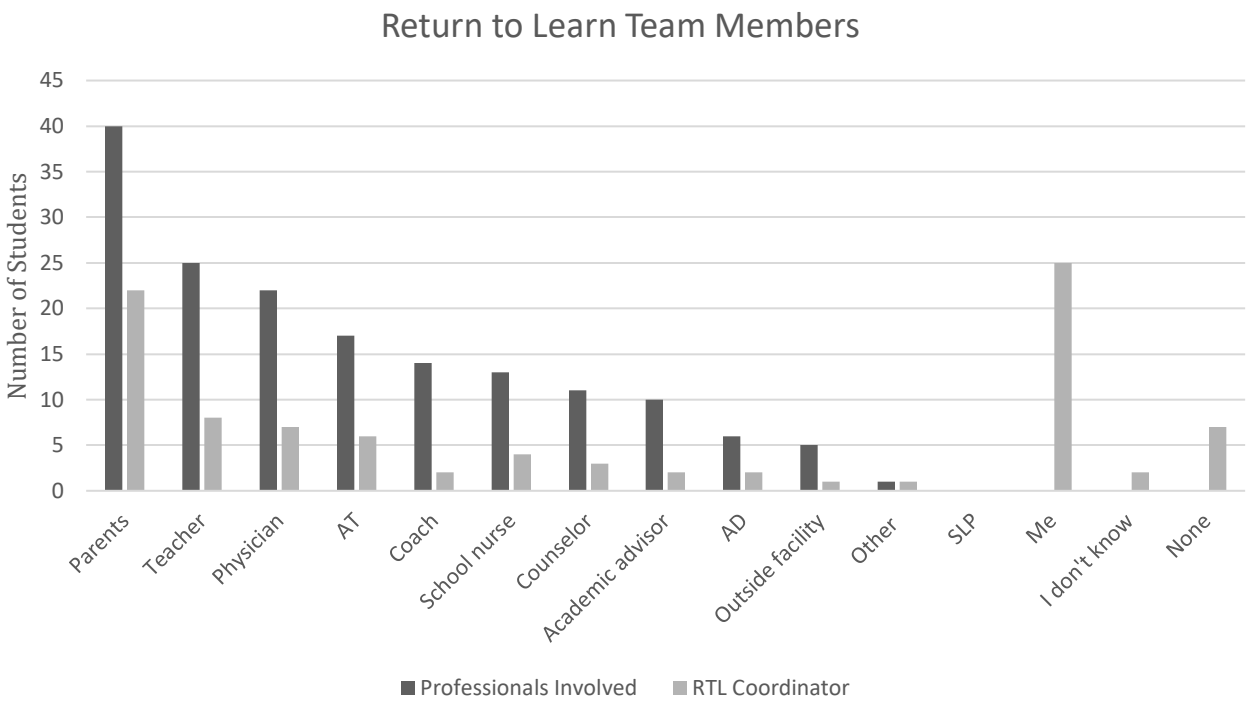

Figure 2. Return to Learn Team Members. This figure represents the people involved in students' RTL experience. AT = Athletic Trainer, AD = Athletic Director, SLP = Speech-Language Pathologist.

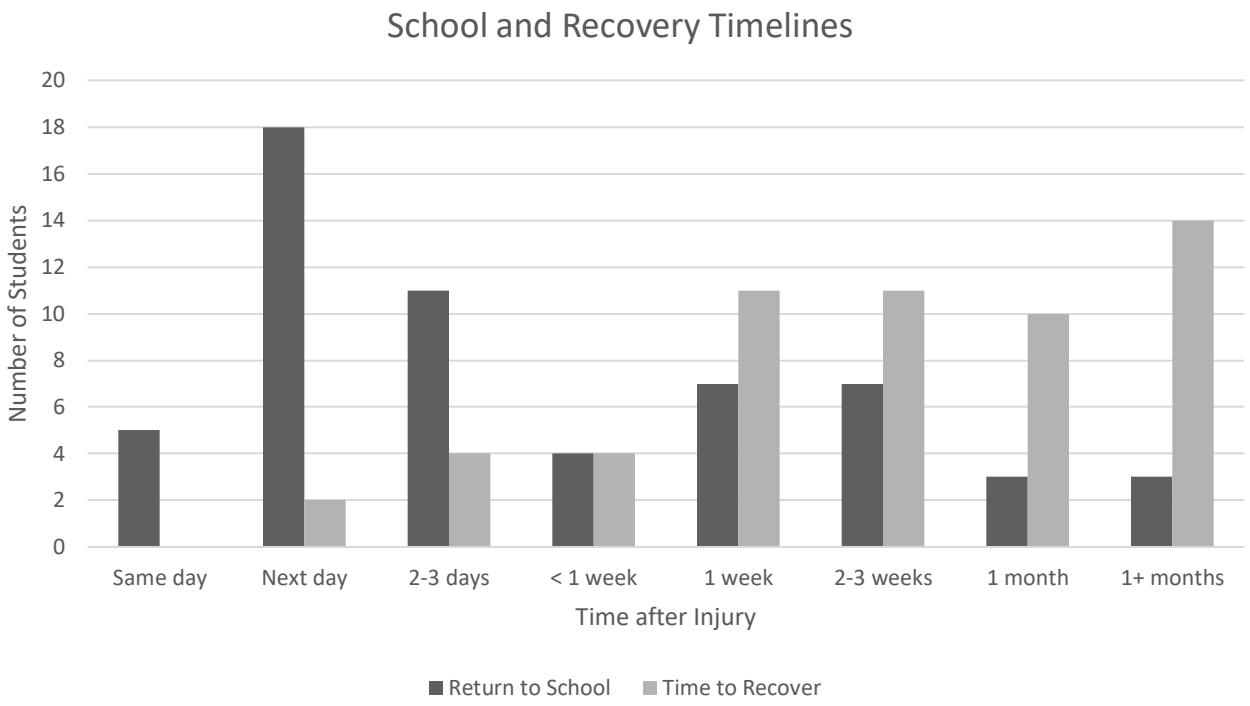

Figure 3. School and Recovery Timelines. This figure compares when students returned to school and when they considered themselves recovered from their concussion. Recovery is defined as no longer symptomatic and no longer requiring academic adjustments in school.

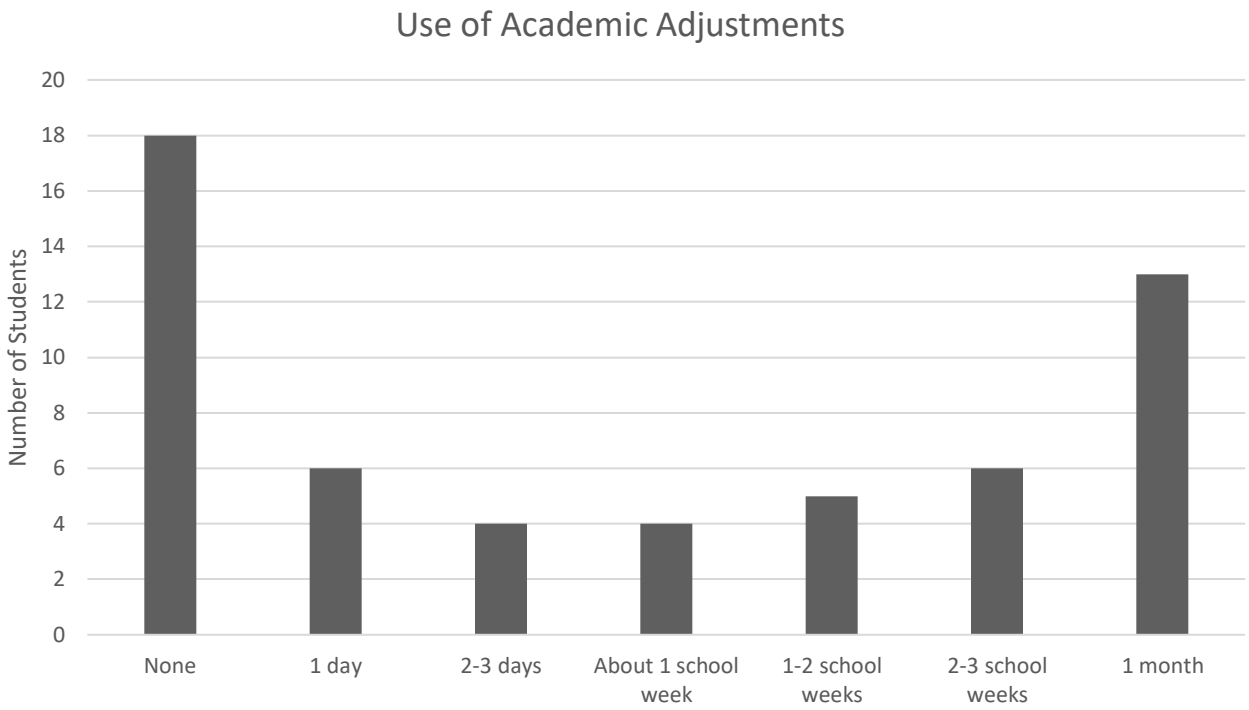

Figure 4. Use of Academic Adjustments. This figure reveals how long students received academic adjustments and those that reported not receiving academic adjustments.

CHAPTER 5

DISCUSSION

The purpose of this study was to describe the experiences of high school students with concussion and the RTL process following their injury. This study aimed to fill the gap in literature around RTL by including student voices and recommendations. Participants were current or recent high school students that sustained a concussion while in high school, and returned to school or attempted to return to school afterwards. Students represented a variety of geographical regions, school settings, and grades. A substantial subset of students reported a history of multiple concussions. Students reported seeking medical care for their concussion and returned to school quickly after their injury, but many reported needing a month or longer to recover. Students described having academic consequences from their injuries, although encouragingly, also reported use of AA. Support was available to students from a variety of professionals as well as their parents, yet students are continuing to self-report as the person responsible for coordinating their own RTL process. Student reflections revealed areas in need of improvement for systematic changes to create a more inclusive and fluid RTL process.

Demographic Information

Our study included more female students than male students, which may be consistent with other research showing that females are at risk for greater symptomatology and longer recovery times following concussion than their male counterparts (Chiang Colvin et al., 2009; Dick, 2009). Lumba-Brown and colleagues (2018a) reported that females age 5-17 had a likely association to experience headaches for 3-12 months following concussion. Similarly,

Wasserman and colleagues (2016) reported that female students experienced more academic dysfunction than their male counterparts at one week and one month postinjury. Some speculate these risks are attributed to anatomical and hormonal differences between sexes. Females have smaller head mass and neck girth than males that may put them at greater risk for concussion (Tierney, Sitler, Swanik, Swanik, Higgins, & Torg, 2005). Investigations of hormonal contributors have found that females who are on their menstrual cycle or have elevated progesterone levels at the time of injury experienced more symptoms and a decrease in QOL for up to one month after their concussion (Wunderle, Hoeger, Wasserman & Bazarian, 2014). However, some studies also suggest that females are more honest in reporting concussions than males for a variety of reasons, largely because males did not think the injury was severe enough, did not want to be excluded from competition, or did not know concussion characteristics (McCrea, Hammeke, Olsen, Leo, & Guskiewicz, 2004). Given that a substantial number of our students reported a prolonged recovery and a high number were female, future analyses should examine the effects of female recovery patterns following concussion in this sample.

Injury

Students are sustaining concussions in ways that we would expect for their age group; sport-related concussions peak during this time, and the majority of our sample reported sports or recreation related injuries. Researchers found that sport-related concussions accounted for 70% of concussions that presented to the emergency department in one hospital for children ages 0-17, with higher ratings for adolescents (Haarbauer-Krupa et al., 2018). In our study, football, soccer, and basketball were the most commonly reported sports in which students sustained their concussions. Similarly, the CDC reported that football, bicycling, basketball, playground

activities, and soccer account for the highest number of emergency department visits for children with sport and recreation-related TBI between 2010 and 2016 (Sarmiento et al., 2019).

Students in our sample sustained their concussions in both organized and unorganized sports, consistent with other findings (Sarmiento et al., 2019). We would expect that students playing organized sports associated with the school would experience consistent, prompt attention after their injury, however, students reported that this was not always the case. One student suggested the following:

> I want researchers to know that there needs to be increased awareness from coaches about concussions. At no time did a coach ever approach me, or come off the bench right after it happened to check on me. I was never removed from the game. I did not miss a play. There also should be an experienced medical professional on site at all times. If the team is playing away, it does not necessarily have to bring a trainer with them. But the home team should have one on call at the field at all times ready to take action even on a visiting team's player.

So, there does appear to be a subset of student-athletes who are being missed by the current system of concussion care, perhaps because of awareness as the student above suggested, or perhaps because of limited resources for ATs or other medical professionals to be available. For students who sustain their injuries in casual sports, recreational activities, or from other mechanisms (e.g. falls, motor vehicle accident, etc.), immediate diagnosis and management can be even more limited. Approximately half of RTL legislation is written for student-athletes who sustain a concussion during play associated with high school sport teams and therefore exclude concussions that are sustained by casual sports or by non-sports related etiologies (Thompson et al., 2016). Therefore, these systems do not benefit many students. Future research should explore

how to develop identification and management systems to better meet the needs of these students who sustain non-sports related concussions as they return to school.

Encouragingly, our students indicated that they sought medical attention soon after their injury and in a variety of settings. More than half of students received medical care within hours of their injury. CDC data shows an increase in emergency room (ER) visits for mTBI starting in 2006 that has been associated with increased public awareness of the risks of concussion (CDC, 2019). Our sample seems to have benefitted from that rise, and was proactive in seeking appropriate care. Most students reported seeing a physician – either primary care, urgent care, or ER – for diagnosis. Other students are receiving medical care from parents or physical therapists, and a few from less expected entities like massage therapists or chiropractors. The 2017 Consensus Statement on Concussion in Sport recommends removing a player from competition if any signs or symptoms are observed and that an evaluation should be completed by a physician or licensed healthcare provider using standard emergency management principles (McCrory et al., 2017). Halstead and Walter (2010) recommend an investigation of the student's symptoms, a neurologic examination, and an evaluation of cognition using a sideline assessment tool for initial evaluations of students with suspected concussion. Parents, physical therapists, massage therapists, or chiropractors may not be qualified to administer these assessments or have adequate experience to identify diagnostic criteria or less common characteristics of concussion.

Students also reported extended recovery times, much longer than the current gold standard of 10-14 days (Halstead & Walter, 2010). Most students in our sample required one month or more to be symptom-free and no longer need AA, which is consistent with more recent reports around adolescent concussion recovery (Lumba-Brown et al., 2018b; McCrory et al., 2017). A large number of our participants returned to school immediately following their injury,

which may have put them at risk for symptom exacerbation or recurrence due to premature RTL (Carson et al., 2014). However, it is unclear if the recovery times in this sample were exacerbated by improper concussion management. A substantial portion of our sample also reported a history of concussion, which is a known risk factor for complicated recovery. Our sample was also primarily female, which may also be an important future variable to consider in understanding the extended timeline to recovery that students were reporting here.

Academics

Students endorsed many academic problems immediately following their injury in all domains - physical, cognitive, emotional, and sleep. Like other reports, students in our sample reported physical symptoms as the most problematic when returning to school (Iadevaia et al., 2015). For example, students agreed that they had problems with lights, noise, and headaches. Cognitive effects were the second most frequent problems for students in the acute period after an injury. One reported, “I just felt like I wasn’t there like I was trying to think through a thick fog.”

Students also reported many persisting problems from all domains at an average of 2.6 years postinjury. The most frequent persisting problems were related to sleep and cognitive function. One student reported, “After getting my first concussion, I got my first migraine headache which I still get and have a prescription for,” and another recalled, “I'm still recovering from my concussion freshman year and I'm a senior now. Math for me is super hard now, I don't remember the basics.” Baker and colleagues (2015) reported that prolonged recovery and being symptomatic exacerbates academic dysfunction. Although it is recommended that students return to school within 2-3 days postinjury (Lumba-Brown et al., 2018a), presumably before they have

completely recovered, without proper support and structure, students can exacerbate symptoms and negatively impact academic performance.

It is noteworthy to mention that many students were endorsing emotional symptoms from their concussion as a persisting problem. One in five students reported feeling more sad than usual and more mood changes than before their concussion. One in four students reported getting more upset about grades or school work after their concussion. Because teachers are less likely to recognize emotional symptoms of concussion including mood changes, depression, and social isolation (Dreer et al., 2017), these persisting emotional symptoms may be particularly problematic for students. One student wanted others to know that, "People with concussions get upset and frustrated easily. We are trying to the best of our abilities, yet nothing is there." Students also may not associate emotional change with their injury and therefore may not be able to understand and communicate their feelings. It's also important to consider the emotional, social, and hormonal changes that take place during adolescent years that may also be attributing to these emotional symptoms.

Return to Learn

While most students in our sample reported needing more than one month to fully recover, most students returned to school the following day. This trend aligns with Baker and colleagues (2015) findings about school attendance following concussion. Nearly all sports practices take place in the afternoons, after school hours, suggesting that students injured in organized sports may have been back in school less than 24 hours after a concussive injury. To some extent, we would anticipate and recommend that students return to school while they are still recovering because research indicates that a return to moderate activity, just below symptom threshold levels, facilitates a faster recovery (Brown et al., 2014; Sady, Vaughan & Gioia, 2011).

However, this return to moderate activity should take place after 24-48 hours of cognitive and physical rest (McCrory et al., 2017). Ideally, students would be returning to school 2-3 days after their injury with AA to reduce their cognitive load (Lumba-Brown et al., 2018a). From this sample, we see a spike in school attendance immediately following injury and AA being used by most students for up to one month, with several using AA for more than one month after injury.

In order to receive AA, a relatively low number of students reported that school administrators or teachers trusted a word-of-mouth report from the student or parents, which may be a barrier for students whose care is being facilitated through someone other than a physician (e.g., parents, physical therapist, chiropractor). Otherwise, students reported using notes from physicians or ATs, though there is some variability in teacher compliance with those recommendations. Several students made comments such as, "Most teachers were extremely supportive but my math teacher told me if I didn't take the tests and quizzes I would get a zero. After doing more poorly on the assignments than usual a doctor told her she had to give me makeups and allow me more time from now on. She ignored this and continued to act as though I was completely fine."

In our study, it is unclear if AAs were individualized to meet the specific needs of students. The most frequently reported AA were designed to manage the timeline and overall load of schoolwork, not to supplement specific concussion symptoms. For example, 84.2% of students reported a light sensitivity, however, only 17.2% of students were offered sunglasses and 13.8% were offered preferential seating. In a survey of teacher management practices for students with concussion, Dreer and colleagues (2017) discovered that the most common AA offered was extended time to submit assignments. Our results concur, the most commonly reported AA were extended time to complete assignments and extended deadlines to submit

assignments, which, if implemented in isolation, only postpones the cognitive burden. Reflecting on AA, one student reported, “Even though I was given extended deadlines, the work still had to be done and turned in, which was stressful as it piled up.”

Kasamatsu and colleagues (2017) reported teachers that completed formal concussion education were more familiar with AA and more likely to implement them for students with concussion. Best practice suggests that students receive an individualized RTL process including supports that are tailored to their specific needs because concussion management should not be a one-size-fits all approach (Halstead et al., 2017; Lumba-Brown et al., 2018a). If RTL policies are created using the framework from Gioia and colleagues, teachers would have access to formal concussion education. In this framework, the school or system would have a dynamic set of interventions for students recovering from concussion, which could include a list of symptoms and several AA that may compensate for that symptom (e.g., light sensitivity – wear sunglasses, preferential seating, taking breaks; noise sensitivity – wearing headphones/ear plugs, preferential seating, completing assignment in quiet area, taking breaks). In this model, students are being offered individualized support and teachers do not have the added burden of searching for appropriate supports for their students.

Glang and colleagues (2015) trialed an online concussion education system, *Brain 101*, which offers information for students, parents, educators, and athletic staff about recognizing and managing sport concussions. Schools that completed *Brain 101* offered students a larger amount of and more diverse set of AA tailored specifically to the student’s needs. Additionally, schools that completed *Brain 101* implemented other best practice strategies for concussion management including the implementation of an RTL team, with an assigned RTL coordinator, that met regularly and had frequent communication with teachers and parents.

Students are reporting working with a variety of people during their RTL, although parents are the most frequently endorsed. Current recommendations are that a multidisciplinary RTL team should be implemented and a point person or case manager (i.e., RTL coordinator) should be selected to facilitate communication with all involved people (Gioia et al., 2015; Halstead et al., 2017). Kasamatsu and colleagues (2017) asserted, "identification of a point person is necessary to streamline communication among all individuals involved in the student's care, limit over- and under-accommodation of students' needs, and facilitate the student's full transition to school and physical activity," (p. 187). In our study, students reported themselves as the RTL coordinator. This is partly encouraging to see students having some autonomy over their recovery, which Gagnon and colleagues (2008) identified as a need for adolescents recovering from concussion. However, it can also be an inefficient use of the student's limited cognitive resources immediately after injury and an added burden.

According to Halstead and colleagues (2017), "A comprehensive team approach to care may reduce mistakes in management, which should potentially risk reinjury during the healing phase, lengthen recovery, or results in untoward long-term consequences," (p. 956). After completing the survey, one student wrote, "I did not have a return to learn process. I got my concussion at an away game so our AT was not there and did not know about it. No one knew I had passed out so I was allowed to go back in and play. I wish I had had a return to learn process because it could have helped me adjust back into school." Students recognized the disturbances their concussions created for academic re-entry and desired a more structured approach to RTL.

Student Reported Needs and Recommendations

The final question on the survey asked students for recommendations for RTL based on their personal experiences. Students generated thoughtful responses to this prompt, many of

which had similar themes including teacher/professional education, information and plan for RTL, self-advocacy during recovery, and wanting trust and understanding. Each of these factors works toward the necessary progression for RTL for students with concussion.

Students frequently mentioned teachers as an influential part of their RTL and desired more concussion education for teachers, adding to other studies with similar student-reported recommendations (Gagnon et al., 2008). It has been established that approximately between 42-44% of teachers have participated in formal concussion education, indicating room for growth (Dreer et al., 2017; Kasamatsu et al., 2017). Dreer and colleagues (2017) demonstrated that, when cued, teachers could often identify common effects from concussion like headaches, trouble concentrating, and memory problems, but were less familiar with emotional symptoms or prolonged recovery. Students recovering from concussion may also be unaware of symptoms related to emotion and therefore may require more support and assurance than before. Teachers are willing to receive more information about concussion (Dreer et al., 2017) and future studies should consider formal concussion education for teachers specifically regarding symptom diversity, prolonged recovery, and individualism in AA.

Students also wanted more education for themselves and their parents. Many statements reflected feeling left alone to navigate the murky waters of RTL. In a survey study of parent knowledge about concussion, just 13% of parents were able to correctly identify all statements about concussion accurately (Mannings, Kalynych, Joseph, Smotherman & Kraemer, 2014). The majority of parents did not know concussions were mTBI and could be caused by something other than a blow to the head. Though some studies have suggested that student-athletes have adequate knowledge of concussion (Chrisman, Quitiquit & Rivara, 2013), others did not recognize grogginess, difficulty concentrating, and personality/behavioral changes could be

associated with concussion and reported that their parents had not discussed concussion awareness with them as required on the annual consent form for sports participation (Cournoyer & Tripp, 2014). Like teachers, students also had difficulty associating emotional symptoms with concussion (Cusimano, Zhang, Topolovec-Vranic, Hutchison & Jing, 2017).

In previous studies as well, students and parents have requested more information about symptom management, injury sequelae, expectations for returning to activities postconcussion (Gagnon et al., 2008). Existing concussion education programs like *Brain 101* (Glang et al., 2015) and *Heads Up! Concussion in Youth Sports* Toolkit (Sawyer et al., 2010) have been effective for implementing recommended concussion management practices for school administrators, coaches, students, and parents. These programs should continue to be researched and updated, but current literature suggests these programs may bridge the gap in knowledge for parents, students, and possibly teachers.

Students understood the importance rest has on symptoms and academic performance in hindsight, but academic pressures or social interactions have been suspected to increase students' rush in returning to normal school activities in the acute phase of their injury (Iadevaia et al., 2015; Sady et al., 2011). With increased education and awareness about concussion, students may feel better about taking adequate time off for rest or breaks. Similarly, with more information about concussion available to students and parents, specifically about the nuances of symptoms, manifestations, and consequences of a premature RTL, students may not feel as pressured about returning to school too quickly and better equipped to advocate for themselves when they need rest or other forms of support.

A study conducted in 2008 determined that adolescent students are lacking support and understanding from teachers about symptom reporting and use of AA (Gagnon et al., 2008).

Students in the current study are continuing to express similar frustrations as they encounter teachers' disbelief and noncompliance with concussion symptoms and recommendations. This highlights the significant need of continued public awareness and education about concussion management and recovery, specifically for those working with students who sustain concussion. Students want teachers and parents to trust that they are not lying about their symptoms and support them during recovery. Mutual trust and understanding were overall very important to students.

Further research should examine how these recommendations work together and their influence on the RTL process. With more education and awareness for professionals working with students who sustain concussion, we may expect more flexibility and understanding from teachers evidenced by an increase in compliance with AA and positive student reflections. Similarly, with improved education for parents and students, we may also expect clearer identification of various concussion symptoms, which can fuel self-advocacy in the school system. Ideally, teachers/academic professionals, students, medical professionals, and parents are all working within a structured, yet dynamic RTL protocol, where expectations and performance can be reviewed and supported strategically to create a trusting and successful RTL experience for everyone.

Limitations and Future Directions

Limitations of this study largely include sample size, time post onset, and concussion history. It is difficult to make generalizations about RTL experiences with 58 participants that are spread throughout the country and may have had very different support systems available to them. Because a large number of our participants have a history of multiple concussions, our sample may also be considered more severe. Data in this study were described descriptively and,

therefore, we did not identify associations for more successful reports of RTL. As an observational study, we also cannot describe causal relationships between factors. Further statistical analysis on this dataset may yield more definite indicators of successful RTL experiences. For example, we may consider participants with and without history of multiple concussions to determine which is more influential – a potential difficult recovery because of the concussion history or better recovery because of previous experience navigating the RTL experience.

Another limitation that must be considered is time post onset. Students in our sample reported their experiences an average of 2.6 years after their injury, which can influence accurate reporting of specific details about their RTL. Students may also have elected to take this survey in order to report their challenging experiences because these may be more memorable, although we did observe a range of experiences. Also, due to the nature of survey studies, we were not able to verify student responses to survey questions using academic records or follow-up interviews with the student, parents, or teachers.

There is still much to understand about concussions and RTL. For example, future studies should seek a greater sample size from more states to determine if differences in recovery and RTL exist between those that have RTL legislation and those that do not. Also, future studies should examine the influence of compliance with best practice recommendations for concussion recovery and persisting academic problems, perhaps by combining student level data with other RTL team members, school RTL documentation, or other related data sources.

CHAPTER 6

CONCLUSION

Many students who sustain a concussion in high school return to school while they are still recovering. This study described RTL experiences of a sample of students with concussion as a step towards identifying gaps and identifying avenues for improvement. As awareness of concussion and TBI continues to grow, so will education and rehabilitative efforts requiring studies like this to ensure student voices and recommendations are driving the formation and implementation of concussion management policies. Results indicated that many students in our sample required more than a month to recover from concussion. The majority of these students reported returning to school soon after their injury and, interestingly, many reported persisting academic problems. Some students receive AA, although it is unclear the degree to which these are individualized to each student's specific symptoms. Students are managing a large burden by acting as RTL coordinator. Continued work in this area will lead to improved systems for students, and incorporating student voices is an important component to serving this population.

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Appendix A

Demographic Information. These questions ask basic information about you.

1. Age: How old are you?
2. Gender

   Male
   Female
   Prefer not to answer
3. Indicate which your race/ethnicity. Select all that apply.

   Caucasian
   Hispanic or Latinx
   Middle Eastern
   Black or African American
   Asian
   American Indian
   Pacific Islander
   Alaska Native
   Native Hawaiian
   Other
   Prefer not to answer
4. What is the highest level of education *completed* by your mother?

   Did not complete high school
   High school or GED
   Some college
   Bachelor's degree
   Master's degree
   Advanced graduate work or Ph.D.
   Not sure
   Prefer not to answer
5. Are you currently a high school student?

   Yes
   No
   6. *Display if currently a high school student.* What grade were you in when you sustained your concussion and what is your current grade?
   7. *Display if no longer a high school student.* If you are no longer a high school student, please indicate the grade you were in when you sustained your concussion and time elapsed since you completed high school.
8. What is your zip code?
9. What state are you from?
   10. *Display if from Georgia.* What county in Georgia do you live in?
   11. *Display if from Georgia.* Did you receive services from the Gwinnett Concussion Institute?

       Yes
       No
12. What type of school setting were you in during the semester you sustained your concussion?

    Public
    Online
    Private
    Alternative

Homeschool Other. Please describe in the space below.

13. How many total courses were you taking during the semester you sustained your concussion?
14. Were you enrolled in any Advanced Placement (AP) or International Baccalaureate (IB) courses during the semester you sustained your concussion?
    Yes
    No
15. *Display if taking AP or IB courses.* How many AP courses were you taking?
16. *Display if taking AP or IB courses.* How many IB courses were you taking?

Academic History. These questions ask about your experiences in school *before* you sustained your concussion.

1. Prior to your concussion, did you have or receive any of the following? Select all that apply.

Individualized Education Plan (IEP)	Assistance in writing
504 Plan	Assistance in math
Assistance in reading	Other. Please describe below.

2. Prior to your concussion, did you receive any mandated academic assistance (e.g., tutoring, extended test time)?
   No
   Yes. Please describe.
   I used to, but not immediately prior to my concussion.
3. Have you ever been diagnosed with a Learning Disability (e.g., ADHD, Dyslexia, Auditory Processing Disorder)?
   Yes. Please describe below.
   No
4. Have you ever skipped a grade?
   Yes
   No
5. Have you ever repeated a grade?
   Yes
   No
6. In general, how would you describe your grades on average in high school?

A	C
A-B	C-D
B	D
B-C	Below D

Injury History. This set of questions will ask you details about how you sustained your concussion.

1. When did your concussion occur?
   Month

Year

2. Prior to that concussion, have you ever had another concussion or traumatic brain injury (TBI)?
   - Yes
   - No
3. *Display if student has a history of brain injury.* How many concussions or brain injuries have you previously sustained?
4. Although we want you to complete this survey with information about your **most recent concussion**, please describe any prior concussions in the box below. At the end of the survey, you may leave contact information that will not be linked to your survey answers. This permits a researcher to contact you with more questions.
5. Immediately after your concussion, did you lose consciousness? If yes, for how long?

No, I did not lose consciousness	30 minutes to 24 hours
0-1 minute	24 hours
1-5 minutes	More than 24 hours. Specify in the box below.
5-30 minutes	

6. Select all of the following that you experienced, others reported about you, and that you or others associated with your concussion.

Neck pain	Headache	Head pressure
Vision problems (new since injury)	Dizzy	Nausea
Hearing problems (new since injury)	Ringing in ear (s)	Dazed
"Just don't feel right"	Slowed down	In a fog
Difficulty concentrating	Fatigue	Low energy
Difficulty remembering	Irritability	Confused

Other. Please describe in the space below.

7. Did you sustain any other injuries with your concussion (e.g., broken bone, fracture, etc.)?
   - Yes
   - No
8. *Display if the student sustained additional injuries.* Describe the injuries you sustained with your concussion. Please briefly mention any medical treatment you may have received for your other injuries and an approximate timeline for recovery (e.g., broken arm, surgery, in a cast for 6 weeks).
9. Did your concussion occur from any of these? Otherwise, use the box to describe how you sustained your concussion.
   - Athletic Event *(with formal sports organization such as high school or traveling team)*
   - Recreational Activity *(such as pick-up sporting events, other outdoor activities)*
   - Vehicle Accident
   - Bike Accident

Fall
Assault/Fight
Unknown
Other. Please describe in the space below.

10. *Display if recreation or sports-related concussion.* What sport were you playing when you acquired your injury?
11. If there is anything else you'd like to tell us about how you sustained your concussion, please use the space below.
12. *Display if recreation or sports-related concussion.* Was an athletic trainer or medical professional present when you sustained your concussion? Please select.
    - Athletic trainer
    - Other health professional
    - None
13. Did you seek or receive medical care from any healthcare professional (e.g., physician, athletic trainer, coach, physical therapist, etc.) after your concussion?

Yes, immediately	Yes, within weeks
Yes, within hours	Yes, after a month
Yes, within days	No, I did not receive medical care

14. Select all that apply. Who provided medical care after your concussion?

Athletic Trainer	Physician - Primary Care Provider
Coach	Physician - Urgent Care
Parent	Physician - Emergency Room
Physical Therapist	Local Skilled Facility or Concussion Center
No Formal Medical Care	Other. Please describe below.

15. Select all that apply. Did you receive any information (like completing online training or a workshop) about concussions and concussion care prior to your injury?

Coach	Local skilled facilities
Athletic trainer	Local brain injury or concussion association
State programs	Centers for Disease Control (CDC) Heads Up Online Training
Federal programs	Local university programs
Teacher	Other. Please describe below.
None	

16. About how long did it take you to recover from your concussion? Recovery means that you were no longer experiencing symptoms, fully returned to school or play, and no longer used academic adjustments that were introduced after your concussion.

Next day	2-3 days
Less than a week	1 week
2-3 weeks	1 month
Multiple months	

17. Is there anything else you'd like to tell us about your concussion? For example, if the sport you were playing when you sustained your concussion was not listed above, please include that here.

Athletic Trainer. If you saw an athletic trainer, we'd like to learn more about your experience.

1. Did you see an athletic trainer(s) after your concussion or during your recovery process?
   Yes
   No
   2. *Display if student worked with AT during recovery.* How often did you visit your athletic trainer(s) following your concussion? Please indicate the answer that best describes your meeting schedule.

Daily	3-5 times a week
2-3 times a week	Once a week
Once every other week	2-3 times a month
Once a month	2-3 times a semester
Once a semester	Other. Please describe below.

   3. *Display if student worked with AT during recovery.* How available was your athletic trainer(s) during your recovery process?
      Scale: Not available at all (0) – Available anytime I needed assistance (100)
   4. *Display if student worked with AT during recovery.* How many athletic trainers are available to you through your school system? If you are unsure, use the number of athletic trainers you have interacted with since your injury.

Academic Effects. The next set of questions is for you to describe how the concussion impacted your academics and regular school routine.

1. These questions ask about the effect your concussion had on your academics.
   In the first column, please indicate if you experienced any of the symptoms listed.
   If you experienced any of these symptoms, please indicate how much of a problem this was for you (if you did not experience a symptom, leave the second column blank).
   Answer all questions for your experiences following your concussion.
   Since my concussion...

	Did you experience this as a result of your concussion? If so, what is the status on this symptom.			Did you experience this as a result of your concussion? If so, what is the status on this symptom.				
	Did not experience	Experienced, but not anymore	Experienced and still experiencing	Almost never	Rarely	Sometimes	Often	Almost all the time or all the time
The lights during school are too bright.								
The noise during school is too loud.								
Tasks that were fairly simple before are significantly harder now.								

It is difficult to read for long periods of time or large amounts of text.								
I find myself much more distracted in school.								
I forget information I have previously learned.								
I find myself more sad than usual.								
My mood changes more often.								
I get more upset about grades or school work.								
I need to take frequent breaks.								
I am more tired in school now than I was before.								
Studying makes me tired.								
I have to review my notes and what I need to learn a lot more than I used to.								
I have to devote more time to studying.								
I need instructions to be repeated in order to understand.								

2. *Display if the student sustained additional injuries.* You replied that you received another injury when you sustained your concussion. Briefly describe if your other injury impacted your academics. For example, if you were not able to take notes in class because of an arm injury, or needed more time to transition between classes because of a knee injury.

Return to Learn Experience. This section will ask about your return to school. "Return to Learn" means returning to a regular school involvement. This includes your attendance in school, participation in class, and ability to study and learn. The "Return to Learn" process might also include support and adjustments you received from parents, school staff, coaches, and other individuals in order to be successful.

1. When did you return to school (either part-time or full-time) after your injury?

Returned the same day	1 week
Returned the next day	2-3 weeks
2-3 days	1 month
Less than a week	Multiple months

2. Select all, if any, academic adjustments you received during your recovery.

Extended deadlines for homework, projects, or assignments	None
Work in quieter area of room or school	Audio record lectures
Reduced screen time (i.e., phones, computers, smart boards)	Audio books
Extended time to take tests and quizzes	Leave school early
Access to instructor or peer notes	Reduced workload
Long exams or assignments broken into shorter sections	Leave class early
Alternative test format (e.g., oral instead of written exam)	Preferential seating

Allotted breaks during class
Wear sunglasses
Other. Please describe in the box below.

3. How long did you receive academic adjustments after you returned to school?
   - 1 day
   - 2-3 days
   - About 1 school week
   - 1-2 school weeks
   - 2-3 school weeks
   - 1 month
   - More than 1 month
4. Select all, if any, documentation that was necessary for you to receive academic adjustments.
   - Letter from my doctor
   - 504 Plan
   - Letter from my athletic trainer
   - Response to Intervention (RTI) plan
   - Individualized Education Plan (IEP)
   - Nothing - my teacher took my word for it
   - Other. Please describe below.
5. We would like to know more about the types of activities you completed and any support you received while you were recovering from your concussion.

	Which of the following were you required to complete while you were recovering? Check all that apply.	For which of these did you receive adjustments (e.g., extended deadlines, extra time)? Check all that apply.
Tests		
Quizzes		
Class assignments		
Group work		
Projects		
Presentations		
AP exams		
Final exams		

6. Was your Return to Learn process structured or unstructured?
   A structured process could include following specific guidelines to help you adjust back to normal school activities. An unstructured process means there were no guidelines in place to help you adjust back to normal school activities.
   - Structured
   - Unstructured
   - I don't remember
7. *Display if structured RTL.* Select all that apply. Who structured your Return to Learn process?
   - Athletic trainer
   - Athletic director
   - Physician
   - Parent(s)
   - Academic advisor
   - Counselor
   - Teacher
   - Coach
   - Speech-language pathologist
   - School nurse
   - Outside facility
   - Other. Please describe below.
8. Select all that apply. Which of these people were involved with your Return to Learn process?

Athletic trainer	Athletic director	Physician
Parent(s)	Academic advisor	Counselor
Teacher	Coach	Speech-language pathologist
School nurse	Outside facility	Other. Please describe below.
None		

9. Who was the point person that initiated and managed communication about your academic progress and health status between involved parties (e.g., physician, teachers, school nurse, school administrators, parents, coach, athletic trainers, etc.) during your Return to Learn process?

Athletic trainer	Athletic director	Physician
Parent(s)	Academic advisor	Counselor
Teacher	Coach	Speech-language pathologist
School nurse	Outside facility	I don't know
None	Me	Other. Please describe below.

10. To your best knowledge, how would you describe the frequency of communication between involved parties (e.g., you, your physician, teachers, school nurse, school administrators, parents, coach, athletic trainers)?
    - Consistent - everyday
    - Frequent - most days
    - Occasional - a couple days per week
    - Rare - only when there was an issue or concern
    - Never - there was no communication between involved parties
    - I don't know
11. How supportive were your teachers during the Return to Learn process?
    Scale: Not supportive at all (0) – Very supportive (100)
12. You can use the space below to tell us more about the support your teachers did or did not provide. Also, please mention if different teachers provided differing levels of support.
13. How supportive were your friends during your Return to Learn process?
    Scale: Not supportive at all (0) – Very supportive (100)
14. You can use the space below to tell us more about the support your friends did or did not provide.
15. How involved were your parent(s)/guardian(s) during your Return to Learn process?
    Scale: Not involved at all (0) – Very involved (100)
16. You can use the space below to tell us any more information about how involved your parents were during your Return to Learn experience.
17. How smooth was your transition back to school?
    Scale: Very rough (0) – Very smooth, no problems (100)
18. You can use the space below to tell us any more information about your experience transitioning back to school after your injury.
19. Following your concussion, how much did you consider yourself to be struggling academically?

Scale: Not struggling at all, things were fine (0) – Really struggling, having a very hard time managing (100)

20. You can use the space below to tell us any more information about struggling with academics following your concussion.
21. How burdensome would you describe the responsibilities of managing your Return to Learn process (e.g., telling teachers about your accident, asking for academic adjustments, managing paperwork/doctor's notes)?

    Scale: Not burdensome at all (0) – Very burdensome (100)
22. You can use the space below to tell us any more information about the burden placed on you to advocate for yourself during the Return to Learn process.
23. Did you participate in Physical Education class (P.E.) or any other physical activity while you were recovering?

    Yes. Please describe in the box.

    No
24. Did you miss any days of school due to your concussion?

    Yes

    No

25. *Display if student missed school.* How many days did you miss?

1	5
2	6
3	7
4	More than 7

26. *Display if student missed school.* Were absences marked as excused or unexcused?

    Excused

    Unexcused

    Not sure

27. *Display if student missed school.* Were you placed on academic probation due to consequences of your concussion?

    Yes

    No

28. *Display if student received academic probation.* Tell us more about your academic probation.
29. List your GPA from the semester or year prior to receiving your concussion and the semester or year after your recovery process was complete.

    GPA before concussion

    GPA after concussion
30. If there was a change in your GPA, do you feel like your concussion was the main reason for the change in GPA?

    Yes

    I'm not sure

    No

There was no change in GPA

31. *Display if student sustained other injuries.* Describe the differences in your return to learn experience between your concussion and your other injury. Things to mention could include:
    - If you received academic adjustments for your other injury (e.g., access to a computer to take notes or other students notes because of a broken hand/arm)
    - Difference in recovery lengths between the two injuries
    - Which injury (concussion or other) made for a more difficult return to learn experience
    - Anything else about the recovery from the other injury that you'd like to share
32. From your experience, what is something you want researchers, medical professionals, and academic professionals to know about students returning to school following a concussion? For example:
    - What was most helpful in your experience?
    - What did you not have that you wished you did?
    - If your friend had a concussion, what would you tell them to help them transition back to school

    Your response to this question will be used to help design future studies to support students with concussion. We appreciate your thoughtful answer to this question.
33. Is there anything else you want to tell us about your Return to Learn experience?