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Factors Associated With Intention to Disclose Concussive Symptoms in Active Duty Soldiers

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FACTORS ASSOCIATED WITH INTENTION TO DISCLOSE CONCUSSIVE SYMPTOMS IN ACTIVE DUTY SOLDIERS

by

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ABSTRACT

Background: Concussion disclosure is a heavily researched topic, and while previous literature has explored predictors of concussion disclosure in numerous populations, research within the active duty Soldier population is limited. This study further explored predictors of concussion disclosure to a medical professional or leadership in the active duty Solider population through the lens of the Theory of Planned Behavior. Methods: A cross-sectional electronic survey was distributed to 181 active duty Soldiers. Descriptive statistics were used to report frequency of high intention to disclose concussive symptoms among demographics, and a multivariate regression model was used to assess significant predictors of intention to disclose concussive symptoms. Results: High intention to disclose concussions to a medical professional was reported by 76% of Soldiers, and 71% reported a high intention to disclose concussions to their leadership. Significant predictors of intention to disclose to a medical professional were history of concussion ($p = .040$), attitudes ($p = .003$), perceived norms ($p = <.001$), and perceived behavioral control ($p = .007$). Significant predictors of intention to disclose to leadership were ethnicity ($p = .019$), history of concussion ($p = .014$), attitudes ($p = <.001$), perceived norms ($p = <.001$), and perceived behavioral control ($p = .011$). Conclusion: Based upon these predictors, efforts should focus on educating all stakeholders through a lens of these theory-based concepts to help combat the barriers to concussive symptom disclosure. Future research should further explore interventions based upon this theory, as well as tracking change in intention through intervention and its relationship with disclosure behaviors.

INDEX WORDS: Military, Army, Concussion reporting, Theory of Planned Behavior

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CHAPTER ONE

INTRODUCTION

There are currently over 1.3 million active duty service members within the U.S.[1] serving across five branches: Air Force, Coast Guard, Marine Corps, Navy, and Army. All members of the Armed Forces are required to meet high levels of physical demand in order to be prepared to protect and fulfill missions. The physical demands placed on service members have caused injuries to be the single leading cause of death, disability, hospitalization, outpatient visits, and manpower losses within the military.[2] One of the prevalent injuries facing the military health system are traumatic brain injuries (TBIs). The risk of sustaining a TBI is much more common among service members than the general population due to involvement in combat operations[3,4] and the specific training required during peacetime.[5]

According to the Department of Defense, between 2000 and 2021 there were 449,026 diagnosed TBIs within the Armed Forces, and 82.3% of those were mild TBIs, also known as concussions.[6] As defined by the Defense and Veterans Brain Injury Center, a traumatic brain injury (TBI) is "a blow or jolt to the head that disrupts normal function of the brain, and depending on severity, can have long lasting effects on anyone who experiences one."[6] TBIs can be sustained during day-to-day sports and recreational activities, military training, and military deployment.[6] Although there is a large number of diagnosed TBIs being reported, this does not account for service members who experienced more than one TBI, and those that went unreported.[6] In fact, 19.5% of previously deployed service members to these wars suffered from a probable concussion, and 57% had not been evaluated by a physician.[7] There is also reported discrepancies between medically documented TBIs and self-reported TBIs in military personnel, further supporting the suspected lack of disclosure.[8]

It is imperative for individuals to disclose their TBIs or concussions as early as possible in order to receive proper care. When a concussive injury is sustained, the brain becomes vulnerable[9] and if it is not cared for properly, negative effects may occur such as extensive damage to neural pathways affecting cognition and functionality,[9] and even long-term diagnosis of neurodegenerative diseases such as

Parkinson's, dementia, and chronic traumatic encephalopathy.[10–12] Early recognition can be difficult for medical providers as they must rely on the individual to report their possible concussion at the time of the injury. Within the military, there is speculation of a lack of disclosure by service members. Current literature has revealed underreporting of TBIs,[7,13,14] and research has begun exploring the potential reasons for disclosure or nondisclosure of service members' TBIs.

Various factors affect TBI disclosure, but the stigma and culture surrounding reporting injuries, specifically concussions and TBIs, is a unique barrier to the military population. Injury reporting among military personnel is often avoided, with reported reasons being "avoiding negative perceptions" and "avoiding a profile,"[15–18] and researchers believe service members do not want others to view them in a negative light for being on a profile.[15] Some have even stated reporting any injury "shows weakness."[14] Specific to TBI, military personnel have reported a lack of empathy from their healthcare providers when seeking treatment, having to "prove" their symptoms they were experiencing, and a general lack of trust in the healthcare system.[19] They have also noted the difficulties they experience when attempting to seek care.[19] Others have expressed negative notions about seeking care for mental health, and this was associated with increased beliefs of a stigma surrounding seeking care for TBI and decreased chances of these individuals actually seeking care for a TBI.[20] Researchers have also speculated those who experienced a TBI reported a stigma associated with it due to how they were treated when they suffered from one.[14] Cadets and active duty service members have also reported a "fear of career repercussions," and often do not report their concussions.[14,21,22] This perception may deter individuals from disclosing their injuries, regardless if it is to their leadership, fellow military personnel, or healthcare providers.

An individual may plan to disclose their concussion ahead of time if they were to sustain one to ensure they receive proper care. This would be referred to as the "intention" to disclose. According to the Theory of Planned Behavior (TPB),[23] an individual's intention to behave in a certain manner is determined by their motivation and willingness to do so, and a higher intention typically indicates a higher chance they will engage in the behavior.[23] Intention is formed by multiple factors: the attitudes,

subjective norms, and perceived behavioral control of an individual regarding a certain behavior.[23] The attitude towards the behavior is how the individual feels about the behavior, positively or negatively.[23] Subjective norms, or perceived social norms, refers to social expectations of an individual to perform or not perform a certain behavior.[23] Perceived behavioral control refers to how difficult or easy it is to perform a behavior, typically based upon past experience.[23] All three of these individual concepts formulate an individual's intention, and typically when an individual expresses more favorable attitudes and subjective norms, as well as higher perceived control, the higher the intention to perform the behavior being considered.[23]

Previous research used the TPB to understand concussion disclosure intentions and behaviors in military cadets,[24] as well as other various populations.[25–30] This study will expand on the literature examining concussion reporting intention within the active duty population. Therefore, the aim of this study is to assess the knowledge, attitudes, perceived social norms, perceived control, intent to disclose concussions, and reasons for the intent of concussion disclosure or nondisclosure in active duty service members. This will provide further understanding of why military personnel do or do not intend to disclose their concussive symptoms. This insight will help ensure care is provided earlier for those who sustain a concussive injury by encouraging disclosure, and combatting disclosure barriers. As the previous study demonstrated,[24] it is hypothesized this population will display a significant association between high knowledge, attitude, perceived behavior control, and perceived social norms scores and a high intention to disclose concussive symptoms.

CHAPTER TWO

REVIEW OF LITERATURE

MILITARY POPULATION

There are currently over 1.3 million active duty service members within the U.S.[1] serving across 5 branches: Air Force, Coast Guard, Marine Corps, Navy, and Army. While all branches serve to defend the nation against international and domestic enemies, each branch is responsible for specific aspects. The Air Force, composed of Airmen, is responsible for protecting the country aerially, as well as protecting the air bases around the U.S.[31] The Coast Guard, composed of Coast Guardsmen, protects our country through ports, waterways, and coasts.[31] They conduct search and rescue in water, prevent drug smuggling, and help protect our marine environment.[31] The Marine Corps, composed of Marines, supports other branches during mission on land, aerially, and in the water.[31] They are also responsible for guarding U.S. embassies around the world.[31] The Navy, composed of Sailors, helps to protect any waterways the Coast Guard does not.[31] They also provide the runway for aircraft takeoff when at sea.[31] Lastly, the Army, composed of Soldiers, is the largest of all 5 branches.[31] The Army is responsible for combat missions on land, and any ongoing operations.[31] The Army must be battle-ready at all times and is involved in high-intensity conflicts.[32] Soldiers are consistently being trained and prepared to become involved in combat whenever their forces are needed.[32] Within the branches, each individual has their own responsibilities to fulfill to contribute to the overall goal.

The Armed Forces classifies their personnel as either enlisted or officers. Enlisted personnel makes up around 82%, and the remaining 18% are officers.[33] These two groups differ in their responsibilities as a service member. Enlisted members typically participate in or support military operations, care for equipment, perform technical activities, and supervise junior enlisted personnel.[33] Officers are expected to lead troops and activities, manage the enlisted personnel, operate and command

aircraft, ships, or vehicles, and provide other services to enlisted personnel such as legal, medical, and engineering.[33] The role of officers and enlisted are further delegated by their specific occupations. There are different occupations for enlisted personnel and officers, and each occupation has different responsibilities. Enlisted personnel and officers can work in administration, combat, construction, electrical repair, engineering, healthcare, human resources, protective services, and more.[33] The demands and responsibilities within each occupation may differ between enlisted personnel and officers. Each occupation has different level of physical demand, labeled as "moderate," "significant," or "heavy."[34] For example, an infantryman is considered "heavy" physical demand, as their main responsibility is combat.[34] During peacetime, training for all service members is focused around preparation for missions, as well as maintaining physical fitness.

Beyond their occupation, service members participate in regular physical training to ensure they are able to meet the physical demands expected of them. If service members do not have the physical capacity to meet these demands, their occupations may be affected and they may be at risk for injury. Due to these demands placed on service members, injuries are the single leading cause of death, disability, hospitalization, outpatient visits, and manpower losses within the military, with injuries annually accounting for over 1 million medical encounters and 10 million limited duty days.[2,35] Injuries can occur in numerous ways, whether it is combat-related or non-combat-related.

Non-combat-related musculoskeletal injuries (MSKI) occur almost six times more frequently than combat-related MSKIs,[36] over half of all non-deployed personnel are affected by them,[37] and account for almost 90% of injuries among deployed service members.[38] Non-combat-related MSKI results in 68,000 non-deployable service members annually, and is still one of the largest health problems faced by the Department of Defense and Military Health System.[35–39] Most of these injuries occur from recreational activities and physical training.[37,38]

Many chronic injuries result from physical training, due to the cumulative effects of repetitive and high intensity training, such as rucking with heavy armor sacks or running long distances. This style of training has resulted in frequent lower extremity MSKI, with over 45% of male recruits sustaining at least one MSKI and nearly half are overuse lower extremity injuries.[40] Along with the chronic injuries seen in the military population, acute injuries are also prevalent. Common acute injuries are ankle sprains[41,42] and anterior cruciate ligament injuries,[43] typically caused by physical training.

Heavy physically demanding Military Occupational Specialties (MOSs) also tend to be at a greater risk of sustaining an injury.[2,44] On average, disability rates are twice as high for those in the infantry MOS, and those in construction and combat engineering tend to have higher disability rates as well.[2] Heavy MOSs such as infantrymen, armor crewmen, cannon crewmen, combat engineers, and cavalry scouts have been found to be at a higher risk for on-the-job injuries.[44] Injuries and disability present a large issue facing the Military Health System, yet whether or not they are being reported is another challenge.

INJURY REPORTING IN THE MILITARY

Injury surveillance/epidemiology within the military has picked up over the past decade, and its accuracy has been questioned.[37] It is believed these numbers are likely underestimated and there is not a true understanding of how large this MSKI issue is,[37] as it is suspected a number of injuries are not reported to healthcare providers, and in turn not being tracked by surveillance systems. Existing literature has found discrepancies in the injury occurrence rates compared to reporting rates within the military. A study of trainees at different installations found that 40% of trainees were injured during initial entry training, and 64% of those were not reported to leadership or a medical provider.[18] Active duty Soldiers' injury reporting rates have also been assessed, and a group of U.S. Army Medical Command personnel

reported 67% of their injuries as a group.[17] Another survey of soldiers within an Infantry Brigade Combat Team revealed 58% of soldiers had an injury they did not report, and nearly 54% reported they "would not immediately seek medical care if they were injured."[16] Another study of an Army Infantry Brigade Combat Team resulted in soldiers reporting 49% of injuries going unreported in the previous 12 months.[15] Within a group of U.S. Army special operations aviation, 77.8% had suffered a musculoskeletal injury in the previous 12 months, but only 64% sought medical care for their injuries.[45] The lack of reporting is evident, resulting in no care being provided for these injuries. The reasoning behind these injuries going unreported is variable, and these have been exposed by previous research.

In some cases, there are differences in the demographics of service members and whether or not they report their injuries. Female trainees were found to be more likely to report their injuries, as well as infantry trainees.[18] One study within the active duty population reported a 100% reporting rate for female Soldiers, although this was not proved to be significant due to only having 6 female participants.[45] Other studies assessing injury reporting of females within the military have documented females underreporting their injuries less often.[46,47] Another reported factor of reporting is service member rank. One study reported lower reporting rates from enlisted Soldiers compared to Officers.[45] This study reasoned this may be related to the idea of not wanting to appear weak and avoiding negative perceptions.[45]

Beyond demographics, there is a unique set of barriers preventing military personnel from reporting their injuries. Due to the physical demands of this population and the expectation to be mentally and physically "tough," literature has exposed more reasons why injuries are underreported. In a study of U.S. Army trainees, the most commonly selected reasons for not seeking care were wanting to graduate on time and wanting to avoid a profile.[18] The least selected reason for not seeking care was having a prior negative experience with military healthcare.[18] In an infantry brigade of Soldiers and a group of U.S. Army Medical Command personnel, "avoiding negative perceptions," "fear of impact on career," and "avoiding a profile" were commonly selected reasons for not reporting injuries.[17,15] These negative

perceptions have been labeled as “weak,” “broken,” or “injured,”[15,17] and Soldiers believe it is better to just “work through the pain” and their unit believes in the “suck it up” mentality regarding being injured.[16] A previous study found that subjective norms regarding injury reporting were reported to be low among Soldiers, revealing their leadership and fellow Soldiers are not supportive of this behavior.[45] Previous literature has reported stigmas and negative perceptions of profiles and injuries among leadership in the military.[48,49] While reporting musculoskeletal injuries has its challenges, literature has shown similarities with disclosing concussions in this population, including some additional factors.

MILD TRAUMATIC BRAIN INJURY IN THE MILITARY

As defined by the Defense and Veterans Brain Injury Center, a traumatic brain injury (TBI) is “a blow or jolt to the head that disrupts normal function of the brain, and depending on severity, can have long lasting effects on anyone who experiences one.”[6] Within the military, most TBIs sustained by service members are classified as mild, also known as a concussion.[6] According to the Department of Defense, between 2000 and 2020 there were 430,720 diagnosed TBIs worldwide within the Armed Forces, and 82.4% of those were mild TBIs.[6] These concussions can be sustained during day-to-day sports and recreational activities, military training, and military deployment.[6] Although there is a large number of diagnosed TBIs being reported, this does not include service members who experienced more than one concussion, and those that went unreported.[6] There is evidence of TBIs going unreported, as a study of 5,174 Soldiers revealed 48% did not seek medical attention for their reported TBI.[14] A validation study reviewed the medical records of reported traumatic brain injuries of a cohort of Soldiers compared to their self-report of traumatic brain injuries, and the self-reported results were 6-fold greater than the medically documented, demonstrating the lack of reporting.[8] This discrepancy between medically

documented and self-reported concussions helps confirm the lack of disclosure in this population, which can be dangerous for the individual.

Early identification and intervention for concussions is imperative. The functional ability of the brain is quickly impacted after sustaining an impact, and can cause the individual to become symptomatic, at an increased risk for repeat injury, and become cognitively impaired.[9] Despite its importance, concussion identification can be difficult due to reliance on self-disclosure from the patient who sustained the concussion.[50] If the patient is unaware of what a concussion is, they will not recognize one when it has occurred. This lack of recognition may prevent them from reaching out to a medical provider. Encouraging concussion reporting by service members is important in order for clinicians to provide proper care. These injuries can cause extensive damage to the brain and its neural pathways, and depending upon the severity, can cause chronic alterations in the brain that affect an individual's functionality and cognition.[9]

There are severe long-term effects and diagnoses that may presents themselves years after a TBI is sustained, and proper and effective treatment is dire to help combat these issues. Veterans who have suffered one or more TBIs while serving have been found to be more likely to develop dementia,[10,11] and other diseases such as chronic traumatic encephalopathy, Parkinson's, postconcussive syndrome, and posttraumatic stress disorder.[12] The dangers of non-disclosure should be combatted to ensure safety of the those who sustain a concussion, but to do so there must be a better understanding of why they are not being disclosed. Although there is limited research surveying the reasons why military personnel are not reporting their concussions, there are similarities to the reasoning for not reporting their musculoskeletal injuries, along with some additional factors.

One documented reason military personnel may not reporting their concussions is dissatisfaction with military medical care after sustaining a concussion. A study examining post-mTBI care and rehabilitation in a group of soldiers revealed an overarching theme of "chasing the care," which was described by soldiers as the need to be persistent to receive appropriate and adequate care post-mTBI.[19]

Soldiers reported a lack of empathy from healthcare provider post-mTBI, having to prove their injury existed, conflict with healthcare providers, and difficulty seeking and receiving the care, which all led to mistrust in the military healthcare system.[19] The military population itself has also revealed a set of unique factors affecting their intention to disclose, one of those being career repercussions. In a study comparing cadet inter-collegiate athletes and future pilot cadets, a primary concern among the future pilot cadets was career repercussions, and expressed their fears of not being able to become a pilot, or pursue their career in general.[21] Cadets have also expressed their want to maintain their physical fitness for career purposes, so they may not report their concussions to ensure ability to participate in their physical training.[22] Service members have also expressed fear of negative impact on their career has caused them to refrain from reporting their concussions.[14]

The military has instilled a stigma surrounding reporting injuries, specifically concussions. A study of service members resulted in 28% who experienced an mTBI versus the 11% who did not report a stigma is associated with mTBI.[14] The researchers speculate this may stem from how the service members were treated when they had a concussion.[14] One of the responses for why service members believe there is a stigma was "reporting any injury shows weakness."[14] Another study revealed high levels of mental illness after deployment among soldiers with mTBI, and the negative beliefs about mental health care caused an increased stigma surrounding the injury, as well as decreased the likelihood soldiers would report their mTBIs.[20]

When those around an individual are not supportive of them disclosing their concussions, they are less likely do so, but the opposite holds true as well. Research has shown that support from leadership in various settings has improved reporting intention and behaviors. For instance, a study of collegiate football players revealed increased perceived support from their coaches regarding concussion reporting resulted in fewer undiagnosed concussions and less frequent returning to play while symptomatic.[51] Another study within the military cadet population revealed individuals who were comfortable reporting

their concussions to a commanding officer or academy military trainer were in higher agreement to seek medical attention.[52] The same study also reported increased comfort with reporting a possible concussion to their squad mate resulted in a lower agreement to seek medical attention, and most participants reported speaking with a squad mate first.[52] All of these reasons have been reported regarding why military personnel have previously avoided reporting their concussion, but whether or not they have the intention to report a concussion before it happens presents a different set of impacting factors.

CONCUSSION REPORTING AND INTENTION

Human behavior is complicated, and there have been a myriad of explanations developed over time. The way a person behaves is determined by numerous variables, and different theories have surfaced to help break down what ultimately drives an individual to behave in a certain way. One of those theories is the Theory of Planned Behavior (TPB).[53] The TPB explains human behavior behind the concept of intention, which is one's motivation to perform such a behavior, or the extent of how hard they are willing to work to perform the behavior.[53] Generally, if there is a stronger intention, the behavior is more likely to be performed.[53]

The idea of "intention" is made up of multiple components: attitude, perceived social norms, and perceived behavioral control.[53] Each component contributes to formulate intention in different ways. An individual's attitude refers to "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question."[53] The perceived subjective norm refers to "the perceived social pressure to perform or not to perform the behavior."[53] Lastly, perceived behavioral control refers to "the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles."[53] The last component, perceived behavioral control, was an addition to the original Theory of Reasoned Action, which only referenced attitude and perceived social

norms.[53] This addition created the current TPB.[53] Perceived behavioral control is an important component as availability of resources and access to those have an effect on behavior, but one's perception of this control is just as influential.[53] Their perception, or self-efficacy, meaning how well an individual believes they will be able to execute the actions required to handle a possible future situation.[53] Control is only dictated by availability of resources to an extent; one's perception is what further determines whether they have high or low perceived control.[53]

There is extensive literature surrounding intention to disclose concussions within different populations, such as collegiate and high school athletes, military cadets and service members. Specifically, the TPB as a whole and its individual components have been used to assess intention to disclose concussions in previous studies. An individual's attitude about concussion reporting has shown to play a role in intention. An improved attitude regarding concussions has been showed to be associated with higher reporting intentions.[24–27] A study of high school athletes revealed increased concussion attitude scores were associated with decreased incidence of playing in games and practice when symptomatic from concussions.[28] Although, a study of junior ice hockey players did not show an association between attitude and actual reporting behaviors,[26] and a study of high school football players did not show an association between attitudes and intention to report.[29]

Subjective norms have an effect on reporting intentions and behaviors as well, with increased subjective norms showing increased reporting behaviors,[25] and a significant association with reporting behaviors and intentions.[26,27] Collegiate athletes who had safer perceived team concussion reporting norms also tended to have greater intention to report concussion symptoms.[25] First-year collegiate athletes also displayed an association between more favorable perceived social norms and a higher intention to disclose, as well as a decreased prevalence of playing with concussive symptoms.[30] A team of collegiate male hockey players also showed a pre-season perception that "most athletes" would engage in safe reporting behaviors was associated with reduced under-reporting of head injury symptoms

throughout the season.[54] First-year cadets with a 10% shift towards more favorable perceived social norms about concussions also displayed an association with high intention to disclose their concussions.[24]

Lastly, some research has shown an individual's perceived control over disclosure will play a role in their reporting behaviors. First-year cadets who reported a higher perceived control over disclosure demonstrated an association with higher intention to report.[24] Also, a significant association between self-efficacy and concussion reporting intentions has been shown in collegiate athletes,[25] junior ice hockey players,[26] and high school athletes.[27,29] While attitudes, perceived subjective norms, and perceived behavioral control have all been explored in the literature, there are more factors beyond the TPB playing a role in an individual's intention.

One of the additional studied factors is an individual's knowledge of concussions. A systematic review of intention to report concussions in high school athletes revealed three out of the four studies evaluated demonstrated an association between increased concussion knowledge and better self-report.[55] Another study of high school athletes revealed increased concussion knowledge was associated with increased occurrence of reporting concussive events that occurred during practice.[28] Similar in the collegiate setting, division I and II athletes showed a significant association between their concussion knowledge and an increased intention to report symptoms and to report concussions.[25] Within the same group of collegiate athletes, increased knowledge also showed decreased reporting behaviors in those who had experienced a concussion.[25] Higher concussion knowledge has also been associated with higher intention to report among first-year cadets.[24] Despite this consistency, other studies have shown a different relationship between these variables. A study of junior ice hockey players revealed a significant association between attitudes about concussion reporting and concussion knowledge, yet there were no significant differences between intention to report between two groups, one with above median concussion knowledge and the other below median knowledge.[26] High school football players were assessed for intention to report, and also did not show an association with their concussion knowledge.[29]

The military population has also shown a general lack of knowledge of concussions, and many did not seek care for their concussion because they did not believe it required care.[14,56] In order to combat this lack of knowledge of concussions and reporting, clinicians have developed concussion educational tools to mitigate these issues.

Concussion education exposure has a goal of increasing intention to report, and research has explored this relationship. A study of collegiate athletes revealed those who were previously exposed to concussion education, and specifically more than one source, showed a significant association with more favorable perceived social norms surrounding seeking care for concussion.[57] Another study of first-year cadets did not show an association with concussion education and concussion-related knowledge, attitudes, perceived social norms, intention to disclose symptoms, and reporting behaviors.[58] Although, this same group showed a 40% higher prevalence of reporting at time of concussion when exposed to multiple forms of education.[58]

CHAPTER THREE

METHODOLOGY

Participants

Fort Stewart is located in southern Georgia and serves around 23,000 Soldiers combined with Hunter Army Airfield within numerous ages, ranks, and MOS.[59] Participants for this cross-sectional survey study were active duty Soldiers at Fort Stewart who are 18 years of age or older. Participants were included regardless of Military Occupational Specialty (MOS), gender identity, rank, or age. Participants who are under 18 years of age, not active duty status, or not serving at Fort Stewart were excluded from participation.

Definitions

- Concussion is defined as "a blow or jolt to the head that disrupts normal function of the brain, and depending on the severity, can have long lasting effects on anyone who experiences one."[24]
- Common concussion symptoms include: headache, feeling slowed down, difficulty concentrating or focusing, dizziness, balance problems/loss of balance, fatigue/loss of energy, feeling in a fog, irritability, drowsiness, nausea, memory loss, sensitivity to light/noise, and blurred vision."[24]
- A medical professional is defined as a "physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer."
- Contact sport was defined as "sports where players experience body-to-body contact as a recognized circumstantial part of the game, but purposeful collisions by rule are not allowed."[60]

- Non-contact sport was defined as "sports where players experience rare body-to-body contact is rare and is typically an unexpected occurrence."[60]

Main Outcome Measures

An electronic survey on Qualtrics[61] was used to assess demographic information, concussion-specific behavioral factors based upon the Theory of Planned Behavior (TPB), intention to disclose concussive symptoms, concussion history, and concussive symptom disclosure history. This survey was previously used within the military cadet population, which assessed intention to disclose concussive symptoms using the TPB framework.[24] The survey was slightly adapted to account for differences between active duty soldiers and cadets. Adaptations to demographics, knowledge responses, and perceived social norm questions were made to be more applicable to the population. Additionally, the questions were separated to assess intention to report to a medical professional and leadership to assess the Soldiers' beliefs about these individually. Content validity was established through review by experts in both military procedures and concussion to determine the wording and content for the survey. After the modification, the survey was piloted with the Special Operations unit at Fort Stewart. During pilot testing, participants expressed the language used was fitting for the population, and all questions were clear. Some participants suggested using a progress bar since it is taken electronically for awareness of length, and changes were made on Qualtrics[61] to accommodate this. Participants suggested keeping the survey as succinct as possible, so length and language were reviewed for concision.

The final survey included: 11 demographic questions, 26 knowledge assessment questions, 12 attitude questions, 13 perceived norms questions, 2 perceived control questions, 2 intention to disclose questions, 2 concussion history questions, 1 concussive symptom disclosure history question, and 1 open-ended question regarding concussive symptom disclosure experiences.

The individual predictors of intention to disclose concussive symptoms within the survey were scored numerically. The knowledge assessment included recognizing symptoms and selecting "yes" or

"no" for individual symptoms that may occur with a concussion, as well as selecting negative effects they believe can occur after a concussion from a list of options. The knowledge assessment portion was scored out of 39, and the participant earned 1 point for each correct answer. A higher score indicated a higher level of knowledge.

The attitudes component of the survey was made up of 12 questions regarding attitudes toward concussive symptom disclosure, each scored on a 7-point scale. Each scale contained 2 different words - one positive and one negative - on either end they are moving the slider closer to, dependent upon how they agree or disagree with each descriptive word regarding concussion disclosure. The overall score ranged from 6-42 points, with a higher score indicating a more positive attitude.

The perceived social norms component of the survey was composed of 13 questions regarding the social expectations of concussive symptoms disclosure, each one scored on a 7-point scale ranging from strongly agree to strongly disagree. The questions were divided between perceived social norms surrounding reporting to a medical professional or leadership. There were 8 questions included in the total score for disclosure to each party, with some questions included in both total scores as they were not specific to either one. The overall score for each ranged from 8-56, with a higher score indicating more favorable perceived social norms.

The perceived control component of the survey was composed of 2 questions regarding the level of control Soldiers feel they have over reporting their concussive symptoms, each one scored on a 7-point scale ranging from strongly agree to strongly disagree. A score of 6 or 7 is indicative of high perceived control, whereas a score of 1-5 indicates low perceived control. A high score indicated higher perceived control.

Intention to disclose concussive symptoms was assessed using 2 questions regarding a Soldier's intention to disclose their symptoms at the time of injury to their leadership or a medical professional.

Both questions were scored on a 7-point scale ranging from strongly agree to strongly disagree. A score of 6 or 7 indicated high intention to disclose, whereas a score of 1-5 indicated low intention to disclose.

Concussion history was assessed by providing a definition of concussion, followed by a yes or no question regarding if the participant has sustained a concussion in the past based on this definition. If the participant responded yes, they were prompted with a question regarding how many they sustained in the past, and how many of those they reported to their leadership or a medical professional.

An open-ended response prompt was provided at the end of the survey for participants to further elaborate on their experiences of disclosing concussive symptoms. The participants were free to share any information in this space before completing the survey.

Procedures

Before beginning recruitment for data collection, this study was approved by the Georgia Southern University Institutional Review Board, and the U.S. Army Research Institute of Environmental Medicine (USARIEM) Institutional Review Board. A letter of support was also obtained to conduct research within the 3rd Infantry Division (3ID). Once approval was granted, participant recruitment began and participants were recruited during Soldier Readiness Processing. The Soldiers were approached in groups ranging from 5-50 people, and the Soldiers were briefed about participating in the study prior to beginning their processing. The aim of the study and its confidentiality was expressed to the possible participants either verbally or electronically through the survey's introduction page, and they were then asked to voluntarily participate. Due to participation being voluntary, not all Soldiers from these groups chose to participate. Those who did wish to participate provided their consent by reading the introductory consent page of the survey tool, then moving forward onto the first question of the survey. Participants were made aware their completion of the survey is implied consent. Participants' responses were kept confidential and were encouraged to provide honest answers.

A very small number of participants (less than 10) were recruited at a different location. USARIEM provides medical coverage during physical readiness training for Soldiers in the morning, and there are pop-up tent locations Soldiers can report to for injury evaluations. These tents specifically work with musculoskeletal injuries, not concussions. Soldiers were recruited after the completion of their injury evaluation to participate. They received the same briefing as other participants, and were reminded it was voluntary.

Data were collected on the participants' cell phones. The survey was accessed through a QR code on their cell phone, and the participants took the survey at the time of recruitment. All data were collected through Qualtrics[61] and analyzed using SPSS Version 26.0.[62]

Statistical Analysis

For the final analysis, descriptive statistics were used to report demographics, as well as the mean scores for the knowledge assessment and each component of the TPB. The frequency of high intention to disclose was reported for each individual demographic. A multivariate linear regression model was used to assess the association between intention to report concussive symptoms (high vs. low) and each primary predictor. The primary predictors used were age (18-20, 21-30, 31-40, or >40) MOS classification (aviation/aerial defense, combat arms/ground forces, engineering/mechanics, medicine/science, signal/intelligence, or support/logistics) rank (enlisted or officer), gender identity (female, male, or other), contact sport participation (contact vs. non-contact), ethnicity (non-Hispanic/Latino vs. Hispanic/Latino), race (non-Caucasian/Caucasian), previous concussion education (yes vs. no), previous concussion history (yes vs. no), knowledge score, attitudes score, perceived control group (high vs. low), and perceived norms score. An *a priori* power analysis was calculated using previous research, which defined a prevalence ratio (PR) of 1.4 to be a medium effect. For sufficient power in this analysis ($P = 0.8$, $a = 0.05$, ß = 0.2), a sample size of 174 participants was required.

CHAPTER FOUR

RESULTS

Demographics

A total of 181 Soldiers currently serving at Fort Stewart were included in this study. Table 1 provides all demographic information. The sample was predominantly male (81%), ages 21-30 (48.6%), White (59.1%), and enlisted (86.7%). Soldiers within all five MOS classifications participated, with the most identifying as combat arms/ground forces (n=69). For socioeconomic variables, 48.1% (n=87) reported their highest level of education as a high school graduate or GED, 43.6% (n=79) reported an annual household income of less than $30,000, and 46.4% (n=84) reported only having one individual in their household. Within the sample, 66.3% (n=120) received some form of concussion education prior to this survey, and 71.3% (n=129) had a history of participating in one or more contact sports. A total of 64.6% (n=117) reported not sustaining a duty-related concussion in the past, while 34.8% (n=63) have sustained 1 or more duty-related concussion in the past.

Knowledge of concussion

Overall, the average knowledge score was 71% (27.7 $\pm$ 8.7). This score is based on the number of correct answers, and the highest possible total score was 39. The symptoms of concussion the Soldiers correctly identified most often was dizziness (n=148, 82%), blurred vision (n=141. 78%), and balance problems (n=138, 76%). Soldiers confidently identified the 2 incorrect symptoms listed, with joint pain (n=150, 83%) and skin rash (n=155, 86%) having the highest number of correct answers out of all symptoms listed. When asked about returning to duty too soon after sustaining a concussion, a lower number of Soldiers identified an increased chance of sustaining another concussion (n=120, 66%) and brain damage (n=101, 59%) as possible complications. When asked about suffering multiple concussions over a lifetime, a lower number of Soldiers identified an increased chance of sustaining another concussion (n=100, 55%), trouble with military-related tasks (n=115, 63%), and changes in social life

(n=120, 66%) as possible complications. Table 2 includes detailed results for all knowledge-related questions.

Attitudes, Perceived Social Norms, and Perceived Behavioral Control

Each component of the TPB was evaluated as a predictor for intention to disclose concussions with a series of questions. Attitudes was the first component of the TPB evaluated, and the average attitudes score for disclosing to a medical professional was 35.4 $\pm$ 6.4, and for disclosing to leadership the average was 34.2 $\pm$ 7.2. Each item was scored on a scale of 1-7. A maximum score of 42 was possible for attitudes, and a higher score reflects a more positive attitude towards the behavior. Table 3 displays the mean and standard deviation for attitudes regarding reporting to a medical professional or leadership.

Perceived norms surrounding concussion disclosure was evaluated as well, and the average score for perceived social norms for disclosing to a medical professional was 45.8 $\pm$ 7.4, and for disclosing to leadership the average score was 44.9 $\pm$ 8.1. A maximum score of 56 was possible for perceived social norms, and a higher score indicates more favorable perceived social norms surrounding disclosing concussions. Table 4 displays the mean and standard deviation of each response for perceived social norms regarding reporting to a medical professional or leadership.

Perceived behavioral control was the last component of the TPB to be assessed, and 78% (n=141) of Soldiers reported a high perceived control over reporting concussions to a medical professional, and 77% (n=140) reported a high perceived control over reporting concussions to leadership.

Predictors of intention to disclose

Overall, a high intention to disclose concussions to a medical professional was reported by 76% (n=138) of Soldiers, and 71% (n=129) reported a high intention to disclose concussions to their leadership. High intention to disclose was identified as a 6 or 7 on a scale of 1-7. Table 5 displays the frequency of high intention to disclose to a medical professional among each specific demographic, and Table 6 displays high intention to disclose to leadership.

Multiple regression analysis was used to test predictors of intention to disclose to a medical professional (r^2 = .556, r^2adj = .522, p=<.001). Significant predictors were history of concussion (p = .040), attitudes (p = .003), perceived norms (p = <.001), and perceived behavioral control (p = .007). Multiple regression analysis was also used to test predictors of intention to disclose to leadership (r^2 = .642, r^2adj = .613, p = <.001). Significant predictors of intention to disclose to leadership were ethnicity (p = .019), history of concussion (p = .014), attitudes (p = <.001), perceived norms (p = <.001), and perceived behavioral control (p = .011). Table 7 reports all values from the multivariate linear regression analysis for predictors of intention to disclose to a medical professional, and Table 8 reports all values from the multivariate linear regression analysis for predictors of intention to disclose to leadership.

The participants were also given the opportunity to write an open-ended response at the end of the survey. The open-ended response stated: “Please feel free to provide additional information regarding your experience reporting concussive symptoms.” Only 36 out of 181 participants (20%) filled in a response, and 23 of those responses were non-descript answers such as “N/A” or “none.” Others expanded on this and provided some additional information, and Table 9 lists these responses out. These were not further analyzed for themes due to lack of responses.

TABLE 1

DEMOGRAPHICS

Demographics	**n**	**Percentile**
Gender Identity (n = 181)		
Male	147	81.2
Female	33	18.2
Other	1	0.6
Prefer not to answer	0	0.0
Age (n = 181)		
18-20	57	31.5
21-30	88	48.6
31-40	30	16.6
>40	6	3.3
Rank (n = 181)		
Enlisted	157	86.7
Officer	24	13.3
MOS Classification (n = 181)		
Aviation/Aerial Defense	11	6.1
Combat Arms/Ground Forces	69	38.1
Engineering/Mechanics	39	21.5
Medicine/Science	24	13.3
Signal/Intelligence	18	9.9
Support/Logistics	20	11.0
Race (n = 181)		
American Indian/Alaska Native	8	4.4
Asian	8	4.4
Black or African American	52	28.7
Native Hawaiian or Pacific Islander	2	1.1
White	120	66.3
Unknown	1	0.6
Other	9	5.0
Ethnicity (n = 181)		
Hispanic/Latino	42	23.2
Non-Hispanic/Latino	139	76.8
Highest Level of Education (n = 181)		
Less than high school	1	0.6

High school graduate or GED	87	48.1
Some college, no degree	47	26
Associate's degree	10	5.5
Bachelor's degree	25	13.8
Master's degree	7	3.9
Professional degree	2	1.1
Doctorate	2	1.1
I do not know	0	0.0
Annual Household Income (n = 181)		
<$30,000	79	43.6
$30,000-$49,999	44	24.3
$50,000-$74,999	33	18.2
$75,000-$99,999	13	7.2
$100,000-$149,999	9	5.0
>$150,000	3	1.7
Number of Individuals in Household (n = 181)		
1	84	46.4
2	35	19.3
3	17	9.4
4	23	12.7
5	15	8.3
6	4	2.2
7 or more	3	1.7
Concussion Education (n = 181)		
No	61	33.7
Yes	120	66.3
Contact Sports History (n = 181)		
No	52	28.7
Yes	129	71.3
Concussion History (n = 181)		
No	117	64.6
Yes	63	34.8

*Note. n = number of individuals who identify with that demographic. Percentile = percentage of individuals who identify with that demographic.

TABLE 2

KNOWLEDGE

Knowledge Question	**n (correct answer)**	**Percentile**
Do you consider the following a primary sign or symptom of concussion? (n = 181)		
Headache (yes)	128	70.7
"Pressure in head" (yes)	127	70.2
Neck pain (yes)	82	45.3
Nausea or vomiting (yes)	130	71.8
Dizziness (yes)	148	81.8
Blurred vision (yes)	141	77.9
Balance problems (yes)	138	76.2
Sensitivity to light (yes)	133	73.5
Skin rash (no)	155	85.6
Sensitivity to noise (yes)	114	63.0
Feeling slowed down (yes)	117	64.6
Feeling like "in a fog" (yes)	128	70.7
"Don't feel right" (yes)	121	66.9
Difficulty concentrating (yes)	132	72.9
Difficulty remembering (yes)	135	74.6
Fatigue or low energy (yes)	101	55.8
Confusion (yes)	134	74.0
Drowsiness (yes)	116	64.1
Joint pain (no)	150	82.9
Trouble falling asleep (yes)	98	54.1
More emotional (yes)	77	42.5
Irritability (yes)	102	56.4
Sadness (yes)	70	38.7
Nervous or anxious (yes)	86	47.5
What do you think can happen to someone returning to duty too soon after a concussion? Mark all that apply. (n = 181)		
No bad things can ever happen (false)	179	98.9
You may be more likely to get another concussion (true)	120	66.3
Difficulty with everyday activities (true)	134	74.0
Skin rash (false)	178	98.3
Brain damage (true)	101	55.8
Trouble with military-related tasks (true)	129	71.3
I do not know what might happen (false)	168	92.8

What do you think can happen to someone as a result of suffering multiple concussions over their lifetime? Mark all that apply (n = 181)		
No bad things can ever happen (false)	180	99.4
You may be more likely to get another concussion (true)	100	55.2
Skin rash (false)	176	97.2
Brain damage (true)	152	84.0
Trouble with military-related tasks (true)	115	63.5
Difficulty with everyday activities (true)	130	71.8
Changes in social life (true)	120	66.3
I do not know what might happen (false)	171	94.5

*Note. Correct answers noted in parentheses. n = number of participants who answered correctly. Percentile = percentage of participants who answered correctly.

TABLE 3

ATTITUDES

Statement	**Mean ± SD**
Reporting possible concussive symptoms to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer) is:	
Cowardly…Brave	5.7 ± 1.5
Shameful…Prideful	5.4 ± 1.5
Harmful…Beneficial	6.2 ± 1.3
Difficult…Easy	5.3 ± 1.6
Bad…Good	6.3 ± 1.3
Unimportant…Important	6.5 ± 1.0
Report possible concussive symptoms to leadership is:	
Cowardly…Brave	5.8 ± 1.5
Shameful…Prideful	5.4 ± 1.6
Harmful…Beneficial	5.8 ± 1.6
Difficult…Easy	5.0 ± 1.7
Bad…Good	5.9 ± 1.5
Unimportant…Important	6.2 ± 1.3

*Note. Statements rated on a Likert scale from 1-7.

TABLE 4

PERCEIVED SOCIAL NORMS

Statement	**Mean ± SD**
I should report possible concussive symptoms when I experience them to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer)	6.5 ± 0.8
I should report possible concussive symptoms when I experience them to leadership	6.2 ± 1.1
In my current unit, most people I know would report their possible concussive symptoms to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer) if they experience them.	5.4 ± 1.4
In my current unit, most people I know would report their possible concussive symptoms to leadership if they experience them.	5.2 ± 1.4
Military treatment facilities (on-post medical facilities) provide appropriate care for individuals with a concussion.	5.5 ± 1.3
If I suffered a concussion, I would feel supported by my unit.	5.4 ± 1.4
If I suffered a concussion, I would feel supported by **l**eadership.	5.5 ± 1.4
When I experience concussive symptoms, I am expected to report them to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer).	6.0 ± 1.2
When I experience concussive symptoms, I am expected to report them to leadership.	5.8 ± 1.2
When I experience possible concussive symptoms, people who are important to me would approve of me reporting them to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer).	6.1 ± 1.1
When I experience possible concussive symptoms, people who are important to me would approve of me reporting them to leadership.	6.0 ± 1.2
When other Soldiers I know experience possible concussive symptoms, they report them to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer).	5.4 ± 1.3
When other Soldiers I know experience possible concussive symptoms, they report them to leadership.	5.3 ± 1.3

*Note. Statements rated on a Likert scale from 1-7.

TABLE 5

HIGH INTENTION TO DISCLOSE TO A MEDICAL PROFESSIONAL PER DEMOGRAPHIC

Demographic	**n**	**Percentile**
Gender Identity		
Male (n = 147)	113	76.9
Female (n = 33)	25	75.8
Other (n = 1)	0	0.0
Prefer not to answer (n = 0)	0	0.0
Age		
18-20 (n = 57)	40	70.2
21-30 (n = 88)	69	78.4
31-40 (n = 30)	24	80.0
>40 (n = 6)	5	83.3
Rank		
Enlisted (n = 157)	120	76.4
Officer (n = 24)	18	75.0
MOS Classification		
Aviation/Aerial Defense (n = 11)	9	81.8
Combat Arms/Ground Forces (n = 69)	53	76.8
Engineering/Mechanics (n = 39)	31	79.5
Medicine/Science (n = 24)	17	70.8
Signal/Intelligence (n = 18)	14	77.8
Support/Logistics (n = 20)	14	70.0
Race		
American Indian/Alaska Native (n = 8)	7	87.5
Asian (n = 8)	7	87.5
Black or African American (n = 52)	43	82.7
Native Hawaiian or Pacific Islander (n = 2)	2	100
White (n = 120)	89	74.2
Unknown (n = 1)	1	100
Other (n = 9)	7	77.8
Ethnicity		
Hispanic/Latino (n = 42)	28	66.7
Non-Hispanic/Latino (n = 139)	110	79.1
Concussion Education		
No (n = 61)	43	70.5
Yes (n = 120)	95	79.2
History of Contact Sports		
No (n = 52)	41	78.8
Yes (n = 129)	97	70.5
History of Concussion		
No (n = 117)	96	82.1
Yes (n = 63)	41	65.1

*Note. Each demographic has the number of participants in total who identify with that demographic. n = the number of participants within each demographic who reported a high intention to disclose. Percentile = the percentage of participants in each demographic who reported a high intention to disclose.

TABLE 6

HIGH INTENTION TO DISCLOSE TO LEADERSHIP PER DEMOGRAPHIC

Demographic	**n**	**Percentile**
Gender Identity		
Male (n = 147)	105	71.4
Female (n = 33)	24	72.7
Other (n = 1)	0	0.0
Prefer not to answer (n = 0)	0	0.0
Age		
18-20 (n = 57)	37	64.9
21-30 (n = 88)	63	71.6
31-40 (n = 30)	24	80.0
>40 (n = 6)	5	83.3
Rank		
Enlisted (n = 157)	113	72.0
Officer (n = 24)	16	66.7
MOS Classification		
Aviation/Aerial Defense (n = 11)	8	72.7
Combat Arms/Ground Forces (n = 69)	50	72.5
Engineering/Mechanics (n = 39)	30	79.9
Medicine/Science (n = 24)	15	62.5
Signal/Intelligence (n = 18)	12	66.7
Support/Logistics (n = 20)	14	70.0
Race		
American Indian/Alaska Native (n = 8)	6	75.0
Asian (n = 8)	7	87.5
Black or African American (n = 52)	38	74.1
Native Hawaiian or Pacific Islander (n = 2)	2	100
White (n = 120)	84	70.0
Unknown (n = 1)	1	100
Other (n = 9)	7	77.8
Ethnicity		
Hispanic/Latino (n = 42)	25	59.5
Non-Hispanic/Latino (n = 139)	104	74.8
Concussion Education		
No (n = 61)	40	65.6
Yes (n = 120)	89	74.2
History of Contact Sports		
No (n = 52)	38	73.1
Yes (n = 129)	91	71.1
History of Concussion		
No (n = 117)	92	78.6
Yes (n = 63)	36	57.1

*Note. Each demographic has the number of participants in total who identify with that demographic. n = the number of participants within each demographic who reported a high intention to disclose. Percentile = the percentage of participants in each demographic who reported a high intention to disclose.

TABLE 7

PREDICTORS OF INTENTION TO DISCLOSE TO A MEDICAL PROFESSIONAL

Variable	***B***	**95% CI**	**ß**	**t**	**p**
Gender Identity	.015	[-.330, .361]	.005	.088	.930
Age	.092	[-.080, .264]	.061	1.053	.294
Rank	-.129	[-.510, .252]	-.037	-.669	.504
MOS Classification	-.006	[-.101. .089]	-.007	-.124	.902
Race (Caucasian vs. Non-Caucasian)	-.189	[-.464, .086]	-.079	-1.356	.177
Ethnicity (Hispanic/Latino vs. Non-Hispanic/Latino)	.106	[-.200, .412]	.038	.682	.496
Concussion Education	.053	[-.225, .331]	.021	.378	.706
History of Contact Sports	-.190	[-.469, .088]	-.073	-1.348	.180
History of Concussion	-.281	[-.549, -.013]	-.114	-2.074	.040
Knowledge Score	.001	[-.014, .016]	.007	.125	.901
Attitudes Score (Medical)	.038	[.013, .062]	.204	3.050	.003
Perceived Norms Score (Medical)	.070	[.048, .093]	.440	6.143	<.001
Perceived Control (Medical – High vs. Low)	.477	[.133, .821]	.168	2.735	.007

*Note. B = standardized regression coefficient. CI = confidence interval for *B*. ß = unstandardized regression coefficient. R^2adj = .522 (N = 181, p = 0.000).

TABLE 8

PREDICTORS OF INTENTION TO DISCLOSE TO LEADERSHIP

Variable	***B***	**95% CI**	**ß**	**t**	**p**
Gender Identity	-.201	[-.562, .160]	-.061	-1.100	.273
Age	.072	[-.109, .254]	.042	.789	.431
Rank	-.174	[-.579, .232]	-.043	-.847	.399
MOS Classification	.006	[-.093, .106]	.007	.128	.898
Race (Caucasian vs. Non-Caucasian)	-.038	[-.320, .245]	-.014	-.264	.792
Ethnicity (Hispanic/Latino vs. Non-Hispanic/Latino)	.386	[.066, .707]	.119	2.379	.019
Concussion Education	-.172	[-.464, .119]	-.060	-1.166	.246
History of Contact Sports	-.117	[-.406, .172]	-.039	-.800	.425
History of Concussion	-.351	[-.630, -.072]	-.124	-2.482	.014
Knowledge Score	.000	[-.015, .016]	.001	.016	.987
Attitudes Score (Leadership)	.050	[.026, .074]	.269	4.156	<.001
Perceived Norms Score (Leadership)	.074	[.051, .097]	.436	6.234	<.001
Perceived Control (Leadership – High vs. Low)	.491	[.113, .869]	.153	2.567	.011

*Note. *B* = unstandardized regression coefficient. CI = confidence interval for *B*. ß = standardized regression coefficient. R^2adj = .613 (N = 181, p = 0.000).

TABLE 9

OPEN-ENDED SURVEY RESPONSES

Prompt: Please feel free to provide additional information regarding your experience reporting concussive symptoms.
"I'm a medic it'll vary for non-medical Soldiers"
"Had multiple concussions in high school"
"I have had head injury before and one health care provider marked it as concussive and another just marked it as me being over worked up and that I was fine knowing I had hit my head about a week or two before that visit"
"Had concussions when performing airborne operations"
"We just need to foster an environment where health of our Soldiers is paramount"
"Have a concussion hotline"
"Have not reported"
"It wasn't great"
"I had none before"
"Not fun"
"It resulted in a very long process, but it helped me overall"
"No symptoms"
"Headaches, forgetfulness, irritability, sensitivity to light"

CHAPTER FIVE

DISCUSSION

Injuries present a major threat to military readiness due to their effect on a Service Member's ability to fulfill their duties, or be prepared to respond to threats as needed. Injuries have caused major losses of manpower through hospitalization, disability, and even death.[2] While a multitude of injuries are contributing to this epidemic, traumatic brain injuries are uniquely threatening to the military population through exposure in combat and training.[3–5] Literature has reported high incidence of traumatic brain injuries - specifically what are classified as concussions - within Service Members,[6] but there is an understanding that many are not being reported when they occur.[6–8] This study intended to further understand and identify the reasoning for lack of concussion disclosure within this population, with the hopes of providing insight to how this can be mitigated in the future to prevent lack of military readiness. The predictors of intention to disclose were based upon the theory of planned behavior, along with other variables established in previous literature.

Numerous variables can predict intent to disclose concussions, however, this study found the established components of the theory of planned behavior (favorable perceived social norms, favorable attitudes, and higher perceived behavioral control) were significant predictors for disclosing concussion to both medical professionals and leadership. Not surprisingly, history of concussion was also found to be a strong predictor of intent to disclose. Interestingly, ethnicity was also a significant predictor of disclosing concussions to leadership, with those individuals who are Hispanic/Latino being less likely to disclose to leadership.

More favorable perceived social norms was one of the strongest predictors in both models, which is the perceived social pressure to perform or not to perform the behavior.[53] In this case, Soldiers are more likely to disclose their concussions when those around them approve of or support this behavior, regardless of role (medical professional versus leadership). Previous literature from various populations has supported this concept of high intention to disclose or even improved disclosure behavior when

perceived social norms are more favorable.[24–27,30,54] Participants expressed through high average scores that they should report their possible concussive symptoms to a medical professional (6.5 ± 0.8) or leadership (6.2 ± 1.1), but other social norms such as most others in their current unit would report possible concussive symptoms (5.2 ± 1.4) and other Soldiers they know report their possible concussive symptoms to a medical professional (5.4 ± 1.3) or leadership (5.3 ± 1.3) showed lower averages. This demonstrates most Soldiers are aware of the importance of reporting possible concussive symptoms if they are to experience them, but they do not believe their peers and colleagues would report their symptoms to a medical professional or leadership.

This finding is not unexpected with the highly researched deep-rooted stigma surrounding injury reporting in this population. It seems as if disclosure is still not happening due to how others believe they will be perceived. Soldiers are well aware they should be disclosing their concussive symptoms, but because of the labels that may be assigned to them such as "weak," they continue to avoid this behavior. This can be further supported by previously reported reasons for non-disclosure in the military population, including "avoiding negative perceptions"[15–18] and how reporting an injury "shows weakness."[14] Literature has also exposed that it is expected that Soldiers "suck it up" and "work through the pain" as their unit believes they should.[16] The stigma and negative beliefs surrounding injury disclosure in the military population is perpetuating poor injury disclosure habits. It appears that these findings, along with previous literature, demonstrate a need for potential change in the military culture that may encourage active duty Soldiers to disclose concussions. The narrative surrounding injury disclosure appears to be shifting to help improve these norms, which would improve disclosure rates and military readiness. The culture surrounding subjective norms associated with disclosing concussions within the military cannot change without addressing the attitudes of active duty Soldiers that accompany concussion disclosure.

Attitudes regarding concussion disclosure was another significant predictor, and one of the most significant when considering disclosing to leadership. Attitudes within the Theory of Planned Behavior refers to how the individual feels about the behavior, whether it's favorable or not.[53] Soldiers in this study

with more favorable attitudes produced a higher intention to disclose concussions. Each attitude scale had a negative word at one end and a positive word at the other end regarding concussion disclosure, such as concussion disclosure is "bad" or "good." All attitude questions produced an average greater than 5.0, and the means for each attitude question were all slightly lower for disclosure to leadership when compared to a medical professional, but not significantly. The only question that produced a higher average when disclosing to leadership was cowardly to brave, meaning Soldiers found it more brave to report to leadership than a medical professional. All of these questions were shifted slightly more towards the negative feeling when asked about reporting to leadership, but overall the greatest difference when comparing a medical professional scale to a leadership question was 0.4 for "bad to good" and "harmful to beneficial." These slight shifts towards less favorable attitudes for disclosing to leadership may be related to how leadership perceives injuries. Research has exposed negative perceptions of injuries and profiles among leadership within the military.[48,49] If these perceptions are passed onto those Soldiers under these leaders, they may feel less inclined, and less favorable attitudes regarding injury disclosure. Besides difficulties with disclosure to leadership, there have also been difficulties reporting to medical professionals within this population as well. The lowest average came from the "difficult to easy" scale, which may be explained by the challenges Soldiers face with the Military Health System.

Soldiers have reported in previous literature difficulties in seeking care, along with negative experiences with healthcare providers when seeking care for a TBI such as having to "prove" their symptoms.[19] These experiences have caused general mistrust in the Military Health System for Soldiers.[19] Previous research supports improved intention to disclose and disclosure behavior occurs with more favorable attitudes.[24–27] It appears the Soldiers in the current study demonstrated generally positive attitudes toward disclosure, however, the attitudes associated with the difficulty in progressing through the Military Health System may also influence perceived behavioral control.

The last component of the TPB, perceived behavioral control, was also a strong predictor of intention to disclose to both a medical professional or leadership. Perceived behavioral control is the idea of how difficult or how easy it is to perform a behavior.[53] This sample demonstrated a high perceived

behavioral control (6 or 7 on a 7-point scale) was associated with a higher intention to disclose concussions. This trend is supported by previous research in military cadets and other populations as well.[24–29] A majority of this sample reported high control over reporting to both a medical professional and leadership, with 78% reporting high control with a medical professional and 77% reporting high control with leadership.

As mentioned previously, perceived behavioral control is based upon the ease or difficulty of performing the behavior, which would be disclosure of concussive symptoms in this scenario. There are a number of barriers that have been reported in previous literature, one of those being difficulties navigating the Military Health System. Soldiers have reported difficulties with seeking and receiving care, as well as conflict with healthcare providers when attempting to receive care for a concussion.[19] Soldiers have also expressed a past negative experience with the Military Health System as a reason for not reporting their injuries.[18]

Another common reason for not reporting injuries in previous research has been avoiding a profile and fear of impact on career.[15,17] These consequences of injuries often leave the control of the individual after reporting an injury, as it would be up to the medical professional's discretion to place them on a profile dependent upon severity. The purpose of the profile system is to protect the Soldier from further injury and encourage a complete healing process. Further, the profile serves as a way to communicate with leadership the Soldiers' functional status and their ability to fully participate in their duties.[63] Previous research in a sample of Soldiers revealed a perception of a lack of credibility in the profile system, which may further heighten this negative perception towards injuries and being placed on a profile.[48] Profiles can have a major impact on a Soldier's ability to fulfill their duties and can potentially lead to medical discharge if they are unable to complete their duties. Therefore, the possibility of losing their ability to perform their job may cause them to feel a loss of control. The Soldiers in this sample demonstrated they mostly feel they have control over disclosure of concussions, but based upon the difficulties with the Military Health System, those with a previous history of concussion may feel differently.

History of concussion was another significant predictor of intention to disclose, but displayed a negative relationship. Those with a history of concussion were less likely to intend to disclose their concussions to a medical professional or leadership, as supported by previous literature.[24,64] There was also a difference between the frequency of those reporting a high intention to disclose concussive symptoms between those with and without a previous history of concussion. In this sample, 65.1% reporting a high intention to disclose to a medical professional and 57.1% reporting a high intention to disclose to leadership for those with a previous history of concussion, compared to 82.1% reporting a high intention to disclose to a medical professional and 78.6% reporting a high intention to disclose to leadership for those without a history of concussion. This may be related to a similar issue seen with the participants' attitudes regarding whether or not disclosing concussive symptoms is difficult or easy. The negative experiences noted in previous literature with disclosing concussive symptoms[19] can be contributing to this issue, as well as speculation that those with a previous TBI were treated poorly and do not disclose subsequent TBIs because of their negative experience.[14] Soldiers have also reported fear of career repercussions when disclosing concussions,[14,21,22] and any Soldiers with previous concussions who did experience career repercussions due to injury may fear this occurring once again with subsequent injuries. An individual with a history of concussion cannot change this, but the narrative surrounding concussion disclosure and the disclosure process can be improved to help shift the perspective of those with negative experiences.

Another significant predictor of intention to report to leadership was ethnicity, revealing those within this sample who are Hispanic or Latino have a lower intention to disclose to leadership. The frequency of high intention to disclose to leadership for those who are Non-Hispanic/Latino was 75%, but only 60% for those who are Hispanic/Latino. This sample was slightly more representative of those who are Hispanic/Latino when compared to the Active Duty Army as a whole, which is only comprised of 16.6% individuals who are Hispanic/Latino,[65] however, this sample included greater representation of those who are Hispanic/Latino.

The Health of the Force Report recently debuted stratifying health reports by race and ethnicity to help address disparities among minority Soldiers and their families.[66] Ethnic differences must be acknowledged at all levels when seeking medical treatment, whether those medical needs are being expressed to leadership or a medical professional. Research has shown disparities in experience with medical issues such as PTSD, and it is imperative those disparities are accounted for when treating those who are Hispanic/Latino.[67] If this demographic is not being addressed appropriately when it comes to healthcare, the Army force is at risk of placing a large number of those serving this branch in a position where they may not be able to fulfill their duties. Injuries that are not addressed can cause further loss of duty days among individual Soldiers and loss of manpower for the branch as a whole. Healthcare must be accessible and equal for all demographics to ensure physical readiness to endure the physical requirements of this job. These disparities may not be limited to medical professionals, but into other forms of leadership as well, as displayed by this sample. Beyond ethnicity, attitudes, perceived social norms, and perceived behavioral control were all significant and strong predictors of intention to disclose among the participants of this study, and if these can continue to be addressed and strengthened, this should help close the gap of those injuries going undisclosed. Apart from these, there were others that did not prove to be significant predictors of intention, such as knowledge of concussion and other demographic variables.

This sample of active duty Soldiers did not show knowledge to be a significant predictor of intention to disclose, which was also seen in the previous sample of military cadets within the multivariate regression model.[24] Previous research has revealed active duty Soldiers have not reported past concussions because they did not believe they required care, revealing their lack of knowledge of concussions and their complications.[14,56] The average knowledge score in this population was slightly lower, with an average score of 27.7 ± 8.7 correct answers compared to 32.1 ± 6.2[24] correct answers out of 39. Previous literature has shown mixed results on whether or not knowledge plays a role in intention to disclose concussions in various populations. While some studies have found a relationship between intention to disclose concussions and knowledge,[24,25,28,55] others have also failed to demonstrate a

relationship between the two.[26,29] One study even found individuals with an increased knowledge of concussion along with a history of concussions showed a decreased intention to report.[25] Beyond this variance of findings, other studies have also demonstrated the overall lack of knowledge of concussion within the military population.[14,56]

Knowledge may not be enough to justify disclosing concussive symptoms in this population, as this sample revealed most of them understand they should be disclosing these symptoms, but there are other barriers keeping them from doing so. This sample also demonstrated the lowest knowledge regarding long-term effects of concussions, and educational efforts may need to be targeted more towards this rather than awareness of acute signs or symptoms. Understanding the long-term effects of concussion is dire to help this population fully understand the consequences of their lack of disclosure. Beyond knowledge, other variables specific to this active duty population such as age, rank, and MOS physicality did not prove to be significant predictors of intention to disclose.

Age was not a significant predictor of intention to disclose in this sample. The previous study in the military cadet population used a sample of individuals who are on average 18.4 $\pm$ 0.9 years old,[24] whereas this study incorporated individuals who are predominantly ages 21-30, but span between ages 18-41 or older. Age was expected to have more of an influence due to the greater variance in comparison, and older age may imply more time in the military, and possible even higher rank. Age has been considered in previous injury reporting research, and a significant relationship has been found between age and underreporting of injuries.[16] In terms of age and rank, the average age of enlisted Soldiers is 27.1 years old and the average age of officers is 34.7 years old, which is not a very large difference.[65] Individuals can enlist and progress through the ranks at different points in life, so age in itself may not be a strong predictor of intention to disclose. Rank also did not prove to be a significant predictor along with age. A previous study did find enlisted Soldiers to be less likely to report their injuries, and they reasoned this may be due to those who are enlisted wanting to avoid negative perceptions or showing weakness.[45] As mentioned previously, those in leadership positions, who are also more likely officers, are also sharing

negative perceptions of injuries and profiles.[48,49] It seems that both enlisted Soldiers and officers have these same negative perceptions, and there may not be much of a difference between the parties in terms of non-disclosure of injuries.

MOS physicality was another included variable that is unique to the active duty population that has been researched in the past. This was not found to be a significant predictor of intention to disclose within this study, although previous research has shown those in higher physicality MOSs, or specifically those in combat arms, tend to underreport. One study revealed in a sample of Soldiers, almost 57% of those in combat arms suffered an injury they did not report.[16] Another study revealed a significant difference in injury reporting habits between those in field artillery and infantry, with infantry reporting significantly less injuries.[18] The infantry trainees in this study also rated the importance of avoiding negative perceptions of being injured higher than those in field artillery and armor MOSs as a reason for not reporting an injury.[18] Due to the higher physical demands for these MOSs, they are at greater risk for injuries.[2,44] Fear of career repercussions is a common reason for non-disclosure, and if these individuals are injured or on profile, they truly cannot fulfill their duties with the high physical demands. This may deter them from disclosing any type of injury to avoid the consequences. This sample was comprised of 69 individuals in combat arms, making up over one-third of the sample, yet this was not a significant predictor. This may be due to a lack of difference in culture of injury disclosure between MOS classifications within this sample, and the overall high percentage of high intention to disclose injuries.

While there are numerous predictors of intention to disclose within this population, this sample demonstrated a majority have a high intention to disclose their concussions. Within every sub-demographic 50% or more reported a high intention to disclose concussive symptoms to leadership or a medical professional. Overall, 76% have a high intention to disclose to a medical professional and 71% have a high intention to disclose to leadership. When looking at these overall numbers and the sub-demographic numbers, a greater difference between intention to disclose to a medical professional versus leadership due to the stigma around injury reporting within the military was expected. It is a medical

professional's duty to treat and provide care for all injuries presented to them, regardless of context. Leadership is not necessarily required to address injuries that are brought to them in any certain manner, and they are sharing this environment that has instilled negative perceptions of those who are injured and let those injuries affect their performance or ability to fulfill their duties. A previous study in a population of military cadets demonstrated that those who felt comfortable reporting their concussion to a commanding officer of academy military trainer were in higher agreement to seek medical attention.[52] If the comfort in disclosing injuries to leadership can be improved, this may also in turn improve the amount of Soldiers who actually seek are from a medical professional. Within this sample, the lack of difference in reporting to leadership or a medical professional may be due to the fact of medical professionals are often Soldiers themselves, and they may also be influenced by these beliefs and stigmas surrounding injuries and the "weakness" associated with it as leadership is as well.

Arguably more importantly, for those who reported a history of concussion, their actual behavior in terms of disclosing concussions was compared to their reported intention. A total of 41 Soldiers reported a high intention to disclose to a medical professional who also had a history of concussion, and a total of 36 Soldiers reported a high intention to disclose to leadership who also had a history of concussions. Those individuals were asked how many of their past concussions they reported. Of the 41 who have a high intention to disclose to a medical professional, 8 of them answered with "0" or "none" in the open-response. Another 22 of those Soldiers responded with a specific number of concussions, such as "1" or "2." Others entered more vague answers, such as "I don't know", "a few", or "now, no telling honestly." This question was based on recall, so answers were expected to have some variance. Of the 36 who reported high intention to disclose to leadership, 7 of those Soldiers did not report any of their past concussions, along with those who specified the number or provided a non-specific response. While the TPB supports the foundation of favorable attitudes, favorable perceived social norms, and high perceived behavioral control as the set up for high intentions to perform a behavior, a high intention does not always guarantee the behavior will be performed. The TPB is based on a planned behavior, and a higher intention

means the behavior is just more likely to occur.[53] This comparison demonstrates that even those who demonstrated high levels of intent to disclose based upon various factors did not previously report a concussion. There are several possible explanations such as recall bias, lack of honest answers, or changes in prior beliefs. These findings will hopefully provide a culture and mindset shift for those who did not report their concussions in the past. Continuing to improve the disclosure process, as well as perceptions of those who choose to disclose their concussive symptoms can keep pushing the change that is needed in the military population for improved intention to disclose and disclosure behaviors.

Limitations

This study has a few limitations. This sample is only representative of those who are Active Duty soldiers at Fort Stewart, and not of the military populations as an entity. Despite this, the sample is representative of some demographics seen within the Army as a whole.[65] While these results cannot be extrapolated to other branches of the military, previous research within the Army has established the prevalent stigma of injuries, as well as reporting them. These results are representative of this branch specifically and can be helpful across installations as this stigma does not stop here.

Self-selection bias is another limitation of this study. Participants were recruited in large groups, and were informed their participation was completely voluntary. Due to this, not all individuals chose to participate. This may produce results that are biased dependent upon how the individual feels about the topic of concussive symptom reporting, and the results may not be representative of the population.

Soldiers were also recruited from USARIEM's pop-up injury evaluation tents, which is another limitation. These individuals were recruited from a location they report to when they have an injury. If the Soldier is willing to report to this tent for a musculoskeletal injury, they may also be more willing to report their concussive symptoms. It is important to note 10 or less (less than 18%) of participants were recruited in this manner, and the survey is specific to concussive symptom reporting rather than musculoskeletal.

Another limitation was the assumption that the participants answered all questions honestly and provided accurate medical history. The Soldiers were ensured all answers would be kept confidential, and all data would be aggregated when reported.

Conclusion

Overall, 76% of the Soldiers who participated in this study reported a high intention to disclose concussive symptoms to a medical professional, and 71% reported a high intention to disclose concussive symptoms to their leadership. Strong predictors of intention to disclose concussive symptoms to a medical professional in this sample were a history of concussion, higher perceived social norms score, more favorable attitudes, and higher perceived behavioral control. Strong predictors of intention to disclose concussive symptoms to leadership were Hispanic/Latino ethnicity, history of concussion, higher perceived social norms score, more favorable attitudes, and higher perceived behavioral control.

Based upon these predictors, efforts should focus on educating all stakeholders through a lens of these theory-based concepts to help combat the barriers to concussive symptom disclosure. The military, and specifically the Army, should continue reducing the stigma, increasing access to the Military Health System, and working to improve the concussive symptom disclosure/care seeking process. Military readiness is the goal to ensure all Soldiers are prepared to fulfill their duties, and without physically healthy Soldiers this cannot be achieved. Creating an environment where Soldiers feel supported in disclosing possible injuries and seeking care for them is imperative to avoid further loss of duty days and manpower within this population. Future research should further explore interventions based upon this theory, as well as tracking change in intention through intervention and its relationship with disclosure behaviors.

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APPENDIX A

EXTENDED METHODOLOGY

Research Questions

1. R_1: What Solider demographics report a higher frequency of high intention to disclose compared to their counterparts?
2. R_2: How do Soldiers' demographics, knowledge, attitudes, perceived social norms, and perceived behavioral control surrounding concussion/concussion disclosure predict their intention to disclose?

Hypotheses

1. H_1: A higher frequency of high intention to disclose compared to its counterparts will be shown in the following demographic groups: 18-20 years old, low physically demanding MOS, enlisted Soldiers, females, non-Caucasian, Hispanic, no history of concussion education, no history of concussion, and a history of non-contact sports.
2. H_2: More favorable attitudes, more favorable perceived social norms, and higher perceived behavioral control will be significantly associated with a higher intention to disclose.

Inclusion Criteria

1. Participants must be 18 years of age or older
2. Participants must be serving on active duty
3. Participants must be serving at Fort Stewart

Exclusion Criteria

1. Participants 17 years of age or younger
2. Participants not serving on active duty

3. Participants not serving at Fort Stewart

Definitions

Concussion: A blow or jolt to the head that disrupts normal function of the brain, and depending on the severity, can have long lasting effects on anyone who experiences one.[24]

Concussion symptoms: Common concussion symptoms include: headache, feeling slowed down, difficulty concentrating or focusing, dizziness, balance problems/loss of balance, fatigue/loss of energy, feeling in a fog, irritability, drowsiness, nausea, memory loss, sensitivity to light/noise, and blurred vision.[24]

Medical professional: Physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer.

Contact sport: Sports where players experience body-to-body contact as a recognized circumstantial part of the game, but purposeful collisions by rule are not allowed."[60]

Non-contact sport: Sports where players experience rare body-to-body contact is rare and is typically an unexpected occurrence.[60]

APPENDIX B

IRB APPROVAL

Institutional Review Board (IRB)
Veazey Hall 3000
PO Box 8005 • STATESBORO, GA 30460
Phone: 912-478-5465
Fax: 912-478-0719
IRB@GeorgiaSouthern.edu

To:	Beck, Carly; Hunt, Tamerah; Byrd, Megan; Westrick, Richard
From:	Eleanor Haynes, Director, Research Integrity
Approval Date:	10/25/2021
Expiration Date:	9/30/2022
Subject:	Approval with Conditions from the Georgia Southern University Institutional Review Board - **Expedited Review**

After a review of your proposed research project numbered: **H22121**, titled **"Factors Associated with Intention to Disclose Concussive Symptoms in Active Duty Soldiers,"** it appears that (1) the research subjects are at minimal risk, (2) appropriate safeguards are planned, and (3) the research activities involve only procedures which are allowable. You are authorized to enroll up to a maximum of **300** subjects.

Description: The purpose of this study is to investigate the factors contributing to the disclosure of concussive symptoms by United States Army Soldiers.

Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your proposed research **with the understanding that you will abide by the following conditions:**

You are approved to conduct research at the following locations for which you have obtained letters of cooperation:
– United States Army at Fort Stewart, Georgia

Additional locations may be added to this study by submitting additional letters of cooperation.

The IRB has approved your safety plan for in person research for this protocol. You may proceed with the research as described in the above protocol as long as you continue to follow the submitted safety plan and local conditions remain manageable by that plan. Any changes to the protocol and/or safety plan must be approved by the IRB before the changes are initiated. It is the researcher's responsibility to maintain awareness of the current COVID Phase (as defined by the CDC) in the community where the research is taking place and to follow applicable safety precautions for that phase. The research must also remain aware of any changes to the University's COVID policies as it relates to research.

If at the end of this approval period there have been no changes to the research protocol; you may request an extension of the approval period. In the interim, please provide the IRB with any information concerning any significant adverse event, **whether or not it is believed to be related to the study**, within five working days of the event. In addition, if a change or modification of the approved methodology becomes necessary, you must notify the IRB Coordinator **prior** to initiating any such changes or modifications. At that time, an amended application for IRB approval may be submitted. Upon completion of your data collection, you are required to complete a *Research Study Termination* form to notify the IRB Coordinator, so your file may be closed.

APPENDIX C

SURVEY INSTRUMENTATION

Determinants of Intention to Disclose Concussion

Start of Block: Default Question Block

Q0

WATERS COLLEGE OF HEALTH PROFESSIONS

DEPARTMENT OF HEALTH SCIENCES AND KINESIOLOGY

INFORMED CONSENT

Carly Beck, LAT, ATC, is a second-year masters student in the MS in Kinesiology, concentration in Athletic Training program at Georgia Southern University, and she is the principal investigator on this study. She is a certified athletic trainer with a background in assisting with research protocols, as well as conducting a study during her undergraduate experience with fellow students. She is also a part of the United States Army Research Institute of Environmental Medicine, and serves as an athletic trainer at Fort Stewart providing evaluation and treatment of injuries.

The purpose of this study is to better understand the factors affecting Soldiers' intention to disclose concussive symptoms. The results of this study will provide a better understanding of concussive symptom reporting from a Soldier's perspective for healthcare providers. Participation in this study includes revealing your perspective and feelings about reporting concussive symptoms. Participation is completely voluntary, and you are able to stop at any time without penalty or retribution. If you choose to participate in this study, you will take the electronic survey following this consent page which will take approximately 15 minutes, and participation ends at the completion of the survey. You must be 18 years of age or older and serving on active duty at Fort Stewart in order to participate. There will be no compensation for participation.

Precautions will be taken in accordance with current Georgia Southern policies to reduce the risk of the spread of communicable diseases (including COVID-19). However, consenting to participate in this research indicates your acknowledgement of the risk of disease transmission. You also acknowledge your requirement to notify the researchers in the event that you are symptomatic prior to or at the time of participation. Contact information and appointment information may be held by the researcher and

provided to health officials for the purpose of contact tracing in the event the research team is notified of a positive exposure to COVID-19. We encourage non-vaccinated participants to wear a mask or face covering while participating in the research. For those participating in research in a group setting, please keep in mind that we cannot guarantee the vaccination status of other participants. The CDC has provided a graphic explanation for Choosing Safer Activities based on vaccination status. The research environment will be similar to "attending a small, outdoor gathering of fully vaccinated and unvaccinated people" as indicated on the Choosing Safer Activities graphic. https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/participate-in-activities.html

Your answers in this survey will remain confidential. You will not be identified by name in the data set or any reports using information obtained from this study, and your confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions. All information will be treated confidentially. There is one exception to confidentiality that we need to make you aware of. In certain research studies, it is our ethical responsibility to report situations of child or elder abuse, child or elder neglect, or any life-threatening situation to appropriate authorities. However, we are not seeking this type of information in our study nor will you be asked questions about these issues. Your confidentiality will be maintained through a password-protected database only the principal investigator will have access to, and all data will be destroyed in 3 years in a confidential manner by the principal investigator.

There is minimal risk involved with participation (i.e. no more than encountered daily). Participation includes answering questions regarding concussive symptom reporting behaviors and beliefs, and you may stop at any time if you experience discomfort or choose not to answer a question. Participants have the right to ask questions regarding the study and have those questions answered. If you have questions, please contact Carly Beck at cb38927@georgiasouthern.edu, or the researcher's faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Institutional Review Board at 912-478-5465 or irb@georgiasouthern.edu.

If you would like a copy of this consent form to keep for your records, please contact Carly Beck at the contact information listed below. This project has been reviewed and approved by the GS Institutional Review Board under tracking number H22121.

Title of Project: Factors Associated with Intention to Disclose Concussive Symptoms in a Population of U.S. Army Soldiers

Principal Investigator: Carly Beck (Phone: 470-588-7418, Email: cb38927@georgiasouthern.edu)
Other Investigator(s): Richard Westrick (Phone: 508-206-2409, Email: richard.b.westrick.civ@mail.mil), Megan Byrd (Phone: 912-478-2274, Email: mmbyrd@georgiasouthern.edu)
Research Advisor: Tamerah Hunt (Phone: 912-578-8620, Email: thunt@georgiasouthern.edu)

You must be 18 years of age or older and serving on active duty to consent to participate in this research study. Please click the "next" button in the bottom right corner of this page if you agree and volunteer to participate.

Q1 What is your current age?

_____

Q2 What is your MOS?

_____

Q3 What is your rank?

_____

Q4 What is your race? Check all that apply.

- ☐ American Indian or Alaska Native (1)
- ☐ Asian (2)
- ☐ Black or African American (3)
- ☐ Native Hawaiian or Pacific Islander (4)
- ☐ White (5)
- ☐ Unknown (6)
- ☐ Other (7) _____

Q5 What is your ethnicity?

- ○ Hispanic/Latino (1)
- ○ Non-Hispanic/Latino (2)

Q6 What is your gender identity?

- ○ Male (1)
- ○ Female (2)
- ○ Other (3)
- ○ Prefer not to answer (4)

Q7 Select the highest level of education you have completed.

- ○ Less than high school (1)
- ○ High school graduate or GED (2)
- ○ Some college, no degree (3)
- ○ Associate's degree (4)
- ○ Bachelor's degree (5)
- ○ Master's degree (6)
- ○ Professional degree (7)
- ○ Doctorate (8)
- ○ I do not know (9)

Q8 For the following questions, the IRS defines "household" as: The taxpayer(s) and any individuals who are claimed as dependents on one federal income tax return. A tax household may include a spouse and/or dependents.

Select the amount that best represents your annual household income.

- ○ Less than $30,000 (1)
- ○ $30,000-$49,999 (2)
- ○ $50,000-$74,999 (3)
- ○ $75,000-$99,999 (4)
- ○ $100,000-$149,999 (5)
- ○ More than $150,000 (6)

Q9
Select the amount of people in your household.

- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 or more (7)

Q10 Have you ever been formally educated about concussion (e.g., watched an official educational video, talked with a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer), or received an educational pamphlet)?

- ○ No (1)
- ○ Yes (2)

Q11 Please check all sports/activities that you participate/participated in for at least 1 season or on average 1 time per month during high school, college, recreational, or community leagues.

- [ ] Baseball (1)
- [ ] Basketball (2)
- [ ] Bowling (3)
- [ ] Boxing (4)
- [ ] Canoeing/Kayaking (5)
- [ ] Cheerleading (6)
- [ ] Crew (7)
- [ ] Cross Country/Track (8)
- [ ] Cross Fit (9)
- [ ] Cycling/Mountain Biking (10)
- [ ] Dance (11)
- [ ] Diving (12)
- [ ] Fencing (13)
- [ ] Field Event (14)
- [ ] Field Hockey (15)
- [ ] Football (16)
- [ ] Golf (17)

- [ ] Gymnastics (18)
- [ ] Ice Hockey/In-Line Hockey (19)
- [ ] Ice Skating (20)
- [ ] Kick Boxing (21)
- [ ] Lacrosse (22)
- [ ] Martial Arts (23)
- [ ] Rifle (24)
- [ ] Rock Climbing (25)
- [ ] Rowing/Crew (26)
- [ ] Rugby (27)
- [ ] Running/Jogging (28)
- [ ] Skateboarding (29)
- [ ] Skiing/Snowboarding (30)
- [ ] Soccer (31)
- [ ] Softball (32)
- [ ] Squash/Racquetball (33)
- [ ] Surfing/Windsurfing (34)
- [ ] Swimming (35)

- [ ] Team Handball (36)
- [ ] Tennis (37)
- [ ] Triathlon (38)
- [ ] Ultimate Frisbee (39)
- [ ] Volleyball (40)
- [ ] Water Polo (41)
- [ ] Waterskiing/Waterboarding (42)
- [ ] Weight Training (43)
- [ ] Wrestling (44)
- [ ] Yoga/Tai Chi (45)
- [ ] None (46)
- [ ] Other (47) _____

Q12 Do you consider the following a primary sign or symptom of concussion?

	No (1)	Yes (2)

Headache (1)	○	○
"Pressure in head" (2)	○	○
Neck pain (3)	○	○
Nausea or vomiting (4)	○	○
Dizziness (5)	○	○
Blurred vision (6)	○	○
Balance problems (7)	○	○
Sensitivity to light (8)	○	○
Skin rash (9)	○	○
Sensitivity to noise (10)	○	○
Feeling slowed down (11)	○	○
Feeling like "in a fog" (12)	○	○
"Don't feel right" (13)	○	○
Difficulty concentrating (14)	○	○
Difficulty remembering (15)	○	○
Fatigue or low energy (16)	○	○

Confusion (17)	○	○
Drowsiness (18)	○	○
Joint pain (19)	○	○
Trouble falling asleep (20)	○	○
More emotional (21)	○	○
Irritability (22)	○	○
Sadness (23)	○	○
Nervous or anxious (24)	○	○

Q13 What do you think can happen to someone returning to duty too soon after a concussion? Mark all that apply.

- [ ] No bad things can ever happen (1)
- [ ] You may be more likely to get another concussion (2)
- [ ] Difficulty with everyday activities (3)
- [ ] Skin rash (4)
- [ ] Brain damage (5)
- [ ] Trouble with military-related tasks (6)
- [ ] I do not know what might happen (7)

Q14 What do you think can happen to someone as a result of suffering multiple concussion over their lifetime? Mark all that apply.

- [ ] No bad things can ever happen (1)
- [ ] You may be more likely to get another concussion (2)
- [ ] Skin rash (3)
- [ ] Brain damage (4)
- [ ] Trouble with military-related tasks (5)
- [ ] Difficulty with everyday activities (6)
- [ ] Changes in social life (7)
- [ ] I do not know what might happen (8)

Q15 For the following, select the number closest to each word **(cowardly to brave)** that describes how you feel about reporting concussive symptoms. (NOTE: If you would like to select "1" as your answer, move the sliding scale forward then back to 1 in order to be able to move onto the next page).

Reporting possible concussive symptoms to a **medical professional** (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer) is:

	COWARDLY					BRAVE
	1	2	3	4	5	6	7
()						

Q16

Reporting possible concussive symptoms to **leadership** is:

	COWARDLY					BRAVE
	1	2	3	4	5	6	7
()						

Q17 For the following, select the number closest to each word **(shameful to prideful)** that describes how you feel about reporting concussive symptoms. (NOTE: If you would like to select "1" as your answer, move the sliding scale forward then back to 1 in order to be able to move onto the next page).

Reporting possible concussive symptoms to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer) is:

	SHAMEFUL					**PRIDEFUL**
	1	2	3	4	5	6	7
()						

Q18

Reporting possible concussive symptoms to leadership is:

	SHAMEFUL					**PRIDEFUL**
	1	2	3	4	5	6	7
()						

Q19
For the following, select the number closest to each word **(harmful to beneficial)** that describes how you feel about reporting concussive symptoms. (NOTE: If you would like to select "1" as your answer, move the sliding scale forward then back to 1 in order to be able to move onto the next page).

Reporting possible concussive symptoms to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer) is:

	HARMFUL					**BENEFICIAL**
	1	2	3	4	5	6	7
()						

Q20
Reporting possible concussive symptoms to leadership is:

	HARMFUL					**BENEFICIAL**
	1	2	3	4	5	6	7
()						

Q21 For the following, select the number closest to each word **(extremely difficult to extremely easy)** that describes how you feel about reporting concussive symptoms. (NOTE: If you would like to select "1" as your answer, move the sliding scale forward then back to 1 in order to be able to move onto the next page).

Reporting possible concussive symptoms to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer) is:

	EXTREMELY DIFFICULT						**EXTREMELY EASY**
	1	2	3	4	5	6	7
()							

Q22 Reporting possible concussive symptoms to **leadership** is:

	EXTREMELY DIFFICULT						**EXTREMELY EASY**
	1	2	3	4	5	6	7
()							

Q23 For the following, select the number closest to each word **(bad to good)** that describes how you feel about reporting concussive symptoms. (NOTE: If you would like to select "1" as your answer, move the sliding scale forward then back to 1 in order to be able to move onto the next page).

Reporting possible concussive symptoms to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer) is:

BAD **GOOD**

1 2 3 5 6 7

() 

Q24

Reporting possible concussive symptoms to leadership is:

BAD **GOOD**

1 2 3 4 5 6 7

() 

Q25 For the following, select the number closest to each word **(unimportant to important)** that describes how you feel about reporting concussive symptoms. (NOTE: If you would like to select "1" as your answer, move the sliding scale forward then back to 1 in order to be able to move onto the next page).

Reporting possible concussive symptoms to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer) is:

	UNIMPORTANT					**IMPORTANT**
	1	2	3	4	5	6	7
()						

Q26
Reporting possible concussive symptoms to leadership is:

	UNIMPORTANT					**IMPORTANT**
	1	2	3	4	5	6	7
()						

Q27 How much do you agree or disagree with the following statement?

I should report possible concussive symptoms when I experience them to a **medical professional** (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer).

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q28 How much do you agree or disagree with the following statement?

I should report possible concussive symptoms when I experience them to **leadership**.

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q29 How much do you agree or disagree with the following statement?

In my current unit, most people I know would report their possible concussive symptoms to a **medical professional** (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer) if they experience them.

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q30 How much do you agree or disagree with the following statement?

In my current unit, most people I know would report their possible concussive symptoms to leadership if they experience them.

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q31 How much do you agree or disagree with the following statement?

Military treatment facilities (on-post medical facilities) provide appropriate care for individuals with a concussion.

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q32 How much do you agree or disagree with the following statements?

If I suffered a concussion, I would feel supported by **my unit**.

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q33
If I suffered a concussion, I would feel supported by **leadership**.

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q34 How much do you agree or disagree with the following statements?

When I experience concussive symptoms, I am expected to report them to a **medical professional** (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer).

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q35
When I experience concussive symptoms, I am expected to report them to **leadership.**

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q36 How much do you agree or disagree with the following statements?

When I experience possible concussive symptoms, people who are important to me would approve of me reporting them to a **medical professional** (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer).

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q37
When I experience possible concussive symptoms, people who are important to me would approve of me reporting them to **leadership**.

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q38 How much do you agree or disagree with the following statements?

When other Soldiers I know experience possible concussive symptoms, they report them to a **medical professional** (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer).

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q39
When other Soldiers I know experience possible concussive symptoms, they report them to **leadership**.

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Somewhat agree (3)
- ○ Neither agree nor disagree (4)
- ○ Somewhat disagree (5)
- ○ Disagree (6)
- ○ Strongly disagree (7)

Q40 How much do you agree or disagree with the following statements?

I have control over reporting concussive symptoms to a **medical professional** (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer).

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

Q41
I have control over reporting concussive symptoms to **leadership**.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

Q42 How much do you agree or disagree with the following statements?

When I experience possible concussive symptoms, I **intend** to report them to a **medical professional** (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer).

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

Q43
When I experience possible concussive symptoms, I intend to report them to **leadership**.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

Q44 **Definition of a concussion**: A concussion is a blow or jolt to the head that disrupts normal function of the brain, and depending on the severity, can have long lasting effects on anyone who experiences on. Common concussion symptoms include: headache, feeling slowed down, difficulty concentrating or focusing, dizziness, balance problems/loss of balance, fatigue/loss of energy, feeling in a fog, irritability, drowsiness, nausea, memory loss, sensitivity to light/noise, and blurred vision.

IMPORTANT: A concussion can occur without being "knocked out" or unconscious; getting your "bell rung" or "clearing the cobwebs" is a concussion.

Given the definition above, have you ever had a concussion from duty-related activities?

- ○ No (1)
- ○ Yes (2)

Q45 How many concussions have you had?

_____

Q46 How many of these concussions did you report to a medical professional (physician, physician assistant, nurse practitioner, physical therapist, or athletic trainer) or leadership at the time of injury?

_____

Q47 Please feel free to provide additional information regarding your experience reporting concussive symptoms:

_____

End of Block: Default Question Block