Myths and Misconceptions of Traumatic Brain Injuries Among High School Learners and University Students in South Africa.

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ABSTRACT

Traumatic Brain Injury (TBI) is a major cause of disability and death around the world with an annual worldwide prevalence rate ranging from 369 per 100 000 people (James et al., 2019). TBI is specifically more concerning in adolescents and young adults as rates of injuries acquired during this period are similar to adult rates, but with more far-reaching effects, especially in low and middle-income countries (Dewan et al., 2016). TBI has significant long-term effects (e.g., cognitive, behavioural, social) on adolescents and young adults, which are compounded in low and middle income countries (LMICs) like South Africa. However, myths and misconceptions regarding TBI and associated outcomes often cloud the understanding thereof and contribute to poor help-seeking behaviours post-TBI. Poor help-seeking behaviours post-TBI can impact TBI recovery and result in even worse impairments if appropriate help is not sought. This study aimed to describe and compare myths and misconceptions about head injuries or traumatic brain injuries (HI/TBI), including concussions, for high school learners (with/without HI/TBI) and university students (with/without HI/TBI). In terms of misconceptions, students (*n=393*) scored significantly higher on HI/TBI and concussion knowledge, compared to learners (*n=80*). Regression analyses showed that adolescence (learners) vs young adulthood (students) was a significant predictor of myths and misconceptions regarding TBI/HI; F (44, 369) = 3.32, $p < .001$; but not for concussion knowledge and attitudes; F (44, 369) = 1.10, p =.31 and F (44, 369) = .725, p =.904. Understanding what high school learners know and how this differs from university students' knowledge about TBI will help inform interventions tailored to adolescents and young adults – which is needed as they are a vulnerable population group.

Myths and Misconceptions of Traumatic Brain Injuries Among High School Learners and University Students in South Africa.

Although awareness about brain injuries and associated consequences in the general public has improved over the last decade, there are still many myths and misconceptions held by the general public regarding these injuries. This is cause for concern as traumatic brain injury (TBI) is a global health concern that is a major cause of disability and death worldwide, and is especially more prevalent in low- and middle-income countries (LMICs), where there are limited resource availability and medical care (Jones et al., 2016; Schrieff-Elson et al., 2017). Annually, over 10 million people are affected across a range of severities with consequent sequelae. TBIs have a worldwide prevalence rate ranging between 47 and 618 per 100 000 people (Feigin et al., 2013; Hyder et al., 2007; James et al., 2019; Jones et al., 2016).

The higher prevalence of TBIs in LMICs is accounted for, at least in part, by high rates of specific mechanisms of injuries. For example, in South Africa, large percentages of pedestrians sustain TBIs in pedestrian-vehicle accidents (Naidoo, 2013). The increased probability of higher incidences of TBIs in a country like South Africa, specifically, is problematic as TBIs have significant long-term effects (such as disability) on the world's population. Of the world's population, adolescents, young adults, and the elderly are more at risk of sustaining TBIs (Dewan et al., 2016). Adolescents (15-18 years old) and young adults (19-25 years old) are at high risk for TBIs due to them engaging in high-risk behaviours, as during this stage of development, their executive functioning has not yet fully matured (Kennedy et al., 2017). Specifically, adolescents are still undergoing physical and cognitive development and are therefore more vulnerable to injuries of a long-lasting nature. Apart from experiencing physical injuries, post-TBI effects amongst adolescents and young adults include cognitive, behavioural, academic, psychiatric, and psychosocial sequelae.

Despite poor outcomes and high prevalence rates, many adolescents and young adults still do not seek medical help following TBIs of varying severities, but especially after milder forms of such injuries (including concussions) (Dewan et al., 2016; Pretorius & Broodryk, 2013; Viljoen, 2016). Much of the problem regarding not seeking medical help or incorrect recovery behaviours may emanate from lack of, or misinformation, poor advice about TBI management, and misconceptions regarding TBIs and head injuries in general. Further, adolescents and young adults may not believe they have an injury or they do not want to miss out on any activities and

they often return to playing sports or recreational activities (common mechanisms of injury) before they have fully recovered from their injuries (Pretorius & Broodryk, 2013). Less recovery time is problematic, as even mild TBIs (mTBI) can have far-reaching effects on the brain and bodily functioning (Corrigan et al., 2010).

Misconceptions are ideas that may result in people incorrectly understanding objects, events, and ideas. Such misconceptions are often described as an incorrect myth or belief about a construct (Thompson & Logue, 2006). Large quantities of the population have incorrect beliefs or misconceptions about what is classified as a TBI as well as the associated symptoms and treatment, which can result in incorrect or maladaptive help-seeking behaviours (Gouvier et al., 1988; Pretorius & Broodryk, 2013). If cognitively developed adults struggle with these misconceptions, one might conjecture that adolescents and young adults, who may be even less knowledgeable or aware of injuries, might have more misconceptions that are not easily addressed by their caregivers or teachers.

Therefore, this study will investigate myths and misconceptions among high school learners (adolescents) compared to that of university students (young adults). In doing so, I will review the definition and common mechanisms of TBI, including definitional inconsistencies, which appear to contribute to misinformation and misconceptions of TBI. I will also review other misconceptions and misinformation about TBIs in general and more specifically, misconceptions surrounding concussion, the factors contributing to it, and its effect on help-seeking behaviours following TBI.

Literature Review

Definition of TBI (including concussion)

There is no universal definition of TBI that spans all healthcare disciplines in LMICs, despite the high prevalence rates of TBIs in LMICs. Neurologists, neuropsychologists, and psychiatrists use different definitions and criteria that are specific to their field (McClure, 2011). TBI is a craniocerebral trauma. It is often described as a brain injury that occurs due to an external blunt or penetrating force to the head that results in functional impairment and affects a person's consciousness (Jones et al., 2016; McClure, 2011; Oosthuizen, 2010). TBI is associated with any of these occurrences: decreased levels of consciousness, amnesia, skull fractures,

diagnosed intracranial lesions, neurologic or neuropsychological abnormalities, and, or, death (Corrigan et al., 2010).

Although there are specific definitions reported for TBI, the terms TBIs, and head injuries are often used interchangeably by the general public but also sometimes in literature. However, relative to the definition of TBI above, head injuries involve no trauma to the brain, but rather involves trauma to the head, scalp, or skull (Bruns & Hauser, 2003). Head injuries (HI) may or may not include TBIs. Notwithstanding this distinction, because of the interchangeable use of the terms in some literature and for some questionnaires about TBI (including the one used in the current study), I will refer to both TBIs and HIs (TBI/HI) in this dissertation.

Generally, HI/TBIs are classified on a continuum of severity ranging from mild, to moderate to severe. The level of severity is commonly calculated using the Glasgow Coma Scale (GCS) (a score out of 15 based on motor, verbal and eye-opening responses); the lower the score, the more severe the TBI (Nguyen et al., 2016; Risdall & Menon, 2011). GCS scores of 8 or less are classified as severe TBIs and scores of 13-15, as mild. Brain scans can also be used in diagnosing TBI severity.

Although many injuries may be classified as mild in nature, many mild injuries can still be a major cause of brain damage, especially in the case of complicated injuries. MTBIs are injuries to the skull that arise from blunt or penetrating force to the head that results in one or more of the following: periods of confusion or disorientation, memory dysfunction around the time of the injury, loss of consciousness which lasts less than 30 minutes or observed symptoms of neurological and/or neuropsychological dysfunction (Corrigan et al., 2010; McKinlay et al., 2011; McKinlay et al., 2008). Concussions form part of the spectrum of mTBIs and are an injury characterized by a sudden alteration in consciousness induced by biomechanical forces transmitted to the brain. Symptoms of a concussion include headaches, irritability, difficulty in concentrating, loss of consciousness, and nausea, with resolution over time (Delahunty et al., 2015; Kroshus et al., 2015). There are different mechanisms of injury that may give rise to these symptoms and sequelae across the spectrum of severity.

Epidemiology of TBI

Globally, previous data have indicated that almost 60% of TBIs worldwide are due to motor vehicle accidents (MVAs), while 20-30% are due to falls, 10% is due to violence and approximately 10% are due to workplace, sports, and recreational activities (Hyder et al., 2007).

In the United States, the main causes of TBIs are MVAs, assault, violence, sports activities, and falls (Baldwin et al., 2016; Langlois et al., 2006; Oosthuizen, 2010). Specific statistics around the mechanisms of TBI are generally difficult to pinpoint in South Africa as the country does not have an up-to-date databank of TBIs (Naidoo, 2013). However, the available data suggests that MVAs are more common in LMICs compared to higher-income countries (HIC) where falls are more common (Li et al., 2016; Naidoo, 2013; Schrieff et al., 2013).

Leading mechanisms of TBI in the US tend to vary with age, with all ages commonly sustaining TBIs through MVAs, falls, and violence (Dewan et al., 2016). MVAs (where children were passengers or pedestrians) and falls have also been reported as leading mechanisms of injury for South African adolescents and young adults (Babikian et al., 2015; Schrieff et al., 2013). However, a recent unpublished study using a university sample in South Africa found that most self-reported TBIs were sustained during a sports or recreational activity (the most common mechanism of concussion) and secondly by experiencing a fall, which has previously been considered as being more prominent in HICs (Mazriel & Moodley, 2017). These differences in mechanisms in these studies can be attributed to differences in the study samples (i.e., university samples vs. general population) as well as to the differences in socioeconomic factors in different countries (i.e., US being a developed vs SA being a developing world country; (Babikian et al., 2015; Guilmette & Paglia, 2004a; Mazriel & Moodley, 2017; Pretorius & Broodryk, 2013). Although the causes seem to differ by country and income, all mechanisms of injury are associated with a range of cognitive (e.g., memory problems), behavioural (e.g., disinhibition), emotional (e.g., irritability), and social (e.g., difficulty in interpreting social cues) sequelae (Babikian et al., 2015).

TBIs are the most common acquired brain injury among adolescents and young adults, globally. Adolescent and young adult TBIs resulting in hospital visits amount to 100-600 per 100 000 of the population per year worldwide (Dewan et al., 2016; McKinlay et al., 2008; Thurman, 2016). This is worrying as the adolescent and young adult rates of TBI account for almost half the global incidences (Thurman, 2016). These rates are concerning as adolescents and young adults are naturally vulnerable groups for illnesses and injuries due to the ongoing developing states of their brain and body (Thurman, 2016). Besides the ongoing brain development, adolescents and young adults are also considered to be a vulnerable population because they go through a phase of rapid physical, sexual, social, and emotional change (Thurman, 2016). Brain

injuries at a young age may impair the maturation of brain systems, such as executive functions, which are critical to complex integrated thought and action (Ciccia et al., 2009; Tierney & Nelson III, 2009). These injuries could also manifest as a slowing in later stages of cognition, social, and motor development beyond a year after brain injury and as other long-term cognitive deficits such as poorer memory functions (Cook et al., 2014). For adolescents, these cognitive deficits can result in poor school performance and behavioural and social dysfunction. For young adults, these deficits can affect their ability to earn an income, alienate family structures, and reduces the individual's standing in society (Eigsti et al., 2006).

TBI incidence rates for US samples including children, adolescents, and young adults have been reported as 12.2% of a sample of 29 832 participants, and 1.10-2.36 per 100 per year, with an overall prevalence rate of approximately 30% (Livingston et al., 2017; McKinlay et al., 2008). However, these incidence rates often refer to TBIs across the severity spectrum, rather than specific severity groupings. Specifically, mild TBIs often go unreported due to individuals' underestimating the effects of the injury (Corrigan et al., 2010; Hyder et al., 2007).

Despite concussions being considered a mild brain injury, concussions are sometimes thought to be most concerning within that category of TBI severity, as 1.6-3.8 million concussions occur annually just in the US (Dewan et al., 2016). Approximately 50-75% of concussions are unreported amongst adolescents and young adults (Rosenbaum & Arnett, 2010). Adolescents and young adults are also more vulnerable to second impact syndrome and exhibit prolonged recovery periods when compared to adults (Manasse-Cohick & Shapley, 2014; Sullivan et al., 2017). Second impact syndrome occurs when a second blow to the head is sustained before the effects of the first concussion have worn off and may be fatal (May et al., 2017). This is a result of adolescents and young adults being more at risk for sustaining a concussion while not often being aware of the fact that they have already sustained an injury (Manasse-Cohick & Shapley, 2014).

Despite adolescents and young adults being a high-risk group for TBIs, there are very few studies published on adolescent TBI, especially in LMICs such as South Africa. However, there is equally very little published on young adult TBIs specifically as literature concerning this population is often limited or included in adult population data. Furthermore, due to the invisible nature of TBIs and the fact that countries like South Africa do not have a lot of

resources to dedicate towards nationwide prevalence studies, there is little to no information regarding TBI incidence rates for adolescents and young adults.

Among the few studies that have been published on TBI incidence rates, the latest data available from the National Health Laboratory Service (2011) in South Africa reported that 89 000 out of 51.73 million people were affected by TBIs. Although some local studies have reported on admission rates for TBI to the only local dedicated pediatric hospital in the country for children (Schrieff et al., 2013), there are no recent reported incidence rates for the population, let alone for adolescents and young adults, in South Africa.

Studies do however suggest that the prevalence of TBI is higher in LMICs vs. HICs. Higher prevalence rates in LMICs seems likely as one study conducted in South Africa almost two decades ago reported an incidence rate in the middle range of 47-618 per 100 000 (i.e., 316 per 100 000) people, while HICs had incidence rates on the lower end of the range (i.e. 167 per 100 000) (Hyder et al., 2007; Nell & Brown, 1991). A recent estimate suggests that TBI incidences in LMICs are 3 times greater than those of HICs (Dewan et al., 2016). Additionally, there is also a huge economic burden associated with TBI, as equipment needed for diagnosis and treatment can be quite costly. Further, time off work and the often impacted life trajectories also contribute to the economic costs associated with TBI. These economic effects would be more pronounced in LMICs where resources, such as funding and necessary specialists, are more limited (Fu et al., 2016). Besides the challenges around updated incidence rates, there are also difficulties around diagnosing TBIs in adolescents and young adults.

Diagnoses and definitional inconsistencies in adolescents and young adults

Misattribution of Symptoms

Although HI/TBIs are more pronounced in LMICs, the injury sequelae are often difficult to diagnose compared to HICs, as medical care is not as easily available or accessible for all. This is made more difficult for adolescents as some of the effects of TBIs are more subtle, especially when dealing with mTBIs. Even with using brain scans and the GCS to classify mTBIs particularly, some cases are misdiagnosed or underdiagnosed (Langlois et al., 2006). This underdiagnosing or misdiagnosing seems to be highly problematic in adolescents where their post-HI/TBI symptoms (such as irritability) are can often be attributed to their ongoing development and maturation (puberty) (McClure, 2011). Young adults' symptoms can also be

attributed to their ongoing maturation processes, however, their cases are explained by the fact that they are transitioning from adolescence to adulthood.

Many behaviours resulting from a HI/TBI may also be attributed to personality. For example, some adolescents may become more withdrawn after a HI/TBI, and this withdrawn behaviour is often attributed to someone being introverted or shy. Such post-HI/TBI behaviours may also be attributed to coming of age stereotypes (younger adults and adolescents are seen as more risk-prone and therefore if they experience disinhibition as a symptom of a HI/TBI, it is discounted as being part of them going through puberty) or stereotypes related to sex (e.g., males are considered more likely to play rough therefore if they sustain injuries as a result; the injury is often discounted if it does not show serious physical signs; (Eigsti et al., 2006; Kirkwood et al., 2008; Kroshus et al., 2015; McRae et al., 2012)). These misattributions make any misinformation problematic as symptoms are often ignored and could therefore be left to worsen. Ignoring symptoms can impact the accurateness of a diagnosis of HI/TBIs as important symptoms often display themselves at the time of injury. The reason that reporting HI/TBIs early on is important is that symptoms of mTBI could easily be missed as they usually appear within the first few hours following the brain trauma and for most individuals, dissipate relatively quickly when compared to more severe forms of TBI (Corrigan et al., 2010; Hyder et al., 2007). Therefore, many non-brain specialists, friends, and family members do not understand or take note of these behaviours, which may be related to the HI/TBI diagnoses. Due to the various misattributions of mTBI in adolescence and young adults, this injury is especially prone to misdiagnosis.

McClure (2011) also mentioned that although research has shown that visible markers of physical disability lead to an individual experiencing prejudice and stigmatization, invisible markers of disability may be worse. Because one is expected to be fully recovered, any after-effects of the injury are discounted as part of an individual's personality, which results in the injured person's needs being dismissed. This attribution of injury is even more concerning in adolescents and young adults. Often the debilitating effects of HI/TBIs may only be noticed at the later stages of injury due to delayed help-seeking behaviours or the misattribution of symptoms. Therefore, the invisibility of the injury combined with friends and family not understanding the nature of TBI and its disparate recovery process can contribute to adolescents

and young adults struggling when trying to reenter school, community, and family settings (Hooper, 2006).

Definitional Inconsistencies

With inconsistencies in definitions for HI/TBI in mind, the initial diagnosis of the TBI is important, as a correct capturing of initial symptoms can aid in the identification of symptoms that need to be monitored over time. However, if universal definitions are not put in place, many initial symptoms will not be considered relevant to the diagnosis (Corrigan et al., 2010; Hyder et al., 2007), which will impact the information that family members and friends have regarding TBI and its recovery.

Nguyen et al. (2016) conducted a systematic review on the incidence of TBI which showed that epidemiological data varies among different studies due to the varying and sometimes vague definitions of TBI across studies. As noted above, HI, TBI, mTBI, and concussion are terms that are often used interchangeably in TBI research. Definitional inconsistencies are also evident for mTBIs (including concussions; Cassidy et al., 2004; Ruff & Jamora, 2009). Although 70-80% of adolescent and young adult TBIs are classified as mild, mTBIs are still vastly different from HIs (Hooper, 2006). This lack of differentiating between injuries has implications for both the diagnosis and treatment thereof. I have however explained the use of HI/TBI for the current thesis.

Additionally, although definitions of concussion discuss the injury as resulting from a blow to the head – therefore classified as a TBI, the classification of this injury as being mild has come into question as a concussion do not always include a loss of consciousness, but rather requires at least one of several symptoms to be present (Halstead & Walter, 2010; Mayer et al., 2017; Sharp & Jenkins, 2015). For the purpose of this study, a concussion is discussed as being part of the mTBI classification. These limitations regarding mTBI diagnoses may result in many individuals who sustain such injuries going misdiagnosed and untreated.

Implications of Misinformation

Apart from dealing with the actual impairment, adolescents and young adults face unrealistic recovery expectations from friends and family, which places undue pressure on patients who have sustained a TBI, as their loved ones expect them to fully recover when they are still struggling to adjust to their impaired functioning (Gouvier et al., 1988; McClure, 2011; Mokhosi & Grieve, 2004; Pretorius & Broodryk, 2013). These unrealistic expectations stem

from the fact that some symptoms of TBI are 'invisible' (e.g., patients are slower in thinking and responding), which results in family and friends believing that the patient has fully recovered. This belief can often cause patients to adjust poorly when integrating back into school or work environments as well as within family and friend circles (Cook et al., 2014; Manasse-Cohick & Shapley, 2014; Melchers et al., 1999). Additionally, due to misinformation and misconceptions regarding TBI, family, and friends may not understand the severity of the injury and may therefore expect individuals to return to their pre-injury state. These misconceptions may result in negative after-effects for the individuals as they may often feel pressured to 'get better'. Some after-effects include becoming depressed as a result of their presumed delayed recovery relative to the quick month or two recovery period, which is portrayed in the media (Gouvier et al., 1988; Mokhosi & Grieve, 2004).

Misinformation about TBI could also result in individuals engaging in activities that could worsen their prognosis and recovery (Mokhosi & Grieve, 2004; Oosthuizen, 2010; Pretorius & Broodryk, 2013). For example, an adolescent with an untreated mTBI could be going back home to perform their familial duties (such as cleaning) without knowing enough about the potential impact of their previous TBI. Therefore, while cleaning, the adolescent may receive a light knock to the head that may worsen the severity of their TBI by worsening the post-injury condition. Hence, misinformation and poor knowledge surrounding beliefs about TBI can often result in severe repercussions that can further affect functioning.

Misconceptions and misinformation

Misconceptions and misinformation regarding TBI

Misattributions and lack of knowledge of TBI can contribute to misconceptions regarding the injury and recovery of adolescents who are dependent on parents and guardians for care after sustaining a TBI. Several studies have investigated such misconceptions about TBIs generally. However, there have been no studies that have investigated the myths and misconceptions that are held by adolescents in South Africa and only two studies that looked at young adults.

Global studies have found that some of these general misconceptions revolve around amnesia, recovery, and post-injury symptoms of TBI (Gouvier et al., 1988; Hooper, 2006; McClure, 2011). The Gouvier and colleagues (1988) study was a landmark study in this area of research. They found that 221 individuals from the general public of South Louisiana, held significant misconceptions with regards to amnesia, unconsciousness, and recovery. For

example, participants in that study believed that once patients awoke from a coma they would be normally responsive and that a second blow to the head could restore a patient's lost memories. However, this is incorrect as patients emerging from a TBI-related coma are often disorientated and can have short-term memory loss aside from the possible long-term effects (Gouvier et al., 1988; McClure, 2011; Pretorius & Broodryk, 2013). Most of the participants also believed that recovery was the responsibility of the patient and that a full recovery even from severe TBI was possible which is incorrect as patients seldom recover completely (Gouvier et al., 1988; Hooper, 2006; Pretorius & Broodryk, 2013). Willer et al. (1993), and Guilmette and Paglia (2004b), found similar misconceptions regarding TBI using an adapted version of the Gouvier et al. (1988) survey. One of the most concerning misconceptions for the adults in that study was that they believed that people who sustained a severe TBI would only experience temporary cognitive deficits (Chapman & Hudson, 2010).

In two related studies by Pretorius and Broodryk (2013) and Mazriel and Moodley (2017), both using a younger sample - university students – in South Africa; both studies found that their participants held similar misconceptions about TBI and recovery to the participants in the Gouvier et al. (1988) study. Categories of questions that were most incorrectly answered surrounded amnesia, recovery, and unconsciousness.

Besides adults and young adults, researchers have found that non-specialist medical practitioners, educators, and patient family members also hold misconceptions about TBI and associated recovery (Ernst et al., 2009; Swift & Wilson, 2001; Yuhasz, 2013). Studies have found that family members who look after patients who have sustained a TBI report similar misconceptions to that of the general population (Chapman & Hudson, 2010; Springer et al., 1997). Apart from family members of patients, school psychologists (Hooper, 2006), nursing students (Ernst et al., 2009), and rehabilitation staff and adolescent educators (Farmer & Johnson-Gerard, 1997) also hold similar misconceptions. One of the common misbeliefs held among health care professionals, for example, was that patients with mTBI had a set recovery period with complete recovery thereafter (Pretorius & Broodryk, 2013). However, even with mTBI and concussions, the recovery trajectory varies from patient to patient, and some effects, such as disorientation or confusion, can persist for weeks after physical evidence of trauma has healed (e.g., head gashes; (Alexander et al., 2009; Hooper, 2006; McClure, 2011; Pretorius & Broodryk, 2013)).

Healthcare professionals and educators play an important role in the recovery of patients with TBI, as well as in informing adolescents and their families about the rehabilitation process. Hence, having healthcare professionals and educators who do not know the full extent of a patient's injury and who do not understand the recovery trajectory, can result in incorrect information being communicated to their friends and family, which can hinder the patient's recovery (Alexander et al., 2009; Pretorius & Broodryk, 2013). Difficulties in understanding or being misinformed about TBI-related symptoms and recovery can impact how patients view their injuries and consequently their help-seeking behaviours post-injury. For example, many patients do not appreciate that even mTBI can result in post-injury symptomatology, because such a slight knock to the head *should* not cause them any harm and they, therefore, *should* not need to seek medical intervention (Pretorius & Broodryk, 2013). However, even mild TBIs, including concussions, can have far-reaching effects on an individual's daily functioning.

Myths and misconceptions regarding concussion

Although some of the abovementioned studies are local ones (e.g., Mazriel & Moodley, 2017; Pretorius & Broodryk, 2013), as noted, none have investigated myths and misconceptions of TBI generally among adolescents. There have, however, been a few studies conducted on young adults and their misconceptions regarding concussion, specifically, as opposed to TBI more generally. The most common survey used to investigate misconceptions regarding concussions is the Rosenbaum and Arnett (2010)'s Concussion Knowledge and Attitudes survey – Student version (RoCKAS).

Rosenbaum and Arnett (2010) validated their survey on high school students in the USA. The study found that athletes do seem to have concussion knowledge, but experience safe attitude deficiencies. Unsafe attitudes refer to incorrect concussion management in terms of behaviour. Sullivan et al. (2017), however, found concussion knowledge to be lacking, but that concussion attitudes were relatively safe. Additionally, Livingston and Ingersoll (2004) previously found that college athletes had misconceptions regarding knowledge and attitudes about return-to-play guidelines, post-concussive symptoms, concussion vulnerability, and mechanisms of injury. A later study showed that high school learners had similar misconceptions to college athletes (Sye et al., 2006). These similarities in misconceptions are interesting as adolescents and young adults are at two different developmental stages with similar misconceptions. One would expect young adults to have fewer misconceptions than adolescents,

as adults are meant to have more knowledge than adolescents due to the fact that adults would have more years to gain knowledge, common sense, and experience (Sturman et al., 2010), but not all studies, as described above, show this trend.

A Gaelic study (Sullivan et al., 2017) by the Gaelic Athletic Association found similar results to Livingston and Ingersoll (2004) and Sye et al. (2006) in terms of concussion knowledge and attitudes. The study found that 54% of young athletes (aged 13-25 years old) who were surveyed, reported being concussed while one in four athletes continued to play while knowingly being concussed. After employing the RoCKAS, researchers found misconceptions and a lack of knowledge regarding how to detect concussions, the importance of reporting concussions to the appropriate channels, as well as the potential risks associated with multiple concussions. Interestingly, this study also found that females had significantly higher concussion knowledge scores and that males were more likely than females to continue playing while concussed. Female athletes were also more likely to report concussions, however, there is uncertainty as to whether this was due to higher knowledge scores or reported tendencies of male athletes to avoid reporting injuries (Sullivan et al., 2017). However, the above studies were conducted in the US and Scotland which are classified as HICs. They also grouped adolescents and young adults in one group.

A similar study done locally by Viljoen (2016) found that at least 40% of South African rugby players aged 14 to over 21 years had unsafe attitudes regarding concussion and return-to-play knowledge. Specifically, adolescents reported that it was fine to return to a sport immediately after a blow to the head if the person did not experience any immediate symptoms. This is incorrect as this tactic may worsen a mild injury – individuals are advised to stop all activity and not return to play on that day (McCrory et al., 2017). This misunderstanding of concussion knowledge and attitudes can also be problematic as incorrect concussion knowledge has been found to result in under-reporting of concussion symptoms in school or university sports (Register-Mihalik et al., 2013). This under-reporting can often be attributed to not understanding the seriousness of concussions as well as not wanting to let team members down in school and university sports. However, incorrect reporting of concussions may impact the recovery of cognitive, social, and physical functioning.

The studies discussed above illustrate that misconceptions about TBI appear widespread. However, the samples used in these studies were mainly older populations from the United

States of America (Gouvier et al., 1988; Guilmette & Paglia, 2004b) and Canada (Willer et al., 1993), with only two local studies being carried out by Pretorius and Broodryk (2013) and Viljoen (2016). Therefore, the data generated by these international studies cannot be fully generalized to other contexts, such as to South Africa, with it being classified as an LMIC as adolescents and young adults in LMICs often face different stressors, such as different socioeconomic climates, different cultural norms and differing access to information than adolescents and young adults in HICs. More local studies are needed to understand if the few local studies conducted hold true for the general population.

Demographic predictors of HI/TBI

In terms of demographic factors (e.g., sex and age) and their impact on understanding HI/TBI and the resulting help-seeking behaviours, research is limited locally and globally, specifically for adolescents and young adults. Hux et al. (2006) show that there are sex differences in some misconception knowledge where males performed significantly better on four items (two brain injury items and two recovery items), while females only performed significantly better on two items (recovery items), while McClure (2011) found no sex differences in misconceptions. Sex differences in concussion knowledge and attitudes have been explored in a study by Sullivan et al. (2017) as well as by Nguyen et al. (2016). Both studies found that there were fewer incidences of reported TBIs amongst females as well as females reporting safer attitudes towards TBI and concussion risks. However, there have been no comparisons between sexes among adolescents and young adults surrounding misconceptions. Young adult and adolescent data are often grouped together and considered as one age group with similar characteristics, whereas literature reporting on HI/TBI high-risk groups often cite adolescents and young adults as two different at-risk groups (Dewan et al., 2016).

In sum, differences in how HIs/TBIs are defined, portrayed, and consequently understood can result in misinformation and misconceptions about such injuries, both in terms of severity and recovery trajectories. Hence, providing sufficient knowledge about HIs/TBIs and its long-term effects is important for providing appropriate care. Much of the published literature on this topic stems from studies in HIC with adult populations. However, very little is published on misconceptions of HI/TBI in adolescence and young adulthood from LMIC settings like South Africa. However, there have not been any comparative studies between adolescents and young adults even though maturation processes differ between the two groups. Adolescence is the

developmental period where an individual starts puberty and matures into early adulthood by going through major changes surrounding physical, cognitive, and social development (Johnson et al., 2009). Early/young adulthood, on the other hand, is characteristic of independence from social roles and responsibilities that are a result of more decision-making power as a result of the final stages of brain maturation (Hochberg & Konner, 2019). More studies on these topics are needed to identify groups in which misconceptions are rife, in a South African context specifically, which could inform relevant help-seeking practices and associated interventions.

Research Aims & Questions

The aim of this study was to better understand what myths and misconceptions adolescents and young adults have regarding HI/TBI (including concussions). This study also aimed to discover which demographic predictors contribute to these myths and misconceptions which may influence their help-seeking behaviour after sustaining a HI/TBI, which results in them being knocked out, experiencing memory loss, and/or being dazed and confused. Further, this study aimed to describe and compare myths and misconceptions about HI/TBI including concussions for HS learners (with/without HI) and university students (with/without HI). This study is exploratory and therefore I did not put forward any specific hypotheses.

Methods

Design and setting

The current study is positioned within a larger research project from the Texas State University with Prof Paul Jantz, the aims of which are consistent with it. The current study made use of a quantitative exploratory research design (Blanche et al., 2006), which compared TBI and concussion misconceptions between high school learners and university students.

The current study looked at the differences in these misconceptions amongst University of Cape Town (UCT) Psychology first-year students and Grade 10 and 11 learners from high schools surrounding UCT. Learners will be used to refer to high school goers, while students will refer to those who attended university. The university data was collected through an online survey while the high school information was gathered using a pen and paper version of the same survey. Most high schools did not have computer facilities that would support learners completing online surveys for data collection and those that did have computers available could

not accommodate all the learners in one sitting. Therefore, a pen and paper administration was less disruptive to the school learning environment, as it could be administered to all learners participating in the study, in one sitting. Both surveys (see Appendix A) were structured, i.e., the majority of the questions asked were closed-ended and standardized, and anonymous.

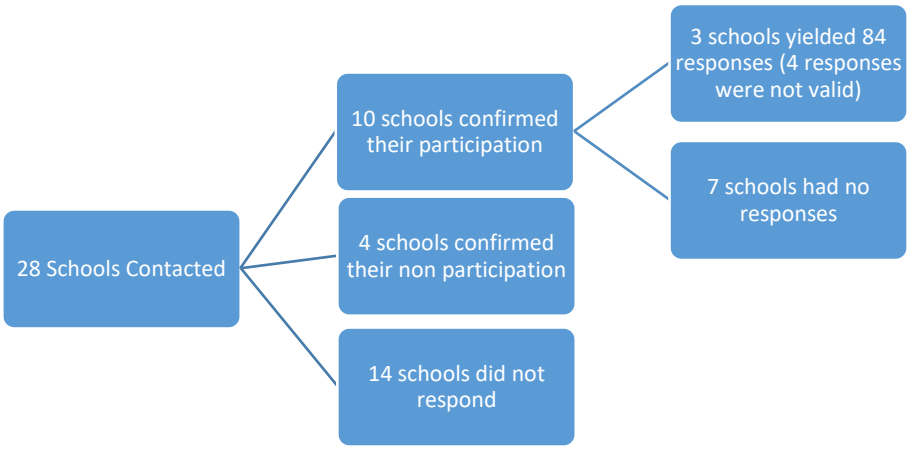
Participants

Learner Sample

A list of 28 English-speaking schools in the Southern Suburbs in Cape Town was compiled and contacted. The attrition diagram for the schools contacted can be seen in Figure 1. Out of an initial 28 schools, 35.71% (*n*=10) of these schools confirmed their participation, while only 30% (*n*=3) of the confirmed schools yielded survey responses from school learners. Of the school learners who had parental consent to participate in the study (*n*=113), only 74.34% of learners completed the survey with 4.76% of the completed responses having to be discarded as these learners completed the survey, but did not assent to the study.

Figure 1

Explanation of School Participation Attrition



Recruitment. All grade 10 and 11 learners at these three high schools in the Southern Suburbs of Cape Town (*N* =80) were invited to participate in this study using convenience sampling techniques. Participants were of both sexes (all schools were co-educational), fluent in English, and between 15 and 18 years old. Recruitment was done by asking the schools to inform learners of the study as well as to send the consent form (Appendix B) to the parents asking for their consent to their children's participation. Those learners who returned signed consent forms

from their parents were asked to assent to the study. Assent forms (Appendix C) were included along with the questionnaires learners received.

Inclusion and exclusion criteria. The study sample was restricted to Grade 10 and 11 students at English-speaking high schools in the Southern Suburbs of Cape Town, which spans from Salt River to Retreat according to the Western Cape Zoning Map (http://emap.capetown.gov.za/EGISPbdm/). The current study is an extension of an Honours research project (Mazriel & Moodley, 2017) which looked at misconceptions among first-year university students. The results showed some misconceptions surrounding TBIs in that study. For the current study, I thought that tracing these misconceptions a step back, within a younger sample would be useful in understanding TBI misconceptions and whether these are even more present in a younger sample. One step back would ideally be looking at the misconceptions amongst grade 12 learners. However, grade 12 learners had to be excluded because they were experiencing stressful examination periods. This resulted in the current study surveying grade 10 and 11 learners.

Student Sample

Participants in the university sample were recruited as part of the Honours research project data collection in 2017 (Mazriel & Moodley, 2017). A group of 393 first-year psychology students at the University of Cape Town (UCT) participated in the study. Participants were older than 18, of both sexes, and fluent in English.

Recruitment. The university study recruited participants by circulating an advertisement (see Appendix D) to first-year psychology students using the UCT Department of Psychology's Student Research Participation Programme (SRPP). Researchers registered in the department may use this program to recruit participants for their research studies. Undergraduate students registered for psychology courses at UCT are required to participate in research studies to earn SRPP points. These points are awarded as part of their duly performed certificate (DP), which allows students to write the final course exam.

Inclusion and exclusion criteria. The university study sample was restricted to students 18 years or older who were enrolled in first-year psychology courses at UCT in 2017. This sample was easily accessible and it was assumed that most students would not have had in-depth course content focused on brain injuries yet, as it was an introductory psychology course.

Measures

Both the university and high school study made use of an adapted survey. The survey asked about the etiology, symptomology, and treatment of the HI/TBIs as well as myths and misconceptions of TBIs and concussions. Two (adapted) self-report measures were incorporated into the survey, the general aim of which was to investigate myths and misconceptions regarding TBIs and concussions. The survey was also shortened to ensure that participants easily understood the questions and did not get fatigued. For example, multiple questions asking about the same instances were condensed (e.g., instead of having someone choose a multiple-choice option and then ask for an open-ended response to check that the participant had correctly understood the question, the open-ended response was removed). The survey (see Appendix A) employed a combination of response formats, including Likert-type scales, dichotomous scales, and open-ended questions. In most cases, the open-ended questions required individuals to elaborate on their responses. The two self-report measures incorporated in this survey, are described below.

A Survey of Common Misconceptions about TBI and Recovery (CM-TBI)

This survey is a commonly used self-report measure, developed to assess the myths and misconceptions individuals hold about TBI and associated help-seeking behaviours. The survey is based on the adaptations made by Linden et al. (2013) to the original survey by Gouvier et al. (1988). It is a 40-item measure with the survey questions grouped into 7 different domains focusing on specific topics which include: prevention, brain damage, brain injury sequelae, unconsciousness, amnesia, recovery, and rehabilitation. There are three to seven items within each domain (Linden et al., 2013).

The items are scored either on a 5-point Likert scale ranging from 1-5 (1 = *Not likely* to 5 = *Very likely*) or a dichotomous scale (e.g. 1 = *True*, 2 = *False*). Participants are also encouraged to provide qualitative feedback in the form of open-ended questions that prompt them to explain their choice of an answer for certain questions where the reasoning for their responses may not be clear or elaboration might be helpful. All 40 misconception items using the dichotomous scale were scored as correct (1) or incorrect (0) with some items requiring reverse scoring. Correct responses were summed to create a total CM-TBI scale where higher scores indicate fewer misconceptions. An initial validation study conducted by Linden et al. (2013) in Northern Ireland, showed that the CM-TBI possessed adequate levels of internal reliability ($\alpha = .75$) while Pappadis et al. (2011) reported a reliability of ($\alpha = .95$).

I made use of an adapted version of the questionnaire. Examples of the adaptations are: United States military-related questions were removed as they are not relevant to the South African context. I also changed some of the words (e.g., all-terrain vehicles and sidewalk) to more commonly used South African words (e.g., 4x4s, and pavement, respectively). For high school learners, an item was added, asking about their current grade. Items 66, 69, 70, 73, 77, 78, and 81 (see Appendix A) were removed to shorten the survey to counter respondent fatigue. These items asked participants to give their reasoning for why or why not in response to them selecting "yes", "no" or "maybe" responses for each response. Instead, an overall question was used for each item that asked participants to "Please explain". Item 208 (Please specify below which sport(s), the duration of your participation, and at what level you play(ed), such as A, B, C team, etc.) was split into 3 questions asking which sports learners played, how long they play sports for, and at what level they played these sports. Afterward, all question items were renumbered numerically so that learners were not confused by the missing question numbers.

Rosenbaum Concussion Knowledge and Attitudes Survey – Student version (RoCKAS-ST)

The original aim of this survey was to record the knowledge and attitudes of high-school students regarding concussions (Rosenbaum & Arnett, 2010). This measure, which uses an assemblage of items from previous TBI/mTBI surveys, has 55 items, divided into 5 sections (Rosenbaum & Arnett, 2010). The survey includes a true/false dichotomous scale as well as a 5-point Likert scale (where 1 = *strongly disagree* and 5 = *strongly agree*). Two total scores comprising the Concussion Attitudes Index (CAI) (range = 1-27) and the Concussion Knowledge Index (CKI) (range = 1-75) are then calculated, where higher scores represent safer attitudes and more knowledge, respectively, regarding concussion.

This measure shows fair to satisfactory test-retest reliability (knowledge items, $r = .67$; attitude items, $r = .79$). Rosenbaum and Arnett (2010) validated this survey and found that internal consistency was adequate ($\alpha = .59$-$.72$).

Procedure

Learner Sample

Once the study received ethical approval from the Department of Psychology's Research Ethics Committee at UCT (ref: PSY2018-029, see Appendix E) as well as from the Western Cape Education Department (ref: 20180614–3312; see Appendix F), an email was initially sent out to four selected schools (the generated list of all 28 schools that met the criteria in the

Southern Suburbs was used and the RAND function in excel was applied to this list where four schools were selected) requesting their participation. The email included the study details, including the aims of the study, what would be expected from learners, and the time commitment involved. Grade 10 and 11 learners were given a consent form for their parents to complete (see Appendix B). However, due to a poor response rate, the study was then opened up to all the schools (the rest of the schools on the generated list) in the Southern Suburbs of Cape Town with the approval of the Western Cape Education Department. The remaining schools on the list were emailed asking if they would like to participate in the study as per Figure 1, with the end result being learners from three schools participating in the study. Consent forms (Appendix B) were sent out to the parents by the schools that agreed to participate. Learners whose parents consented to their participation were given an assent form (see Appendix C) confirming their willingness to participate. At the same time, learners were then handed a pen and paper survey and given time to complete the survey in a classroom setting. Once data collection was completed at the school, participants received a debriefing brochure informing them of TBIs and general misconceptions (see Appendix G). Additionally, after the study was conducted, a random draw competition was run for each school where learners won Cavendish Shopping Mall (Claremont, Cape Town) vouchers. Paper-based surveys were then captured electronically via a Google form which was exported to a Google sheet.

Student Sample

Once ethical approval from the Department of Psychology's Research Ethics Committee at UCT was received (ref: PSY2017-019; see Appendix H), an announcement (see Appendix B) was posted on the UCT SRPP Vula page (UCT's intranet course site) which invited UCT Psychology department students to complete the online survey for SRPP points. Participants completed this survey via a survey link which started with an informed consent form, administered from a Qualtrics platform. Only students who consented to participate in the study could continue with the survey. The survey was run on two different occasions with the survey being available for completion for less than 4 weeks on each occasion and the data was then captured in a Google Sheet. Once a participant completed the survey, they were thanked for their time and directed to a form where they filled in their student numbers for their SRPP points allocation. Lastly, participants were emailed a debriefing form once they completed the study (Appendix I).

Data Analysis

This study made use of the statistical software packages Jamovi (Version 1.2), R Studio (Version 1.1.453), and Microsoft Excel (2016). For all analyses, a significance level of $p < .05$ was used. Statistical assumptions were checked and if the assumptions were not upheld, the necessary corrections were implemented.

Descriptive statistics (*M, SD, %*) for sociodemographic variables for the sample were calculated. Descriptive statistics were then run for TBI symptomology, misconceptions, and concussion knowledge and attitudes items for high school students and then compared to that of university students. Independent sample t-tests and Chi-square tests of contingency were calculated to investigate between-group differences in the two samples so that the data could be compared. Mean differences (high school vs. university) were then calculated for the misconceptions items and tabulated. Lastly, three linear regression analyses were run to look at demographic variables' contributions towards misconceptions in terms of the CM-TBI, CAI, and CKI.

Ethical Considerations

Informed Consent, Assent, and Voluntary Participation

Before any questions were answered, learners completed an assent form (Appendix C) after handing in a consent form (Appendix B) from their parents. Both forms informed participants and their parents of the basic nature of the survey such as the risks and rewards as well as the fact that their answers were confidential and that the publication of results would not include any identifying information. University participants had to complete a consent form (Appendix A) which relayed the same information to participants.

Confidentiality and Anonymity

All information collected from participants was kept confidential. I made use of participant numbers rather than their names in all the data analyses, to ensure anonymity and confidentiality. Any personal information collected was for record-keeping, assignment of SRPP points, and for debriefing purposes. Additionally, all data was stored on a password-protected laptop as well as a locked cabinet that only the researcher and supervisors had access to.

Possible Risks.

For participants who had experienced a TBI, there was a risk that answering the survey questions about previous TBIs could bring up unsettling feelings. Therefore, high school

participants who experienced unsettling feelings were encouraged to contact their school counsellor and if there was no counsellor available, they were advised to seek help from the Western Cape Education Department School Clinic at https://www.westerncape.gov.za/text/2006/7/mh_resource_directory_optimised_fgamieldien.pdf. University students were referred to the university's Student Wellness Centre.

Compensation

High School participants were entered into a lucky draw for their school and stood a chance to win a voucher; R1000 for 1st place, R500 for 2nd place, and R200 for 3rd place. University students received 2 SRPP points.

Debriefing

After the study was run, a debriefing document was distributed to high school participants (Appendix G). For university students, a similar debriefing letter was distributed via email (Appendix I). The relevant contact details of who to contact if they experienced any problems were given to each participant as part of the survey.

Results

Sample Characteristics

The final sample size for the study was *N*=473, of which *n*=80 were learners while *n*=393 were students. Table 1 indicates the key characteristics of the study sample with learner and student groups depicted separately. All participants were between 14 and 44 years old. The learner sample ranged between 14 and 18 years old and students were between 18 and 44 years old. However, the modal age for the total sample was 19, with 83.09% of the total sample being older than 18 years old. Most participants were female (69.77%). The majority of the sample responded to being South African (83.30%) as well as to using Western medicine (60.89%).

Of the total sample, 180 (38.05%) responded that they had previously sustained HI[1]. More females than males responded to having sustained a head injury both for learners and students. Additionally, 199 participants (42.07%) reported playing contact sports. Almost three times as many learners who played contact sports reported sustaining head injuries when

[1] A reminder that the questionnaire used makes reference to HI and not TBI, although the latter is implied

compared to those who did not play contact sports. A similar number of students responded to sustaining a head injury, regardless of whether they played contact sport or not.

Table 2 indicates between-group outcomes for the sample demographics, where contact sports and sex show significant differences ($p<.05$) for learners vs students. More students (77.7%) than learners (22.2%) played contact sports. Females were the majority in both the student (76.6%) and learner (60%) groups. An independent samples t-test also indicated that age was a significant between groups differentiator between learners (M= 15.4; SD=0.75) and students (M=19.4; SD=2,93), $t(453) = -23.9$, 95% CI [-4.40, -3.73], $p <.001$ with a large effect size; $d = -1.51$, where learners were significantly younger, as one might expect.

Table 1

Sociodemographic Characteristics of Learners vs Students(N=473)

Variable	High School (*n*=80)			University (*n*=393)		
	Total *n*	**Head Injury n (%)**	**No Head Injury n (%)**	**Total *n***	**Head Injury n (%)**	**No Head Injury n (%)**
Sex (*N*=447)	75			372		
Male		9 (11.25)	17 (21.25)		46 (11.70)	31 (7.89)
Female		16 (20)	29 (36.25)		93 (23.66)	192 (48.85)
Prefer not to respond		1 (1.25)	3 (3.75)		6 (1.53)	4 (1.02)
HI (*N*=473)	80	29 (36.25)	51 (63.75)	393	151 (38.42)	242 (61.58)
Contact Sport (*N*=344)	73			271		
Yes		19 (23.75)	23 (28.75)		72 (18.32)	75 (19.08)
No		7 (8.75)	26 (32.5)		72 (18.32)	52 (13.23)
Country of Origin (*N*=429)	75			355		
Azania						1 (0.25)
Botswana					1 (0.25)	
France					1 (0.25)	
Germany					1 (0.25)	1 (0.25)
Greek / South African						1 (0.25)
India						1 (0.25)
Kenya						1 (0.25)
Malawi						1 (0.25)
Mauritius					2 (0.51)	2 (0.51)
Namibia						1 (0.25)
Rwanda		0	1 (1.25)			
South African		26 (32.5)	46 (57.5)		130 (33.08)	192 (48.85)
South Korea					2 (0.51)	
Swaziland						1 (0.25)
UK					2 (0.51)	1 (0.25)
USA						2 (0.51)
Zambia						2 (0.51)
Zimbabwe					2 (0.51)	6 (1.53)
Other		1 (1.25)	1 (1.25)		1 (0.25)	
Medical Practices (*N*=439)	67			372		
Western		12 (15.00)	25 (31.25)		97 (24.68)	154 (39.19)
Traditional		1 (1.25)	2 (2.5)		1 (0.25)	4 (1.02)
Homeopathic		2 (2.50)	4 (5)		7 (1.78)	9 (2.29)
Combination		9 (11.25)	11 (13.75)		39 (9.92)	55 (13.99)
Other			1 (1.25)		1 (0.25)	5 (1.27)

Note: Sample sizes are different for each variable as not all participants answered all the questions. All missing data accounted for less than 10% for each variable except for the variables medical practices and contact sport.

Table 2

Between Group Differences Based on Demographic Variables for Learners (*n*=80) *vs Students (n=393)*

Variable	Calculation	Value	df	p	φ_c
Head Injury	χ^2	0.145	1	.703	.02
	N	472			
Contact Sports	χ^2	6.85	1	.009**	.12
	N	446			
Sex	χ^2	9.01	2	.011*	.14
	N	447			
Country	χ^2	16.7	18	.542	.20
	N	430			
Medicine	χ^2	8.54	5	.129	.14
	N	439			

Notes: Statistical significance is indicated by *p < 0.05. **p < 0.01. ***p < 0.001.

Between Group Differences for Sample Characteristics

A two-tailed single-sample *t*-test indicated statistically significant differences between mean CM-TBI scores between learners (*M* = 63; *SD* = 10.3), and students (*M* = 74.6; *SD*=7.95), *t*(471) = -9.551, 95% CI [-14.10, -9.25], *p* <.001 in the sample. The effect size was large, *d* = -1.39. Students performed better on the CM-TBI than learners. The CKI also showed a significant difference between learners (*M* = 58.94; *SD* = 13.01), and students (*M* = 64.26; *SD*=12.54), *t*(471) = -3.44, 95% CI [-8.37, -2.29], *p* <.001 with a moderate effect size *d* = -.42. Students also performed better than learners in terms of their knowledge of concussions. The CAI did not show significant differences between learners (*M* = 75.45; *SD* = 12.64), and students (*M* = 76.15; *SD*=12.25), *t*(471) = -0.456, 95% CI [-0.297, 0.184], *p* =.057 in the sample with a very small effect size *d* = -.06.

Symptoms, Help-Seeking and Mechanisms of Head Injuries

Of the total number of participants who reported sustaining a head injury (*N*=180), on average, 174 (96.67%) participants responded to questions about symptomology and mechanisms of injury. Figure 2 indicates reported symptoms experienced by learners and students as well as whether a medical diagnosis was obtained. Learners (62.1%) and students (80.8%) reported confusion as to the most commonly experienced symptom post head injury. The least frequently reported symptom for both learners (13.8%) and students (13.2%) was

memory loss. However, between 3.4 and 10.3% of learners could not recall their symptoms while for students, this same outcome ranged between 8.6 and 12.6%.

Apart from symptomology, 65.5% of learners sought medical care for their injuries while just over 50% of students sought medical care. Of those 105 participants who sought medical care approximately 50% more learners (38.5%) received medical diagnoses than students (18.9%). Of the learners (*n*=10) who responded to having received a medical diagnosis, 7 (70%) learners had a concussion, 2 (20%) learners had an mTBI, and 1 (10%) learner chose other, without specifying the nature of the injury. Of the student (*N*=29) sample who responded yes to a medical diagnosis, 25 (89%) students had a concussion, 2 (7%) students had an mTBI, and 1 (3.57%) student chose other, adding that they experienced whiplash when asked to specify the nature of the injury.

Figure 2

Reported symptoms and medical help-seeking behaviour of HI/TBI by learners(n=28) vs students (n=151); (N=179)

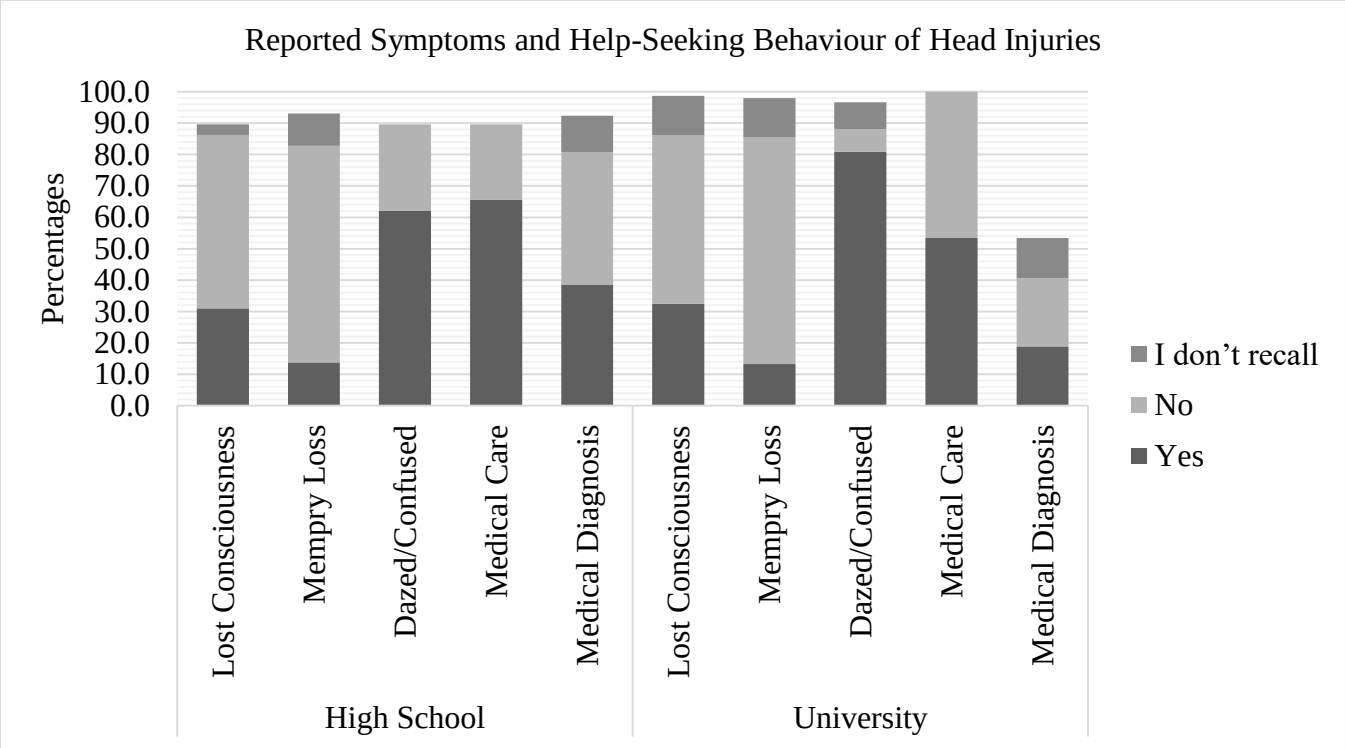
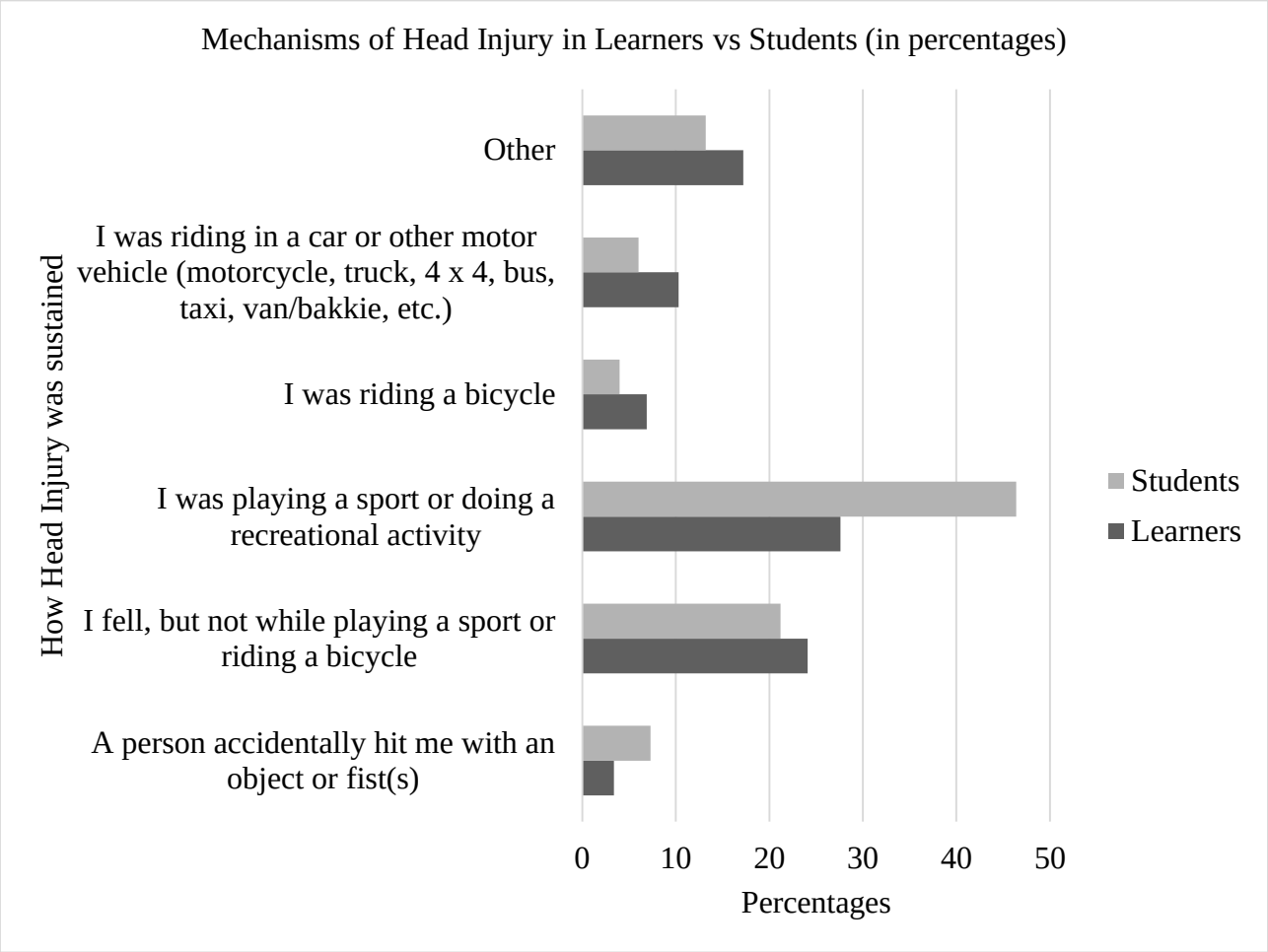


Figure 3 indicates how participants sustained their head injuries. Overall, both students (46.4%) and learners (27.6%) commonly responded to sustaining a head injury by playing sport or being involved in a recreational activity. The least common way in which participants

reported sustaining a head injury for students was through riding a bicycle (4%), while learners (3.4%) were least likely to sustain a head injury through a person accidentally hitting them with an object or fist. Examples of other mechanisms of injury included learners and students walking into objects and hitting their heads or having fainted as a result of other injuries.

Figure 3

Reported mechanisms of Head Injury/Traumatic Brain Injury by learners(n=28) vs students (n=151); (N=179)



Demographic Predictors of the CM-TBI, CKI, and CAI

I used three multiple regression analyses to test if the grouping variable (high school vs university), having reported a head injury or not, age, sex, country, participation in contact sports, and medicinal practices were significant predictors of head injury and concussion knowledge and attitudes amongst learners vs students. All assumptions for the regression models were met.

Linear Regression 1

The predictive value of the head injury, age, sex, country, participation in contact sports, and medicinal practices on the *CM-TBI* was statistically significant, F (44, 369) = 3.32, $p < .001$, where the grouping variable (high school vs university) and sex explained 20% of the model (Table 3). However, in the final model, the beta values suggest that high school vs university was the only significant predictor of the *CM-TBI*.

Table 3

CMTBI: Final Regression Model (N=473)

						95% CI	
Predictor	***B***	**SE**	***t***	***p***	***β***	**Lower**	**Upper**
Intercept [a]	60.38	2.40	25.17	< .001***			
Data:							
University – High School[a]	11.47	1.09	10.56	< .001***	1.20	0.98	1.43
Sex:							
Male – Prefer to not respond[a]	2.84	2.42	1.17	0.24	.30	-0.20	0.80
Female – Prefer to not respond	3.06	2.32	1.32	0.19	.32	-0.16	0.80

Note. CI = confidence interval. Overall R^2 = .283; Overall adjusted R^2 =.198; F (44, 369) = 3.32, *$p < .05$. [a] Represents reference level. Statistical significance is indicated by *p < 0.05. **p < 0.01. ***p < 0.001.

Linear Regression 2

The predictive value of having reported a head injury or not, age, sex, country, participation in contact sports, and medicinal practices on the *Rosenbaum CKI* was not statistically significant, F (44, 369) = 1.10, p =.31, where the variables explained 1% of the model (Table 4). None of the beta values indicate significant coefficients.

Table 4

CKI: Final Regression Model (N=473)

						95% CI	
Predictor	***B***	**SE**	***t***	***p***	***β***	**Lower**	**Upper**
Intercept [a]	53.88	15.18	3.55	< .001			
Data:							
Uni – HS	12.30	6.97	1.76	.08	1.03	-0.12	2.17
Age:							
14 – 1	-8.62	15.04	-0.57	.57	-0.72	-3.19	1.75
15 – 1	0.84	13.95	0.06	.95	0.07	-2.22	2.36
16 – 1	1.26	14.11	0.09	.93	0.12	-2.21	2.42
17 – 1	-2.42	12.85	-0.19	.85	-0.21	-2.31	1.91
18 – 1	-8.54	12.05	-0.71	.48	-0.71	-2.69	1.27
19 – 1	-8.52	12.01	-0.71	.48	-0.71	-2.69	1.26
20 – 1	-6.58	12.07	-0.55	.59	-0.55	-2.53	1.43
21 – 1	-8.93	12.19	-0.73	.46	-0.75	-2.75	1.26
22 – 1	0.15	12.65	0.01	.99	0.01	-2.07	2.09
23 – 1	-9.50	14.72	-0.65	.52	-0.79	-3.21	1.62
24 – 1	-2.29	14.62	-0.16	.88	-0.19	-2.59	2.21
25 – 1	4.97	16.99	0.29	.77	0.42	-2.38	3.21
30 – 1	-4.60	17.05	-0.27	.79	-0.38	-3.19	2.42
34 – 1	-31.61	17.00	-1.86	.06	-2.64	-5.43	0.15
36 – 1	-1.98	17.00	-0.12	.91	-0.17	-2.96	2.63
44 – 1	-6.33	13.80	-0.46	.65	-0.53	-2.80	1.74
HI:							
Yes – No	1.54	1.32	1.17	.24	0.13	-0.09	0.35
Contact Sport:							
No – Yes	0.02	1.30	0.013	.99	0.001	-0.21	0.22
Sex:							
Male – Prefer to not respond	3.21	3.94	0.82	.42	0.27	-0.38	0.92
Female – Prefer to not respond	4.49	3.83	1.17	.24	0.37	-0.25	1.00
Country:							
Rwanda – South Africa	22.61	14.78	1.53	.13	1.89	-0.54	4.32

CKI: Final Regression Model (N=473)

						95% CI	
Predictor	***B***	**SE**	***t***	***p***	***β***	**Lower**	**Upper**
Other – South Africa	5.72	7.30	0.78	.43	0.48	-0.72	1.68
India – South Africa	22.14	12.64	1.75	.081	1.85	-0.23	3.93
USA – South Africa	2.52	8.57	0.29	.77	0.21	-1.20	1.62
Zimbabwe – South Africa	-6.78	4.62	-1.47	.14	-0.57	-1.33	0.19
Swaziland – South Africa	-1.73	12.12	-0.14	.89	-0.15	-2.14	1.85
Zambia – South Africa	4.62	8.74	0.53	.60	0.39	-1.05	1.82
Botswana – South Africa	2.86	12.06	0.24	.81	0.24	-1.74	2.22
Germany – South Africa	-2.83	8.83	-0.32	.75	-0.24	-1.69	1.21
Malawi – South Africa	10.06	12.00	0.84	.40	0.84	-1.13	2.81
South Korea – South Africa	10.97	8.81	1.25	.21	0.92	-0.53	2.36
UK – South Africa	-16.02	6.98	-2.30	.02	-1.34	-2.49	-0.19
Mauritius – South Africa	5.28	6.09	0.87	.39	0.44	-0.56	1.44
France – South Africa	4.83	12.05	0.40	.69	0.40	-1.58	2.38
Greek / South African – South Africa	-11.96	12.04	-0.99	.32	-1.00	-2.98	0.98
Kenya – South Africa	-25.03	12.07	-2.07	.04	-2.09	-4.08	-0.11
Azania – South Africa	2.51	13.09	0.19	.85	0.21	-1.94	2.36
Namibia – South Africa	-4.14	12.20	-0.34	.73	-0.35	-2.35	1.66
Medicine:							
Western medicine – Traditional medicine	1.87	4.98	0.38	.71	0.16	-0.66	0.97
Combinations of these – Traditional medicine	1.67	5.05	0.33	.74	0.14	-0.69	0.97
Homeopathic medicine – Traditional medicine	2.79	5.63	0.50	.62	0.23	-0.70	1.16
Other – Traditional medicine	-4.43	6.96	-0.64	.53	-0.37	-1.51	0.77
Homeopathic – Traditional medicine	-3.16	13.03	-0.24	.81	-0.26	-2.41	1.88

Note. CI = confidence interval. Overall R^2 = .116; Overall adjusted R^2 =.011; F (44, 369) = 1.10, [a] Represents reference level.

Linear Regression 3

The predictive value of having reported a head injury or not, age, sex, country, participation in contact sports and medicinal practices on the *Rosenbaum CAI* was not statistically significant, F (44, 369) = .725, p =.904, where the variables explained .08% of the model (Table 5). None of the beta values indicate significant coefficients.

Table 5

CAI: Final Regression Model (N=473)

						95% CI	
Predictor	***B***	**SE**	***t***	***p***	***β***	**Lower**	**Upper**
Intercept [a]	72.35	13.95	5.19	< .001			
Data:							
Uni – HS	3.23	6.40	0.50	0.61	0.30	-0.87	1.47
Age:							
14 – 1	-1.09	13.82	-0.08	0.94	-0.10	-2.62	2.42
15 – 1	1.17	12.82	0.09	0.93	0.11	-2.23	2.45
16 – 1	-2.41	12.96	-0.19	0.85	-0.22	-2.59	2.14
17 – 1	2.04	11.81	0.17	0.86	0.19	-1.97	2.35
18 – 1	-3.17	11.07	-0.29	0.78	-0.29	-2.32	1.73
19 – 1	-2.09	11.04	-0.19	0.85	-0.19	-2.21	1.82
20 – 1	-2.19	11.09	-0.20	0.84	-0.20	-2.23	1.82
21 – 1	-3.37	11.20	-0.30	0.76	-0.31	-2.36	1.73
22 – 1	-3.39	11.62	-0.29	0.77	-0.31	-2.44	1.81
23 – 1	3.08	13.52	0.23	0.82	0.29	-2.18	2.75
24 – 1	-1.32	13.43	-0.10	0.92	-0.12	-2.57	2.33
25 – 1	3.72	15.61	0.24	0.81	0.35	-2.50	3.19
30 – 1	-8.50	15.66	-0.54	0.59	-0.79	-3.65	2.07
34 – 1	12.31	15.62	0.79	0.43	1.14	-1.71	3.99
36 – 1	-1.02	15.62	-0.07	0.95	-0.09	-2.95	2.76
44 – 1	-0.15	12.68	-0.01	0.99	-0.01	-2.33	2.30
HI:							
Yes – No	1.12	1.21	0.92	0.36	0.10	-0.12	0.33
Q166:							
No – Yes	0.53	1.19	0.45	0.66	0.05	-0.17	0.27
Sex:							

CAI: Final Regression Model (N=473)

Predictor	*B*	SE	*t*	*p*	*β*	95% CI Lower	95% CI Upper	
Male – Prefer to not respond	4.99	3.62	1.38	0.17	0.46	-0.20	1.12	
Female – Prefer to not respond	5.25	3.52	1.49	0.14	0.49	-0.16	1.13	
Country:								
Rwanda – South Africa	8.28	13.58	0.61	0.54	0.77	-1.71	3.25	
Other – South Africa	-2.23	6.71	-0.33	0.74	-0.21	-1.43	1.02	
India – South Africa	0.98	11.61	0.08	0.93	0.09	-2.03	2.21	
USA – South Africa	3.76	7.87	0.48	0.63	0.35	-1.09	1.79	
Zimbabwe – South Africa	-6.08	4.24	-1.43	0.15	-0.56	-1.34	0.21	
Swaziland – South Africa	-4.97	11.13	-0.45	0.66	-0.46	-2.49	1.57	
Zambia – South Africa	-7.61	8.03	-0.95	0.34	-0.71	-2.17	0.76	
Botswana – South Africa	2.99	11.08	0.27	0.79	0.28	-1.74	2.30	
Germany – South Africa	-11.67	8.11	-1.44	0.15	-1.08	-2.56	0.40	
Malawi – South Africa	12.54	11.03	1.14	0.26	1.16	-0.85	3.18	
South Korea – South Africa	-2.10	8.09	-0.26	0.80	-0.19	-1.67	1.28	
UK – South Africa	-4.93	6.41	-0.77	0.44	-0.46	-1.63	0.71	
Mauritius – South Africa	-1.52	5.60	-0.27	0.79	-0.14	-1.16	0.88	
France – South Africa	7.17	11.07	0.65	0.52	0.67	-1.36	2.69	
Greek / South African – South Africa	4.82	11.06	0.44	0.66	0.45	-1.57	2.47	
Kenya – South Africa	-0.17	11.09	-0.01	0.99	-0.02	-2.04	2.01	
Azania – South Africa	13.47	12.03	1.12	0.26	1.25	-0.95	3.45	
Namibia – South Africa	-23.78	11.21	-2.12	0.03	-2.21	-4.25	-0.16	
Medicine:								
Western medicine – Traditional medicine	-1.94	4.57	-0.42	0.67	-0.18	-1.02	0.65	
Combinations of these – Traditional medicine	-3.00	4.64	-0.65	0.52	-0.28	-1.13	0.57	
Homeopathic medicine – Traditional medicine	-1.16	5.17	-0.22	0.82	-0.11	-1.05	0.84	
Other – Traditional medicine	-7.99	6.40	-1.25	0.21	-0.74	-1.91	0.43	
Homeopathic – Traditional medicine	6.54	11.98	0.55	0.59	0.61	-1.58	2.79	

CAI: Final Regression Model (N=473)

						95% CI	
Predictor	***B***	**SE**	***t***	***p***	***β***	**Lower**	**Upper**

Note. CI = confidence interval. Overall R^2 = .08; Overall adjusted R^2 = -.03; F (44, 369) = 0.725, [a] Represents reference level

Common Misconceptions Regarding HI/TBI.

Table 6 indicates the misconceptions regarding HI/TBI for the entire sample, and then separately for students and learners. These common misconceptions were based on Linden et al.'s (2013) adaptions to the common misconceptions survey created by Gouvier et al. (1988). Results broadly indicate that misconceptions were highest in the section regarding amnesia (correct responses - 45.9%), followed by unconsciousness (correct responses - 60.4%). The highest correct responses were recorded for questions regarding brain damage (92%) and brain injury sequelae (80.3%).

The majority of the entire sample had misconceptions surrounding items 24 and 29 (see Table 6). More than 20% of the whole group experienced misconceptions on items 3, 9, 18, 19, 21, 23, 24, 26, 29, 32, 34, 37, and 40 (these misconceptions are in red and bold).

Learners vs Students

Overall, high school learners had fewer correct mean percentages per category when compared to university students. However, in terms of unconsciousness, university students (59.9%) had fewer correct mean responses than high school learners (62.9%).

Head Injury vs No Head Injury

Descriptively, participants who reported head injuries reported slightly fewer misconceptions than those who did not have head injuries (see Table 6). In terms of high school to university comparisons, items 3, 9, 18, 19, 21, 24, 26, 29, 32, and 37 showed more than 10 percentage point differences when misconceptions were compared for learner vs. student participants who had head injuries vs those who did not. Overall, there seem to be larger absolute differences in these misconceptions between high school learners and university students who had not sustained a head injury, where more university students who had not sustained a head injury had misconceptions surrounding these items than high school learners who had not.

Table 6:
Number of participants with misconceptions about TBIs in High School vs University: Items of the CM-TBI questionnaire (N=451)

Category	Item (Correct Response)	All		High School		University	
		Head injury (n=173)	**No Head injury (n =278)**	**Head injury (n =28)**	**No Head injury (n =51)**	**Head injury (n =145)**	**No Head injury (n = 227)**
Prevention	1. You don't need seatbelts as long as you can brace yourself before a crash (F)	5 (1.11)	5 (1.11)	1 (1.27)	2 (2.53)	4 (1.08)	3 (0.81)
	2. It is more important to use seatbelts on long trips than in driving around town (F)	22 (4.88)	47 (10.42)	8 (10.13)	20 (25.32)	14 (3.76)	27 (7.26)
	3. It is safer to be trapped inside a wreck than to be thrown clear (T)	107 (23.73)	162 (35.92)	20 (25.32)	28 (35.44)	87 (23.39)	134 (36.02)
	4. Wearing seatbelts causes as many injuries as it prevents (F)	29 (6.43)	46 (10.2)	6 (7.59)	11 (13.92)	23 (6.18)	35 (9.41)
Brain damage	5. A head injury can cause brain damage even if the person is not knocked out (T)	11 (2.44)	18 (3.99)	3 (3.8)	9 (11.39)	8 (2.15)	9 (2.42)
	6. A little brain damage doesn't matter much, since people only use a part of their brains anyway (F)	4 (0.89)	1 (0.22)	0 (0)	2 (2.53)	1 (0.27)	2 (0.54)
	7. It is obvious that someone has brain damage because they look different from people who don't have brain damage (F)	5 (1.11)	15 (3.33)	1 (1.27)	10 (12.66)	4 (1.08)	5 (1.34)
	8. Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head (T)	33 (7.32)	54 (11.97)	7 (8.86)	18 (22.78)	26 (6.99)	36 (9.68)

Note. All items had less than 10 missing values between both learners and students.

Category	Item (Correct Response)	ALL		High School		University	
		Head injury (n=180)	**No Head injury (n =289)**	**Head injury (n =28)**	**No Head injury (n =51)**	**Head injury (n =150)**	**No Head injury (n = 240)**
Brain injury sequelae	**9. It is common for people with brain injuries to be easily angered (T)**	88 (19.51)	179 (39.69)	14 (17.72)	27 (34.18)	85 (22.85)	152 (40.86)
	10. It is possible that a person's personality will change after a brain injury (T)	12 (2.66)	19 (4.21)	4 (5.06)	13 (16.46)	8 (2.15)	6 (1.61)
	11. Problems with speech, coordination, and walking can be caused by brain damage (T)	2 (0.44)	15 (3.33)	1 (1.27)	12 (15.19)	1 (0.27)	3 (0.81)
	12. Problems with irritability and difficulties controlling anger are common in people who have had a brain injury (T)	40 (8.87)	82 (18.18)	9 (11.39)	21 (26.58)	31 (8.33)	61 (16.4)
	13. Most people with brain damage are not fully aware of its effect on their behaviour (T)	26 (5.76)	43 (9.53)	8 (10.13)	8 (10.13)	18 (4.84)	35 (9.41)
	14. Brain injury patients usually show a good understanding of their problems because they experience them every day (F)	48 (10.64)	85 (18.85)	8 (10.13)	24 (30.38)	40 (10.75)	61 (16.4)
	15. Brain injuries may cause one to feel depressed, sad and hopeless (T)	17 (3.77)	36 (7.98)	6 (7.59)	15 (18.99)	11 (2.96)	21 (5.65)
	16. Drinking alcohol may affect a person differently after a brain injury (T)	23 (5.1)	38 (8.43)	3 (3.8)	7 (8.86)	20 (5.38)	31 (8.33)
	17. It is common for people to experience changes in behaviour after a brain injury (T)	11 (2.44)	20 (4.43)	4 (5.06)	4 (5.06)	7 (1.88)	16 (4.3)

Category	Item (Correct Response)	ALL		High School		University	
		Head injury (n=180)	**No Head injury (n =289)**	**Head injury (n =28)**	**No Head injury (n =51)**	**Head injury (n =150)**	**No Head injury (n = 240)**
Unconsciousness	**18. When people are knocked unconscious, most wake up quickly with no lasting effects (F)**	86 (19.07)	137 (30.38)	11 (13.92)	22 (27.85)	75 (20.16)	115 (30.91)
	19. People in a coma are usually not aware of what is happening around them (T)	58 (12.86)	95 (21.06)	7 (8.86)	9 (11.39)	51 (13.71)	86 (23.12)
	20. Even after several weeks in a coma, when people wake up, most recognize and speak to others right away (F)	63 (13.97)	90 (19.96)	12 (15.19)	19 (24.05)	51 (13.71)	71 (19.09)
Amnesia	**21. People usually have more trouble remembering things that happen after an injury than remembering things from before (T)**	77 (17.07)	130 (28.82)	13 (16.46)	19 (24.05)	64 (17.2)	111 (29.84)
	22. Sometimes a second blow to the head can help a person remember things that were forgotten (F)	39 (8.65)	58 (12.86)	7 (8.86)	17 (21.52)	32 (8.6)	41 (11.02)
	23. A person with a brain injury may have trouble remembering events that happened before the injury, but usually does not have trouble learning new things (F)	106 (23.5)	172 (38.14)	18 (22.78)	36 (45.57)	88 (23.66)	136 (36.56)
	24. People with brain injury can forget who they are and not recognise others, but be normal in every other way (F)	143 (31.71)	250 (55.43)	18 (22.78)	42 (53.16)	125 (33.6)	208 (55.91)

Category	Item (Correct Response)	ALL		High School		University	
		Head injury (n=180)	**No Head injury (n =289)**	**Head injury (n =28)**	**No Head injury (n =51)**	**Head injury (n =150)**	**No Head injury (n = 240)**
Recovery	25. Recovery from a brain injury usually is complete in about 5 months (F)	27 (5.99)	42 (9.31)	10 (12.66)	17 (21.52)	17 (4.57)	25 (6.72)
	26. Complete recovery from a severe brain injury is not possible, no matter how badly the person wants to recover (T)	93 (20.62)	155 (34.37)	12 (15.19)	34 (43.04)	81 (21.77)	121 (32.53)
	27. Once a person is able to walk again, his/her brain is almost fully recovered (F)	27 (5.99)	46 (10.2)	8 (10.13)	19 (24.05)	19 (5.11)	27 (7.26)
	28. Slow recovery may continue even 1 year after injury (T)	13 (2.88)	22 (4.88)	7 (8.86)	6 (7.59)	6 (1.61)	16 (4.3)
	29. People who have had one brain injury are more likely to have a second one (T)	134 (29.71)	225 (49.89)	18 (22.78)	38 (48.1)	116 (31.18)	187 (50.27)
	30. It is necessary for a person to go through a lot of physical pain to recover from a brain injury (F)	32 (7.1)	64 (14.19)	8 (10.13)	28 (35.44)	24 (6.45)	36 (9.68)
	31. Once a person with a brain injury realises where they are, they will always be aware of this (F)	38 (8.43)	74 (16.41)	8 (10.13)	26 (32.91)	30 (8.06)	48 (12.9)
	32. A person who has recovered from a head injury is less able to withstand a second blow to the head (T)	69 (15.3)	123 (27.27)	8 (10.13)	19 (24.05)	61 (16.4)	104 (27.96)

Category	Item (Correct Response)	ALL		High School		University	
		Head injury (n=180)	**No Head injury (n =289)**	**Head injury (n =28)**	**No Head injury (n =51)**	**Head injury (n =150)**	**No Head injury (n = 240)**
	33. A person who has a brain injury will be "just like new" in several months (F)	14 (3.1)	18 (3.99)	5 (6.33)	7 (8.86)	9 (2.42)	11 (2.96)
	34. Asking persons who have had a brain injury about their progress is the most accurate, informative way to find out how they have progressed (F)	64 (14.19)	108 (23.95)	13 (16.46)	36 (45.57)	51 (13.71)	72 (19.35)
	35. It is good advice to remain completely inactive during recovery from a brain injury (F)	39 (8.65)	50 (11.09)	9 (11.39)	21 (26.58)	30 (8.06)	29 (7.8)
	36. Once a person recovering from a brain injury feels "back to normal," the recovery process is complete (F)	17 (3.77)	36 (7.98)	3 (3.8)	16 (20.25)	14 (3.76)	20 (5.38)
	37. How quickly a person recovers depends mainly on how hard he or she works at recovering (F)	89 (19.73)	115 (25.5)	18 (22.78)	33 (41.77)	71 (19.09)	82 (22.04)
Rehabilitation	38. "Cognitive" refers to thinking processes such as memory, attention, and learning (T)	8 (1.77)	16 (3.55)	3 (3.8)	11 (13.92)	5 (1.34)	5 (1.34)
	39. "Cognitive" refers to the ability to move your body (F)	24 (5.32)	43 (9.53)	7 (8.86)	23 (29.11)	17 (4.57)	20 (5.38)
	40. The primary goal of brain injury rehabilitation is to increase physical abilities such as walking (F)	61 (13.53)	99 (21.95)	15 (18.99)	32 (40.51)	46 (12.37)	67 (18.01)

Concussion Knowledge and Attitudes: RoCKAS-ST

Table 7 indicates participants' misconceptions surrounding concussion knowledge and attitudes.

CKI

The mean CKI score for the whole sample was 17.1 (*SD*= 3.22, range = 3-24, mode= 19). This score is above the midpoint, regarding knowledge surrounding concussions (64.44%) when compared to the upper-cut off of this index, which is 27, which shows that participants seem to have a fair amount of knowledge regarding concussions. There were no large differences significantly or descriptively between learners and students surrounding concussion knowledge. Participants' scores also did not differ descriptively based on whether they had sustained a head injury or not. However, within groups, in terms of those who had sustained a head injury, high school learners (14.7/27, 54%) scored poorer than university students (17.6/27, 65.19%), at least descriptively, on the CKI. There was little difference among those who had not sustained a head injury based on whether they were in high school (16.5/27, 61%) or university (17.2/27, 63.70).

Just over half of those who did not sustain a head injury had misconceptions surrounding item 8 (in bold). This item also created a large percentage point (21.96) difference between those who had sustained a head injury vs. those who had not, where fewer participants who had sustained a head injury reported misconceptions than those who had, overall. Participants also show group differences (high school vs. university) on items 2, 4, 8, 11, 12, and 14. These items also show differences based on whether a group had sustained a head injury or not. Differences range from 12.16 to 35 percentage points where university students scored more poorly on these items.

CAI

The mean CAI score for the whole sample was 57.51 (*SD*= 7.62, range = 32-75, mode= 56). This is an acceptable amount of knowledge surrounding concussions (76.68%) when compared to the upper-cut off of this index, which is 75, which shows that participants seem to have fairly safe attitudes regarding concussions. Descriptively, learners and students did not differ largely in terms of their CAI scores; i.e., concussion safety attitudes. Participants' scores did not show large differences based on whether they had sustained a head injury or not. In terms of those who had sustained a head injury, high school learners (57.2/75, 76.4%) scored marginally higher than university students (56.8/75, 75.7%) on the CAI. There was little

difference in terms of those who had not sustained a head injury based on whether they were in high school (56.3/75.1, 61%) or university (57.3/75, 76.4%).

Participants show group differences (high school vs. university) on items 27, 29, 30, 31, and 33. Similar to the CKI, these items also show differences based on whether a group had sustained a head injury or not. Differences range from 9.38 to 22.81 percentage points where university students scored more poorly on these items.

Table 7:
Number of participants with misconceptions about concussions in High School vs University: Items of the RoCKAS-ST (N=469)

Item (Correct Response)	All		High School		University	
	Head injury (n=177)	**No Head injury (n =292)**	**Head injury (n =28)**	**No Head injury (n =51)**	**Head injury (n =149)**	**No Head injury (n = 241)**
1.* There is a possible risk of death if a second concussion occurs before the first one has healed. (T)	23 (4.9)	45 (9.59)	5 (6.33)	2 (2.53)	18 (4.62)	43 (11.03)
2.* People who have had one concussion are more likely to have another concussion. (T)	111 (23.67)	192 (40.94)	19 (24.05)	33 (41.77)	92 (23.59)	159 (40.77)
3.* Cleats help athletes' feet grip the playing surface. (T)	41 (8.74)	58 (12.37)	10 (12.66)	15 (18.99)	31 (7.95)	43 (11.03)
4.* In order to be diagnosed with a concussion, you have to be knocked out. (F)	103 (21.96)	167 (35.61)	23 (29.11)	25 (31.65)	80 (20.51)	142 (36.41)
5.* A concussion can only occur if there is a direct hit to the head. (F)	19 (4.05)	35 (7.46)	4 (5.06)	8 (10.13)	15 (3.85)	27 (6.92)
6.* Being knocked unconscious always causes permanent damage to the brain. (F)	24 (5.12)	45 (9.59)	6 (7.59)	10 (12.66)	18 (4.62)	35 (8.97)
7.* Symptoms of a concussion can last for several weeks. (T)	46 (9.81)	70 (14.93)	9 (11.39)	11 (13.92)	37 (9.49)	59 (15.13)
8.* **Sometimes a second concussion can help a person remember things that were forgotten after the first concussion. (F)**	143 (30.49)	246 (52.45)	21 (26.58)	41 (51.9)	122 (31.28)	205 (52.56)
10.* If you receive one concussion and you have never had a concussion before, you will become less intelligent. (F)	9 (1.92)	17 (3.62)	1 (1.27)	6 (7.59)	8 (2.05)	11 (2.82)

Item (Correct Response)	All		High School		University	
	Head injury (n=180)	**No Head injury (n =289)**	**Head injury (n =28)**	**No Head injury (n =51)**	**Head injury (n =150)**	**No Head injury (n = 240)**
11.* After 10 days, symptoms of a concussion are usually completely gone. (T)	104 (22.17)	183 (39.02)	16 (20.25)	38 (48.1)	88 (22.56)	145 (37.18)
12.* After a concussion, people can forget who they are and not recognize others but be perfect in every other way. (F)	101 (21.54)	138 (29.42)	12 (15.19)	27 (34.18)	89 (22.82)	155 (39.74)
13.* Concussions can sometimes lead to emotional disruptions. (T)	18 (3.84)	39 (8.32)	4 (5.06)	9 (11.39)	14 (3.59)	30 (7.69)
14.* An athlete who gets knocked out after getting a concussion is experiencing a coma. (T)	113 (24.09)	199 (42.43)	13 (16.46)	25 (31.65)	100 (25.64)	174 (44.62)
15.* There is rarely a risk to long-term health and well-being from multiple concussions. (F)	42 (8.96)	76 (16.2)	13 (16.46)	19 (24.05)	29 (7.44)	57 (14.62)
16.* It is likely that Player Q's concussion will affect his long-term health and well-being. (F)	45 (9.59)	80 (17.06)	8 (10.13)	15 (18.99)	37 (9.49)	65 (16.67)
17.* It is likely that Player X's concussion will affect his long-term health and well-being. (T)	22 (4.69)	35 (7.46)	4 (5.06)	9 (11.39)	18 (4.62)	26 (6.67)
18.* Even though Player F is still experiencing the effects of the concussion, her performance will be the same as it would be had she not suffered a concussion. (F)	26 (5.54)	44 (9.38)	6 (7.59)	10 (12.66)	20 (5.13)	34 (8.72)
19. I would continue playing a sport while also having a headache that resulted from a minor concussion. (SD~)	43 (9.17)	78 (16.63)	5 (6.33)	18 (22.78)	38 (9.74)	60 (15.38)
20. I feel that coaches need to be extremely cautious when determining whether an athlete should return to play. (SA~)	17 (3.62)	25 (5.33)	3 (3.8)	7 (8.86)	14 (3.59)	18 (4.62)

Item (Correct Response)	All		High School		University	
	Head injury (n=180)	**No Head injury (n =289)**	**Head injury (n =28)**	**No Head injury (n =51)**	**Head injury (n =150)**	**No Head injury (n = 240)**
21. I feel that concussions are less important than other injuries. (SD~)	26 (5.54)	51 (10.87)	8 (10.13)	11 (13.92)	18 (4.62)	40 (10.26)
22. I feel that an athlete has a responsibility to return to a game even if it means playing while still experiencing symptoms of a concussion. (SD~)	11 (2.35)	32 (6.82)	3 (3.8)	11 (13.92)	8 (2.05)	21 (5.38)
23. I feel that an athlete who is knocked unconscious should be taken to the emergency room. (SA~)	26 (5.54)	35 (7.46)	7 (8.86)	7 (8.86)	19 (4.87)	28 (7.18)
24. I feel that Coach A made the right decision to keep Player R out of the game. (SA~)	14 (2.99)	19 (4.05)	5 (6.33)	6 (7.59)	9 (2.31)	13 (3.33)
25. Most athletes would feel that Coach A made the right decision to keep Player R out of the game. (SA~)	68 (14.5)	91 (19.4)	14 (17.72)	19 (24.05)	54 (13.85)	72 (18.46)
26. I feel that Athlete M should have returned to play during the first game of the season. (SD~)	24 (5.12)	46 (9.81)	7 (8.86)	12 (15.19)	17 (4.36)	34 (8.72)
27. Most athletes would feel that Athlete M should have returned to play during the first game of the season. (SD~)	94 (20.04)	152 (32.41)	18 (22.78)	28 (35.44)	76 (19.49)	124 (31.79)
28. I feel that Athlete O should have returned to play during the semifinal playoff game. (SD~)	25 (5.33)	49 (10.45)	7 (8.86)	15 (18.99)	18 (4.62)	34 (8.72)
29 Most athletes feel that Athlete O should have returned to play during the semifinal playoff game. (SD~)	94 (20.04)	167 (35.61)	14 (17.72)	30 (37.97)	80 (20.51)	137 (35.13)
30. I feel that the athletic trainer, rather than Athlete R, should make the decision about returning Athlete R to play. (SA~)	91 (19.4)	141 (30.06)	13 (16.46)	23 (29.11)	78 (20)	118 (30.26)

Item (Correct Response)	All		High School		University	
	Head injury (n=180)	**No Head injury (n =289)**	**Head injury (n =28)**	**No Head injury (n =51)**	**Head injury (n =150)**	**No Head injury (n = 240)**
31. Most athletes would feel that the athletic trainer, rather than Athlete R, should make the decision about returning Athlete R to play. (SA~)	87 (18.55)	150 (31.98)	11 (13.92)	30 (37.97)	76 (19.49)	120 (30.77)
32. I feel that Athlete H should tell his coach about the symptoms. (SA~)	13 (2.77)	28 (5.97)	5 (6.33)	6 (7.59)	8 (2.05)	22 (5.64)
33. Most athletes would feel that Athlete H should tell his coach about the symptoms (SA~)	68 (14.5)	126 (26.87)	7 (8.86)	15 (18.99)	51 (13.08)	111 (28.46)
34.*Headache (Legitimate)	25 (5.33)	39 (8.32)	14 (17.72)	23 (29.11)	11 (2.82)	16 (4.1)
35.*Sensitivity to Light (Legitimate)	46 (9.81)	76 (16.2)	11 (13.92)	15 (18.99)	35 (8.97)	61 (15.64)
36.*Difficulty Remembering (Legitimate)	39 (8.32)	62 (13.22)	9 (11.39)	14 (17.72)	30 (7.69)	48 (12.31)
37.*Drowsiness (Legitimate)	42 (8.96)	82 (17.48)	10 (12.66)	9 (11.39)	32 (8.21)	73 (18.72)
38.*Feeling in a “Fog” (Legitimate)	81 (17.27)	134 (28.57)	23 (29.11)	28 (35.44)	58 (14.87)	106 (27.18)
39.*Feeling Slowed Down (Legitimate)	59 (12.58)	104 (22.17)	10 (12.66)	14 (17.72)	49 (12.56)	90 (23.08)
40.*Difficulty Concentrating (Legitimate)	38 (8.1)	61 (13.01)	10 (12.66)	7 (8.86)	28 (7.18)	54 (13.85)
41.*Dizziness (Legitimate)	21 (4.48)	17 (3.62)	6 (7.59)	2 (2.53)	15 (3.85)	15 (3.85)

Note. *All these questions relate to the Concussion Knowledge Index (CKI). While all unmarked questions in this table relate to the Concussion Attitudes Index (CAI). ~Participants who scored 1, 2, and 3 on these questions were tallied as incorrect responses. All items had less than 10 missing values between both learners and students.

Discussion

LMICs, like South Africa, often have high prevalence rates of HI/TBIs. These high incidences are often combined with poor knowledge surrounding HI/TBIs where LMICs often do not have much literature surrounding high-risk groups. Adolescents and young adults are particularly high-risk groups for sustaining TBIs and their risks of injury can be exacerbated by poor knowledge and misconceptions surrounding HI/TBIs. These misconceptions can often result in ineffective help-seeking behaviour after sustaining a HI/TBI, which can have poor long-term outcomes for both learners and students. However, learners and students are at different developmental stages, but literature often reports on individuals within these age brackets as one group – students are also often included in adult study samples (Chapman & Hudson, 2010; Hux et al., 2006; Pappadis et al., 2011). Therefore, this study aimed to understand what myths and misconceptions adolescents (learners) vs young adults (students) had regarding HI/TBI (including concussions) and what factors contributed to these myths and misconceptions which could influence their help-seeking behaviour after sustaining a HI/TBI, which could result in them being knocked out, experiencing memory loss, and/or being dazed and confused. This study also aimed to describe and compare myths and misconceptions about HI/TBI including concussions for learners (with/without HI) and students (with/without HI).

Summary of Results

Overall, in this study, I found that there were significant differences between participant groups in terms of age, sex, and contact sports played. Learners were significantly younger than students. The majority of the sample was female. While the majority of students (77.7%) played contact sports, less than a quarter of learners (22.2%) did. I found that of the participants who reported sustaining a head injury, most of the symptoms, and therefore injuries experienced by both learners and students, were reported as being mild in nature. Fewer learners (34.5%) and students (46.6%) did not report seeking medical care for their injuries than those who did report seeking medical care. Common mechanisms of injury for students and learners were through playing sport or being involved in a recreational activity.

In terms of misconceptions, students scored significantly higher on HI/TBI and concussion knowledge when compared to learners. Regression analyses showed that adolescence (learners) vs young adulthood (students) was a significant predictor of myths and misconceptions

regarding TBI/HI; where students scored better on HI/TBI knowledge, but not for concussion knowledge and attitudes. I discuss each of the main findings below.

Incidences of TBI

In this study, just over a third (38.05%) of the sample reported sustaining a HI/TBI. Comparable numbers of students (38.42%) and learners (36.25%) reported sustaining a HI/TBI. This total sample prevalence of TBI is higher than global TBI statistics involving adolescent and young adult populations where 20-22% of participants reported sustaining a head injury in the past (Alexander et al., 2009; Dewan et al., 2016; Ilie et al., 2020). The rates reported in this study may be higher than that of the global rate due to the speculation that LMIC countries experience higher TBI incidences that often go unreported and undiagnosed (Dewan et al., 2016; Hyder et al., 2007; Kirkwood et al., 2008). The under-reporting and under-diagnosis of TBI could be a result of definitional inconsistencies combined with poor knowledge surrounding TBIs (Corrigan et al., 2010; Hyder et al., 2007; Mayer et al., 2017). If adolescents and young adults do not understand their symptoms, they often disregard the after-effects of sustaining a TBI and continue with their daily life or even misperceive their injury as being benign and not needing medical attention. The continuation of normal activities too soon may potentially further impact on their recovery as not reporting the injury to medical professionals could result in alterations to their mental state or consciousness while severe injuries may cause disability or even death (Halstead & Walter, 2010; Mayer et al., 2017; Sharp & Jenkins, 2015).

Apart from the prevalence statistics for the current study being different from global data, sex differences in terms of injuries in this study are also different from the outcomes reported in past literature. For this study, significantly more females (N=109; 63.74%) than males (N=55; 32.16%) reported sustaining head injuries in both the learner and student groups. This finding from the current study may be a function of sex differences in the population from which the sample was recruited. The university sample used Psychology students where males are generally underrepresented. The learner sample may be skewed as the survey was voluntary and more females signed up for the survey than males. However, overall, research suggests that males are twice as likely as females to sustain a TBI (Cook et al., 2014; Jones et al., 2016; Langlois et al., 2006).

Symptoms, Help-Seeking and Mechanisms of Head Injuries

Over half (58.3%) of the sample of participants who reported sustaining a head injury reported seeking medical care. More learners (65.5%) than students (53.4%) reported seeking medical help after sustaining a head injury where the confusion was the most commonly reported post-injury symptom by both students (80.8%) and learners (62.1%). The finding that more learners than students sought medical help may be due to the easier access to and availability of medical staff at events such as sports days at schools as well as the fact that learners would have parents and guardians who regularly check upon them. Students often live at university residences or on their own and may not be forced into seeking medical care. When asked to explain their response, one of the reasons students and learners who did not seek medical care for their injuries thought their injuries were not serious. At the end of the data collection session for the current study, participants were debriefed via an email or brochure making them aware of the seriousness of HI/TBIs, and were advised to seek medical care in the event of sustaining a HI/TBI. This raising of awareness would hopefully help students and learners to seek medical evaluation in the future.

Although more learners than students sought medical care, concussions (mTBI) were more commonly reported by students than learners. More students (46.4%) than learners (27.6%) also reported sustaining injuries by playing sports or being involved in a recreational activity where such concussions can be sustained. Such activities are offered more extensively and with more variety at universities compared to high schools. Current literature does not actually separate learners and students by age differences and these findings cannot be compared locally or globally. However, individuals aged 15-19 years old are considered as a high-risk group for concussions and often report high incidence rates for mTBIs specifically (Corrigan et al., 2010; Dewan et al., 2016; Ilie et al., 2020). However, the finding of injuries reported as sustained through playing sports or recreational activities is inconsistent with global statistics on LMICs like South Africa, as the most common mechanism of injury reported for learners and students are motor vehicle accidents where they were the passengers (Alexander et al., 2009; Corrigan et al., 2010; Hyder et al., 2007; Jones et al., 2016; Langlois et al., 2006). These common mechanisms of injury differing from global data may be a function of the study's sample selection, which is not representative of the broader South African public.

Demographic Predictors of the CM-TBI, CKI, and CAI

The only significant predictor of the CMTBI was group membership (learners vs students) where students performed better on the CMTBI compared to learners, which could relate to age as a predictor of educational knowledge. However, the majority of misconception studies did not find age to be a significant predictor (Ernst et al., 2016; Guilmette & Paglia, 2004a; Pappadis et al., 2011). However, these studies focused on adult samples and not specifically on adolescents and young adults. The current study found no significant predictors of the RoCKAS-ST; CKI or CAI. This is consistent with global studies as research has found education to be the common predictor of knowledge (Pappadis et al., 2011; Schellinger et al., 2018)

Common Misconceptions Regarding HI/TBI.

The sample had more misconceptions surrounding amnesia and unconsciousness, where learners had more misconceptions than students. Items 24 (*People with brain injury can forget who they are and not recognise others, but be normal in every other way:* which is false**)** and 29 (*People who have had one brain injury are more likely to have a second one;* which is true) were largely misconceived across the whole sample. Ten items surrounding unconsciousness, amnesia, and recovery showed large differences in head injury vs no head injury in the learner vs student groups, with learners who had reported sustaining head injuries having more misconceptions than students who had reported sustaining head injuries.

Past adult and university student studies looking at TBI misconceptions had similar incorrect responses towards unconsciousness, amnesia, and recovery items (Chapman & Hudson, 2010; De Iorio et al., 2017; Gouvier et al., 1988; Guilmette & Paglia, 2004a; Hux et al., 2013; Hux et al., 2006; Keow et al., 2008; Pretorius & Broodryk, 2013). In addition, educators and rehabilitation staff performed poorly on brain injury sequelae items (Ernst et al., 2016; Farmer & Johnson-Gerard, 1997).

The only other South African study conducted had undergraduate students as participants and found that amnesia and unconsciousness items were most misconceived (Pretorius & Broodryk, 2013). This is slightly different from my findings, where participants also had poor misconceptions surrounding recovery. However, the two studies were done at different universities in Cape Town. Also, my study specifically sampled from first-year psychology students while Pretorius and Broodryk (2013) recruited students from the entire university.

Furthermore, no prior studies have sampled adolescent misconceptions using the CMTBI. However, if adults and educators struggle with correct information (as in Hux et al. (2006); Hux et al. (2013); Guilmette and Paglia (2004a)) these are the people who educate adolescents and young adults), it is important to understand where the knowledge gaps are for adolescents and young adults; as these two latter groups are high-risk groups for sustaining TBIs. These misconceptions experienced by adolescents and young adults are often a result of poor knowledge passed on from the media, family, and friends. Also, poor knowledge can lead to incorrect medical help-seeking behaviour which could lead to poor recovery, disability, and even death (De Iorio et al., 2017; Hux et al., 2006; McClure, 2011).

Concussion Knowledge and Attitudes: RoCKAS ST

CKI

Learners (54%) scored poorer than students (65.19%) in terms of the average concussion knowledge score, but no significant differences between concussion knowledge were found between the two groups. However, students had more misconceptions on items surrounding concussion knowledge and recovery. There was little difference in knowledge in terms of head injury vs no head injury subgroups among learners and students. The average concussion knowledge score for the entire sample was 63%. However, this was lower than scores reported for global (Manasse-Cohick & Shapley, 2014; Sullivan et al., 2017) and local (Kraak et al., 2018) studies (4 vs 12 percentage point difference, respectively) using similarly aged participants. This difference in scores may be due to the fact that in all 3 of the above-mentioned studies, the sample was focused on participants who play sports, whereas the current study looked at learners and students who did or did not play sports. In fact, 189 of 344 (54.94%) participants reported playing contact sports. Participants who play contact sports may have more knowledge of concussions due to a higher likelihood of experience with concussions and therefore may have slightly higher CKI scores (Delahunty et al., 2015). Therefore, it is important to understand how sample demographics (e.g., age, sex, and socio-economic status) differ in terms of misconceptions as different misconceptions surrounding HI/TBI knowledge need to be addressed for adolescents and young adults to be able to predict what factors affect these misconceptions.

CAI

Students and learners showed an average safety attitude of 77% towards concussions, where learners (76.4%) scored slightly higher than university students (75.7%). Related studies showed similar attitudes toward concussion safety (+/- 3 percentage point difference) (Kraak et al., 2018; Manasse-Cohick & Shapley, 2014; Sullivan et al., 2017).

Interestingly students and learners seem to have good safety habits regarding concussions, but they do not seem to have good knowledge of the injury, based on poorer scores on the CKI compared to the CAI. This poor knowledge but safe attitudes surrounding concussion suggests a starting place for learning about concussions, and that adolescents and young adults may be less risk-prone (unsafe attitudes) than their developmental maturation suggests. These safer attitudes towards concussions could be the result of concussion after-effects becoming more commonly discussed in the media so that adolescents and young adults gain better knowledge surrounding TBIs. Additionally, due to the severity of TBIs, more guidelines and testing of head injuries have been introduced in the US and UK over the last decade to help prevent severe TBIs (Harrison, 2014; Khellaf et al., 2019). These guidelines often filter down to LMICs and provide a good framework that LMICs can work from.

Limitations and future directions

Despite contributing to the literature on myths and misconceptions about HI/TBIs, the current study has a number of limitations. Firstly, this study made use of a university and high school sample through convenience sampling. Therefore, the current findings' generalizability is limited. However, this research into adolescents and young adult HI/TBIs was a good base for understanding misconceptions. Even using a small sample group, there are some similarities to global studies. These similarities are positive in that interventions and prevention information from higher-income countries can be adapted to LMICs. Secondly, this study used a self-report survey which can be inherently problematic as participants often report desirable responses. This bias, where participants may respond in a more favourable manner than what they actually believe because they do not want to be viewed negatively, is well known in literature (Blanche et al., 2006). However, validity check questions were used in the CMTBI and RoCKAS-ST found that responses were consistent. Thirdly, past literature indicates that socio-economic status (SES) is a significant factor that contributes to the understanding of TBI and its recovery process. However, the university data collected did not have a good SES indicator. The current study did use varied questions to understand the SES of learners however, high school learners did not

understand the point of these questions and were not able to answer the questions easily. Therefore, SES was not used as a predictor in this study. Lastly, with regard to the length of the survey, participants seemed to become fatigued towards the latter part of the survey, especially the high school sample. This was evident when participants had to explain their choices to previous questions; many explanatory questions were answered poorly with very brief or no explanation. These questions were not included in this study for these reasons. Despite these limitations, a survey-based study was ideal in terms of maximizing the number of participants reached and is consistent with other research studies of this nature.

Significance and Future Directions

Definitional inconsistencies coupled with the unrealistic and optimistic portrayals of TBI can result in misconceptions and misinformation about TBI, which could affect help-seeking behaviours and can be detrimental to the recovery process. Due to these factors, it is evident that understanding current misconceptions and providing sufficient knowledge about TBI and its long-term effects is important especially for providing appropriate care and interventions for adolescents and young adults. Specifically, understanding what high school learners know and how this differs from university students' knowledge about TBI will help inform interventions tailored to adolescents and young adults – which is needed as they are a vulnerable population group.

Future studies should focus on larger school samples with richer qualitative data to understand not just student responses but also their risk perception of HI/TBIs and knowledge. Exploring significant predictors of misconceptions of HI/TBI would also be useful as previous studies did not find a common predictor thereof. Such information will help determine the focus of interventions.

Furthermore, much of the current literature on help-seeking behaviours post-TBI has come from adult populations in HIC. Very little information is published on misperceptions of HI/TBI in LMICs, where there are reportedly higher prevalence rates of TBIs, and specifically amongst adolescents and young adults. This is an important research group as adolescents and young adults are more at risk of sustaining TBIs than adult populations. Therefore, identifying misconceptions in a South African context is necessary to inform interventions that may seek to provide appropriate psychoeducation, which may, in turn, facilitate optimal health-seeking behaviours.

Conclusion

Misconceptions and misinformation regarding HI/TBIs, including concussions, are fairly common amongst all population groups (adults, educators, adolescents, and young adults) where these misconceptions often surround unconsciousness and recovery. This study found that misconceptions are generally higher for learners than students, which could suggest that perhaps misconceptions do improve with age and further education and experience. These are important subject areas to understand as inaccurate information could affect help-seeking behaviours and can be detrimental to the recovery process, especially in young developing minds, i.e., learners and students. Therefore, understanding the current knowledge gaps about HI/TBI and its immediate as well as long-term effects on young adults and adolescents in South Africa is important for providing appropriate care and interventions, as global solutions may not cater to the population demographics. It is also important to focus more resources on South African adolescents and young adult research surrounding HI/TBIs as these two groups are high-risk populations for sustaining HI/TBIs who are based in a country with high HI/TBI prevalence rates (South Africa being a LMIC).

References

Alexander, T., Fuller, G., Hargovan, P., Clarke, D., Muckar, D., & Thomson, S. (2009). An audit of the quality of care of traumatic brain injury at a busy regional hospital in South Africa. *South African Journal of Surgery, 47*(4).

Babikian, T., Merkley, T., Savage, R. C., Giza, C. C., & Levin, H. (2015). Chronic aspects of pediatric traumatic brain injury: review of the literature. *Journal of neurotrauma, 32*(23), 1849-1860.

Baldwin, G., Breiding, M., & Sleet, D. (2016). Using the public health model to address unintentional injuries and TBI: A perspective from the Centers for Disease Control and Prevention (CDC). *NeuroRehabilitation, 39*(3), 345-349. https://doi.org/10.3233/NRE-161366

Blanche, M. T., Durrheim, K., & Painter, D. (2006). *Research in practice: Applied methods for the social sciences*. Juta and Company Ltd. https://doi.org/10.4314/asp.v5i1.31636

Bruns, J., & Hauser, W. A. (2003). The epidemiology of traumatic brain injury: a review. *Epilepsia, 44*(s10), 2-10.

Cassidy, J. D., Carroll, L., Peloso, P., Borg, J., Von Holst, H., Holm, L., Kraus, J., & Coronado, V. (2004). Incidence, risk factors and prevention of mild traumatic brain injury: results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury. *Journal of rehabilitation medicine, 36*(0), 28-60.

Chapman, R. C., & Hudson, J. M. (2010). Beliefs about brain injury in Britain. *Brain injury, 24*(6), 797-801. https://doi.org/10.3109/02699051003709607

Ciccia, A. H., Meulenbroek, P., & Turkstra, L. S. (2009). Adolescent brain and cognitive developments: Implications for clinical assessment in traumatic brain injury. *Topics in language disorders, 29*(3), 249-265. https://doi.org/10.1097/TLD.0b013e3181b53211

Cook, L. G., Chapman, S. B., Elliott, A. C., Evenson, N. N., & Vinton, K. (2014). Cognitive gains from gist reasoning training in adolescents with chronic-stage traumatic brain injury. *Frontiers in neurology, 5*(1), 87. https://doi.org/10.3389/fneur.2014.00087

Corrigan, J. D., Selassie, A. W., & Orman, J. A. L. (2010). The epidemiology of traumatic brain injury. *The Journal of head trauma rehabilitation, 25*(2), 72-80.

De Iorio, M. L., Nolan, S. A., & Teague, S. (2017). The effect of education type on common misconceptions of traumatic brain injury. *Rehabilitation Psychology, 62*(4), 516-524. https://doi.org/10.1037/rep0000131

Delahunty, S. E., Delahunt, E., Condon, B., Toomey, D., & Blake, C. (2015). Prevalence of and attitudes about concussion in Irish schools' rugby union players. *Journal of school health*, *85*(1), 17-26. https://doi.org/10.1111/josh.12219

Dewan, M. C., Mummareddy, N., Wellons III, J. C., & Bonfield, C. M. (2016). Epidemiology of global pediatric traumatic brain injury: qualitative review. *World neurosurgery*, *91*(1), 497-509. e491. https://doi.org/10.1016/j.wneu.2016.03.045

Eigsti, I.-M., Zayas, V., Mischel, W., Shoda, Y., Ayduk, O., Dadlani, M. B., Davidson, M. C., Aber, J. L., & Casey, B. (2006). Predicting cognitive control from preschool to late adolescence and young adulthood. *Psychological science*, *17*(6), 478-484. https://doi.org/10.1037/e527352012-625

Ernst, W. J., Gallo, A. B., Sellers, A. L., Mulrine, J., MacNamara, L., Abrahamson, A., & Kneavel, M. (2016). Knowledge of traumatic brain injury among educators. *Exceptionality*, *24*(2), 123-136. https://doi.org/10.1080/09362835.2015.1107832

Ernst, W. J., Trice, A. D., Gilbert, J. L., & Potts, H. (2009). Misconceptions about traumatic brain injury and recovery among nursing students. *The Journal of head trauma rehabilitation*, *24*(3), 213-220. https://doi.org/10.1097/htr.0b013e3181a7ecd8

Farmer, J. E., & Johnson-Gerard, M. (1997). Misconceptions about traumatic brain injury among educators and rehabilitation staff: A comparative study. *Rehabilitation Psychology*, *42*(4), 273-286. https://doi.org/10.1037/0090-5550.42.4.273

Feigin, V. L., Theadom, A., Barker-Collo, S., Starkey, N. J., McPherson, K., Kahan, M., Dowell, A., Brown, P., Parag, V., & Kydd, R. (2013). Incidence of traumatic brain injury in New Zealand: a population-based study. *The Lancet Neurology*, *12*(1), 53-64. https://doi.org/10.1016/s1474-4422(12)70262-4

Fu, T. S., Jing, R., McFaull, S. R., & Cusimano, M. D. (2016). Health & economic burden of traumatic brain injury in the Emergency Department. *Canadian Journal of Neurological Sciences*, *43*(2), 238-247.

Gouvier, W. D., Prestholdt, P. H., & Warner, M. S. (1988). A survey of common misconceptions about head injury and recovery. *Archives of Clinical Neuropsychology*, *3*(4), 331-343. https://doi.org/10.1093/arclin/3.4.331

Guilmette, T. J., & Paglia, M. F. (2004a). The public's misconceptions about traumatic brain injury: A follow up survey. *Archives of Clinical Neuropsychology*, *19*(2), 183-189. https://doi.org/10.1016/S0887-6177(03)00025-8

Guilmette, T. J., & Paglia, M. F. (2004b). The public's misconceptions about traumatic brain injury: A follow up survey. *Archives of Clinical Neuropsychology*, *19*(2), 183-189. https://doi.org/10.1016/s0887-6177(03)00025-8

Halstead, M. E., & Walter, K. D. (2010). Sport-related concussion in children and adolescents. *Pediatrics, 126*(3), 597-615.

Harrison, E. A. (2014). The first concussion crisis: head injury and evidence in early American football. *American journal of public health, 104*(5), 822-833. https://doi.org/10.2105/AJPH.2013.301840

Hochberg, Z. e., & Konner, M. (2019). Emerging adulthood, a pre-adult life-history stage. *Frontiers in Endocrinology, 10*, 918. https://doi.org/10.3389/fendo.2019.00918

Hooper, S. R. (2006). Myths and misconceptions about traumatic brain injury: Endorsements by school psychologists. *Exceptionality, 14*(3), 171-182. https://doi.org/10.1207/s15327035ex1403_5

Hux, K., Bush, E., Evans, K., & Simanek, G. (2013). Misconceptions about traumatic brain injury among students preparing to be special education professionals. *Support for Learning, 28*(3), 109-114. https://doi.org/10.1111/1467-9604.12028

Hux, K., Schram, C. D., & Goeken, T. (2006). Misconceptions about brain injury: A survey replication study. *Brain injury, 20*(5), 547-553. https://doi.org/10.1080/02699050600676784

Hyder, A. A., Wunderlich, C. A., Puvanachandra, P., Gururaj, G., & Kobusingye, O. C. (2007). The impact of traumatic brain injuries: a global perspective. *NeuroRehabilitation, 22*(5), 341-353.

Ilie, G., Trenholm, M., Boak, A., Mann, R. E., Adlaf, E. M., Asbridge, M., Hamilton, H., Rehm, J., Rutledge, R., & Cusiman, M. D. (2020). Adolescent traumatic brain injuries: Onset, mechanism and links with current academic performance and physical injuries. *PLoS one, 15*(3), e0229489. https://doi.org/10.1371/journal.pone.0229489

James, S. L., Theadom, A., Ellenbogen, R. G., Bannick, M. S., Montjoy-Venning, W., Lucchesi, L. R., Abbasi, N., Abdulkader, R., Abraha, H. N., & Adsuar, J. C. (2019). Global, regional, and national burden of traumatic brain injury and spinal cord injury, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *The Lancet Neurology, 18*(1), 56-87. https://doi.org/10.1016/S1474-4422(18)30415-0

Johnson, S. B., Blum, R. W., & Giedd, J. N. (2009). Adolescent maturity and the brain: the promise and pitfalls of neuroscience research in adolescent health policy. *Journal of Adolescent Health, 45*(3), 216-221. https://doi.org/10.1016/j.jadohealth.2009.05.016

Jones, K. M., Kydd, R., Broadbent, E., Theadom, A., Barker-Collo, S., Edwards, H., Feigin, V. L., & Group, B. S. (2016). Brain drawings following traumatic brain injury (TBI) and links to illness perceptions and health outcomes–Findings from a population-based study. *Psychology & health, 31*(10), 1182-1202.

Kennedy, E., Cohen, M., & Munafo, M. (2017). Childhood traumatic brain injury and the associations with risk behavior in adolescence and young adulthood: a systematic review. *The Journal of head trauma rehabilitation, 32*(6), 425-432. https://doi.org/10.1097/HTR.0000000000000289

Keow, L., Ng, I., & Ti, A. (2008). Common misconceptions about traumatic brain injury (TBI) among mild TBI patients and their immediate family members. *Singapore Nursing Journal, 35*(3), 18.

Khellaf, A., Khan, D. Z., & Helmy, A. (2019). Recent advances in traumatic brain injury. *Journal of neurology, 266*(11), 2878-2889. https://doi.org/10.1007/s00415-019-09541-4

Kirkwood, M. W., Yeates, K. O., Taylor, H. G., Randolph, C., McCrea, M., & Anderson, V. A. (2008). Management of pediatric mild traumatic brain injury: A neuropsychological review from injury through recovery. *The Clinical Neuropsychologist, 22*(5), 769-800. https://doi.org/10.1080/13854040701543700

Kraak, W., Bernardo, B., Gouws, H., Loubser, A., Vuuren, J., & Coetzee, M. (2018). Concussion knowledge and attitudes amongst Stellenbosch University hostel rugby players. *South African Journal of Sports Medicine, 30*(1), 1-5.

Kroshus, E., Garnett, B. R., Baugh, C. M., & Calzo, J. P. (2015). Social norms theory and concussion education. *Health education research, 30*(6), 1004-1013. https://doi.org/10.1093/her/cyv047

Langlois, J. A., Rutland-Brown, W., & Wald, M. M. (2006). The epidemiology and impact of traumatic brain injury: a brief overview. *The Journal of head trauma rehabilitation, 21*(5), 375-378.

Li, M., Zhao, Z., Yu, G., & Zhang, J. (2016). Epidemiology of traumatic brain injury over the world: a systematic review. *General medicine: open access, 4*(5), e275-e275. https://doi.org/10.4172/2327-5146.1000275

Linden, M. A., Braiden, H.-J., & Miller, S. (2013). Educational professionals' understanding of childhood traumatic brain injury. *Brain injury, 27*(1), 92-102. https://doi.org/10.3109/02699052.2012.722262

Livingston, E. M., Thornton, A. E., & Cox, D. N. (2017). Traumatic brain injury in adolescents: incidence and correlates. *Journal of the American Academy of Child & Adolescent Psychiatry, 56*(10), 895-897. https://doi.org/10.1016/j.jaac.2017.07.787

Livingston, S. C., & Ingersoll, C. D. (2004). An investigation of collegiate athletes' knowledge of concussions. *Journal of athletic training, 39*(Suppl. 2), S17-S18.

Manasse-Cohick, N. J., & Shapley, K. L. (2014). Concussion education for high school football players: a pilot study. *Communication disorders quarterly*, *35*(3), 182-185. https://doi.org/10.1177/1525740113506605

May, T., Foris, L. A., & Donnally III, C. J. (2017). *Second Impact Syndrome*. StatPearls Publishing. http://www.ncbi.nlm.nih.gov/books/NBK448119/

Mayer, A. R., Quinn, D. K., & Master, C. L. (2017). The spectrum of mild traumatic brain injury: a review. *Neurology*, *89*(6), 623-632. https://doi.org/10.1212/WNL.0000000000004214

Mazriel, R., & Moodley, M. (2017). *Moderating Variables in Medical Help-Seeking Following Traumatic Brain Injuries* [Unpublished, University of Cape Town]. Cape Town.

McClure, J. (2011). The role of causal attributions in public misconceptions about brain injury. *Rehabilitation Psychology*, *56*(2), 85-93. https://doi.org/10.1037/a0023354

McCrory, P., Meeuwisse, W., Dvorak, J., Aubry, M., Bailes, J., Broglio, S., Cantu, R. C., Cassidy, D., Echemendia, R. J., & Castellani, R. J. (2017). Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016. *British journal of sports medicine*, *51*(11), 838-847. https://doi.org/10.1136/bjsports-2017-097699

McKinlay, A., Bishop, A., & McLellan, T. (2011). Public knowledge of 'concussion'and the different terminology used to communicate about mild traumatic brain injury (MTBI). *Brain injury*, *25*(7-8), 761-766. https://doi.org/10.3109/02699052.2011.579935

McKinlay, A., Grace, R., Horwood, L., Fergusson, D., Ridder, E. M., & MacFarlane, M. (2008). Prevalence of traumatic brain injury among children, adolescents and young adults: prospective evidence from a birth cohort. *Brain injury*, *22*(2), 175-181. https://doi.org/10.1080/02699050801888824

McRae, K., Gross, J. J., Weber, J., Robertson, E. R., Sokol-Hessner, P., Ray, R. D., Gabrieli, J. D., & Ochsner, K. N. (2012). The development of emotion regulation: an fMRI study of cognitive reappraisal in children, adolescents and young adults. *Social cognitive and affective neuroscience*, *7*(1), 11-22. https://doi.org/10.1093/scan/nsr093

Melchers, P., Maluck, A., Suhr, L., Scholten, S., & Lehmkuhl, G. (1999). An early onset rehabilitation program for children and adolescents after traumatic brain injury (TBI): Methods and first results. *Restorative neurology and neuroscience*, *14*(2-3), 153-160.

Mokhosi, M., & Grieve, K. (2004). African families' perceptions of traumatic brain injury. *South African Journal of Psychology*, *34*(2), 301-317.

Naidoo, D. (2013). Traumatic brain injury: the South African landscape. *South African Medical Journal*, *103*(9), 613-614. https://doi.org/10.7196/SAMJ.7325

Nell, V., & Brown, D. S. (1991). Epidemiology of traumatic brain injury in Johannesburg—II. Morbidity, mortality and etiology. *Social Science & Medicine, 33*(3), 289-296.

Nguyen, R., Fiest, K. M., McChesney, J., Kwon, C.-S., Jette, N., Frolkis, A. D., Atta, C., Mah, S., Dhaliwal, H., & Reid, A. (2016). The international incidence of traumatic brain injury: a systematic review and meta-analysis. *Canadian Journal of Neurological Sciences, 43*(6), 774-785.

Oosthuizen, D. (2010). *Families of children with traumatic brain injuries: Stressors and needs in the South African context* University of Cape Town]. Cape Town.

Pappadis, M. R., Sander, A. M., Struchen, M. A., Leung, P., & Smith, D. W. (2011). Common misconceptions about traumatic brain injury among ethnic minorities with TBI. *The Journal of head trauma rehabilitation, 26*(4), 301-311. https://doi.org/10.1097/HTR.0b013e3181e7832b

Pretorius, C., & Broodryk, M. (2013). Misconceptions about traumatic brain injuries among South African university students. *South African Journal of Psychiatry, 19*(3), 75-80. https://doi.org/10.4102/sajpsychiatry.v19i3.436

Register-Mihalik, J. K., Guskiewicz, K. M., McLeod, T. C. V., Linnan, L. A., Mueller, F. O., & Marshall, S. W. (2013). Knowledge, attitude, and concussion-reporting behaviors among high school athletes: a preliminary study. *Journal of athletic training, 48*(5), 645-653. https://doi.org/10.4085/1062-6050-48.3.20

Risdall, J. E., & Menon, D. K. (2011). Traumatic brain injury. *Philosophical Transactions of the Royal Society B: Biological Sciences, 366*(1562), 241-250.

Rosenbaum, A. M., & Arnett, P. A. (2010). The development of a survey to examine knowledge about and attitudes toward concussion in high-school students. *Journal of Clinical and Experimental Neuropsychology, 32*(1), 44-55. https://doi.org/10.1080/13803390902806535

Ruff, R. M., & Jamora, C. W. (2009). Myths and mild traumatic brain injury. *Psychological Injury and Law, 2*(1), 34. https://doi.org/10.1007/s12207-009-9029-4

Schellinger, S. K., Munson, B., & Kennedy, M. R. (2018). Public perceptions of traumatic brain injury: predictors of knowledge and the effects of education. *Brain injury, 32*(11), 1377-1385. https://doi.org/10.1080/02699052.2018.1492737

Schrieff-Elson, L. E., Thomas, K. G., & Rohlwink, U. K. (2017). Pediatric Traumatic Brain Injury: Outcomes and Rehabilitation. *Textbook of Pediatric Neurosurgery*, 1-28. https://doi.org/10.1007/978-3-319-31512-6_150-1

Schrieff, L. E., Thomas, K. G., Dollman, A. K., Rohlwink, U. K., & Figaji, A. A. (2013). Demographic profile of severe traumatic brain injury admissions to Red Cross War Memorial Children's Hospital, 2006-2011. *SAMJ: South African Medical Journal, 103*(9), 616-620. https://doi.org/10.7196/samj.7137

Sharp, D. J., & Jenkins, P. O. (2015). Concussion is confusing us all. *Practical neurology, 15*(3), 172-186. https://doi.org/10.1136/practneurol-2015-001087

Springer, J. A., Farmer, J. E., & Bouman, D. E. (1997). Common misconceptions about traumatic brain injury among family members of rehabilitation patients. *The Journal of head trauma rehabilitation, 12*(3), 41-50. https://doi.org/10.1097/00001199-199706000-00005

Sturman, D. A., Mandell, D. R., & Moghaddam, B. (2010). Adolescents exhibit behavioral differences from adults during instrumental learning and extinction. *Behavioral neuroscience, 124*(1), 16-25. https://doi.org/10.1037/a0018463

Sullivan, L., Thomas, A. A., & Molcho, M. (2017). An evaluation of Gaelic Athletic Association (GAA) athletes' self-reported practice of playing while concussed, knowledge about and attitudes towards sports-related concussion. *International journal of adolescent medicine and health, 29*(3). https://doi.org/10.1515/ijamh-2015-0084

Swift, T. L., & Wilson, S. L. (2001). Misconceptions about brain injury among the general public and non-expert health professionals: an exploratory study. *Brain injury, 15*(2), 149-165.

Sye, G., Sullivan, S. J., & McCrory, P. (2006). High school rugby players' understanding of concussion and return to play guidelines. *British journal of sports medicine, 40*(12), 1003-1005. https://doi.org/10.1136/bjsm.2005.020511

Thompson, F., & Logue, S. (2006). An exploration of common student misconceptions in science. *International Education Journal, 7*(4), 553-559.

Thurman, D. J. (2016). The epidemiology of traumatic brain injury in children and youths: a review of research since 1990. *Journal of child neurology, 31*(1), 20-27.

Tierney, A. L., & Nelson III, C. A. (2009). Brain development and the role of experience in the early years. *Zero to three, 30*(2), 9-13.

Viljoen, C. (2016). *Concussion knowledge among South African rugby players* University of the Free State].

Willer, B., Johnson, W. E., Rempel, R. G., & Linn, R. (1993). A note concerning misconceptions of the general public about brain injury. *Archives of Clinical Neuropsychology, 8*(5), 461-465.

Yuhasz, J. E. (2013). Misconceptions about traumatic brain injury among correctional health care professionals. *Journal of Correctional Health Care*, *19*(2), 135-143.

Appendix A

Survey (All)

(Please see separate attachment for full survey document)

Appendix B

Parents Informed Consent Form (High School)

University of Cape Town
Department of Psychology
Telephone: 021 650 3430

Informed Consent Form

Sociodemographic Predictors of Myths and Misconceptions of Traumatic Brain Injuries Among High School Learners in South Africa

Informed consent for your child to participate in a research study.

Traumatic Brain Injury (TBI) is a major cause of disability and death around the world with an annual worldwide prevalence rate ranging from 47 to 618 per 100 000 people. TBI has significant long-term effects on the world's population. However, many people still do not seek medical help post-TBI. Much of the population have misconceptions regarding TBI which contributes towards poor help-seeking behaviours post TBI. Many of the current studies on medical help-seeking behaviours post-TBI stems from high-income countries while very little information is published on misconceptions of TBI in multicultural, developing world countries, such as South Africa.

Purpose of the Study:

The researcher is trying to learn more about the circumstances in which people sustain a TBI, the medical care people receive afterward, the lasting consequences of TBI, and high school learners' ideas about TBI. Specifically, it examines traumatic brain injuries that results in being knocked out, experiencing memory loss, and/or being dazed and confused. If you agree for your child to be part of this research, your child will be asked to take a survey of about 75 questions. It should take approximately 45 minutes to finish the survey.

Researcher Contact Details:

The research is being conducted by Miranda Moodley, as part of her research for her Masters' degree in psychology. The contact details are as follows: moodleymiranda@gmail.com, 072 816 1914. Dr. Leigh Schrieff-Elson is supervising this project. Her contact details are as follows: leigh.schrieff-elson@uct.ac.za, Tel: 021 650 3708.

Questions or concerns about the research, your/your child's rights, and/or research-related injuries should be directed to Rosalind Adams in the Psychology Department at 021-650- 3417.

Who can take part and what will be done:

Grade 10 and 11 students will be asked to take part in a paper-based survey. The survey will ask students questions about their experience with TBI causes, symptoms and treatment as well as questions regarding their understanding of TBIs. This survey will take place on school property and during school time (a free class period so as to not interfere with school work). Therefore, there will be no costs to you in allowing your child to participate in this study.

Risks

This is a low risk study for your child, however some of the questions may be personal. For example, if you report that you have had a TBI that resulted in being knocked out, experiencing memory loss, and/or being dazed and confused, you will be asked questions about your injury (an example: "Did you receive a medical diagnosis for your traumatic brain injury?").

If answering any questions in this survey results in unsettling feelings for your child, you should speak to a counsellor at your school or contact the relevant Western Cape Education Department School Clinic at https://www.westerncape.gov.za/text/2006/7/mh_resource_directory_optimised_fgamieldien.pdf

Reward

After participating in this study, your child will be entered into a lucky draw where they could stand a chance to win a shopping voucher; R1000 for 1st place, R500 for 2nd place and R300 for 3rd place.

Benefits

Society may benefit from the data collected from your child. This study aims to contribute to the knowledge of myths and misconceptions regarding TBIs. This may, in future, improve the psychoeducation that is available to learners regarding TBI in general. Additionally, a report on the data collected from the school will be sent to you and the school.

Confidentiality of Data

The survey is anonymous; your child will receive a participant number so that they may be entered into the lucky draw. Only those directly involved in the study will have access to the data. The researchers will keep the survey results on a password protected laptop for five years and then they will destroy the survey results. Only the researcher and the supervisors will have access to the survey data. All paperwork relating to the study will be kept in a locked file cabinet. If there are any publications apart from the thesis that this study is contributing to, all identifying information gathered from your child will not be revealed.

Withdrawing from the study

Participation is voluntary. You and your child are free to withdraw your consent and assent, respectively, to stop participating in this research study at any time. If you do withdraw your

consent, there will be no penalty. If you do withdraw your consent, may the researcher still use the data already collected?

Yes ☐ ☐ No

Signatures

Statement of Consent: I have read this consent form and agree for my child to be in this study, with the understanding that my child's participation is voluntary and we may withdraw our consent and assent at any time. I understand that signing below indicates that I have read the description of the study, understand any risks involved, and I agree that my child may participate.

I consent that _____ (child's name) may participate in the abovementioned study.

Signature of Consent: _____

Relationship to child participating in the study: Parent ☐ Legal Guardian ☐

Name of Parent/Legal Guardian: _____

Cell phone number for parent/legal guardian: _____

Email address for parent/legal guardian: _____

Appendix C

Learners Informed Assent Form (High School)

University of Cape Town
Department of Psychology
Telephone: 021 650 3430

Sociodemographic Predictors of Myths and Misconceptions of Traumatic Brain Injuries Among High School Learners in South Africa

Informed assent for your data to collected in this research study.

You are being asked to have your data collected, stored and used as part of a research project. The researcher is trying to learn more about the circumstances in which people sustain a traumatic brain injury (TBI), the medical care people receive afterward, the lasting consequences of TBI, and your ideas regarding TBI. Specifically, it examines TBIs that result in being knocked out, experiencing memory loss, and/or being dazed and confused. If you agree to be part of this research, you will be asked to take a survey of about 75 questions. It should take approximately 45 minutes to finish the survey. The research is being conducted by Miranda Moodley, as part of a Masters' degree in psychology.

If you complete the survey, you will be entered into a lucky draw to win a shopping voucher; R500 for 1st place, R300 for 2nd place and R200 for 3rd place.

The researcher does not think that there are any serious risks to you, but some of the questions may be personal. For example, if you report that you have had a traumatic brain injury that resulted in being knocked out, experiencing memory loss, and/or being dazed and confused, you will be asked questions about your injury (an example: "Did you receive a medical diagnosis for your traumatic brain injury?").

If answering any questions in this survey results in unsettling feelings for you, you should speak to a school counsellor. Or if a counsellor is not available to you, please contact the relevant Western Cape Education Department School Clinic at https://www.westerncape.gov.za/text/2006/7/mh_resource_directory_optimised_fgamieldien.pdf

The survey is anonymous; you will receive a participant number so that you may be entered into the lucky draw. Only people directly involved in the study will have access to the data. The researcher will keep the survey results on a password protected laptop for five years and then they will destroy the survey results. All paper copies of data will be stored in a locked file cabinet. Only the researcher and the supervisors will have access to the survey data.

Participation is voluntary. You are therefore free to withdraw your assent and to stop participating in this research study at any time. If you do withdraw your assent, there will be no penalty. You and your school will receive a report of the data findings from this study. However, all information displayed will not refer back to you at any point in time.

If you do withdraw your assent, may the researcher still use the data already collected?

Yes ☐ No ☐

Questions or concerns about the research, your rights, and/or research-related injuries should be directed to Rosalind Adams in the Psychology Department at 021-650- 3417.

I have explained the purpose of the study, how data will be collected, stored and used to the participant's parent/legal guardian.

Signature of Researcher: _____

Date: _____

Statement of Assent: I have read this assent form and agree to be in this study, with the understanding that my participation is voluntary and I may withdraw my consent at any time. I understand that signing below indicates that I agree for my data to be collected, stored and used in future studies.

Signature of participant: _____

Name of Participant: _____

Date: _____

Appendix D

SRPP Advertisement (University)

Subject: Research Invitation - Medical Help-Seeking Following Traumatic Brain Injuries

First year students are invited to participate in a study on Moderating Variables in Medical Help-Seeking Following Traumatic Brain Injuries Including Myths and Misconceptions for 2 SRPP points.

Details about the study: Researchers at the Psychology department in association with Prof Paul Jantz at Texas State University are running a study on Medical Help-Seeking Following Traumatic Brain Injuries. Due to standardization procedures, we are only recruiting ***first year PSY1004F***. Participation will involve an online survey regarding myths and misconceptions of TBIs and concussions. It should take 60 minutes (at most) to complete. At the end of the survey, you will fill out a form with your student number and will receive 2 SRPP points. This study has been approved by the Department of Psychology's Research Ethics Committee.

How to participate: If you would like to find out more about the study and sign up to participate, please go to the SRPP site on VULA and find the study details and participant sign-up sheet under the sign up tab on the left-hand side of the VULA page.

Appendix E

Ethical Approval for High School Learners

UNIVERSITY OF CAPE TOWN

Department of Psychology

University of Cape Town Rondebosch 7701 South Africa
Telephone (021) 650 3417
Fax No. (021) 650 4104

31 May 2018

Miranda Moodley
Department of Psychology
University of Cape Town
Rondebosch 7701

Dear Miranda

I am pleased to inform you that ethical clearance has been given by an Ethics Review Committee of the Faculty of Humanities for your study, *Socio-demographic predictors of myths and misconceptions of TBI among high school learners in South Africa.* The reference number is PSY2018-029

I wish you all the best for your study.

Yours sincerely

Signature Removed

University of Cape Town
ΨPSYCHOLOGY DEPARTMENT
Upper Campus
Rondebosch

Lauren Wild (PhD)
Associate Professor
Chair: Ethics Review Committee

Appendix F

Western Cape Education Department Ethical Approval

Western Cape Government
Education

Directorate: Research

Audrey.wyngaard@westerncape.gov.za
tel: +27 021 467 9272
Fax: 0865902282
Private Bag x9114, Cape Town, 8000
wced.wcape.gov.za

REFERENCE: 20180614-3312
ENQUIRIES: Dr A T Wyngaard

Ms Miranda Moodley
20 d'Urban Street
Bothasig
7401

Dear Ms Miranda Moodley

RESEARCH PROPOSAL: SOCIODEMOGRAPHIC PREDICTORS OF MYTHS AND MISCONCEPTIONS OF TRAUMATIC BRAIN INJURIES AMONG HIGH SCHOOL LEARNERS IN SOUTH AFRICA

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **14 January 2018 till 27 September 2018**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number?
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

    The Director: Research Services
    Western Cape Education Department
    Private Bag X9114
    CAPE TOWN
    8000

We wish you success in your research.

Kind regards.
Signed: Dr Audrey T Wyngaard
Directorate: Research
DATE: 18 October 2018

Appendix G

Debriefing Pamphlet (High School)

Contact

If you have experienced a traumatic brain injury or head injury, please seek medical help as soon as possible.

Neurosurgery Clinic

Red Cross War Memorial

7700

Tel: 021 658 5434

How does Traumatic Brain Injury affect me?

What is Traumatic Brain Injury (TBI)?

TBI is a brain injury that occurs because of an external blunt or piercing force to the head. This impacts on a person's ability to complete daily activities and affects a person's awareness.

Facts about TBI

- Each year more than 10 million people are affected by a traumatic brain injury
- An average of 626 000 TBIs occur amongst children
  - 62 000 children are hospitalised
  - 564 000 children are seen in emergency departments

Why is TBI important?

Anyone can experience a TBI. Even a slight knock to the head can result in a TBI. It is **important** that a brain injury be properly diagnosed and treated so the brain has the opportunity to recover, and to prevent symptoms from worsening.

Causes of TBI

COMMON MYTHS AND MISCONCEPTIONS REGARDING TBI FROM UNIVERSITY OF CAPE TOWN'S FIRST YEAR (2017)STUDENTS

88% thought people with a brain injury can forget who they are and be normal in every other way	If people with a brain injury forget who they are, they would also have other severe impairments
79% thought that people who have had one brain injury are not more likely to have a second brain injury	People who have had one brain injury are more likely to have a second injury because your brain is more vulnerable
70% thought that an athlete who gets knocked out after getting a concussion is not experiencing a coma	Athletes who get knocked out after experiencing a concussion can go into a coma
62% thought that it is not common for people with brain injuries to be easily angered	A person's anger threshold is lowered when they experience a brain injury. Therefore, they get angry more easily and more intensely
53% thought that it is not possible to recover from a severe brain injury	It is possible to improve your condition after a severe brain injury

Appendix H

Ethical Approval for University Students

UNIVERSITY OF CAPE TOWN

Department of Psychology

University of Cape Town Rondebosch 7701 South Africa
Telephone (021) 650 3417
Fax No. (021) 650 4104

09 June 2017

Department of Psychology
University of Cape Town
Rondebosch 7701

Dear Robyn and Miranda

I am pleased to inform you that ethical clearance has been given by an Ethics Review Committee of the Faculty of Humanities for your study, *Moderating Variables in Medical Help-Seeking Following Traumatic Brain Injuries.* The reference number is PSY2017 -019.

I wish you all the best for your study.

Yours sincerely

Signature Removed

University of Cape Town
ΨPSYCHOLOGY DEPARTMENT
Upper Campus
Rondebosch

Lauren Wild (PhD)
Associate Professor
Chair: Ethics Review Committee

Appendix I

Debriefing Email (University)

Thank you for participating in the Help-Seeking Behaviors after TBI survey. Your responses were greatly appreciated. The information below will inform you of what to do if you have any concerns regarding your participation in the survey. It will also provide you with information regarding why the survey was run and what we aim to gather from this research project.

Concerns: If you experience any unsettling feelings or anxiety related to filling in this survey, please speak to a mental health provider at the UCT Student Wellness Centre, Ivan Toms Building, 28 Avenue, Mowbray Rhodes, Rhodes Drive, Mowbray, Cape Town, 7700; Tel: 021 650 1017.

You can also contact the researchers or their supervisor if you have any complaints or queries: Supervisor: Dr Leigh Schrieff-Elson (schrieff-elson@uct.ac.za; Tel: 021 650 3708); Researchers: Robyn Mazriel (robzmazriel@gmail.com) and Miranda Moodley (moodleymiranda@gmail.com).

Aims: This study is part of a larger study that is being run at the Texas State University by Prof Paul Jantz. These studies aim to understand what decision factors influence individuals to seek help after TBIs. Therefore, identifying these factors in a South African context can help inform interventions that may seek to provide appropriate psychoeducation, which may in turn facilitate optimal health-seeking behaviours.

For any further questions, please contact the researchers involved in this study.