CONCUSSION REPORTING INTENTIONS AND PERCEPTIONS AMONG COLLEGE STUDENTS

by

MADISON NEESE

(Under the Direction of Katy H. O'Brien)

ABSTRACT

A concussion or mild traumatic brain injury (mTBI) is the most common type of brain injury sustained by both adults and children with a high incidence of mTBI among college students. This study evaluates health-action behaviors for college students seeking or recommending healthcare through the Common Sense Model. A survey for college students assessed health-action behavior and expected outcomes following concussion, which analyzed influencing factors from the model. Results suggest that college students are more likely to recommend seeking healthcare for others whereas students are more likely to wait, monitor symptoms, or seek others' opinions before seeking care for themselves. Additionally, students were sensitive to the *cause* or mechanism of injury when determining health-actions and expected outcomes. As a result, future studies should seek to understand reasoning behind specific health-action behaviors regarding concussion injuries to inform educational efforts around the importance of seeking healthcare following a concussion.

INDEX WORDS: mild traumatic brain injury (mTBI), Common Sense Model, health-action, expected outcomes, college students

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TABLE OF CONTENTS

Page

ACKNOWLEDGEMENTS iv

LIST OF TABLES vi

LIST OF FIGURES vii

CHAPTER

1 Introduction 01

2 Literature Review 03

Mild Traumatic Brain Injury 03

3 Methods 11

Participants 11

4 Data Analysis 16

5 Results 19

6 Discussion 30

7 Conclusion 38

REFERENCES 39

APPENDICES

A Concussion Health Expectations in College (CHECk) Complete Survey 46

LIST OF TABLES

Page

Table 1: Common Sense Model Components (Leventhal 1980; Leventhal, 2016).....08

Table 2: Self & Other Condition Survey Components.....13

Table 3: Codebook for Actions – Self and Other Condition 17

Table 4: Codebook for Expected Outcomes – Self and Other Condition.....18

Table 5: Correlations for Theory of Planned Behavior 19

Table 6: Health Preparedness Demographics 20

Table 7: Health Preparedness Demographics Likert Scale.....20

Table 8: Health Preparedness Social Contexts 21

Table 9: Common Sense Model Chi Square Analysis Health-Action.....25

Table 10: Common Sense Model Chi Square Analysis Expected Outcome 29

LIST OF FIGURES

Page

Figure 1: CHECk Survey Components.....12

Figure 2: Health-Action Plan across Varying Mechanisms of Injury.....24

Figure 3: Expected Outcomes across Varying Mechanisms of Injury 28

CHAPTER ONE

INTRODUCTION

Concussions or mild traumatic brain injuries (mTBI) are frequent and the most common type of brain injury sustained by both adults and children (Polinder et al., 2018). Around 500,000 children visit the emergency department annually for brain injury, and 75% of these children are diagnosed with mTBI (Jager et al., 2000; Committee on Quality Improvement American Academy of Pediatrics, 1999; Koepsell et al., 2011). A concussion or mild traumatic brain injury can be caused "by a bump, blow, or jolt to the head or by a hit to the body that causes the head and brain to move rapidly back and forth" (Centers for Disease Control and Prevention, 2019). The quick movement of the brain within the skull can lead to shearing of axons of neurons, thus damaging brain cells and neuronal pathways. Even without structural damage, such rapid movement of the brain results in the release of neurotransmitters and an energy crisis as cells work to restore equilibrium (Giza & Hovda, 2014). Known as the neurometabolic cascade, this disruption of the ability of neurons to function results in somatic or physical symptoms such as headaches, dizziness, nausea, fatigue, cognitive changes such as forgetfulness, and emotional changes such as frustration (Eisenberg, et al., 2014). Other symptoms of a mild traumatic brain injury can include a short period of loss of consciousness, changes in mental state after the incident such as confusion, post-traumatic amnesia of less than 24 hours, and a Glasgow Coma Scale of 13-15 (American Congress of Rehabilitation Medicine, 1993).

College students are one of the populations at greatest risk for concussion. Although college campus non-athletes are more likely to sustain concussions than athletes (Breck et al.,

2019), there is a lack of literature examining concussion symptoms, reporting, and education among this population. There are a vast number of concussion research studies within the sports-related injuries; however, there is limited research examining concussion knowledge within the general public. As a result, it is unclear what these students may know about concussion or factors that may influence how or when students seek care following head injury. Therefore, more research is needed to understand how non-athlete's knowledge of concussion injuries impact health actions following injury. This will support a better understanding of reporting behavior, health actions, differences between sports and non-sports related concussions, and public knowledge of concussion, all of which are needed to inform better identification and management protocols for concussion in college students. As a result of the lack of current evidence in this area, this study seeks to understand college-aged individual's health actions and expected outcomes for seeking care following concussions.

CHAPTER TWO

LITERATURE REVIEW

Mild Traumatic Brain Injury

Concussions or mild traumatic brain injury result from a "blunt injury to the head or to the body with impulsive force" (p. 1000) accompanied by additional symptoms including headaches, dizziness, vision deficits, balance difficulties, among cognitive difficulties such as poor concentration and impaired memory (Eisenberg, et al., 2014). Causes vary from falls, recreational and sports injuries, motor-vehicle crashes (MVC), assault, being struck by or hit against an object, and others; however, falls are the most common type of mTBI for both young children and older adults. According to Silverberg et al. (2019), most traumatic brain injuries are categorized as mild because there is no loss of consciousness or less than 30 minutes loss of consciousness, as well as posttraumatic amnesia for less than 24 hours. Symptoms can vary, but the average return to work time for adults is one to two weeks while children can return to school between two and four days (Silverberg et al., 2019). Prognosis and recovery must also consider an individual's comorbid conditions and health condition prior to the injury. As a result, post-concussive symptoms can vary on an individual basis; however, around 30% of individuals with mTBI will have symptoms lasting over a month, known as post-concussive symptoms (Manasse-Cohick & Shapley, 2014).

Currently, the general public has limited knowledge on concussion and mTBI (O'Brien, et al., 2019), which could lead to fewer individuals seeking care or reporting symptoms. Schellinger and colleagues (2018) performed a study designed to examine the general public's

knowledge regarding traumatic brain injury (TBI) to determine whether educational materials can have an impact on understanding of TBI. Participants were randomly assigned to a) an unrelated video or b) a video of experts explaining TBI, followed by testimonials of individuals with TBI. Results showed that the group exposed to the brief TBI video increased public knowledge on the impact of concussions and TBI. These results suggest that even limited education can have an impact on understanding of these injuries as well as when, why, and how to seek care for their head injury. However, knowledge alone may not be sufficient for individuals to actually seek care, particularly when faced with real or perceived social pressures.

Concussion in College Students

Breck et al. (2019) examined incidence of concussions on college campuses for undergraduate students as well as varsity student-athletes at the university. According to the study, college students – both female and male – experienced a higher incidence of non-sports related concussion than sports-related concussion. Although the incidence is higher for non-sports related injuries, much of the recent focus in popular media has been on concussion within the sports industry rather than advocating for the general public (Ruston, et al., 2019). Without proper knowledge of concussion injury, symptoms, signs, and proper care, college students are susceptible to further damage by ignoring signs and symptoms and not seeking care (Kroshus, et al., 2014; Manasse-Cohick et al., 2014; Mihalkik et al., 2013).

Additionally, college-students who obtain a mTBI may experience persistent symptoms weeks to months after injury referred to as post-concussive symptoms. Eisenberg et al. (2014) examined post-concussive symptoms in individuals aged 11 to 22 who visited the emergency department. Symptoms were monitored for 90 days post injury, and researchers examined physical, cognitive, and psychosocial symptoms such as headache, fatigue, needing extended

time to think, feeling “foggy,” and depression. Additional symptoms such as sleep difficulties, frustration, and forgetfulness were most likely to develop during the follow-up period. Findings indicated that physical symptoms often develop immediately after injury, while emotional symptoms develop later after injuries, and cognitive symptoms may be present throughout recovery. Due to these post-concussive symptoms (e.g., headaches, fatigue, difficulty sleeping, and cognitive deficits), college students may experience academic dysfunction in their studies as a result of their mTBI (Wasserman, et al., 2016). Wasserman and colleagues (2016) found that 61% of students one-month post-concussion experienced academic dysfunction impacting their schooling performance. These students are at risk for difficulty managing class work and falling behind in school. By incorporating more educational materials, clinical resources, and awareness on college campuses, students with mTBI may better understand how to seek care for their symptoms while also having greater support among professors, colleagues, and peers within the college campus communities.

In addition to post-concussive symptoms, Bevilacqua et al. (2019) examined additional factors that may influence symptom recovery for return to learn for college student-athletes with mTBI. An ecological momentary assessment approach was used to monitor symptoms of students with concussion six times per day via text messages and daily phone-calls. Behavioral variables including music, sleep, physical activity, water, and time were evaluated to determine any significant influence on symptom recovery. Although the researchers could not draw definitive conclusions due to the small sample size and new research in this area, evidence suggested a significant relationship between greater sleep duration, ample water intake, and time post-injury that aided in symptom resolution.

However, due to varying beliefs for concussion care within college-aged populations, many students may minimize their symptoms or take damaging self-care measures to treat their symptoms independently. For instance, many individuals may believe that sleep should be avoided, and that individuals with concussion should remain in a dark room avoiding screens and exercise (O'Brien et al., 2019). However, studies have explored these misconceptions, and research shows that students participating in moderate physical exercise while also returning to school at moderate levels of cognitive activity showed greater improvement and less emotional side-effects such as depressive symptoms from being isolated(Brown et al., 2014; Majerske et al., 2008; Thomas, et al., 2015). Various models and theories seek to understand these perceptions and behaviors related to concussion injuries to evaluate and understand the complexities of human behavior. The model that this study uses to better understand college students' perceptions and behaviors following suspected concussion injuries is the Common Sense Model, which focuses on identification of a health threat followed by coping strategies to obtain a specific health outcome.

Common Sense Model

One model that investigates the impact of fear or "health threats" and its relation to perceived health outcomes is the Common Sense Model. The Common Sense Model examines illness representations, which inform perceptions and beliefs about a particular illness (Leventhal 1980; Leventhal 2016; Baumann & Leventhal, 1985; Meyer et al., 1985). The overall idea of the Common Sense Model is that these illness representations lead to the development of coping strategies, which then impact the health outcome. If a coping strategy does not lead to the desired health outcome or reduce or eliminate the health threat, then individuals will return to the initial stage of the model, forming a new illness representation. This feedback loop allows individuals

to evaluate the health threat, determine coping methods, and evaluate whether those mechanisms are effective in overcoming the health threat (Hagger et al., 2017). The illness representation allows individuals to understand and cope with their specific health condition. Five constructs form the illness representations, including: identity of the illness, timeline perceptions, anticipated consequences, perceptions of control, and attributions of cause (Leventhal 1980; Leventhal 2016; Morris et al., 2002). The identity component refers to the label or diagnosis of the specific health problem. Timeline perceptions are related to beliefs about recovery timelines. Expected consequences refers to an individuals' expectation or belief about the health outcome as a result of the illness. Perceptions of control refers to beliefs about the ability to manage or overcome the illness. Attributions of cause refers to beliefs about the cause of the illness. According to this model, these illness representations can lead to the formation of coping strategies related to the specific health outcomes (Breland et al., 2020; Snell et al., 2013). For instance, an individual may have an emotional response such as venting to a friend as a mechanism to handle the "health threat" of an uncurable medical diagnosis (Haggar, et al., 2017). Furthermore, a person with a new onset illness or injury may seek out or avoid healthcare based on these illness representation constructs.

Snell and colleagues (2013) used the Common Sense Model to examine health outcomes for individuals with mTBI three months after their initial injury. Constructs of the Common Sense Model examined included illness representations, coping strategies, and emotional distress experienced by participants. During post-injury examinations, individuals with overall positive beliefs about concussion (identity) and the trajectory of recovery (timeline) demonstrated better functional health outcomes participating in activities such as conversation, routine activities, leisure activities, and work load maintenance (Snell et al. 2013). In contrast, those that reported

more negative beliefs about concussion and the trajectory of recovery displayed lower functional health outcomes. Moreover, participants with more negative beliefs about concussion at the post-injury analysis had more difficulties in functional and social situations than their counterparts. From these findings, targeting individuals' injury perceptions during recovery can alter their illness representation to ultimately resolve or reduce their specific health threats.

Table 1
Common Sense Model Components (Leventhal 1980; Leventhal, 2016).

Illness Representations	An individual's perceptions and beliefs about a particular health threat where the illness representation includes labels and diagnoses of the illness, timeline perceptions, anticipated consequences, perceptions of control, and attributions of cause
Coping Mechanism	A behavior an individual takes to eliminate or resolve the overall health threat.
Health Outcome	The overall result of the coping mechanism to eliminate or resolve illness representation.

Student Athletes Symptom Reporting and Intentions to Report

Much research has focused on understanding college athletes reporting behaviors and intentions to report concussion symptoms. For example, Torres and colleagues (2013) found that 43% of 262 college athletes had experienced concussion symptoms, but not reported their symptoms. In addition, 22% of students were unlikely to report future concussion symptoms to coaches or athletic trainers, with males even less likely to report their symptoms. By avoiding reporting their concussions or concussion symptoms, these student-athletes are not receiving the quality care needed to support concussion recovery and prevent further injury. Playing through a concussion can lead to more symptoms and longer recovery (Elbin et al., 2016) or even second impact syndrome (SIS), which if untreated could be as devastating as rapid brain swelling within the skull leading to death (Manasse-Cohick et al., 2014).

Similarly, a study by Weber et al. (2019) examined student-athletes' concussion reporting intentions and behaviors to determine if factors such as sex, number of years of sport eligibility, and playing in high versus low contact sports impacted individuals' intentions to report symptoms. Results showed that females and athletes playing in limited or non-contact sports had greater intentions to report concussions than males and those playing contact sports; however, the actual reporting behaviors did not differ among the groups, suggesting a gap also exists between intentions and behaviors around reporting of concussion. Additionally, Manassee-Cohick et al. (2014) conducted a study providing educational materials to high school football players to determine whether educational materials can impact reporting behavior. Concussion knowledge increased, but player attitudes surrounding concussion reporting did not change. Such findings point to the need to further determine factors that influence intention to report and participate in the actual behavior of reporting concussion. Furthermore, no research has yet examined intention to report or actual reporting behaviors of non-athletes.

Perceptions of Concussion and Social Factors

Perceptions surrounding concussion as well as social factors may influence an individual's decision to seek care. According to a systematic review by Ruston et al. (2019), specific narratives surrounding concussions in the media, professional sports, and media entertainment influence athlete perceptions and subsequent decision-making regarding concussion reporting. Key themes identified in the systematic review included continuing to play through pain or injury, showing masculinity or toughness through success in sports, and seeking safety or care following injury. Of these narratives, seeking care and safety was shown to be a low priority within the sports culture. In effect, the media and sports-related culture places more value on continuing to play through injury to show masculinity, to achieve victory, and to

support their teammates. Such social influences may underlie hesitancy to seek care, report symptoms, or stop particular behaviors after a potential concussion injury occurs. How such perceptions may impact non-athletes has not yet been explored systematically, but it is likely that such narratives permeate this space as well.

As a result of the variety of influential factors that play a role in human behavior and decision-making, the purpose of this study is to examine how the Common Sense Model may apply to this much larger group of students to explain reporting behaviors in those at risk for injury outside of organized sports. Analyzing the Common Sense Model may provide some insight into the complexities of the reasoning behind reporting behaviors for concussion-related injuries as a result of specific constructs within the Common Sense Model. By using this framework, particular constructs within the Common Sense Model (e.g., illness representations, coping strategies, and health outcomes), we can attempt to understand potential factors influencing college students' decision-making in relation to seeking healthcare following a concussion. As a result, the current study aimed to examine the Common Sense Model illness representations, coping strategies, and health outcomes; therefore, the aim of this study was to: *examine differences in health-action behavior following suspected concussion between students seeking care for themselves compared to students recommending care for a friend across varying mechanisms of injury.*

CHAPTER THREE

METHODS

Participants

All research activities were conducted under the oversight of the University of Georgia Institutional Review Board. Participants included currently enrolled college students from the University of Georgia, all of whom were recruited through listserv emails. Inclusion criteria were that participants be currently enrolled at the University of Georgia and between the ages of 18 to 35 years old. No additional exclusion criteria were applied. Demographic information was gathered to determine age, gender, race, ethnicity, employment status, enrollment status, class standing, degree in progress, living situation (on or off campus), insurance, transportation, and preference for health care location (University Health Center, primary care physician, urgent care, etc.).

Materials and Procedures

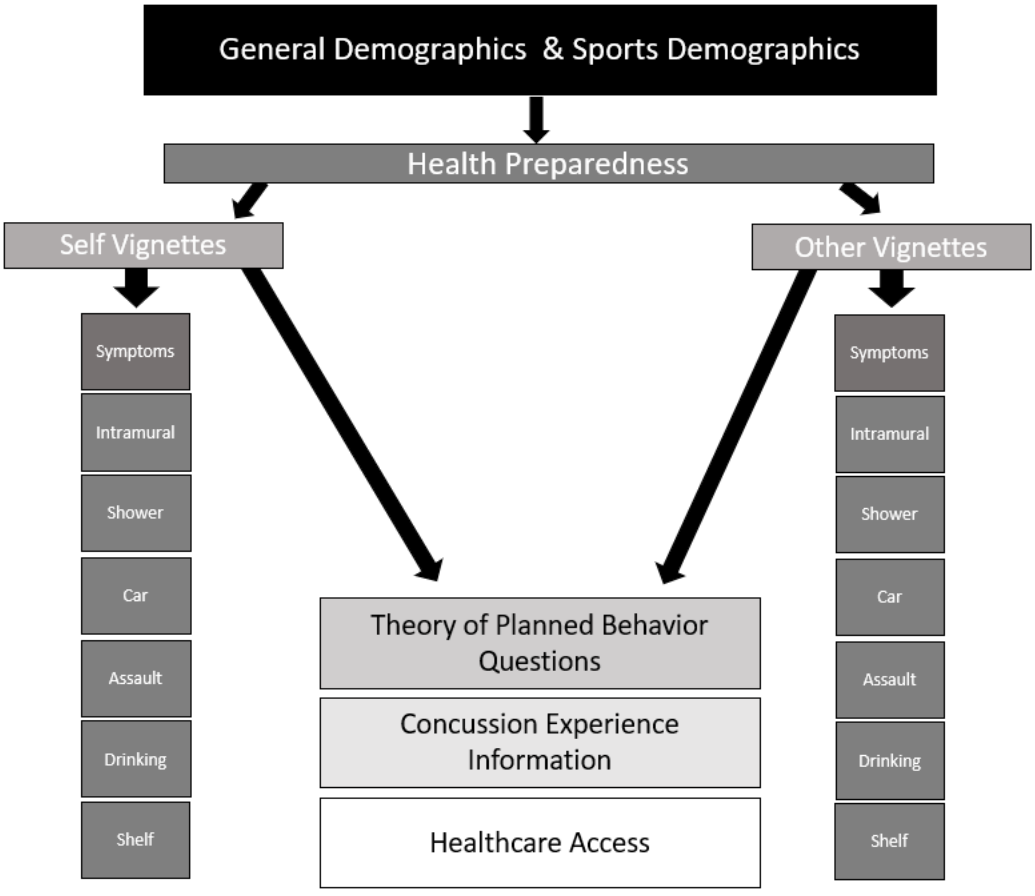
Survey Components

The Concussion Health Expectations in College (CHECk) survey was designed to assess expected outcomes and intended actions following concussion, as well as influencing factors from the Common Sense Model (see Appendix A for complete survey). The survey was designed to assess the impact of illness representations (based on the Common Sense Model) for self-management behavior (e.g., seeking or not seeking health or other care) and intentions to report concussion related-injuries. Likert scale questions addressing elements of Theory of Planned Behavior were designed based on those Register-Mihalik and colleagues (2013)

employed to assess those constructs in student-athletes; however, the current report focuses only on results from the vignette blocks that addressed the Common Sense Model. The survey was administered using Qualtrics XM and consisted of a total of up to 245 questions (depending on internal logic) organized into six blocks (see Figure 1). The first two blocks addressed demographics (including previous sports participation) and health preparedness. Health preparedness included items related to participant's current health, hospital visits, hospitalizations, and health seeking behaviors such as potential actions that they would take in medical or emergency situations.

Figure 1

CHECk *Survey Components*



Self or Other Condition

In the third block, participants were randomized into two groups: Self or Other. In order to address *cause* as a component of the CSM, individuals were asked to answer questions across a series of seven vignettes about what actions they would take following an impact to the head sustained with each of the most common mechanisms of injury (see Table 2). The Self group was asked to answer the questions based on what they would do, while the Other group was asked to answer the questions based on what they would tell their friend to do. The first of the seven vignettes provided a vague "hit on head" scenario, whereas each of the vignettes that followed were scenarios representing the most common injury mechanisms for concussion including motor vehicle crash, assault, falls, being struck by or against an object, sports collision, and an additional mechanism of fall while intoxicated (see Table 2). Each vignette provided the mechanism in a statement, followed by questions related to perceptions of what would happen and whether, when, and where to seek care. All seven vignettes were presented for both the Self and Other groups, with language modified to specify whether the person was considering care for themselves or for a friend. For example, in the motor vehicle crash scenario, participants in the Self group saw the prompt, "Imagine you are in a car accident." Participants in the Other group were shown, "Imagine a friend was in a car accident." Concussion symptoms and self-management behavior were examined in expected outcome items that followed each of the vignettes presented in Self and Other, including self-treatment, symptoms, and diagnosis identification. The injury processing method participants employed (e.g., seeking healthcare, calling a parent, etc.) were also collected from actions taken and expected outcomes in the Self and Other condition.

Table 2
Self & Other Condition Survey Components

Mechanism of Injury (*Cause*)	**Scenario**

General	Imagine you hit your head and afterwards don't feel right. - What do you think this is? (i.e., your diagnosis) - How certain are you that you know what this could be? - What would you do in this scenario? - How soon would you seek healthcare? - What medications do you think you would use in this situation (if any)? - What self-treatment do you think you would use in this situation (if any)?
Sports/Recreation	Imagine you (or your friend) is playing intramural sports and collides with another player.
Fall	Imagine you (or your friend) slip in the shower.
Motor Vehicle Crash	Imagine you (or a friend) are in a car accident.
Assault	Imagine you (or a friend) are assaulted.
Fall while Intoxicated	Imagine you (or a friend) are drinking and fall.
Struck By/Against	Imagine a shelf on your wall breaks and falls on you (or your friend).

Note. Instructions were provided to the participants to "assume you sustain a hit to the head and feel like something is not right afterwards" for each of the specific injury vignettes listed above.

Theory of Planned Behavior

The fourth survey block examined the Theory of Planned Behavior, which evaluated the three constructs of the theory (perceived behavioral control, subjective norms, and attitudes) in hopes to determine participants' intentions to report concussion related injuries. Questions focused on beliefs and values participants assign to social influences (friends, parents, siblings, etc.) in their lives and level of importance of partaking in particular activities (e.g., doing well in school, attending social events, maintaining or canceling plans, etc.). Finally, the last set of items in this block focused on the impact that others' opinions have on a participant's likeliness of seeking care (e.g., the concern my friend has for me makes it more or less likely that I would seek healthcare).

Concussion Experience and Healthcare Access

The final two survey blocks addressed any previous concussion experiences followed by perceptions of healthcare access. Survey logic was used so that the concussion experience block only appeared for those who had indicated previous history of concussion in the first block of the

survey. Questions examined whether students obtained their concussion in college while also asking for participants to tell the researchers about the concussion. Injury details were collected such as additional questions targeted losing consciousness, prior concussions, diagnoses, diagnoses by medical professionals, return to learn, resources provided for returning to campus, and additional information shared by participants. Lastly, the final block of the survey included brief questions regarding whether participants had current health insurance, how participants paid for health insurance, if they had a primary care physician, how they accessed healthcare (e.g., car, public transport, etc.), and if they would seek care at the University of Georgia Health Center or another facility.

CHAPTER FOUR

DATA ANALYSIS

The initial survey block asking questions regarding demographics, healthcare utilization, likelihood of information seeking using the internet, and social contexts important to healthcare decision-making are presented descriptively. After the initial general hit head scenario, participants responded to the specific *causes* or mechanism of injury vignettes. Each vignette included five questions, one of which was a closed-ended Likert scale response about the likelihood of participants discussing the injury with social referents (e.g., friends, parents, physicians, professors, etc.), two were open-ended addressing health actions (e.g., what would you do) and expected outcomes (e.g., what do you think would happen), one was ordinal timepoints (e.g., immediately, the next day, etc.), and the last was categorical site of healthcare if sought (e.g., the UGA Health Center, primary care physician, emergency room, etc.).

The current report focuses narrowly on responses to open-ended health action and expected outcome questions. Open-ended responses were coded inductively based on participant responses (see Tables 3 and 4). The codebook for the specific codes for survey items were created by trained undergraduate, master's student, and doctoral research assistants by developing qualitative codes from the first 25 responses When beginning the coding, the research assistants coded each scenario independently. Codes were then compared and discussed as a coding team. Following the traditional inductive approach, higher-level categories were created from the initial codes to establish the final codes to categorize the health-actions. These codes were then used to code the remaining responses in each respective constructed response question.

To ensure reliability, second coders were blinded to the first coder's responses. Lastly, a consensus coder determined the final code. Discrepancies were discussed with the final coder and the master's research assistant. After consensus was reached, descriptive statistics were utilized to determine count data for each specific code. Inter-rater reliability was completed for 20% of responses. Reliability was excellent at 98%.

Once coding was complete, responses were entered as categorical variables for quantitative analyses. A series of chi-squared analyses were used to determine if the distribution of responses regarding actions and expected outcomes differed according to group (Self and Other) for each injury vignette. Similarly, separate chi-square tests were used to compare the main outcome variables, action plan and expected outcomes, to determine if there were differences between Self and Other in each injury vignette. Post hoc analysis using Bonferroni correction with alpha > .05 was conducted where results were significant and to explore specific differences in action plans by injury mechanism.

Table 3
Codebook for Actions – Self and Other Condition

Code	Category	Definition/Examples
1	Medical	Participant mentions seeking medical help such as seeking a doctor, going to the Emergency Room, or visiting their Primary Care Physician.
2	Family/Friends	Participant mentions calling or seeking the help of parents, grandparents, siblings, other relatives, or friends for care or advice after concussion injury.
3	Nothing	Participants state that they would not seek care. Participants would laugh, walk it off, or do nothing in this category.
4	Self-Treat	Participants stated that they would treat the symptoms themselves. Actions included resting, icing head, sitting down, drinking water, etc.
5	Something Else	Participants indicated any other response that did not fit in a previous category such as stopping the behavior, vague responses, or non-medical actions such as hanging the shelf back up, etc.

Table 4

Codebook for Expected Outcomes – Self and Other Condition

Code	Category	Definition/Examples
1	Medical	Participant mentions seeking medical help such as seeking a doctor, going to the Emergency Room, or visiting their Primary Care Physician.
2	Family/Friends	Participant mentions calling or seeking the help of parents, grandparents, siblings, other relatives, or friends for care or advice after concussion injury.
3	Nothing	Participants state that they would not seek care. Participants would laugh, walk it off, or do nothing in this category.
4	Self-Treat	Participants stated that they would treat the symptoms themselves. Actions included resting, icing head, sitting down, drinking water, etc.

CHAPTER FIVE

RESULTS

The present study sought to evaluate the Common Sense Model to examine factors for college students seeking care for themselves or recommending care for others across varying mechanisms of injury. There were 528 total participants with a mean age of 22.04 (*SD*=3.70). The majority of survey participants were female (*n*=405) as well as white (*n*=381). Additionally, most survey participants reported not being Hispanic/Latinx (*n*=496), lived off campus (*n*=360), and had siblings (*n*=483) and roommates (*n*=508). A majority of survey participants were enrolled as in-state (*n*=427) full-time undergraduate students (*n*=363) (See Table 5). In addition, the majority of participants in our study did not visit the emergency room during 2019 or 2020 (See Table 6). Students were also likely to use Internet to search for health information (See Table 7). Lastly, participants reported themselves, physicians, and parents as most important social referents when making healthcare decisions (See Table 8). For more detailed demographic information, see tables 5-8.

Table 5

Sample Characteristics (*n*=528)

		n (%)
Gender	Female	405 (76.70)
	Male	114 (21.59)
	Queer/Gender non-conforming	6 (1.14)
	Trans male	1 (.19)
	Other identity	1 (.19)
Race	White	381 (72.16)
	Asian	75 (14.20)
	Black	30 (5.68)
	Other	36 (6.82)
	Not Disclosed	6 (1.14)
	No	496 (93.93)

Ethnicity	Yes	30 (5.68)
Hispanic/Latinx	Not disclosed	2 (.38)
Housing	Off campus	360 (68.18)
	On campus	142 (26.89)
	Off campus with Parent	24 (4.55)
	Other	2 (.38)
Siblings	Yes	483 (91.48)
	No	45 (8.52)
Roommates	Yes	508 (96.21)
	No	20 (3.79)
Enrollment	In-state	427 (80.87)
	Out of State	77 (14.58)
	International	24 (4.55)
Enrollment Status	Full-time undergraduate	363 (68.75)
	Full-time graduate	138 (26.14)
	Part-time undergraduate	8 (1.52)
	Part-time graduate	17 (3.22)
	Other	2 (.38)
Concussion History	Yes	117 (22.16)
	No	411 (77.84)
Sports History	Yes	430 (81.44)
	No	98 (18.56)

Table 6
Health Preparedness Demographics

Hospitalizations/Emergency Room Visit		Before March 2020	Since March 2020
	Number of Visits	*n* (%)	*n* (%)
	0	410 (77.65)	439 (83.14)
	1	73 (13.83)	59 (11.17)
	2	28 (5.30)	24 (4.55)
	3	10 (1.89)	5 (.95)
	4	1 (.19)	4 (.76)
	5	3 (.57)	1 (.19)
	6+	3 (.57)	0 (0)

Note. Students were given a dropdown menu to select the number of visits to the hospital/emergency room.

Table 7
Health Preparedness Demographics Likert Scale

Statements	Mean (SD)	Median	Mode
Likelihood of searching health information using the internet	4.55 (.90)	5	5
Likelihood of taking further actions	3.71 (1.25)	4	4

Note. Questions were scaled on Likert Scale with 5 being very likely, 4 being somewhat likely, 3 being neither likely nor unlikely, 2 being somewhat unlikely, and 1 being very unlikely.

Table 8
Health Preparedness Social Contexts

Statements	Mean (SD)
If I have to make a decision about my health, rate how important these people are	
Me	4.63 (0.72)
Doctor	4.30 (1.05)
Parents	4.20 (1.03)
Significant other	3.36 (1.44)
Siblings	3.15 (1.44)
Friends	2.88 (1.16)
Roomates	2.35 (1.26)
Professors	1.91 (1.11)
Other	1.70 (1.24)
Other students at UGA	1.67 (1.01)

Note. Survey responses were rated on a Likert Scale with 5 being very important, to 1 being very unimportant.

To examine our aim, we analyzed the Common Sense Model to determine factors that may impact whether students would seek care for themselves or recommend care for another. A series of chi square analysis examined health-action behavior across the seven vignettes of various *causes* within both the Self and Other condition. Following chi square tests, a post hoc analysis using Bonferroni correction with alpha >0.05 assessed the significance among each mechanism of injury.

When evaluating the health-action question in the survey, “what would you do in this scenario?” results varied per mechanism of injury (*cause*). For the general hit head scenario, results suggested that college students in the Other condition were more likely to recommend seeking medical care within this mechanism of injury (p=.002). In comparison, students in the

Self condition were more likely to seek the opinion of family/friends or take no action than participants in the Other condition (all $p<.001$). Results are broken down further by each mechanism of injury, and these can be observed in detail in Figure 2 and Table 9.

Results indicated that in the sports collision mechanism of injury, those in the Other condition were more likely to recommend seeking emergency medical services (EMS) or medical care compared to those in the Self condition seeking these services for themselves ($p<.001$). Additionally, participants responding to the Self condition for the sports collision scenario were more likely to take no action for themselves ($p<.001$) or seek the opinion of family/friends ($p<.001$) while those in the Other condition were more likely to recommend seeking care ($p<.001$). Similarly, within the fall mechanism of injury, those in the Other condition were more likely to recommend seeking EMS or medical care compared to those in the Self condition seeking care for themselves ($p<.001$). In the Self condition, individuals were more likely to reach out to family/friends in this vignette or take no health-action (all $p<.001$).

Results for the motor vehicle crash mechanism of injury indicated those in the Other condition were more likely to recommend seeking EMS or medical care while those in the Self condition were less likely to seek medical care for themselves ($p<.001$). In comparison, students in the Self group were more likely to reach out to family/friends more than those in the Other group ($p<.001$). Furthermore, students in the Self group for this mechanism of injury were more likely to self-treat their injuries after a motor vehicle crash ($p=.002$).

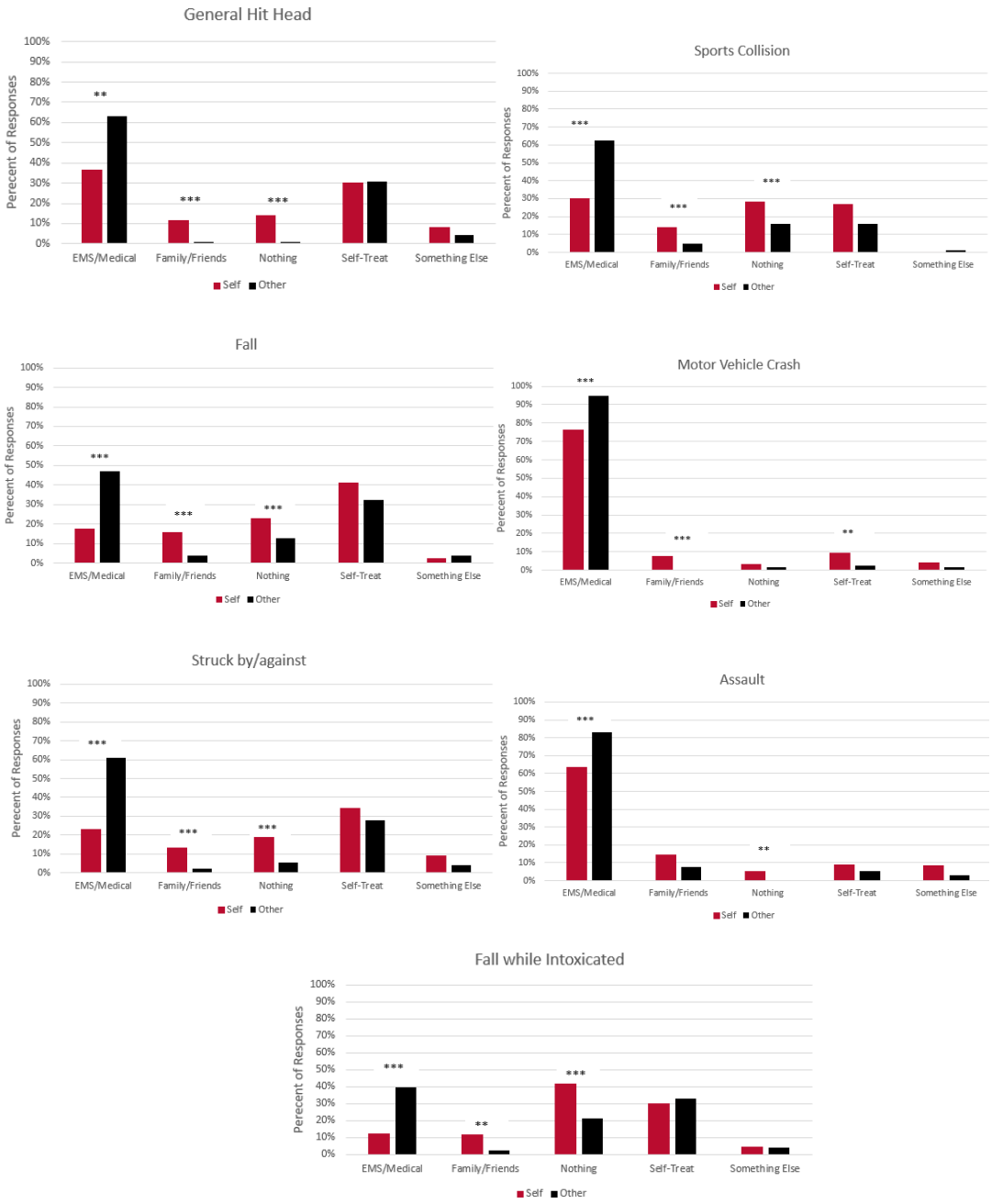
Within the assault mechanism of injury, those in the Other group were more likely to recommend that a friend seek medical care while those in the Self group were less likely to seek care for themselves ($p<.001$). In contrast, college students in the Self group were more likely to take no health-action following an assault ($p=.003$).

From the fall while intoxicated mechanism of injury, results varied among three of the four codes (EMS/medical, family/friends, nothing, self-treat). Students in the Other group were more likely to recommend seeking medical care following a fall while intoxicated ($p<.001$) while those in the Self group were less likely to seek care for themselves. In contrast, those in the Self condition were more likely to reach out to family/friends ($p=.001$) or to take no action in this vignette ($p<.001$).

In the last condition, being struck by/against, similar results were observed. Students in the Other group were more likely to recommend seeking medical care for a friend ($p<.001$), while those in the Self group were less likely to seek care for themselves. In comparison, students in the Self group were more likely to seek the opinion of family/friends or take no action after a shelf has fallen on them (all $p<.001$).

Figure 2

Health-action plans across varying mechanisms of injury



Note. See Table 9 for more detailed values regarding health-actions across the mechanisms of injury.

Table 9

Common Sense Model Chi Square Analysis Health-Action

		Medical		Family/Friends		Nothing		Self-Treat		Something Else		Chi Square df=4	p-value
Vignette	Group	N	%	N	%	N	%	N	%	N	%	χ^2	P
General	Self	88	36.2%	28	11.5%	34	14.0%	93	38.3%	0	0%	58.71	<.001
	Other	119	50%	2	0.8%	2	0.8%	114	47.9%	1	0.4%		
Sports collision	Self	72	30%	34	14.2%	68	28.3%	65	27.1%	1	0.4%	82.25	<.001
	Other	159	69.1%	12	5.2%	40	7.0%	40	17.4%	3	1.3%		
Fall	Self	39	17.5%	35	15.7%	51	22.9%	92	41.3%	6	2.7%	55.35	<.001
	Other	105	47.1%	9	4.0%	28	12.6%	72	32.3%	9	4.0%		
MVC	Self	172	76.1%	17	7.5%	7	3.1%	21	9.3%	9	4.0%	32.62	<.001
	Other	211	94.6%	1	0.4%	3	1.3%	5	2.2%	3	1.3%		
Assault	Self	143	63.3%	32	14.2%	12	5.3%	20	8.8%	19	8.4%	25.95	<.001
	Other	179	83.3%	16	7.4%	1	0.5%	12	5.6%	7	3.3%		
Fall – Intoxicated	Self	27	12.2%	26	11.8%	92	41.6%	66	29.9%	10	4.5%	59.80	<.001
	Other	84	39.6%	5	2.4%	45	21.2%	70	33%	8	3.8%		
Struck by/against	Self	49	22.9%	28	13.1%	45	21%	73	34.1%	19	8.9%	78.63	<.001
	Other	126	60.9%	4	1.9%	11	5.3%	58	28%	8	3.9%		

When examining the expected outcome vignettes, fewer comparisons between the Self and Other conditions across mechanisms of injury were statistically significant when compared to the health-action behaviors (See Figure 3 and Table 10). The expected outcome vignettes assessed what might be the expected results of health-actions the students may do or recommend a friend do following a specific injury. However, most students interpreted this expected outcome to be what might happen *immediately* after making the recommendation, rather than a longer term outcome. For example, if a respondent recommended healthcare to a friend as a health action, the expected outcome was that the friend sought healthcare, rather than the friend recovering more quickly because of health care utilization. Therefore, results that follow should be interpreted with caution, and future survey design take this response pattern into account.

The expected outcomes of the sports collision mechanism of injury suggested that students in the Other group expected that they would recommend a friend seek medical care following this injury (p=.002). Similarly, participants in the Other group expected they would recommend seeking medical care following a fall in the shower as well (p<.001). Those in the Self group were less likely to seek EMS or medical care following a sports collision, and self-treatment or no action were reported more than seeking care within the Self group.

Results of the motor vehicle crash mechanism of injury indicated that students in the Other group expected that they would recommend a friend seek medical attention more than those in the Self group expected that they would seek medical care for themselves (p<.001). In contrast, students in the Self group expected that they would do nothing (p<.001) or self-treat (p<.001) following a motor vehicle crash. In addition, students in the Self group expected they would self-treat after a fall while intoxicated (p<.001). For the struck by/against mechanism of injury, individuals in the Self group expected they would do nothing in this vignette (p<.001).

Within the fall while intoxicated mechanism of injury, significance results were found as individuals in the Other group expected that they would recommend self-treatment following a fall while intoxicated ($p<.001$). These results differ from the health-action behavior where participants in the Other group expected they were more likely to recommend a friend seek health care following this mechanism of injury.

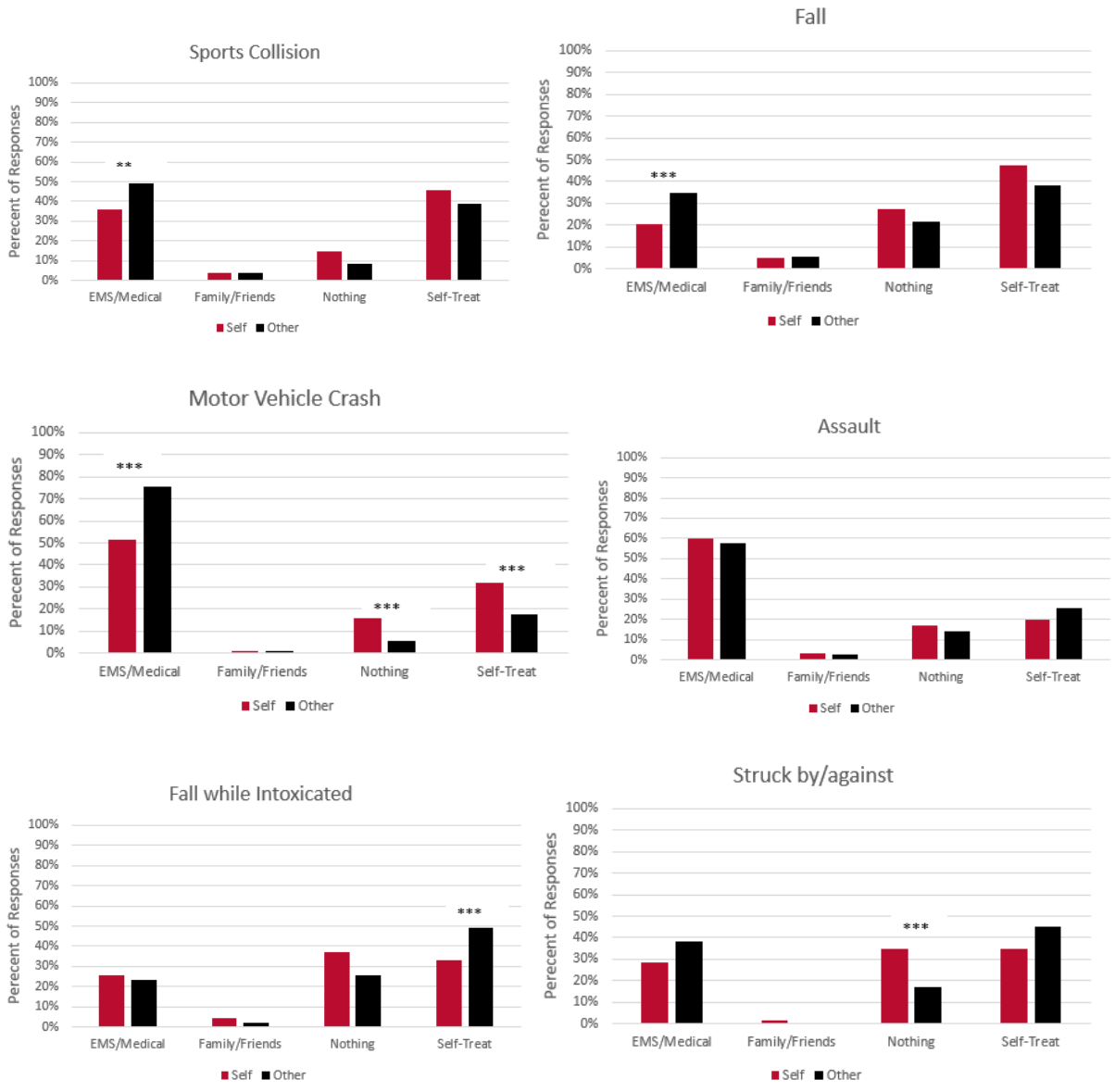
In the fall scenario, participants in the Other group expected that they were more likely to recommend that individuals seek EMS or medical care ($p<.001$) compared to those in the Self condition seeking EMS or medical care for themselves. Although no statistical significance was found, individuals in the Self condition expected they were more likely to take no action or self-treat following a typical fall.

No statistical significance was found within the assault mechanism of injury. Although no statistical significance was found among the expected outcomes assault mechanism of injury, there was a higher number of participants within the Self condition who expected that they would seek emergency medical services or care following an assault compared to the Other group, which had a greater number of participants expecting they would tell a friend to self-treat injuries after an assault. Within the final mechanism of injury, struck by/against, participants in the Self condition expected they would take no action after being struck by or against a shelf ($p<.001$).

Overall, students in the Self condition expected they would self-treat or take no action in the sports collision, motor vehicle crash, fall while intoxicated, and fall mechanism of injury while individuals in the Other condition expected they would recommend a friend seek medical attention following a sports collision, motor vehicle crash, fall, or struck by/against mechanism of injury.

Figure 3

Expected outcomes across varying mechanisms of injury



Note. See Table 10 for more detailed values regarding expected outcomes across the mechanisms of injury.

Table 10

Common Sense Model Chi Square Analysis Expected Outcome

		Medical		Family/Friends		Nothing		Self-Treat		Chi Square (df=4)	P-value
Vignette	Group	N	%	N	%	N	%	N	%	χ^2	P
Sports collision	Self	83	34.7%	9	3.8%	34	14.2%	105	43.9%	16.9	.002
	Other	103	49%	8	3.8%	17	8.1%	82	39%		
Fall	Self	47	20.6%	11	4.8%	62	27.2%	108	47.4%	11.7	.008
	Other	73	34.9%	11	5.3%	45	21.5%	80	38.3%		
MVC	Self	117	51.3%	2	0.9%	36	15.8%	73	32%	29.12	<.001
	Other	158	75.6%	2	1%	12	5.7%	37	17.7%		
Assault	Self	132	59.7%	7	3.2%	38	17.2%	44	19.9%	2.53	.470
	Other	119	57.8%	5	2.4%	29	14.1%	53	25.7%		
Fall – Intoxicated	Self	55	25.3%	10	4.6%	80	36.9%	72	33.2%	13.75	.003
	Other	49	24.4%	4	3.3%	53	31.2%	103	41.1%		
Struck by/against	Self	61	28.5%	3	1.4%	75	35%	75	35%	21.17	<.001
	Other	78	38%	0	0%	35	17.1%	92	44.9%		

CHAPTER SIX

DISCUSSION

This study examined college students' perceptions of concussion in relation to their actions and intention to seek or recommend healthcare following a concussion-related injury. Survey participants were randomized into two conditions, Self and Other. Students were then asked to determine health action behaviors for themselves or for a friend across seven *cause* vignettes reflecting common mechanisms of injury following a concussion. The survey questions were created from the Common Sense Model framework to attempt to explain the complexities of human health-related behavior. The results of the study suggest that students are more likely to recommend care for others rather than seeking care for themselves; however, results varied across *cause* or mechanism of injury, with particularly notable differences in recommendations for care in the fall while intoxicated *cause.* In addition, injuries resulting from motor vehicle crashes and assault generated greater consensus toward more immediate treatment. Regarding expected outcomes, students expected that they were more likely to self-treat or take no action for themselves while they expected that they would recommend a friend seek care following a concussion injury. Despite differences across mechanisms of injuries in the health-action vignettes, in general, the Self group was more likely to seek a second opinion, take no action, or self-treat following injury while those in the Other group were more likely to recommend care.

According to the Common Sense Model, individuals' illness representations influence actions and decisions to resolve the overall health threat as well as perceptions of the health threat and intangible ideas including diagnoses or labeling the health threat (Breland et al.,

2020). To explain the results of our study according to the model and literature, individuals within the Self group may have perceived their illness representations for themselves as less severe than when examining a health threat for a friend in the Other group. As a result, the coping strategy to resolve the health threat was simply to take no action, seek a second opinion, or self-treat rather than immediately seek care for oneself.

Additional factors from this model that could potentially have influenced students' health-actions and expected outcomes include the five subgroups within the illness representation construct being symptoms or the diagnosis, the timeline of recovery, level of control over the health threat, *cause* of the illness representation, and the consequences due to the illness (Breland et al., 2020). Preconceived beliefs and general concussion knowledge about concussion diagnoses, trajectory of recovery, level of situational control, or the consequences of obtaining a concussion, could have influenced individuals' reporting behavior and health-actions and expected outcome responses. Within this model, self-efficacy components could have also played a role in determining individuals' motivation to solve the illness representation, the potential disruption of activities of daily living, and the ability to prepare for the future as well as anxiety, depression, and overall concern following concussion (Breland et al., 2020; Snell et al., 2011). From the literature, all of these factors could have influenced individuals' health-actions and expected outcomes when determining health-actions to seek, recommend, or expect following a concussion.

With the wide range of influential factors involved in health-actions according to this model, students in the Self condition could be more inclined to seek out the opinion of others before making a complete decision (Breland et al., 2020; Snell et al., 2013, Snell et al., 2013). When individuals seek out a second opinion from a friend or family member, the person

providing the advice may perceive a greater health threat because the individual reached out for advice. Therefore, individuals in the Other condition could have been more likely to recommend an individual seek medical care due to their perception of a more serious health threat. If an individual in the Self condition feels as though they need to ask an additional person about the injury, then these individuals most likely need to ask a medical professional as well.

Additional explanations could include that individuals in the Other condition may have felt a lower level of control over the situation when the injury occurred to a friend; therefore, they were more likely to recommend a friend seek medical treatment following a concussion-related injury (Breland et al., 2020). Moreover, seeking medical attention could also be emotionally and mentally challenging for individuals as they must retell the difficult situation for some mechanisms of injury such as assault (Snell et al., 2011).

The fall while intoxicated mechanism of injury led to further examination of the current literature to determine the reasoning for the similarities across conditions (Self and Other) for the health-actions and expected outcomes of college students following a fall while intoxicated as both conditions expected they would take other coping strategies rather than seeking healthcare. To attempt to explain students' lack of urgency of seeking healthcare for themselves and recommending for others, there are several factors that could play a role in the decision-making. For instance, many students could have felt that the timeline aspect of the illness representation was not as urgent; therefore, students tended to recommend a friend wait before seeking medical treatment and self-treat (Breland et al., 2020; Snell et al., 2013; Snell et al., 2011). Wicki et al. (2018) examined positive and negative experiences of adolescents when drinking and found that despite the negative consequences individuals may experience while drinking, such as embarrassment from behaviors like falls, these individuals continued to drink again in the future

as positive experiences drove their drinking behaviors more than the negative consequences. From this study and to relate to the Common Sense Model, these young adults could perceive the negative consequences as minimized in order to achieve the positive outcomes associated with drinking (Wicki et al., 2018). Therefore, the health threat accompanying a fall while intoxicated may be perceived as less urgent as the fall is simply a negative byproduct of the overall positive experience the adolescents had while drinking (Wicki et al., 2018; Snell et al., 2013).

Further explanations could include that students who are drinking underage may expect that they would recommend self-treatment to avoid legal trouble. As a result, the coping strategy may simply be to self-treat to obtain the health outcome rather than seeking medical services. As fall risks are increased while under the influence of alcohol (Scheenen et al., 2016), it is important for future research to work toward educating college students of the risks of injury while consuming alcohol. Additionally, future research and community outreach should work toward educating college students on concussion, the signs and symptoms, and the importance of reporting concussion. As results from Schellinger et al. (2018) demonstrated, brief educational materials can improve concussion knowledge, which in turn could lead to better awareness of what a concussion is and when to report a concussion to obtain the appropriate medical care.

In contrast to the other vignettes, within the *causes* or mechanisms of injury, motor vehicle crashes and assault vignettes resulted in fairly similar patterns of actions and expected outcomes (see Figure 2). This could be explained as participants may have perceived a motor vehicle crash or assault as more serious injuries (in the case of motor vehicle crashes, high velocity injuries means that this is often the case), or that legal concerns may result in notifying police as well as emergency services (Ruff et al., 2009; Vanderploeg et al., 2007; Holm, et al., 2005). In addition, either of these may result in co-morbid injuries, treatment of which may need

to be emergent (Ruff et al., 2009; Vanderploeg et al., 2007; Holm, et al., 2005). As a result, these participants felt that they should seek healthcare and seek healthcare immediately, which was shown when recommending health-actions in the Other condition.

Overall, the evidence suggests that students are more likely to recommend care for others rather than seek care themselves. In accordance with the Common Sense Model, this could be explained through students in the Self group having a lower or less urgent illness representation surrounding a suspected concussion injury that occurs to themselves. This in turn leads to a less urgent coping strategy to resolve the overall health outcome. However, it appears that students in both the Self and Other group understand the appropriate action to take following a concussion injury to support a healthy recovery by seeking medical attention. This conclusion results from the similarities among the demographics of the study, suggesting that participants understand the appropriate action to take for themselves as they are quick to recommend this to an individual in the Other group; however, there are still discrepancies among the expectations and actual health-action behaviors.

Recent studies have suggested extending the Common Sense Model to incorporate the constructs within the Theory of Planned Behavior (Haggar & Orbell, 2021). According to Haggar and Orbell (2021), an extended model of the Common Sense Model should be implemented to encompass an action plan within the model for decision-making and coping strategies while also accounting for the constructs of the theory of planned behavior (attitudes, subjective norms, and perceived control). The updated model states the impact that these three constructs have on intentions to report while also factoring in the cognitive component of the illness representations meaning the causes, level of control, consequences, diagnosis or label, and timeline and the emotional representation toward a particular injury. This leads to development

of an action plan to then form a coping behavior to achieve the health outcome (Hagger and Orbell, 2021). Additionally, both models incorporate the importance of self-efficacy influencing decision-making for activities and behaviors (Ajzen, 1991; Snell et al., 2011; Snell et al., 2013). Therefore, future research should examine how the Theory of Planned Behavior and the Common Sense Model interact with one another to develop a clearer picture of reasoning for these discrepancies. Combining both theories when examining individuals' perception, beliefs, and actions related to concussion could be useful in better understanding concussion reporting behavior among college students.

Limitations

Despite the results and suggested interpretations from the study, there are still various limitations indicating the need for future research. The study demographics were largely female, which is not an accurate representation of college students at the University of Georgia. To address another limitation of the study, expected outcomes questions could have been misinterpreted, as these aligned very closely with health-actions of students. Students consistently put the health-action in the first survey section, and then according to the specified health-action, the expected outcomes aligned with that health-action. Therefore, survey instructions could have been misinterpreted as students thought the expected outcome questions should be the same as the health-actions they would take rather than reporting more expectations as a result of the scenario such as "I will feel sad, or I will have a headache." Therefore, future research should include clearer survey questions to explain the expected outcomes portion to ensure participants understand the question rather than aligning their responses with the actual health-action they would take.

From the data, we still do not fully understand why students in the Self group would not take specific health-action behaviors when an injury occurred to themselves; however, the Other group typically recommended other students to seek healthcare following a suspected concussion injury. Although this study explored potential explanations for this discrepancy, additional research is needed to better understand the complexities of human behavior when evaluating health-seeking behavior for oneself versus a friend or other individual.

Future Directions

Due to the higher incidence of concussion within non-sports related college students, research should continue to search for ways to support college students' concussion knowledge and awareness of the risks. As a result of the study, we have learned that there is an inconsistency either within the study or within college students' perceptions of concussion. For instance, within the fall mechanism of injury, responses from the Self condition indicated that students are more likely to take no action or self-treat following a fall; however, falls are one of the most common mechanisms of injury for brain injury (Anderson et al., 2022; Breck et al., 2019; Snell et al., 2013). To ensure students are aware of the importance of seeking care following a concussion, future studies should work toward educating college students about the importance and steps of seeking care following a suspected concussion.

This study suggests that college students do understand the appropriate behavior to take following a concussion as they are consistently recommending individuals seek healthcare within the Other condition. Moreover, college students in the Self condition appear to understand the gravity of the concussion-related injuries as they are seeking the opinion of others suggesting that those in the Self condition are already concerned about the injury. However, there is an inconsistency in these perceptions and the actual reporting behaviors. As a result, future studies

should attempt to determine the cause of this discrepancy to better understand how individuals feel towards concussion reporting and how they expect and plan to act following various mechanisms of injury. To support this growth and awareness, further advocacy measures, research, and educational materials should be incorporated on college campuses to support concussion knowledge and awareness for this population. For example, to aid college students' understanding of mTBI, instructors could incorporate a section on all course syllabi addressing signs and symptoms of a concussion, where to report concussion, and why you should report concussion. In this way, students would have resources readily available, and they may have a more positive attitude toward concussion reporting as a result of this education. Additional advocacy measures that could be implemented on campuses include programs in college seminar classes on mTBI and the laws surrounding amnesty while being injured while underage drinking. Regardless, to grow our understanding of college student behaviors regarding concussion reporting, future research should be conducted to determine the best, most effective materials needed to support concussion reporting behaviors among college students.

CHAPTER SEVEN

CONCLUSION

Overall, this study sought to evaluate perceptions of concussion in college students and how their perceptions impact health-action behavior following concussion. This study has demonstrated the need for more education and advocacy to teach college students about concussion and the importance of reporting. Additionally, it is essential that college students feel that they can seek assistance for concussions regardless of specific mechanisms of injury. Creating a college community that values students' safety and explaining laws regarding injuries while underage drinking or other mechanisms of injury could express that seeking healthcare will not result in legal repercussions within specific mechanisms of injury. Therefore, seminars or educational materials around campus, explaining signs and symptoms of concussions as well as the repercussions of not seeking care could be helpful in educating this population on the importance of seeking healthcare following a concussion. This study adds valuable information to better understand how students' perceptions of concussion impact their concussion seeking behavior. Moreover, the study demonstrates that there are a variety of factors that do impact an individual's decision-making process when deciding whether to seek care for themselves or recommend care for others. However, future research should be implemented to better understand the underlying reasons behind concussion reporting behavior and additional influential factors.

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APPENDIX A

Concussion Health Expectations in College (CHECk) Complete Survey

Background and Eligibility		
	Question	*Response*
	Are you willing to participate in this survey?	• Yes, I agree to participate. • No, I do not agree to participate.
	Eligibility	*Response*
1	How old are you?	Slider selection from 0 to 60 for age selection
2	Are you currently enrolled at the University of Georgia? (any level or program)	• Yes • No
3	Have you ever been diagnosed with any of the following? (Please select all that apply)	• Stroke • Cancer or Tumor • Multiple Sclerosis • Parkinson's Disease • Psychological Disorder Requiring Hospitalization • Encephalitis • Meningitis • Any other neurological problem (*free text entry*)
	Demographics – Tell us about yourself.	*Response*
4	What is your identified race? (select all that apply)	_____ White _____ Black or African American _____ American Indian or Alaska Native _____ Asian _____ Native Hawaiian or Pacific Islander _____ Other _____ Prefer not to answer
5	Do you identify as Hispanic/Latinx?	• Yes • No • Prefer not to answer
6	What is your current gender identity?	• Male • Female • Transmale • Transfemale • Genderqueer/Gender non-conforming • Prefer not to answer • (*Free text entry*) Other identity

7	Which of the following best describes your employment status?	• Employed Part-Time • Employed Full-Time • Not employed, seeking work • Disabled, not able to work • (Free text entry) Other
8	Which of the following describes your current enrollment status?	• Full-Time Undergraduate Student • Part-Time Undergraduate Student • Full-Time Graduate Student • Part-Time Graduate Student • (*Free text entry*) Other
9	Current Class Standing	• Freshman • Sophomore • Junior • Senior
10	Degree Objective	• Master's • Professional • Doctorate • (*Free text entry*) Other
11	Which of the following best describes your enrollment status?	• In State Student • Out of State Student • International Student
12	Where do you live currently?	• On Campus • Off Campus • Off Campus with Parent • (*Free text entry*) Other
13	Have you ever been diagnosed with a concussion?	• Yes • No
14	Have you ever been involved in organized sports? (Previously or presently)	• Yes • No
15	Do you have any siblings?	• Yes • No
16	Have you ever lived with a (non-family) roommate?	• Yes • No
	Sports Demographics (Displayed if participants answered yes to item #14)	
17	When were you involved in organized sports? Choose all that apply.	• Currently • Earlier in College (not currently playing) • High School • Middle School • Elementary School
18	What level of organized sport did you participate in? Check all that apply.	• Varsity • Junior Varsity • Club • Intramural • Recreational/Hobby • Other (*free text entry*)

19	Which organized sports have you been involved in? Choose all that apply (previously or presently)	• Basketball • Cheerleading • Cross Country/Track & Field • Dance • Field Hockey • Football • Golf • Gymnastics • Ice Hockey • Lacrosse • Rugby • Soccer • Softball • Swimming/Diving • Tennis • Volleyball • Water Polo • Wrestling • Other (*free text entry*)

Health Preparedness		
	Question	*Response*
1	Since March 2020, how many times have you gone to a hospital or emergency room?	Drop down for number selection 0-12+
2	In the 12 months before March 2020, how many times did you go to a hospital or emergency room?	Drop down for number selection 0-12+
3	How likely is it that you would search for health information using the Internet? (For example, if you were experiencing unfamiliar symptoms, would you look online to find out what it could be?)	• Very likely • Somewhat likely • Neither likely nor unlikely • Somewhat unlikely • Very unlikely
4	How likely is it that you would take further action after researching for health information on the internet?	• Very likely • Somewhat likely • Neither likely nor unlikely • Somewhat unlikely • Very unlikely
5	How likely is it that you would take further action after researching for health information on the internet?	• Very likely • Somewhat likely • Neither likely nor unlikely • Somewhat unlikely
6	What further action do you typically take after researching health information on the internet?	*Free text entry*

7	If I have to make a decision about my health, rate how important these people are:	• My friends • My parents • My brother/sister • My significant other • My roommate • My professors • Other Students at UGA • My doctor • Other (*free text entry)*

Self Condition		
	Question	*Response*
	Please indicate what you would do in the following scenarios. Imagine you hit your head and afterwards don't feel right	
1	What do you think this is? (i.e., your diagnosis)	*Free text entry*
2	How certain are you that you know what this could be?	• Very Certain • Somewhat Certain • Neither Certain Nor Uncertain • Very Uncertain
3	What would you do in this scenario?	*Free text entry*
4	What symptoms would you expect to experience?	*Free text entry*
5	How soon would you seek healthcare?	• I would not seek healthcare • Immediately • Within a few hours • The same day • The next day • Within the week • Only if problems persisted after a week
6	What medications do you think you would use in this situation (if any)?	*Free text entry*
7	What self-treatment do you think you would use in this situation (if any)?	*Free text entry*
	Instructions: In each of the following scenarios, assume you sustain a hit to the head and feel like something is not right afterwards. *Imagine you are playing intramural sports and collide with another player.* *Imagine you slip in the shower.* *Imagine you are in a car accident.* *Imagine you are assaulted.* *Imagine you are drinking and fall.* *Imagine a shelf on your wall breaks and falls on you.*	
8	How likely is it that you would discuss this with each of the following people?	*A sliding scale from -3 to 3 was used for responses. A -3 indicated*

		not at all likely while 3 indicated extremely likely. • My friends • My parents • My brother/sister • My significant other • My roommate • My professors • Other Students at UGA • My doctor • Other (*free text entry)*
9	What would you do in this scenario?	*Free text entry*
10	Based on actions you described, what do you think would happen?	*Free text entry*
11	How long would you wait before doing something about it?	• I would not do anything about it • Immediately • Within a few hours • The same Day • The next day • Within the week • Only if symptoms persisted after a week
12	If you were to see a healthcare professional, where would you go?	• The UGA Health Center • My primary care physician • The emergency room • Urgent Care • A specialist doctor or center • *(Free text entry)* Other

Other Condition		
	Question	*Response*
	Please indicate what you would do in the following scenarios. Imagine your friend tells you they hit their head and afterward doesn't feel right.	
1	What do you think this is? (i.e., their diagnosis)	*Free text entry*
2	How certain are you that you know what this could be?	• Very Certain • Somewhat Certain • Neither Certain Nor Uncertain • Somewhat Uncertain • Very Uncertain
3	What is the first thing you would think of telling them to do?	*Free text entry*
4	What symptoms would you expect them to experience?	*Free text entry*

5	How soon would you recommend they seek healthcare?	• I would not recommend they seek healthcare • Immediately • Within a few hours • The same day • The next day • Within the week • Only if problems persisted after a week
6	What medications do you think your friend should use in this situation (if any)?	*Free text entry*
7	What self-treatment do you think your friend should use in this situation (if any)?	*Free text entry*
	Instructions: In each of the following scenarios, assume your friend sustains a hit to the head and feel like something is not right afterwards. *Imagine your friend is playing intramural sports and collides with another player.* *Imagine your friend slips in the shower.* *Imagine you your friend is in a car accident.* *Imagine your friend is assaulted.* *Imagine your friend is drinking and falls.* *Imagine a shelf on your wall breaks and falls on your friend.*	
8	How likely is it that your friend would discuss this with each of the following people?	*A sliding scale from -3 to 3 was used for responses. A -3 indicated not at all likely while 3 indicated extremely likely.* • Their friends • Their parents • Their siblings • Their significant other • Their roommate • Their professors • Other Students at UGA • Their doctor • Other (*free text entry)*
9	What would you tell your friend to do in this scenario?	*Free text entry*
10	Based on the actions you suggested your friend take, what do you think would happen?	*Free text entry*
11	How long would you recommend your friend wait before doing something about it?	• They do not need to do anything about it • Immediately • Within a few hours • The same day • The next day • Within the week • Only if problems persisted after a week

12	If your friend were to seek healthcare, where should they go?	• The UGA Health Center • Their primary care physician • The emergency room • Urgent care • A specialist doctor or center • *(Free text entry)* Other

Theory of Planned Behavior		
	Question	*Response*
	Please use the sliders to indicate how you feel about the following questions.	
1	In general, how much do you care…	*A sliding scale from -3 to 3 was used for responses. A -3 indicated none at all likely while 3 indicated very much.* • what your friends think? • what your parents think? • what your siblings think? • what your significant other thinks? • what your roommate thinks? • what your professors think? • what other students at UGA think?
2	Select the extent to which you agree that the following statements are important or not important.	*A sliding scale from -3 to 3 was used for responses. A -3 indicated not at all important while 3 indicated very important.* • Not disappointing my family is… • Doing well in school is… • Being there for my family is… • Maintaining my health is… • Attending social events is… • Not letting my friends down by cancelling plans is… • Maintaining my academic performance is …
3	Seeking healthcare for suspected concussion will…	*A sliding scale from -3 to 3 was used for responses. A -3 indicated Strongly Disagree while 3 indicated Strongly Agree* • disappoint my parents. • improve my academic performance. • help me recover sooner. • reassure my family that I'm okay. • help me maintain my health. • cause me to miss out on social activities. • impact my friendships negatively. • help maintain my school performance.
4	If I suspect I have a concussion,	*A sliding scale from -3 to 3 was used for responses. A -3 indicated definitely **NOT** seek healthcare while a 3 indicated **Definitely** seek healthcare.* • my friends think I should… • my parents think I should…

		• my siblings think I should… • my significant other thinks I should… • my roommates think I should… • my professors think I should… • other students at UGA think I should…
5	If I sustained a concussion…	*A sliding scale from -3 to 3 was used for responses. A -3 indicated Strongly Disagree while a 3 indicated Strongly Agree.* • I expect my friends to place a lot of pressure on me. • I expect my parents to place a lot of pressure on me. • I expect my siblings to place a lot of pressure on me. • I expect my significant other to place a lot of pressure on me. • I expect my roommates to place a lot of pressure on me. • I expect my professors to place a lot of pressure on me.
6	If I sustained a concussion…	*A sliding scale from -3 to 3 was used for responses. A -3 indicated Less likely that I will seek healthcare while a 3 indicated more likely that I will seek healthcare.* • My friends' expectations make it… • My parents' expectations make it… • My siblings' expectations make it… • My significant others' expectations make it… • My roommates' expectations make it… • My professors' expectations make it… • Other students at UGA's expectations make it…
7	If I sustained a concussion…	*A sliding scale from -3 to 3 was used for responses. A -3 indicated Less likely that I will seek healthcare while a 3 indicated more likely that I will seek healthcare.* • The concerns my friends have for me makes it… • The concern my parents have for me makes it… • The concern my siblings have for me makes it… • The concern my significant other has for me makes it… • The concern my roommates have for me makes it… • The concern my professors have for me makes it… • The concern that other UGA students have for me makes it…
8	If your friend were to seek healthcare, where should they go?	• The UGA Health Center • Their primary care physician • The emergency room • Urgent care • A specialist doctor or center • *(Free text entry)* Other

Concussion Information Block		
	Question	*Response*

	Display if: *Selected yes to "have you ever been diagnosed with a concussion?"*	
1	Did you sustain your concussion while you were in college? (if you have had more than one, tell us about your most recent)	• Yes • No
2	Select the date of your concussion	Drop down information for the month, date, and year were provided on the survey. Month: January-December Date: 1-31 Year: 2012 or earlier - 2021
3	Tell us about your concussion. What happened?	*Free text entry*
4	Did you lose consciousness?	• Yes • No
5	Have you had any prior concussions?	• Yes • No
6	How many total concussions have you had?	Drop down information for selecting the number of concussions. 1-5+
7	Were you diagnosed by a medical professional?	• Yes • No
8	Which medical professional(s) diagnosed your concussion?	• Athletic Trainer • Emergency Room Medical Professional • Family Physician • Neurologist • Occupational Therapist • Physical Therapist • Psychologist/Psychiatrist • Speech Language Pathologist • University Health Center Medical Professional • Urgent Care Medical Professional • Other (*free text entry)* • Did not seek medical care
9	Have you returned to your studies yet?	• Yes • No
10	How soon after your concussion did you return to your studies?	Drop down box responses: • The same day • The next day • Within a few days • Within the week • After more than a week
11	When do you plan on returning to your studies?	Drop down box responses:

		• The same day • The next day • Within a few days • Within a week • After more than a week • After more than a month • After a semester • After a year • After more than a year
12	Did anyone on campus help you manage your studies after your concussion occurred? (For example: professors, academic tutors, etc.)	*Free text entry*
13	Is there any other information you would like to provide us about your concussion or educational history?	*Free text entry*

Final Block		
	Question	*Response*
	Please answer the following questions about your insurance and transportation	
1	Do you currently have health insurance?	• Yes • No
2	Who pays for your health insurance? (Check all that apply)	• Parents • Former Employer • Current Employer • Self-Funded • Local Government • State Government • National Government • *(Free text entry)* Other
3	*Display if:* *Selected no for item #1 of final block.* What is the main reason you do not currently have health insurance?	• Do not need insurance • Employer doesn't pay for insurance • Insurance company refused coverage for health reasons • Cannot afford insurance • Do not believe in insurance • *(Free text entry)* Other
4	Do you have a primary care physician?	• Yes • No • Prefer not to answer
5	If feeling unwell, would you go to the University of Georgia Health Center?	• Yes • No
6	*Display if:* *Selected no for item #5 of final block.* Where would you prefer to go instead of the University of Georgia Health Center?	*Free text entry*

7	In terms of accessing healthcare, do you:	• Have your own means of reliable transportation • Rely on public transportation • Rely on friends or family for transportation • Do not have a means for reliable transportation • *(Free text entry)* Other