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High School Student Concussion Recovery Program: Teacher Involvement in Student Academic Transitions to Classroom and to Sports

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Signature Sheet

This thesis, written under the direction of the candidate's thesis advisor and approved by the Chair of the Master's program, has been presented to and accepted by the Faculty of Education in partial fulfillment of the requirements for the degree of Master of Science. The content and research methodologies presented in this work represent the work of the candidate alone.

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Table of Contents

Abstract

Many symptoms of concussions can substantially interfere with the cognitive abilities, and skills students use in school. Although students may have similar symptoms, they experience concussions differently. Students returning to the classroom from a concussion often have different needs and abilities.

Research shows that a formal, individualized protocol to treat suspected concussions, both academically and physically, is vital to the successful recovery of each student. Much research is available on concussions for professional athletes, specifically related to recovery and returning to their sport. However, there is little research about high school students regarding concussions. Concussion recovery programs for high school student athletes primarily concentrate on returning the athlete to the playing field and often do not include protocols reintegrating students back into academics (Williams, Welch, Parsons, McLeod, & Valovich, 2015).

Typically teachers are notified when their students are returning to school after recovering from a concussion. However, many times teachers are not trained to help their students successfully return to the academic program. The high school under study has a concussion management program to help safely and quickly integrate students into their sport. This study documents how teachers can be included in the concussion recovery program by developing an academic protocol that allows students to gradually reintegrate into the learning environment based on their individual needs.

Keywords: Concussion, academic protocol

Chapter 1 High School Student Concussion Recovery Program

A student is hunched over her desk, cradling her head in their hands. She has a drawn look in her eyes that suggests exhaustion and hints of a lingering headache. While her friends chat animatedly beside her, she sits silently staring down at the desk. She looks as if she is doing all she can just to sit there. She had a concussion last Friday in the soccer game. She cannot use a computer or watch TV or play games on her phone. She cannot complete her homework or study for tests. Her demeanor has changed since the concussion; she is not her usual self. She needs help from teachers with her transition back to the classroom and eventually the playing/ athletic field.

Statement of Problem

High school students who play sports are at risk for sustaining concussions. Concussions account for 10-13% of all injuries among US high school athletes (Wasserman, Bazarian, Mapstone, Block, & van Wijngaarden, 2016). Overall, the impact of concussion-related impairment on student functioning can be significant. When a concussion occurs, students are out of school for a varying number of days that depends upon the severity of the head injury. By missing instruction, students are losing instructional content, which can put them behind their classmates academically. Common signs and symptoms of concussions that students may experience can be physical, cognitive, or emotional and can significantly affect the skills students need to succeed in school. Concussed individuals experience somatic symptoms such as a headache and or dizziness, cognitive difficulties such as impaired concentration and or memory loss, sleep disturbance, and altered mood, especially depression. These concussion symptoms are associated with poor

academic performance and can substantially impair a concussed students' ability to perform at their maximum academic potential (Bradley-Klug, Garofano, Lynn, DeLoatche, & Lam, 2015; Halstead, McAvoy, Devore, Carl, Lee, & Logan, 2013; Wasserman, et al., 2016). Both long-term and short-term memory deficits interfere with the learning process. Learning depends on the student's ability to process information, taking it in, making new connections to already learned concepts, and then applying it to real life situations (Burns & Gianutsos, 1987).

The first step in concussion recovery is organized and implemented by the athletic trainer at the school site. The athletic trainer interacts with the athlete, families and the physician to focus on coordinating the student's initial physical recovery. The next step is returning students to school. Typically, when students who have experienced a concussion return to school, teachers are informed that the student is recovering from a concussion. However, teachers may not receive information on ways to accommodate student academic needs. There is often no formal academic component to the concussion recovery program and little communication between the members of the academic team and the athletic trainer. This lack of communication results in a weak, inefficient academic re-entry for concussed students and does not support their recovery. Teachers are also not involved in the decision to return students back to active involvement in sports. That becomes a problem when students are returned to the playing field before they can catch up with their schoolwork.

Purpose Statement

The purpose of this study is to engage classroom teachers in developing new academic protocols for concussion recovery that involve their participation as the student-athlete transi-

tions back to the classroom and active participation in sports. Classroom teachers have experience in working with an array of students with differing needs. Often the teachers want to bring their expertise to facilitate inclusion when students return to school but are not sure how to help.

Research Questions

How can teachers assist in integrating their knowledge of student learning into a plan for a concussion recovery program? How can teachers be involved in writing an academic component to the concussion recovery program? How can teachers be involved in writing a return to the classroom protocol for students? How can teachers be involved in developing a protocol to return students to their sports?

Keywords: concussion, treatment strategies, school re-entry, symptoms

Theoretical Rationale

Paolo Freire (Smith, 2002) was born into poverty in Brazil during the great Depression. In school, he was four grade levels below his typical age placement. He attributed the low quality of his education to poverty and hunger. He felt that he was not in a situation that allowed him to learn. His early life experience led him to dedicate his life to improve the lives of the poor, specifically concentrating on education. He felt that education should be a dialogue. "It should not involve one person acting on another, but rather people working with each other" (Smith, 2002, paragraph 2). According to Freire, the participatory action research approach is concerned with empowering the poor and marginalized members of society to take steps to improve or change their place in society (MacDonald, 2012).

The action-based process used by Freire is referred to as praxis. Working primarily with

illiterate Brazilian migrant workers, he tried to fight poverty from the bottom up by empowering the poor to help themselves. He talked to the migrant workers about how they could improve their economic situation by becoming literate. At that time, literacy was a requirement to vote in Brazilian presidential elections. They had no power to change their social conditions because they could not vote. Collectively the workers decided to concentrate on becoming literate. Becoming literate led to the migrant worker's ability to vote in the next presidential election, which gave them a voice to elect leaders that considered their position and help bring about change. Praxis, taking action, is necessary for this study because of the need for teacher integration into the concussion recovery program. The approach for this study follows Freire's work, which involves engagement of key people to address a particular problem that relates directly to their jobs. The teachers come together to develop protocols for returning students to the classroom and their sports, in a systematic, individualized way where students are supported as they safely and efficiently return to the classroom.

Assumptions

For students, the return to school and activity after a concussion is stressful and full of pressure to be “normal” and return to full ability immediately. Teachers want to help their students ease back into the classroom and sports safely, quickly and as effectively as possible. Teacher involvement is necessary to assist in transitions, taking into account student welfare.

Background and Need

In recent years much attention has been paid to the effect of brain injuries on student athletes. Wasserman et al., (2016) report that more than 10-13% of the injuries to high school ath-

letes are due to concussions or traumatic brain injuries (TBI). The researchers examined a cohort group from 2013-2015 where they studied students with sport related concussions. They obtained data for 106 students from hospital medical records, telephone conversations, and interviews with students one week and again one month following the injury. They compared students who sustained concussions with students who sustained an extremity injury. A week after injury the group suffering from concussions reported significantly more academic dysfunction and trouble than the students with extremity injuries. A month after the date of injury the level of academic dysfunction was the same. The data also shows that females and students with 2 or more concussions are more susceptible to the effects of concussions compared with students who have only sustained one concussion.

Summary

A concussion is a serious injury that affects many student athletes in high school. Following Freire's example of praxis, teachers need to voice their observations in developing a transition plan to reintegrate students back to the classroom and their sport successfully. The study by Wasserman et al., (2016), makes the case that students who have sustained concussions during sports deal with academic dysfunction for a period of time after they return to school. The data from this study point to a need for concussion recovery guidelines that involve teachers, the people that work in close collaboration with the concussed athlete, as they recover from their concussion. The following chapter is a review of the academic literature on concussion recovery programs.

Chapter 2 Review of the Literature

Introduction

This section is an examination of the research literature on integrating teachers in a concussion recovery program. Information was gathered from academic library searches using online resources. Review of the academic research is organized in the following categories: Understanding concussions and how they are manifested in high school student athletes, history of concussion recovery, the physical aspect of concussion recovery, and the academic aspect of concussion recovery.

Review of Academic Research

Understanding Concussions and How They Are Manifested in High School Student Athletes

A concussion can also be referred to as a mild traumatic brain injury (TBI). A concussion is an alteration in brain function due to biomechanical forces affecting the brain that may or may not cause loss of consciousness (Eastman & Chang, 2015; Kelly & Rosenberg, 2001). A concussion may be caused either by a direct blow to the head, face, or neck or force applied to another part of the body that transmits that force to the head. There is also some evidence that concussion-like symptoms can result from an accumulation of sub-concussive hits, hard hits to the body that do not directly cause a concussion but can collectively cause changes in the mental ability of the brain. Abnormal rotation and movement of the brain within the skull cause the change in mental ability. A concussion typically results in the rapid onset of short-lived impairment of neurologic function that resolves spontaneously (Halstead & Walter, 2010). It is important to note that brain tissue is often not damaged by a concussion, but that the symptoms and

effects of a concussion are caused by cellular dysfunction including a decrease in energy production and the inability to properly communicate with other cells. Approximately 80% of patients recover within three weeks. However, 20% of athletes take over three weeks to recover following a sport-related concussion. The differences in recovery between individuals may be due to risk factors associated with concussion. (Collins, et al., 2013; Bradley-Klug et al., 2015). Risk factors include a history of concussion, history of migraine headaches, a learning disability, attention-deficit hyperactivity disorder (ADHD), sex, and age (Collins, et al., 2013). According to Foley, Gregory and Solomon (2014) when compared to adults, children and adolescents appear to be more susceptible and slower to recover from a concussion possibly due to differences in brain tissue maturation (Bradley-Klug et al., 2015). Regardless of injury severity, children with TBI may have difficulties in retaining and retrieving newly learned information, and for children with severe TBI, memory deficits may worsen over time. Memory and concentration impairments are particularly handicapping in the classroom (Hawley, Ward, Magnay, & Mychalkiw, 2004). Deficits in memory and concentration interfere with the process of learning where students are required to intake, process and apply concepts. There is also evidence that having a prior concussion can prolong recovery (Covassin, Stearne, & Elbin, 2008). Behavioral signs that someone has suffered a concussion include showing signs of confusion, such as going in the wrong direction, difficulty with balance directly following impact, forgetting plays, slurred speech, slow response, or any change in typical behavior or personality (CIF, 2015). Boys are reported to have a lower rate of concussion than girls in similar sports. However, the disparity in the number of concussions could be attributed to the fact that male athletes may be more reluctant to report their injuries. The low incidence of boys reporting concussions could be due to

fear of not being allowed to play or pressure from teammates and coaches to return to the game (Halstead & Walter, 2010).

History of Concussion Recovery

The need for a formal set of concussion management guidelines arose from the concerns of athletic trainers and physicians that often found themselves arguing with athletes, parents, and coaches when removing players from competition for their safety (Kelly & Rosenberg, 2001). In the past, if an athlete did not lose consciousness they were assumed to be okay. Loss of consciousness occurs in less than 10% of all concussions (Halstead & Walter, 2010). Given that a concussion is not a visible injury, and that students can appear physically healthy after a concussion, adults may expect that young athletes can function normally. In the absence of a physical injury, teachers and schools administrators may not understand that injured students experience many cognitive, emotional, and physical deficits due to the symptoms of their concussion and may need academic adjustments to help them during recovery. Although a concussion can have direct effects on a young athlete's ability to learn, there is also evidence that injured students trying to learn may worsen symptom and prolong the time needed for recovery (Baker, Leddy, Darling, Rieger, Mashtare, Sharma, & Willer, 2015; Halstead et al., 2013). Skills students employ while learning, using cognitive brain function, can add stress to the already injured brain. Too much cognitive activity too soon can cause an increase in the severity of concussion symptoms (Halstead et. al, 2013).

The Physical Aspect of Concussion Recovery

Research shows that a clear concussion recovery program is needed to rehabilitate stu-

dents with a concussion successfully. The first step of a concussion management plan is the assessment of the suspected injury. The initial sideline assessment should include an inquiry into the athlete's symptoms, a neurologic examination, and an evaluation of the athlete's cognition by using one of several available methods. These tools include a series of questions and tasks that allow an athletic trainer to determine if the athlete is experiencing any physical or cognitive deficits. Current sideline evaluations used include the Maddocks questions, Standardized Assessment of Concussion (SAC), Balance Error Scoring System (BESS), or Sport Concussion Assessment Tool 2 (SCAT2) (Collins et al., 2013; Halstead & Walter 2010; Kelly & Rosenberg, 2001; Marshall, 2012). The Maddocks questions evaluate memory and BESS is an assessment of balance. The SAC is also a set of questions testing memory and concentration. The SCAT2 is a combination of the three tests described above. If athletes are identified as having a possible concussion, they should be removed from the remainder of practice or game on that day and evaluated by an athletic trainer (AT) or a physician (Halstead et al., 2013; Halstead & Walter, 2010). In the State of California, if there is even a possibility that athletes have a concussion, they are removed from the playing field. They cannot return to their activity until the next day, and they must have a note from their physician clearing them to play (CIF, 2015). In some athletic leagues, this step also includes neurocognitive evaluation (McGrath, 2010; Halstead & Walter, 2010). The neurocognitive assessment is a simple pencil and paper form, but there are now many computer programs available to compile data. The Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) is the most common. The ImPACT test is an objective measure of both concussion symptoms and cognitive function. Ideally, athletes would also have a pre-season baseline test with which to compare their post-injury test results. A physician who is

experienced with these tests should interpret the results. The test results can be compared with age-established norms if there is not a baseline test available for the athlete (Halstead & Walter, 2010).

Once a student is diagnosed with a concussion, the second step is to spend time resting, both physically and cognitively (Eastman & Chang, 2015). Managing the symptoms, such as headaches, fatigue, visual and auditory sensitivities, and difficulties with attention, memory, and concentration, through prescribed rest from physical and cognitive exertion has become the cornerstone of recovery from a concussion. However, little guidance is available as to how much rest is needed, how much time off school is recommended, and what to do when children have difficulty with school routines (DeMatteo, Stazyk, Giglia, Mahoney, Singh, Hollenberg, & Randall, 2015). "The goal during concussion recovery is to avoid overexerting the brain to the level of worsening or reproducing symptoms. Determining the appropriate balance between how much cognitive exertion and rest is needed is the hallmark of the management plan during cognitive recovery" (Halstead et al., 2013, p. 949). Physically, concussed athletes may participate in normal activities of daily life that do not result in an increased heart rate or breaking a sweat; it is important the activities do not trigger or worsen symptoms (Marshall, 2012; Master et. al, 2012; Williams et. al, 2015). Cognitive rest, in contrast, can be a more challenging concept for physicians to communicate, and for patients and families to understand and implement. There are a wide variety of physical and cognitive symptoms that can be caused by a concussion. Cognitive impairments can include difficulty concentrating, headache, blurry vision, crankiness, inability to process or remember new information, and sensitivity to stimulation (Baker et al., 2015). Each person exhibits different combinations of symptoms including physical, cognitive and mental

impairments. Because everyone reacts differently to a concussion, a "one size fits all" approach to concussion care will not work. A successful recovery plan must be individualized and based on the specific symptoms experienced by the student (Collins, et al., 2013; Halstead, et al., 2013). Initially, cognitive rest includes no school attendance, no home/school work, no reading, no video games, no texting, no computer time, and for some, no television. The goal is to keep cognitive activity below the level that triggers symptoms (Halstead et al., 2013; Master et. al, 2012). Exacerbation of symptoms due to cognitive exertion is of specific concern for educators, as it is expected that students exhibit a significant amount of cognitive effort when engaged in learning (Bradley-Klug et al., 2015). Re-introducing cognitive activities in small doses is imperative for the healing process because it allows the brain time to recover (Williams et al., 2015). In the past, it was believed that cognitive rest should last until there was an abatement of symptoms.

However, there is new research by that shows that athletes prescribed an extended period of strict rest reported longer symptom duration. It took three days longer for 50% of the patients in the strict rest group to recover. Additionally, this group reported a significantly higher total number of post-concussion symptoms with a higher trajectory of emotional symptoms (Eastman & Chang, 2015). It is thought that prolonged absence from school may be equally as devastating due to the stress of missing academic content and isolation from peers which may contribute to depression and anxiety (DeMatteo, et al., 2015). Ultimately, the goal is to keep disruptions in the student's life to a minimum. Even though they may still be experiencing symptoms, students need to return to school and their routines as soon as possible. As students recover, stimulation can be increased gradually, in terms of minutes. As soon as students can tolerate 30-45 minutes

of stimulation without re-triggering concussion symptoms, they are ready to try to attend school.

The challenge of the academic team is to find a balance between the need for students to attend school and the cognitive and emotional demands placed on them. The right balance can be achieved with the appropriate adjustments for the school requirements that have the potential for increasing symptoms (Halstead et al., 2013). Possible changes include a shortened school day, rest periods, and limiting classes that exacerbate symptoms. Returning to school has a positive effect on the recovery of athletes. Patients who returned to school performed better on each domain of imPACT testing and reported fewer post-concussion symptoms compared to those that did not return to school (Eastman & Chang, 2015, Majerske et al., 2008).

The final step of physical concussion recovery is returning to play. Once a student-athlete has achieved a full day of school without symptoms while tolerating a normal course load, including testing, the formal return to play protocol may begin (Master et. al, 2012; Collins et al., 2013; Halstead & Walter, 2010; Marshall, 2012; McGrath, 2010). Students must also score levels equal to or below their baseline ImPACT test. Gradual return to physical activity has become the norm for concussion management. Incremental increases in the intensity of exercise are used to assess students' readiness to return to their sport while monitoring for concussion symptoms (Kasamatsu, Cleary, Bennett, Howard, & McLeod, 2016). The return to play is a 5 step formalized increase in activity levels. Athletes must remain symptom-free at each level for 24 hours. If symptoms return, athletes resume the previous level of the protocol they passed and start again. It takes athletes a minimum of 5 days to move through the protocol (Master et. al, 2012; Collins et al., 2013; Halstead & Walter, 2010; Marshall, 2012).

The Academic Aspect of Concussion Recovery

After some physical recovery, student-athletes need to return to their school routine. Achieving a balance between the importance of brain healing and the need to go back to normal routines can be challenging (DeMatteo, et al., 2015). Returning to school should be a top priority for children and adolescents experiencing concussion even more so than return to sport. The primary occupation of childhood is that of a student. Therefore, it is critical for children to get back into the classroom with appropriate modifications (DeMatteo, et al., 2015). Research concerning how a concussion can affect the learning and academics of students is limited. The lack of research makes it challenging to develop appropriate and useful guidelines to return the students to the classroom (Halstead et al., 2013).

Increasing evidence that children and adolescents benefit from a controlled, gradual return to learn approach, rather than an attempt to go back to a full load immediately. Gradually re-integrating students to the classroom resulted in symptom abatement (Baker et al., 2015; Bradley-Klug et al., 2015; Halstead, 2013; Master et al., 2012). If left on their own, patients often pursue a too rapid return-to-learn with a steep ramp up of return to cognitive activity, which often results in the exacerbation of concussion symptoms that had previously been improving. Re-triggering symptoms prolongs a students' recovery and return to full activity (Master et al., 2012). Many post-concussion student athletes are unable to resume that level of sustained cognitive activity after injury and cognitive rest; they require time to gradually return to the degree of stamina necessary to participate in a full day of school (Bradley-Klug et al., 2015; Master et al., 2012).

A critical component that encompasses all of the steps within a return to learning protocol is

communication. Given the impact concussion has on student's social, physical, behavioral, and emotional functioning, numerous stakeholders (e.g., athletic trainer, medical doctor, school psychologist, counselor, or teacher) are likely to be involved. Therefore, it is important that all colleagues share information to best support the student and ensure that the student's needs are being met (Bradley-Klug, et al., 2015). Many researchers recommend a team of individuals to help the concussed student return to school as smoothly as possible. In the early phases of a concussion, the school academic team must coordinate the return of the student to class and help to facilitate the appropriate level of academic adjustments necessary to reduce or eliminate symptoms (Halstead et al., 2013). As soon as the AT identifies a concussion injury, key members of the school staff including the guidance counselor and teachers should be notified. The notification will indicate that the student may temporarily need assistance, as described above, with managing symptoms and academic demands. The school academic team should include as many of the following as possible: teachers, counselors, athletic trainer, school nurse, administrators and the school psychologist. A point person on the team should be identified to coordinate all team members (Bradley-Klug et al., 2015).

As symptoms become tolerable, enough for students to concentrate for 30-45 minutes, they may return to school with the use of supplemental academic adjustments (Halstead et. al, 2013). Current post-concussion recommendations for academic adjustments include shortened school days, tutoring, a note taker or printed note sets, reductions in academic workloads, extended time for completion of assignments and tests, limited homework, no more than one quiz/test per day, and avoiding loud areas (CIF, 2016; Wasserman et al., 2016). To benefit from instruction in the classroom setting, students need to both attend school and have the cognitive ability to retain and

apply knowledge (Bradley-Klug et al., 2015). When students return to school, they need adjustments to avoid re-triggering concussion symptoms. Students may be able to tolerate certain academic subjects or classes better than others. Limiting assignments in, or exposure to, classes that exacerbate symptoms allows for a smooth re-entry. Teachers may make additional academic adjustments to help students succeed. Students should start with half days at school. When a half-day of school is tolerated without triggering concussion symptoms, a progression from a full day at school with maximal supports to a full day with no supports should be followed; each reduction in supports representing its own step (Bradley-Klug, 2015). Teachers and those on the academic team should reassess progress at weekly intervals to determine the effectiveness and continued need for adjustments (Halstead et al., 2013). As their concussion symptoms improve, students can gradually increase their cognitive and social activities as tolerated (Halstead et al., 2013). Teachers can begin assigning more work, or the students can try attending a social event.

While they are at school, concussed students can benefit from academic adjustments. The type of academic adjustments put in place should depend on the type and severity of concussion symptoms, specific teaching styles used by a teacher in the classroom, and pattern of the symptoms (Halstead et. al, 2013). Standard accommodations include a quiet location to use as needed for cognitive rest. A rest period is typical every two hours or so during the school day. It is important that any nonessential schoolwork is excused because concussions are a brain injury (Master et. al, 2012). Additional time and extended due dates are needed for all essential assignments and projects. Tutoring and extra help may also be necessary. Preprinted class notes may be an important supplement to taking notes in class. Providing students with additional time may be part of the plan as part of their preparation for taking tests, only when students can tolerate a

full day school and full normal workloads (Master, et. al, 2012). In extreme cases, when a letter from a physician is insufficient to secure academic accommodations, a formal 504 plan or individualized education plan (IEP) may be needed. (Master et. al, 2012). According to the Individuals with Disabilities Act, after three weeks with concussion symptoms, students are eligible for a formal 504 plan to guarantee accommodations.

Summary

It is important to individualize the return to learning and play plan for each student because each person exhibits different combinations of symptoms. Concussed students benefit from a gradual return to school and learning plan that is supported by a team of teachers, counselors, and the athletic trainer. They need help navigating the many different parts of their re-entry to school such as how much school to attend, which work or tests to make up first, and who to go to if they are having issues. The purpose of this research project is to integrate teachers in the process of adding an academic component to the concussion recovery program at a high school and to involve teachers in releasing students back to their activities when they are sufficiently caught up with their assignments.

Chapter 3 Method

Research Approach

This study is a participatory action research (PAR) approach where I, as the researcher, guide teachers in developing a protocol to integrate academics into the concussion recovery program at our high school and in the process that releases students back to their sport. "Qualitative research integrates the methods and techniques of observing, documenting, analyzing, and interpreting characteristics, patterns, attributes, and meanings of human phenomena under study (Gillis & Jackson, 2002; Leininger, 1985). The purpose of qualitative methodology is to describe and understand, rather than to predict and control (Streubert & Carpenter, 1995). Qualitative methods focus on the whole of human experience and the meanings ascribed by individuals living "(MacDonald, 2012, p. 34). PAR is a type of action research in which groups of people collect and analyze data to take action on something that is relevant or meaningful to their lives. "Participatory Action Research (PAR) is one option in qualitative research methodology where features of an individual's feelings, views, and patterns are revealed without control or manipulation from the researcher. The participant is active in making informed decisions throughout all aspects of the research process for the primary purpose of imparting social change; a specific action (or actions) is the ultimate goal" (MacDonald, 2012, p. 34). PAR allows the researcher and the participant to dialogue and learn from one another (MacDonald, 2012). Data should be collected in a variety of ways. The researcher is the primary instrument that will be collecting data through notes and observations of the participants as they go through the process of writing protocols to return students safely and efficiently back into the classroom and to their sport. The participants will also be completing a survey about their experiences and the final protocols pro-

duced. Ideally, the protocols developed will be put into action at the high school, improving the concussion recovery program for both students and teachers.

Ethical Standards

This paper adheres to the ethical standards for the protection of human subjects of the American Psychological Association (2010). Additionally, a research proposal was submitted and reviewed by the Dominican University of California Institutional Review Board for the Protection of Human Subjects (IRBPHS), approved and assigned number 10490.

Sample and Site

Teachers and counselors were recruited, forming a sample of convenience to develop an academic component to the concussion recovery program at a high school. There is a sampling of new and experienced teachers, counselors, the athletic trainer, and administrators. All participants were interested in creating a working model to involve teachers in the development of an academic component to the concussion recovery program in in the process of releasing students back to their sport.

Access and Permissions

As an employee at a private high school, I as the researcher obtained all permissions needed to conduct this study. The researcher completed an application the Institutional Review Board for the Protection of Human Subjects, Dominican University of California in accordance with federal and state guidelines for research. The application was approved. A letter of permission to the principal of the high school was approved and signed. An email was sent to the staff

of the high school requesting their participation in the study. Teachers who were interested in participating signed a letter of consent. Multiple working meetings were held to accommodate the participant's schedules.

Data Gathering Procedures

Teachers helped to develop an academic component to a concussion recovery program and a form to indicate academic readiness before releasing students back to their sports. A group of teachers, counselors, the Vice Principal of Athletics and the Athletic Trainer then talked about, tweaked, and changed those protocols to fit our high school. Throughout the process, the researcher took notes, which were used to improve and modify the protocols as described and suggested by the participants.

Measurement

The independent variable of this study was developing an academic component to the concussion recovery program of a high school. The dependent variables were the ability of the participants to work together to form cohesive, useful protocols and the administration and staff's acceptance of the new protocols. The data collected while observing the participants in the process of developing the protocols was used, in addition to the results of surveys completed by the participants about the process and the protocols written, to measure the success of the study.

Data Analysis Approach

Data were collected on teacher participation in the process of developing concussion recovery protocols that identify the academic needs of student athletes returning to the classroom and releasing them to the playing field. The protocols were adjusted according to the suggestions and notes from the participants. After the protocols were finalized, the participants completed a survey about their experience in the study and their feelings about the protocols produced.

Chapter 4 Findings

Description of Site, Individuals, Data

Data were collected both as the writing of the concussion protocol was being written and at the end to determine how the teachers felt about the protocols and their involvement in their development. During the writing and revision of the academic concussion protocols, the researcher identified suggestions for improvements made by the participants. Teachers, counselors, administrators, and the AT at the high school completed surveys at the end of the writing process. The participants included both men and women with a range of teaching experience. The survey is comprised of two parts. The first part consists of seven questions, which the respondents answered on a Likert scale, one to five, with one meaning “not really”, and five meaning “yes!” The second part of the survey consists of three open-ended questions.

Participant Response to Part 1 of the Survey

Questions	1	2	3	4	5
I could see this protocol being used at the high school.	0	0	0	5	13
These protocols will improve the concussion recovery program at the high school.	0	0	2	4	12
These protocols will help create a smooth transition for concussed students to re-integrate into the classroom.	0	0	1	4	13
These protocols will integrate teachers into the concussion recovery program in a positive way.	0	0	1	1	16
These protocols will help students and staff work together to transition concussed students back into the classroom.	0	0	1	4	13
These protocols will allow teachers to communicate the academic readiness of students returning to their activity.	0	0	1	5	12
This process makes you feel involved in a school process.	0	0	3	3	12

Written Questions

1. Describe the need for teachers to be integrated in the concussion recovery program at the high school.
2. How will these protocols help you in accommodating concussed students when they return to your classroom?
3. Describe any other way(s) to integrate teachers in the concussion recovery program at MC.

Overall Themes

The survey results revealed that the majority of the participants felt the academic concussion protocols would improve the concussion recovery program at the high school. A review of the data revealed three main themes.

First, participants were overwhelmingly interested in being involved in helping their students make a smooth and successful return into the classroom. They felt that the protocol would be a positive way to integrate teachers into the concussion recovery program. Teachers stated that they were willing to make whatever adjustments or accommodations are in the best interest of the student, they just were not sure what to do. Many indicated that they would be interested in participating in professional development training teachers and staff on how to support students through their concussion recovery, as well as to review the different stages of concussion and the steps of this protocol. Participants also thought it would be helpful to hear personal experiences of students and fellow colleagues that have had concussions at the high school.

The second emerging theme was that this academic concussion protocol was needed to increase the communication between the athletic and academic teams. The athletic team does an excellent job at managing the physical recovery of concussed students athletes. She talks to the doctors and coordinates with the student's families. However, the AT is not on campus during the school day to manage the concussed students. The AT updates a Google doc when a student gets a concussion, but otherwise, little information is given to teachers on how to best help their students. This lack of communication results in no accountability for the teacher or the students. There is no one checking to see that teachers are doing anything to support the students and no one to monitor if students are taking advantage of getting out of assignments and tests.

The third theme was centered on developing an academic team to support each student and their individual needs. All participants in the study agreed that the student's counselor is in the best position to organize and coordinate the academic team. The team would also include the AT, the VP of Athletics, and the student's teachers and parents. The increased communication between the individuals that are in contact with the student every day will help to smooth the student's transition back to school. Teachers, counselors and the family can work together to individualize the concussion recovery program for each student. There can be a discussion about which academic adjustments or accommodations will work best for the symptoms the student is experiencing, and teachers can coordinate the amount of work they are assigning the student so that the student does not become overwhelmed. There was some argument about whether there should be a weekly in-person meeting of the academic team or if emails from the counselor after meeting with the student would suffice. Those that felt there should be in person meetings thought that teachers would not read emails and those that felt emails are the best way of communicating felt that no one would bother to come to a meeting.

Chapter 5 Discussion /Analysis

Summary of Major Findings

An academic component to high school concussion recovery programs to gradually reintroduce students back to learning is needed. A teenagers main job is to be a student. To be successful in school, students are required to use many cognitive, physical, and emotional skills that are affected by the symptoms of a concussion. Students need help transitioning themselves back into the classroom as their brain recovers. A formal protocol prevents parents, coaches and the athletes themselves from doing too much too soon, which could exacerbate or re-trigger concussion symptoms. A formal protocol establishes a line of communication between the athletic and academic areas of a student's life. This communication would allow the academic concussion recovery protocol to be individualized and based upon the symptoms being experienced by the student. Involving teachers in developing an academic component to a concussion recovery program is important. They are the ones that work most closely with the students as they recover. They can closely observe which academic accommodations are working and whether they need to be adjusted. All of the teachers who participated in the study were excited to be involved in helping their students during their recovery and wanted to do what was best for the student. Participants also felt that the academic concussion protocols would improve the concussion recovery program, while smoothly re-integrating students back to the classroom. Teachers felt that these protocols would positively involve them in their students recovery and would help students and staff work together during the transition.

Comparison of Findings to the Literature

The components of the academic concussion recovery program are based on current literature and research. Previous research found that clear and formal protocols reintegrating concussed students back to the classroom are necessary. "The need for specific recommendations for returning a student to learning after concussion is necessary" (Halstead, et al., 2013, p. 949). The symptoms of a concussion can affect the ability of a student to learn. Symptoms decrease student concentration and information retention (Hawley, Ward, Magnay, & Mychalkiw, 2004). Without a formal plan, students may try to resume their academic and athletic activities too soon, which can have direct effects on learning and recovery. Too much cognitive or physical stimulation before the brain has recovered from a concussion can re-trigger or prolong the symptoms of a concussion. It can also lead to second impact syndrome, which is suffering a second concussion before the brain has recovered from the initial concussion. Second impact syndrome is a severe side effect that leads to brain swelling and death. The components of the academic concussion protocol developed in this study were taken from recent articles and tweaked to fit the needs of the school. An academic team was established (Halstead, et al., 2013). The team will include the counselor, the athletic trainer, the Vice Principal of Athletics and all of the student's teachers. If needed, the therapeutic counselor and a special education teacher can be included. The student's counselor act as the head of the academic team and will coordinate the academic adjustments necessary to help the student reintegrate back into the classroom. Possible academic adjustments will be suggested, and the teacher will use those that fit best with their style of teaching and subject. Typical adjustments include a decreased workload, exemption from non-essential assignments, printed note sets, and extended time for assignments and tests. The team

will meet weekly at a time that works for most members of the team (Halstead et al., 2013). The meeting will be arranged and led by the counselor. This academic team will increase the communication between the academic and athletic teams, allowing them to work together to benefit the student. The teachers will also be able to communicate academic progress of the student to the athletic department through the "Academic Progress Report". The progress report is a document filled out by the teachers of the student before they return to their activity. It indicates any assignments or tests that are still outstanding for the student. This way, the student will not return to sport if they are still significantly behind in their schoolwork. Teachers will also receive professional development on academic concussion management as suggested by Halstead, et al., in 2013.

Limitations/Gaps in the Research

The number of participants to the survey limits this study. Only one third of the faculty and staff participated in this study. Participation by the entire faculty and staff would ensure that the academic concussion recovery protocol would work for everyone. The surveys at the end of the study were blind, so it is unknown which opinions in the survey were from faculty, staff or the administration. The participants were also from one small, private high school. Procedures and protocols developed for the academic concussion recovery protocols may not work for bigger, public schools. A larger pool of teachers from multiple schools could adjust the academic concussion recovery protocols so that they could be useful for many schools.

Implications for Future Research

A formal academic component is needed in concussion recovery programs. It reintegrates students back to learning based on the concussion symptoms they are experiencing. Individualizing recovery programs helps to prevent symptom recurrence and allows students to catch up in school with reduced stress. It increases the communication between the athletic and academic teams that are helping the students to recover from a concussion. Increased communication benefits everyone involved in the recovery process. Teachers will know how the physical recovery is going and the academic adjustments being used in each subject. The athletic trainer will know how the student is handling being at school during the day. The family will know what is being done both athletically and academically to help their student. Finally, the formal protocol prevents the student from doing too much too fast due to pressure from coaches and friends. Too much stimulation before an athlete is ready can re-trigger concussion symptoms and prolong recovery. Schools looking to write an academic component to their academic concussion recovery program can use this study as a model to base their school protocols on. This protocol was written for a small private high school. Different types of high schools may need to change or tweak some of the protocols to fit their school's concussion recovery programs.

Overall Significance of the Study

There is some research about what components should be included in an academic concussion recovery program. However, I couldn't find any actual published academic concussion recovery protocols. Including teachers in the development of the academic concussion recovery protocols at the high school was successful. The participants in this study were glad to be a part of helping their students recover. Most were excited about being involved in the development of

the protocols and felt that the academic concussion recovery protocols would improve the concussion recovery program at the high school. Teachers should be involved in the development of protocols to help students, as they will be the individuals following the protocols and working closely with the students as they recover.

About the Author

Brittany Diego has taught high school science for 8 years. She earned a B.S. in Biology and a single subject teaching credential in science from Dominican University of California. She hopes to help her students re-integrate in the classroom more smoothly using the academic concussion protocol developed in this study.

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Appendix: Concussion Recovery Plan

Academic Reintegration Protocol

1. The Athletic Trainer will update the school's Concussion Update google doc.
    a. The google doc is shared with all faculty and staff and lists the date and phase of the students concussion. The concussion phase used is from http://www.nationwidechildrens.org/concussions-in-the-classroom.
2. The Athletic Trainer will send an email to the concussed student's counselor.
    a. The AT will tell the counselor how long the student will be out and when school reintegration can begin.
3. The counselor will meet with the student when they return to school.
    a. Together, based on symptoms, they will decide
        i. A plan for if the student if not feeling well and symptoms return.
        ii. Full vs. half days.
        iii. What sort of accommodations make sense due to symptoms (no computer, need printed notes, no tests, no HW, light HW, etc.)
        iv. A plan to safely catch up and complete work including things such as how long the student should spend on HW, which classes should be integrated first, what type of HW/ activities can be completed.
    b. Start the Missed Work handout. This handout should be filled out by all teachers with the work the student needs to make up. This will not include any assignments the teacher decides are appropriate to exempt for the student.
4. The counselor will send an email to the academic team (teachers, counselors, etc.) to set up an in person weekly meeting time.
    a. At the meeting an academic plan for the student will be discussed and developed based on the meeting of the counselor and the student. This plan will be based on the symptoms of the student and will include what classes the student is attending, academic adjustments to be used, what type of activities can be finished, etc.
    b. The academic team will meet in person weekly to discuss the academic adjustments being used and how the student is doing.
5. The counselor and the student will meet again as needed, at least weekly.
    a. As the student recovers, academic adjustments will be decreased until the student no longer needs them.
6. When the student is ready to return to sport/activity, the student will get the Athlete Academic Progress Form from their counselor.
7. The completed form will be reviewed by the counselor, the athletic trainer, and the Vice Principal of Athletics. The student will be cleared or not cleared by the VP of Athletics to return to activity.

** All forms will be filled out by hand. You can not write to check the website as students with concussions often can't use the computer.

Student Athlete Academic Progress Form

Name of Athlete: _____ Date: _____

Class	Assignments Needed	Teacher Signature

Concussion Absence Missed Assignments

Name: _____ Date: _____

Class	Missing Assignments/Activities	Missed Tests