Parent and Teacher Knowledge of Head Injuries

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Abstract

This study examined parents and teachers knowledge of aspects of head injury (HI). Part one examined the various sources of information and education parents and teachers have access to that could impact on their knowledge of HI. Part two surveyed 64 parents and 64 teachers of young children (<5 years) from the North Shore, Auckland, to examine the extent of their personal knowledge of HI, and the sources of their knowledge (e.g. media). Participants were asked about the source of their knowledge of HI (i.e. various types of media, personal experiences etc), and the qualifications they hold that could impact on their knowledge (i.e. first aid training, teacher training qualification). Participants were also asked to complete a questionnaire about aspects of head injury - general knowledge, memory, recovery.

Results indicated that there is a wealth of information in the public domain regarding HI. First aid courses provide information that can help a person deal with a HI immediately following the incident, but are not compulsory for teachers to have. Various other sources of information such as doctors, PlunketLine and the internet also provide information and advice for the public to access.

When parents and teachers were surveyed it was found that they have similar levels of knowledge regarding HI, although on average parents had slightly higher scores than teachers. Having a first aid certificate did not mean parents and teachers had higher levels of accuracy - in fact those who did not have a first aid certificate had higher average scores than those who did.

Doctors and PlunketLine were the most likely source of information for parents and teachers. The most popular media-specific sources were daily newspapers and television news.

Further studies could examine the wider public's knowledge of HI. A more complete form of the survey could be used to get a well rounded picture of the current knowledge base of HI.

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Overview

Head Injury (HI) is a common cause of death and disability worldwide. Children in particular have one of the highest rates of HI, therefore knowledge of the symptoms and long term consequences of this is crucial.

Within the spectrum of HI severity, mild HI accounts for approximately 80% of HI's. Information on the prevalence of mild HI is difficult to determine as some of the symptoms of mild HI (headache, nausea, fatigue etc) can be attributed to other causes, or can be attended to without medical attention. For those who care for young children knowledge of the symptoms of mild HI is particularly important – young children do not have the skills to describe any potential symptoms following a HI and it is up to those who care for them to be able to identify when these symptoms are occurring, to therefore seek and advocate for medical assistance if required.

Therefore a literature review was performed, focussing on the levels of knowledge the parents and teachers of young children have about HI. This search found previous studies which have examined the public knowledge of HI symptoms, in particular a study by Gouvier, Presholdt, and Warner (1988). This survey found there were many misconceptions held by the general public in regards to HI, and has since been repeated with similar results.

From this it was found that there has not yet been a survey of similar sorts in New Zealand. Experiences of the researcher as an early childhood teacher were that many children have accidents, and there was questions regarding how these injuries are dealt with by teachers and parents, and what knowledge parents and teachers have about HI. The researcher also spoke to some parents and teachers throughout the course of researching this topic and found some general confusion about signs and symptoms of mild HI.

Given the above the current study focuses on the knowledge that teachers and parents of young children have about HI. There is a focus on the sources and accuracy of this knowledge, with a comparison to previous studies.

Chapter one begins with an outline of HI, discussing the definitions and different terms used to define HI, and epidemiology of HI. The causes of HI are discussed, and the effect HI has on young children and the general population is also examined. The three ways in which the severities of HI are classified are then outlined.

Following from this Chapter two looks at mild HI, and the definitions and ways in which mild HI is classified. The symptoms of mild HI are divided into three categories – physical, cognitive, and behavioural - and are discussed. The epidemiology and causes of mild HI are outlined, showing how widespread and common mild HI is. The reasons for mild HI being referred to as the 'silent epidemic' are discussed, and the risk factors that influence the outcome following a HI are outlined.

Chapter three reviews the factors that influence symptom knowledge, with a focus on the general public and teachers. Misconceptions about HI are discussed, and previous studies analysed. Media and public awareness of HI, and the organisations that help dispense this information are examined. The impact that attitudes can have on knowledge is examined, and the legislation that dictates the training that teachers may get in regards to HI is also discussed.

Chapter four outlines the current study's aim and hypotheses, further emphasizing the need for the research.

This is followed by chapter five, outlining the method of the current study which is divided into two parts – research into the knowledge available to the public in regards to HI, and a survey of parents and teachers of young children about their knowledge of HI.

Chapter six details the results of the current study.

Chapter seven discusses the results of the current study, followed by an outline of the possible limitations of the study, suggestions for future research, and conclusions.

Chapter One: Head Injury

As background to the study, this chapter will outline the definition, epidemiology, and causes of head injury (HI), as well as the effects that it has on young children and the general population. The financial costs of HI are also discussed to given an understanding of the cost of treatment and rehabilitation. The different methods of assessing severity will also be outlined. Finally the management and treatment of HI will be discussed.

Definition

A concise definition of HI is that it is 'an acute brain injury that results from mechanical energy to the head from external physical forces' (New Zealand Guidelines Group, 2006, p. 22). HI is a major health problem in New Zealand and around the world (New Zealand Guidelines Group, 2006) and is the leading cause of death in the United States in people under 35 years of age (Fletcher, Ewing-Cobbs, & Francis, 1995) and the leading cause of death and disability worldwide (International Brain Injury Association, 2010). In New Zealand it is estimated that approximately 20,000 to 30,000 people suffer a HI each year (New Zealand Guidelines Group, 2006).

The terms traumatic brain injury (TBI) and HI are often used interchangeably. The term TBI implies that the brain is injured and that therefore the consequences are likely to be more serious than HI (where the injuries may be confined to surface facial and scalp injury). However from this point on, the term head injury (HI) will be used to cover both conditions on the basis that a HI may be superficial but should treated as serious until proven otherwise.

Epidemiology

The incidences of HI is highest in early childhood, late adolescence/early adulthood and older age (Bruns & Hauser, 2003). A study of attendees at a Melbourne hospital found that children under three years comprised 49.1% of all HI's (Crowe, Babl, Anderson, & Catroppa, 2009). A Manhattan study found the incidence of HI in infants (less than 1 year of age) was approximately 155 per 100,000 children in this age group (Durkin, Olsen, Barlow, Virella, & Connolly, 1998). This is comparative to a study in Olmsted County, Minnesota, which had an incidence rate of 190 of 100,000 children

in the same age group (Annegers, Grabow, Kurland, & Laws, 1980). In the Manhattan study the HI incidence for children aged 1-4 years was 104 per 100,000 children of this age group (Durkin, et al., 1998).

In terms of gender, boys and girls have similar incidences of HI until the age of 5 when the incidence of HI for boys increases – by the time children reach adolescence the ratio of incidence boys vs. girls is 2:1 (Max, 2005). It is thought that boys have more accidents as their play is generally more active in comparison to girls (McKinlay, et al., 2010).

Causes

In New Zealand HI's sustained by children under five is commonly a result of 'motor vehicle accidents (17%), loss of balance/personal control (17.2%), or being struck by a person or object (16.1%)' (Larking, 2004, p. 4). HI can occur as a result of 'direct (hitting head on a surface/blunt object) or indirect (acceleration/deceleration) trauma' (Alexander, 1995, p. 1253).

Effects on young children and general population

Young children (0 – six years of age) are most susceptible to HI in comparison to other age groups (Wrightson, McGinn, & Gronwall, 1995) which could be due to their large head to body ratio and thinner skull (Cook, Schweer, Shebesta, Hartjes, & Falcone, 2006). Further, children's brains are smaller than adults (Blinkov & Glezer, 1968), which means any force from a HI is likely to be absorbed by more of the skull, resulting in not only damage to the focal point of the injury, but also diffuse damage such as tearing or sheering of the neurons., (Boll, 1983). This widespread damage is thought to interrupt neural progression more so than focal damage, causing more disruption of function than focal damage alone (Kolb, Gibb, & Gorny, 2000).

Brain injury has significant implications for children, both developmentally and psychologically, and can have an immense emotional impact on all those involved, including not only the child but also their parents and siblings (Gronwall, Wrightson, & Waddell, 1990). Injury at an early age can interrupt the developmental stages occurring at the time of injury, and can also impact on those skills yet to develop (Catroppa, Anderson, Morse, Haritou, & Rosenfeld, 2007). The most detrimental time

for a HI to occur is during a child's first year of life due to the high rate of development occurring during this time (Anderson, et al., 1997; Kolb, et al., 2000; Kolb & Whishaw, 2003). Despite this there are currently only a limited number of epidemiological studies that include preschool children, particularly due to the issues regarding assessment of HI (i.e., shorter attention spans). There is a need for further research in this area in order for the relationships between age and recovery to be more firmly established (Kolb & Whishaw, 2003).

Costs

In 2004 ACC estimated it had paid over $100 million a year for treatment and rehabilitation for those suffering a HI or concussion (New Zealand Guidelines Group, 2006). In the United States pediatric HI hospital charges are estimated to cost approximately $1 billion annually (Bowman, Bird, Aitken, & Tilford, 2008; Schneier, Shields, Hostetler, Xiang, & Smith, 2006).

Classification of Head Injuries

HI's are commonly classified by severity – mild, moderate or severe. Severity is thought to be the most common 'predictor of neurobehavioural outcomes of childhood TBI' (Taylor, 2010, p. 150). Three of the most commonly used methods of assessing HI severity (both nationally and internationally) are the injured persons score on the Glasgow Coma Scale(Teasdale & Jennett, 1974, 1976), length of loss of consciousness, and duration of post-traumatic amnesia (Kirkwood & Yeates, 2010).

Glasgow Coma Scale.

The Glasgow Coma Scale ('GCS', Teasdale & Jennett, 1974, 1976) is a measure comprised of 15 possible points, scored over three categories – eye opening, verbal, and motor response. The resulting score is used to describe a person's level of consciousness following an accident (see Table 1: Glasgow Coma Scale). A score below 8 indicates severe brain damage, a score of 8-12 indicates moderate brain injury, and a score of 13-15 is indicative of a mild brain injury (Jawahar & Nanda, 2003). The GCS is the most common approach to measuring HI severity (McCrea, 2008).

Table 1
Glasgow Coma Scale

Eyes Open	Score	Best Verbal Response	Score	Best Motor Response	Score
Spontaneous	4	Orientated	5	Obeys command	6
To sound	3	Confused conversation	4	Localise pain	5
To pain	2	Inappropriate words	3	Flexion (withdrawal)	4
Never	1	Incomprehensible words	2	Flexion (abnormal)	3
		None	1	Extension	2
				None	1

Note. Coma score = eyes open + best verbal response + best motor response. Adapted from "Assessment and prognosis of coma after head injury," by G. Teasdale, B. Jennett , 1976, *Acta Neurochirurgica, 34*,p. 46. Copyright 1976 by the European Association of Neurosurgical Societies (EANS).

Table 2
Pediatric Glasgow Coma Scale

Eyes Opening Response < 1 year	Score	Best Verbal Response 0 – 2 years	Score	Best Motor Response < 1 year	Score
Spontaneous	4	Coos, babbles	5	Normal spontaneous movement	6
To speech	3	Irritable, cries	4	Withdraws to touch	5
To pain	2	Cries to pain	3	Withdraws to pain	4
None	1	Moans to pain	2	Abnormal flexion	3
		None	1	Abnormal extension	2
				None	1

Note. Coma score = eyes open response + best verbal response + best motor response. Adapted from H.E. James, cited in "Performance of the pediatric glasgow coma scale in children with blunt head trauma" J.F. Holmes, M.J. Palchak, T. MacFarlane, and N. Kuppermann, 2005, *Academic Emergency Medicine, 12*(9), p. 815. Copyright 2005 John Wiley & Sons, Inc.

Due to the varying and complex stages of development that occur between infancy and adolescence and through to adulthood, one scale alone would not be effective to measure the level of severity while accounting for developmental differences (Adelson, 2010). Although many scales have been introduced to try to bridge this gap, (including a pediatric version of the Glasgow Coma Scale – Pediatric Glasgow Coma Scale, see Table 2) they have not, as yet, been validated or used in pediatric HI studies (Adelson, 2010). Therefore, as there are no agreed upon 'gold standard' assessments for infants, it can make injury assessment very difficult (Ewing-Cobbs, et al., 1997).

Additionally, as the GCS is not sensitive to somatic symptoms (such as headaches, nausea, dizziness) or changes in mental status (such as confusion, disorientation or amnesia), it alone is not enough to assess HI (McCrea, 2008). Therefore two other measures are used to assess severity – the length of an injured person's loss of consciousness and post traumatic amnesia (Uzzell, 1999).

Loss of consciousness.

Much of the literature gives evidence to support the idea that the longer a person has experienced a loss of consciousness (LOC), the more severe their outcome (McCrea, 2008). However the duration of LOC can be hard to determine, particularly if there is no one around when the incident occurs, and therefore LOC can be confused with post traumatic amnesia – for example after falling off a bike a person might report having 'woken up in the ambulance'. This may be true if they were unconscious, but sometimes people report that the injured person has been awake the whole time, and therefore the person was actually experiencing post traumatic amnesia, not loss of consciousness (Forrester, Encel, & Geffen, 1994).

Post traumatic amnesia.

Post traumatic amnesia (PTA) is the term given to the confused state that can occur in individuals immediately following a HI. This effects memory and acquisition of new information (Forrester, et al., 1994). The period of PTA is thought to have stopped when the child is 'orientated to time, place, and person' (Blosser & DePompei, 2003, p. 25). The length of time PTA occurs for can be used as a measure of severity – though it is not as effective in regards to mild HI (likely because many who suffer a mild HI do experience PTA) (McCrea, 2008). This has an effect on the child's further learning and

can therefore have a substantial impact on a childs return to continuing their pre-injury activities (e.g., childcare, hobbies, and interests) (Whyte, et al., 2009).

In summary HI is a commonly occurring injury, and a worldwide cause of disability and death. Children under five have some of the highest rates of HI worldwide, with many injuries being caused by 'motor vehicle accidents' or 'loss of personal control' (Larking, 2004, p. 4). Mild HI is the most common type of HI, particularly in young children, and due to its seemingly mild nature comparative to other can be easily overlooked (Kirkwood & Yeates, 2010). It is essential that those who are caring for young children have an understanding of the dangers and sequelae of HI, particularly mild HI, in order to prevent injuries and to lessen the impact of those injuries that do occur. Without an understanding of the possible sequelae of HI the problems that a child is having may be attributed to other causes, and a HI may go undiagnosed. As mild HI is the most commonly occurring type of HI this will be focussed on next.

Chapter Two – Mild Head Injury (Mild HI)

Because most of the head injuries sustained by children are mild (if they are classified as HI at all), and this research focuses on injuries typically as the milder end of the spectrum, the next section provides a broad review of mild HI.

Definition

The definition of mild HI is a source of ongoing debate, due to the varying terms used to describe mild HI, the difficulties in defining upper and lower thresholds (McCrea, 2008), and the uncertainty faced as to whether someone has actually suffered an injury (Margulies, 2000). The lack of a clear definition causes wide spread confusion and therefore means that research results might not be interpreted correctly or consistently (Yeates & Taylor, 2005).

Within the literature terms such as 'mild closed head injury' (Heitger, et al., 2006), 'minor closed head injury', 'mild traumatic brain injury', 'concussion' (Yeates & Taylor, 2005), 'minor head injury', 'mild head injury', 'mild concussion syndrome' (Gerstenbrand & Stepan, 2001) and 'mild permanent brain injury' (Margulies, 2000) are commonly used and often interchangeably. 'Post concussion syndrome' is the term often used to describe the constellation of symptoms that can occur following a mild HI (Kashluba, Casey, & Paniak, 2006).

Classification

There is a lack of consistent classification of mild HI, however many studies use the following classification: a GCS of 13-15; some signs of alteration of consciousness – for example PTA lasting less than 1 hour, and/or LOC lasting less than 15 minutes; and no signs of neurological deficits if a neurological scan is performed (Anderson, Catroppa, Morse, Haritou, & Rosenfeld, 2001; De Kruijk, Twijnstra, Meerhoff, & Leffers, 2001). Sometimes there will be no period of either LOC or PTA (McCrea, Kelly, Randolph, Cisler, & Berger, 2002). Table 3 gives a more concise summary of definitions of mild HI used by three mild HI focussed groups.

Table 3

Definitions of Mild Head Injury from Various Focus Groups

Organisation	Criteria
American Congress of Rehabilitation Medicine (ACRM) – Mild Brain Injury Committee of the Head Injury Interdisciplinary Special Interest Group (Kay, et al., 1993).	A patient with Mild Traumatic Brain Injury is a person who has had a traumatically induced physiological disruption of brain functions as manifested by at least one of the following: - Any period of loss of consciousness - Any loss of memory for events immediately before or after the accident - Any alternation in mental state at the time of the accident (eg. Feeling dazed, disorientated, or confused) - Focal neurological deficit that may or may not be transient But the severity of the injury must not exceed the following - Loss of consciousness of approximately 30 minutes or less - After 30 minutes, an initial Glasgow Coma Scale (GCS) of 13-15 - Posttraumatic amnesia (PTA) not greater than 24 hours
World Health Organisation Collaborating Task Force on Mild Traumatic Brain Injury Operational Definition of MTBI (Carroll, Cassidy, Holm, Kraus, & Coronado, 2004).	Mild Traumatic Brain Injury is an acute brain injury resulting from mechanical energy to the head from external physical forces. Operational criteria for clinical identification include: (i) 1 or more of the following: confusion or disorientation, loss of consciousness for 30 minutes or less, post-traumatic amnesia for less than 24 hours, and/or other transient neurological abnormalities such as focal signs, seizure, and intracranial lesion not requiring surgery; (ii) Glasgow Coma Scale score of 13–15 after 30 minutes post-injury or later upon presentation for healthcare. These manifestations of MTBI must not be due to drugs, alcohol, medications, caused by other injuries or treatment for other injuries (e.g. systemic injuries, facial injuries or intubation), caused by other problems (e.g. psychological trauma, language barrier or coexisting medical conditions) or caused by penetrating craniocerebral injury
Starship Hospital (Law & Settle, 2009).	Admission criteria - GCS < 15 - CT abnormality except simple uncomplicated fracture - Delayed seizure - Disabling symptoms Requirements for discharge - orientated in time and place (GCS 15) - No focal neurological signs - Mild/moderate headache only - Normal CT scan with or without skull fracture - Accidental causes

Note. Adapted from "Definition of mild traumatic brain injury," by T. Kay, D.E. Harrington, R. Adams, T. Anderson, S. Berrol, Cicerone, K. et al., 1993, *Journal of Head Trauma Rehabilitation, 8*(3), pg. 86. Copyright 1993 by Wolters Kluwer Health, Inc ; "Methodological issues and research recommendations for mild traumatic brain injury: The WHO collaborating centre task force on mild traumatic brain injury," by L.J. Carroll, J.D. Cassidy, L. Holm, J.F. Kraus, and V.G. Coronado, 2004, *Journal of Rehabilitation Medicine, 43*, pg. 115. Copyright 2004 by the Foundation of Rehabilitation Medicine; "Management of Paediatric Head Injury," by A. Law and F. Settle, 2009, *Clinical guidelines for Common Paediatric Conditions*, from http://www.starship.org.nz/assets/Uploads/Starship-Hospital-Content/Health-Professionals/Clinical-Guidelines/Head-Injury.pdf. Copyright 2009 Starship Hospital.

Symptoms

The symptoms of mild HI can occur immediately following the incident (i.e. headache or nausea), or evolve over a period of time (i.e. difficulty with memory or attention) which can be anywhere from days to months (New Zealand Guidelines Group, 2006). In most mild HI cases symptoms resolve within one to 14 days, however a small percentage of people may have ongoing symptoms that last for longer than six months (Brain Injury New Zealand, 2007). Symptoms can occur alone or in combination with other symptoms, which can be extremely disabling (Mateer & D'Arcy, 2000). The cluster of persistent symptoms that occur following a mild HI is commonly referred to as post concussion syndrome (PCS) (Alexander, 1995; McCrea, 2008). Symptoms can also be divided into immediate, long term/late emerging, and impairments of development as it would have occurred without the injury (New Zealand Guidelines Group, 2006). Table 4 contains a concise list of symptoms common in the early stages following mild HI, from various sources. In saying this however, many of the symptoms in the table can also be long term (such as headaches, memory problems).

Some impairments of development are only obvious as the child gets older and are no longer keeping up with their peers or environment at a rate as they were in the past. This is likened to 'growing into a deficit' (O'Shea, Harel, & Fein, 2002, p. 257). For example if a child suffers an accident at a young age and the process of developing social skills is disrupted. As they get older they may not develop further social skills and still use the same level of social skills they used at the time of the injury. Their level of socialisation may no longer be appropriate as the child gets older and it then that the deficit is evident, rather than at the time of injury (O'Shea, et al., 2002).

Children, and in particular young children (under age five), may not be able to articulate how they are feeling or what they are having difficulty with in regards to the symptoms of their mild HI. They may be restless, irritable and aggressive which are often signs of other problems such as headaches, fatigue and a general feeling of being unwell (Gronwall, et al., 1990). It is important to note that the most important time for close monitoring following a HI is immediately after the injury, until approximately 48 - 72 hours post injury (if no complications occur before this time) (American Academy of Neurology, 1997).

Table 4

Symptoms of Mild Head Injury Immediately Following the Incident

Organisation/Group	Mild Head Injury symptoms
ACC NZ (Knowing about your Mild Traumatic Brain Injury MTBI)	- Persistent headache - Feeling tired or dizzy - Blurred vision - Difficulty concentrating - Difficulty with memory - Moodiness, short temper or irritability - Intolerance of noise Can take seven to ten days for the symptoms to settle.
ACC NZ (Caring for your child after a Head Injury)	For a few days after a head injury it is normal for a child to: - Feel a little unsteady or giddy - Not feel like playing with one thing for long or doing schoolwork or homework - Be a little bit grumpy - Seem to need more sleep than usual - Complain of a bit of a headache - Dislike loud noises Your child should start to feel better in three to four days after the injury
Brain Injury New Zealand (Concussion in Children pamphlet)	Signs and symptoms – some immediate signs that a child has sustained a concussion include: - Appears dazed - Confused - Poor balance and lack of coordination - Answers questions slowly - Runs in the wrong direction - Forgets events that occurred before and after impact - Loss of consciousness – but it is important to remember that child can sustain a concussion without losing consciousness A child may complain of: - Headache - Nausea and vomiting - Double or blurred vision - Confusion - Fatigue - Poor concentration - Memory problems - Sleep difficulties - Irritability - Sensitivity to noise and light and ringing in ears
American Congress of Rehabilitation Medicine (ACRM) – Mild Brain Injury Committee of the Head Injury Interdisciplinary Special Interest Group (Kay, et al., 1993)	- Physical symptoms of brain injury – nausea, vomiting, dizziness, headache, blurred vision, sleep disturbance, quickness to fatigue, lethargy, or other sensory loss) that cannot be accounted for by other causes - Cognitive deficits – (involving attention, concentration, perception, memory, speech/language, or executive functions) that cannot be completely accounted for by emotional state or other causes; and

	- Behavioural change(s) and/or alterations in degree of emotional responsively (eg. Irritability, quickness to anger, disinhibition, or emotional lability) that cannot be accounted for by a psychological reaction to physical or emotional stress or other causes.

Note. Adapted from "Knowing About Your Mild Traumatic Brain Injury (TBI)," by Accident Compensation Corporation, 2006, New Zealand Guidelines Group, Wellington New Zealand. Copyright 2006 Accident Compensation Corporation; "Caring for Your Child after a Head Injury," by Accident Compensation Corporation, 2007, Accident Compensation Corporation, Wellington New Zealand. Copyright 2007 Accident Compensation Corporation; "Concussion in Children," by The Brain Injury Association of New Zealand, 2007, Brain Injury Association of New Zealand, Auckland, New Zealand; "Definition of Mild Traumatic Brain Injury," by K.T. Kay, D.E. Harrington, R. Adams, T. Anderson, S. Berrol, K. Cicerone, et al., 1993, *Journal of Head Trauma Rehabilitation, 8*(3), p. 87. Copyright 1993 Wolters Kluwer Health, Inc.

Physical symptoms.

Headaches are the most common symptom of mild HI (Anderson, Heitger, & MacLeod, 2006; Boran, 2006; Kay, et al., 1993; Wrightson & Gronwall, 1999), with many children suffering from persistent headaches that only resolve over time (New Zealand Guidelines Group, 2006). Headaches can have many origins ranging from fatigue, pain from the injury site itself, over exertion or for other neurological reasons (Wrightson & Gronwall, 1999). Other symptoms such as fatigue and sleep disturbances frequently occur following a mild HI, which can also be extremely frustrating for a child who is not able to be as active as they were pre-injury due to lower energy levels (Gronwall, et al., 1990). It is particularly important for parents and teachers to monitor children's' activity levels and monitor for fatigue when they begin to recommence their normal activities (Furlonger & Johnson, 1989).

One symptom that is also seen as a risk factor for further complications is nausea or vomiting (New Zealand Guidelines Group, 2006). This is particularly true in infants and young children, although some studies have recognized that nausea and vomiting is not exclusive to head injuries and can occur for many reasons (American Academy of Pediatrics Committee on Quality Improvement & American Academy of Family Physicians Commission on Clinical Policies and Research, 1999). Nausea and vomiting can be a warning sign for intracranial pressure and therefore needs to be taken seriously (New Zealand Guidelines Group, 2006).

Dizziness, balance and coordination problems (Hurt, 2000), and changes in eating patterns (Dickerson, Johnson, & Maclean) can also occur as a result of a HI. Visual disturbances are also not uncommon, particularly as injuries that have caused

damage to the back of the brain can affect the occipital lobe, the visual centre of the brain (Gronwall, et al., 1990). This is sometimes likened to 'seeing stars' after hitting your head.

Cognitive symptoms.

Difficulties with memory and attention are not uncommon following a mild HI (Blosser & DePompei, 2003) (Yeates, 2010) and are usually noticed and reported by teachers or parents of children who have suffered a mild HI, rather than the child themselves (Baron, Fennell, & Voeller, 1995). Information processing can also be affected, and this combined with attention and memory difficulties can have a significant impact on a child's return to their normal activities. Also, as the physical expressions of these symptoms can vary from child to child, and can be therefore confusing for children and their peers, they can sometimes alienate children from their peers (Wrightson & Gronwall, 1999).

Long term, those who have suffered a head injury during their pre-school years have been found to have difficulties reading, as well as problems interpreting visual puzzles (Gronwall, Wrightson, & McGinn, 1997).

Behavioural symptoms.

These symptoms are an important set of symptoms for parents and teachers to monitor following a child's mild HI. As other symptoms are not usually directly observable, those that manifest physically may give an indication that there are post injury complications and should therefore be monitored more closely, or taken to seek medical attention. In particular irritability and various forms of altered behaviour (emotional and impulse control difficulties, depression, anxiety, confusion and moodiness) (New Zealand Guidelines Group, 2006). For those children who have suffered a HI in early childhood, even a mild HI, behavioural issues may not manifest until years after the incident (New Zealand Guidelines Group, 2006).

Epidemiology of Mild Head Injury

The Brain Injury Association states there are approximately 24,000 cases of mild HI every year (Brain Injury New Zealand, 2007). As mild HI can be hard to detect, many more injuries are likely to be unreported or are unaccounted for (Kirkwood, et al., 2008) so this number could be even higher. If these figures are taken from hospital

admissions alone, which is true of many previous studies, it is likely that the overall incidence is even higher (McKinlay, et al., 2008). This is due to some people not seeking medical attention at a hospital, preferring to see their family doctor. The incidence of this could be as high as for every 100 people seen in hospital, another 60 are seen and managed by their family doctor (New Zealand Guidelines Group, 2006). Recent research has found that as many as 42% of people who suffer a HI do not seek medical attention (Setnik & Bazarian, 2007). It is reassuring that this particular study found that a high percentage of those who do receive medical attention are children or young adults, possibly due to interventions from parents, teachers and coaches (Setnik & Bazarian, 2007). A study by Wrightson and Gronwall (1998) found that more than 900 preschool children each year are treated at emergency departments but not admitted to hospital after HI's. A study of high school students noted that approximately 30% of students surveyed had already suffered a HI (Segalowitz & Lawson, 1995).

Even though the effects of mild HI are minor comparative to moderate and severe HI, the incidence of mild HI is so high that even if a small percentage of children are affected the outcome would be far-reaching (Keenan & Bratton, 2006).

Children aged 0-4 are most likely to only attend an emergency department for assessment of HI, rather than be admitted suggesting their injuries to be most likely mild. This is comparative to older adolescents in the 15-19 year old age group who are hospitalized and more frequently die from more serious injuries (Yeates, 2010).

Causes

The most common cause of mild HI in young children are falls, for example from beds, change tables (Boll, 1983; Crowe, et al., 2009; McCrea, 2008), followed by 'other causes' such as being dropped by an adult while being carried (Crowe, et al., 2009). Boll (1983) reports that mild HI's tend not to occur as often when a child is alone, but when incidences do occur alone they are more severe. One theory for this could be that children do not report minor incidences and carry on playing only seeking help when the incidence is more serious and stops them from continuing play. Also, if a child approaches the parent with the claim of having been injured, if the parent has not witnessed it then the fact that the child is able to walk and talk might

be evidence enough for the parent to think they are okay, and no medical attention is required (Boll, 1983).

Interestingly, Boll (1983) states that many mild HI's occur during summer, with most injuries occurring during school holidays, in the early evening, and at home. Similar results were found by Crowe, Babl, Anderson, and Catroppa (2009) who retrospectively studied children aged 0-16 who attended the Royal Children's Hospital in Melbourne, following a head injury found that a high proportion of injuries occurred during the weekend, during school holidays, and in the home.

The 'silent epidemic'

Mild Head Injury is often referred to as the 'silent epidemic' (Almquist, Broshek, & Erlanger, 2001), as it is common for the person to not suffer a loss of consciousness or other symptoms that are reported by those suffering more severe injuries (Tellier, Della Malva, Cwinn, Grahovac, & Brennan-Barnes, 1999). The 'silent epidemic' is also referred to by this term as there is a great need for more research in the area, and because of the high rate of such incidences (Schneier, et al., 2006). Because of the risk of not identifying the injury when it happens, there is even greater risk for repeated injury, which can have an added detrimental effect on the person concerned (Gioia, Isquith, Schneider, & Vaughn, 2009). Symptoms from mild HI's may be short (days) or long term (months or years) (Kay, Newman, Cavallo, Ezrachi, & Resnick, 1992).

Boll (1983) raises the point that while the physical symptoms of mild HI usually resolve over time or with rehabilitation, less obvious symptoms such as psychological/behavioural symptoms can take longer to resolve. Due to this the motivation of a child to want to get better is sometimes called into question – they have obviously recovered so why are they having trouble with attention or memory? Why are they more emotional than they were pre injury? Without an understanding of the sequelae of mild HI, children can be criticised of not trying hard enough to recover which can have a detrimental effect on their recovery. Boll illustrates this point by referring to Hans Lukas-Teuber's comment that 'absence of evidence is not evidence of absence' (Boll, 1983, p. 77).

Although measures of severity can be helpful in measuring outcome following HI, this is not necessarily the case for mild HI. The neurological and neurocognitive

changes that occur following a mild HI are often more subtle than those of moderate or severe levels. Therefore the measures of GCS/LOC/PTA are not sensitive enough to pick up these changes (McCrea, et al., 2002). It is therefore important for parents and teachers (those caring for young children) to have a firm understanding and knowledge of HI symptoms, and in particular mild HI as this is the most common type of injury and easily overlooked.

Risk factors and factors influencing outcome

Many studies have discussed the idea that children suffering a HI were behaviourally different to the general population prior to the injury occurring (e.g., Anderson, et al., 2001; Kirkwood, et al., 2008; Light, Asarnow, Satz, & al, 1998). Rutter, Chadwick, Shaffer, and Brown (1980, cited in Wrightson, et al., 1995) considered that although severe HI had significant effects on cognition and behaviour, this was not the case with mild HI, and that these children had been less capable even before the injuries. More specifically characteristics such as impulsiveness and aggressiveness are thought to be aspects of behaviour that could 'predispose children to accidents' (Burke & Ylvisaker, 1996, p. 3). Many studies have excluded children who had problems prior to the injury to try and control for factors that would influence neuropsychological assessment scores (Satz, et al., 1997). These children may in fact be the ones that are more likely to suffer a mild HI and therefore need to be studied, so this has resulted in a significant limitation in the existing literature. As McKinlay and colleagues (2010) emphasize, those children who have learning and behaviour problems may not possess the ability to predict the consequences of their actions, and therefore be more likely to suffer a HI. This study also found that of all the factors examined on their influence on HI outcome, only three factors - child's sex, punitive parenting style, and the number of adverse life events experienced by the family actually increased the risk of a HI. It was also suggested that instead of placing so much emphasis on the pre-injury behaviour in children, emphasis should be placed on the family pre-injury behaviour as this is a better predictor of outcome (McKinlay, 2010). Family function that is seen as rigid both pre- and post-injury is thought to be harmful for a child's recovery, as these families are considered to be unable to cope with the ongoing stress and needs of a child suffering from a HI (Rivara, et al., 1994).

In terms of outcome, family stress that occurs as a result of both the injury itself and the situation surrounding the injury plays a significant role in lowering the prognosis for recovery from HI (Rivara, et al., 1992). A study by Hu, Wesson, Kenney, Chipman, and Spence (1993) found that if the child's mother was suffering from depression or anxiety during the child's recovery it could lead to poorer outcomes for the child. Ponsford and colleagues (1999) also found that how information was given and shared with children and their parents influences the outcome.

It is therefore important that the parents and teachers of those who are most at risk of HI are aware of the symptoms and signs of HI, as well as the ways in which it can be prevented. This is particularly true as children are less likely to be able to explain what is wrong with them, and therefore less likely to be asked, which can leave room for some severe misconceptions (Boll, 1983). If knowledge of HI is common amongst those caring for young children it will mean a higher chance of injuries being prevented, and will ensure that if an injury does occur the child has the best possible opportunity for optimal recovery. Both parents and teachers can add essential information which will aid in the child's recovery (Gioia, et al., 2009). This is particularly important for those caring for young children with few communication skills who are therefore unable to communicate any potential symptoms.

In summary there are many definitions of mild HI currently in use, which can be confusing for both health professionals and lay persons. Mild HI is currently classified using assessments of GCS, PTA, and LOC, but there is a lack of validated assessments for use in infants. Due to this the symptoms of mild HI are often used as warning signs to indicate a need for medical attention. The potential symptoms of mild HI are vast and cover areas of cognitive, behavioural, and physical wellbeing.

Mild HI occurs most often at home, in the evenings and during school holidays. Common causes include falls and many mild HI's may not be easily identified, due to the ability of symptoms to be attributed to other things.

Children who often exhibit behaviours such as impulsiveness and aggressiveness may be at higher risk to suffer a mild HI. It is therefore important that it is recognised which children are most at risk for such an injury, and knowledge of mild HI is widespread and accurate. If an injury does occur knowledge of mild HI will help

identify problems the child is likely to face relative to their injury, and will increase the effectiveness of rehabilitation.

The next chapter discusses the various factors that influence the knowledge of mild HI symptoms in an effort to outline the various sources that influence people's abilities to detect injuries.

Chapter Three: Factors that influence symptom knowledge

This chapter focuses on discussing factors that impact on HI knowledge both in the general public, and also specifically in teachers. This is important to the current research as these factors have a significant effect on the level of understanding of various aspects of HI, and can therefore effect when and how children who suffer HI receive medical attention.

The chapter begins by outlining the importance of mild HI symptom knowledge, and explaining how misconceptions occur and the impact they can have on a person's recovery. The media has a significant impact on how information is perceived by the general public and is discussed next. Within this the work that various organisations do to improve the public's knowledge of mild HI and HI will be examined, as will the impact the internet has on health knowledge. The importance of first aid training available to the public is summarised. The impact that attitudes can have on peoples understanding of mild HI and HI is explained, with particular attention paid to current attitudes in New Zealand.

The second section examines mild HI knowledge with regard to teachers, giving an outline of a previous study that focussed on the sources of teacher's knowledge. The legislation in New Zealand and Australia with regard to specific requirements for teacher's first aid training is also outlined.

Factors that impact on mild HI knowledge in the general public

Knowledge of mild HI symptoms.

Knowledge of HI symptoms is likely to be most crucial immediately following the child's accident. A study by Osberg and Lash (1997) found that basic information about brain injury[1] was what parents and educators thought most important (e.g., knowing that a brain injury can increase the risk of a second injury would have an impact on a parent or teacher's decision whether or not to allow their child to return to play following an accident) (Swaine, et al., 2007). Without this knowledge then they were at risk of letting the child carry on playing, or allow them to take part in activities

[1] When specific research is discussed the term 'brain injury' is used to keep consistency with the research results, however the definition of the term is thought to not differ greatly from the definition of HI.

well before they are able to, with possible detrimental consequences. If they are aware of the impact one head injury can have, they will make better decisions in regards to further care and may also be more likely to seek medical advice. Methods of coping were also a priority for parents and families, and educators wanted information regarding indentifying children with a brain injury.

One reason some information about HI may not be available to the public is discussed by Osberg and Lash (1997) who suggest that information about new developments regarding HI is available to more specialised audiences (such as studies in peer reviewed journals) but has not yet 'trickled down to the lay community' (Osberg & Lash, 1997, p. 156).

Due to the lay community not having complete access to the latest development, health professionals have an impact on how information is given to parents and families. While the hospitalisation rates of mild HI are low, the rate of children actually suffering a mild HI is high, so it often falls on non hospital healthcare professionals (i.e. family doctors) to make the best decision in regards to a child's care following an incidence of mild HI (Fay, et al., 2010). It is therefore crucial for parents and teachers to have a thorough knowledge of the symptoms of mild HI, to ensure all applicable information about the incident is given to medical professionals and any mild HI's are not overlooked. It will also ensure that parents are able to advocate for follow up care for their child if necessary, and will also ensure that any follow up care that is received is appropriate and effective.

Kirkwood, Yeates, Taylor and Randolph (2008) highlight two key points that show the importance of caregiver knowledge of the symptoms of mild HI. Firstly, if the child does not require admission to a healthcare facility, healthcare professionals must ensure the parents or caregivers are able to act if a medical emergency occurs. Parents need to be wary of any changes in their child's behaviour and healthcare professionals should ensure parents feel confident in doing so. Following on from this, in order to ensure parents are aware of what symptoms to watch for, education is essential. Ensuring parents have the information and knowledge to make decisions regarding their child's recovery, both in the short term (in case of emergency) and long term, when other problems may evolve is essential. This is even more relevant as some health care professionals who do not specialise in the area of head injuries can hold

some misconceptions about head injuries. A study by Swift and Wilson (2001) found that non expert health professionals (for example, GPs who may see people with HI every so often, but do not specialise in the area) held similar misconceptions as common amongst the public. Specifically, the extent of the injury, how behavioural symptoms are linked to the injury, and a lack of understanding regarding motivation problems as laziness were areas in which misconceptions were common.

For those who seek medical attention from their GP or hospital, it is necessary that the information given to patients is in a form that is appropriate and easy to understand, in order to encourage the highest level of compliance possible (Moore & Leathem, 2004). Written information is also likely to lower anxiety levels and empower parents to be able to cope with their childs injury more confidently; having the information provided early on also makes a positive difference (Morris, 2001).

Misconceptions.

Misconceptions about medical conditions are not uncommon in the general population. One example is evident in studies by Ferrari and colleagues (Ferrari, Constantoyannis, & Papadakis, 2001; Ferrari, Obelieniene, et al., 2001) who found that Canadians, Lithuanians and Greeks all have different expectations of the outcome of minor HI, and in particular the duration the symptoms are present for. This highlights that geographical location and culture may have an impact on peoples understanding of HI.

A study by Gouvier and colleagues (1988) examined the lay population's beliefs in various statements about HI. The public at a mall in South Louisiana were asked to rate various brain injury themed statements on a scale of true, probably true, probably false and false. This study found that most individuals surveyed were reasonably well educated about HI, although areas such as amnesia and recovery were not very well understood. In particular the question 'People can forget who they are and not recognize others, but be normal in every other way' was only answered accurately by 17.65% of participants, showing a clear misunderstanding of the sequelae of brain injury in regards to amnesia. Gouvier also collected information regarding the source of the participant's knowledge, and found that popular sources of information about head injury were daily newspapers, TV news, and talk shows. Professionals were the most popular type of social source for information about HI, and approximately 40% of

participants had had personal experience with HI's or strokes via a close family member.

Gouvier's (1988) study has been replicated in various forms in various locations in America and Britain. Willer et al. (1993) used nine of the questions from Gouvier's study, and surveyed the public at malls in Ontario and Western New York. Similar to Gouvier's study they found that the statement 'after a head injury people can forget who they are and not recognize others, but be normal in every other way' was the most incorrectly endorsed statement. The researchers attributed this to incorrect portrayals of brain injury in the media, particularly those in movies or comedies. Their study also showed that misconceptions about brain injury were not limited to one geographical location.

Following Gouvier's (1988) study, and Willer's (1993) study, Guilmette & Paglia (2004) surveyed the public in New England, USA, and again found similar statements were answered incorrectly. Guilmette also suggested the public's knowledge of mild HI was higher than that of moderate or severe HI, which they consider could be due to the increase in public awareness of sports injuries.

More recently Hux, Schram, and Goeken (2006) found the public endorsed misconceptions about brain injury, in particular in regards to memory and recovery. The Nebraskan public was surveyed, using seventeen questions from Gouvier's study and rating them true, probably true, probably false or false. Again the public endorsed the idea that it was possible for someone to have a HI that damaged their ability to remember who they or familiar people are, but be completely normal otherwise. The percentage of people who answered this correctly was the lowest across all studies published to date.

The most recent study of the public's misconceptions of HI was undertaken in the UK by Chapman and Hudson (2010). The survey was a replication of Hux et al. (2006) and it was found there were still many misconceptions being endorsed by the public. In fact overall scores of accuracy were lower than previous studies. Again the media portrayal of brain injury was suggested as a key source of misconceptions, particularly those depicting unrealistic recovery of memory ability, and the process of recovery in general. In this study the authors also thought that personal experiences may heavily influence a person's perspective of HI. If a person had suffered a HI but did

not have any memory problems, they may over estimate the outcome of another person's HI because of their own experiences, and believe that a full recovery is always possible, when it may not be.

This is similar to findings by O'Jile et al, (1997) who surveyed undergraduate students in Louisiana, and found that those who had themselves suffered a head injury endorsed the highest percentage of misconceptions about coma, unconsciousness and retrograde amnesia, but were most knowledgeable about seat belt use, physical complications and post traumatic amnesia. One reason given for this is the possibility of participants answering in regards to their experience, and not as a general answer about head injury – i.e. those that have had a mild HI have very different experiences to those that suffer severe incidences.

Identifying the knowledge base of those who care for young children is important, as is identifying the areas in which they would like further education. A study by Farmer & Johnson-Gerard (1997), compared educator and rehabilitation staff knowledge of TBI. The study was a replication of previous studies (Gouvier, et al., 1988; Springer, Farmer, & Bouman, 1997; Willer, et al., 1993), asking 40 questions about various aspects of TBI. This study showed that rehabilitation specialists answered more accurately over all in comparison to educators. There were significant differences in groups for the question 'children who have had one brain injury are more likely to have a second one' (62.2% of rehabilitation staff answered correctly, compared to 18.2% of educators) and also for the question 'brain-injured children can forget who they are and not recognize others, but be normal in every other way' (57.8% of rehabilitation specialists answering correctly compared to 35.5% educators). This could be due to the nature of the rehabilitation specialist's role and their ongoing involvement with the child's recovery process.

A similar study found that family members of people who were undergoing rehabilitation (at the time of admission) following a HI, endorsed many misconceptions regarding consciousness, amnesia and recovery (Springer, et al., 1997). From this study it was evident that knowledge about the short term symptoms of HI among relatives was strong, but knowledge about long term consequences was relatively weak. The authors suggested this could be due to the optimistic beliefs the families held regarding their family member's recovery. The survey took place when the family

members were being admitted to rehabilitation which may mean they had experienced the short term symptoms, but were yet to experience the long term recovery phase.

Not understanding the process of recovery that is likely to occur could have a negative impact on the individual's recovery. For example, if family members do not understand that recovery isn't about the person's motivation to get better, and it seems that the individual isn't 'trying' due to fatigue then they may feel the individual does not want to get better, and may blame them for a slower recovery than what was expected (Willer, et al., 1993).

Media and Public Awareness.

Information regarding mild HI is available from many sources, including the media (newspapers, magazines, books, TV, radio, internet,), from professionals such as GPs (in verbal or written form), family, friends, or from personal experiences.

A study by Swift and Wilson (2001) suggested that the misconceptions people (both health professionals and non health professionals) hold about recovery of HI may be influenced by the media. Baxendale (2004) undertook a review of movies which contain portrayals of amnesic characters and found that many of the portrayals were inaccurate to true sequelae. One example of this would be the common scenario of a blow to the head which results in memory loss and is then resolved by a second blow (Baxendale, 2004). This is also evident in slapstick comedy television programmes (Willer, et al., 1993) and movies of various genre, aimed at different audiences (Chapman & Hudson, 2010). The dangers of the media incorrectly portraying the incidences and recovery of head injuries are serious given the wide range and accessibility of media available today. Those incorrect portrayals of head injury could lead to an incorrect belief that there is little or no damage done to a person who has hit their head. Therefore people may not seek medical attention when needed, or will have greater expectations for recovery than what is possible.

Organisations.

New Zealand has two prominent organisations working to raise awareness of HI in New Zealand. These organisations – The Brain Injury Association of New Zealand and the Head Injury Society – both have an awareness/appeal week at different stages in the year. As part of these awareness and appeal weeks they release information via

the media regarding HI and the symptoms and consequences of brain injury. They also often hold various activities over the week long appeal (The Brain Injury Association, 2010; The Head Injury Society of New Zealand, 2010).

The Neurological Foundation of New Zealand also has a week of awareness and appeal. Even though their focus is not primarily on HI, information on this area is mentioned on their website (The Neurological Foundation of New Zealand, 2010).

Internet.

One of the most common sources of information is the internet. More than 75% of New Zealand's homes have access to the internet (Statistics New Zealand, 2010) and finding health information is the third most common reason for using the internet (Bernstam, Shelton, Walji, & Meric-Bernstam, 2005). Numerous studies have been undertaken to assess the accuracy of health information available on the internet. A study by Pandolfini and Bonati (2002) examined the content of numerous websites containing health information, and compared their content to a previous study examining the same websites. It was found that the websites had improved in regards to the accuracy of the information presented, but there was still a number of websites that did not meet the criteria completely. Another study estimated that over half of participants surveyed believed most of the information they read on the internet (Houston & Allison, 2002).

Information is sourced not only from organisation and association websites, but also social networking sites such as Facebook (Ahmed, Sullivan, Schneiders, & McCroy, 2010), via videos on websites such as You Tube, personal pages such as blogs, and academic sources such as journal articles (Purcell, Wilson, & Delamothe, 2002), to name a few. Information can be accessed by lay persons relatively quickly and without difficulty for those with internet access (Osberg & Lash, 1997), and a wide range of information, both accurate and inaccurate is easily accessible.

First aid training.

First aid training for those working with young children is one way in which head injuries can be prevented and the long term consequences of HI's be lessened. A study by Glendon and McKenna (1985) studied a community in Staffordshire, UK, and found that there could be many benefits to communities if a high percentage of the population was first aid trained, both in regards to reducing risk and ensuring better

outcomes. First aid training could also enable people to better recognise their responsibilities to prevent accidents (McKenna & Hales, 1982). Those who have had training are more confident about their abilities and perform better when their abilities are assessed (Steele, 1994).

Research by (Lynch, et al., 2006) found that first aid courses can increase peoples knowledge and abilities to deal with situations that require first aid, but overall, the public's knowledge of first aid was poor. Previous studies have found approximately 48% of teachers have first aid training (Lafferty, Larsen, & Galletly, 2003). Other studies have reported that between 34% (Tomruk, Soysal, Gunay, & Cimrin, 2007) and 41% (Steele, 1994) of the general public hold first aid certificates.

Attitudes

One of the questions from Gouvier's study ("No pain no gain' is good advice for a person recovering from a brain injury') resonates with an attitude prevalent in New Zealand culture. Often players in sports teams are encouraged to shake off their injury and 'harden up' – carrying on playing even though injured, thinking that the dizziness they are experiencing is minor (Setnik & Bazarian, 2007). Although awareness of the dangers of this attitude are increasing worldwide (with rules in sports to stop players continuing play if they show signs of head injury/concussion (Sandsberry, 2010), the 'harden up/no pain no gain' attitude is still prevalent in New Zealand culture. In a newsletter from the Brain Injury Association of New Zealand, National President John Clough spoke about a well known rugby player brushing off his recent concussion, which was actually the second one he had suffered in as many weeks (Clough, 2009). Clough discusses the disastrous impact that this misinformation can have on the public, in particular young players, and points out that if people see their role models (i.e. high profile sports people) taking risks, they are more likely to do so too. This is particularly worrying given the already high rates of HI in young males who suffer head injuries (Yeates, 2010). Having this sort of attitude can impact on recovery, as many of the symptoms of HI can go unseen, particularly those which cause slower information processing, shorter attention span, headaches, fatigue etc.

The attitude of others can easily influence children's attitudes; research has found that those children who have had contact with children who are disabled have a

better understanding and more positive attitudes towards the children when compared to those who have not had such contact (Crother, Linden, & Kennedy, 2007). As children who suffer HI, even mild HI, may experience changes in confidence levels and social skills, it is important to ensure that other children have positive attitudes towards children who suffer HI.

Factors that impact on HI knowledge in Teachers

Mohr & Bullock (2005) examined the sources of teachers knowledge of HI. They conducted two focus groups with an aim to discover more about the teachers perceived abilities to support children with HI, and how they felt their training had prepared them for such a role. Only half of those in the groups had received training in HI and none were offered courses that prepared them for working with children with HIs in their undergraduate studies. At least 71% of those in the focus groups felt that coursework with an aim to prepare teachers for working with children with HI is very important. This study also found that teachers discovering previous HI incidents in students files were not uncommon, and often information regarding a child's HI was given on a 'need to know' basis (Mohr & Bullock, 2005, p. 54), usually when teachers inquired about a childs behaviour. Many teachers found information regarding HI on the internet, using this to substitute an overall lack of knowledge regarding HI. This lack of information and knowledge is concerning, given that without the understanding of the importance of HI knowledge, more teachers are likely to believe myths and be misinformed about various aspects of HI (Farmer & Johnson-Gerard, 1997). A lack of information for teachers may also mean a breakdown in communication between teachers, specialists, and families, resulting in the child missing out on essential support.

Legislation.

In New Zealand it is not compulsory for early childhood teachers to hold teaching qualifications in order to be as an early childhood teacher. It is also not a requirement for all early childhood teachers to be first aid trained. Centres licensed under the Education (Early Childhood Services) Regulations (Ministry of Education, 2008) only require that there is one adult present at all times with first aid training, or a nurse, medical practitioner, ambulance officer or paramedic.

In Australia the Children's Service Regulations (Department of Education and Early Childhood Development, 2009) state that 'each staff member employed, engaged, appointed or approved by the service completes the first aid and anaphylaxis management training (a) by 1 January 2012; and (b) then at least every three years. This training does not explicitly include head injuries, though includes injury and basic wound care appropriate for children.

In summary there are many factors that influence the knowledge of HI and in particular what we recognise as symptoms. New Zealand societies such as the Brain Injury Association and the Head Injury Society offer information to the public which is easily accessible. The media has a significant effect on how HI knowledge is portrayed to the public; however information is not always accurate. First aid training can also influence people's knowledge by learning through participating in educational activities that teach correct responses to accidents, and also learning information from correct sources. Attitudes of sports players can have an effect on how people believe HI's should be handled; these attitudes can have a huge effect on how children perceive HI's also.

Given the regular close contact that teachers have with children it is important they hold a strong knowledge of HI. Often teachers need to find information about HI themselves, rather than being taught during training. It is possible that many teachers first encounter children who have suffered HI when they have entered the workforce, and this may be urge teachers to extend their knowledge to learning more about the symptoms of HI. Holding a teaching qualification or having a first aid certificate is not compulsory for teachers in New Zealand, and this may have an impact on the knowledge that teachers hold about HI.

The next section outlines the aims and hypotheses of the current study, and further emphasizes the importance for such research.

Chapter Four: Aims and Hypotheses

Overview and Aims

The previous chapters have outlined the epidemiology and short and long term consequences of HI, with a focus throughout on mild HI. It is clear for this that in spite of HI being so common, there are many misconceptions held by the public at large. This may also hold true for early childcare centres and schools where legislation requires that only one person in each facility must be trained in first aid. Given that teachers and parents of young children carry the responsibility of ensuring accidents are prevented as much as possible, and manage them when they do, it is important that they know how to deal with them effectively. However, there is a shortage of research about mild HI or HI as it affects very young children, and the extent to which those caring for young children actually do know about how to recognise and deal with HI when it occurs, is unclear. Accordingly the aim of the present study is to explore the nature, extent, accuracy and source of the knowledge that parents and teachers of young children have about HI.

Review of the relevant literature suggested that the research in the area could be approached from two perspectives. The first presented as Part one, investigates the nature and extent of the first aid training that teachers receive. This part of the research also looks at what information is available in the public domain with regard to HI. Sources of information that parents are likely to utilise (i.e. Doctors, books, the internet, PlunketLine) are investigated and summarised.

The second part of the research surveyed teachers and parents to determine: their level of knowledge about HI; the percentage of parents and teachers with first aid certificates; and the extent to which having a first aid certificate, having some personal experience with HI, and media exposure of HI, influences the accuracy of knowledge about HI.

Hypotheses

Part One

1. Teachers will get first aid training as part of their teaching qualifications and regulations regarding first aid training will be similar to those in Australia.
2. First Aid training providers will teach general knowledge about HI and in particular how to deal with a HI immediately following the injury.
3. All childcare services contacted will have at least one staff member who is first aid trained.
4. The information about HI in the public domain will be easily accessible and reasonably accurate with information provided by doctors and PlunketLine most accurate.

Part Two

1. First Aid Training
    a. At least 45% of teachers will hold first aid certificates. This is based on previous studies by Balkytny, Surbuts, Thomas, and Hunter (2001), and Lafferty, Larsen, and Galletly (2003).
    b. At least 35% of parents will hold first aid certificates. This is based on previous studies by Tomruk, Soysal, Gunay, and Cimrin (2007) and Steele (1994).
    c. Parents are most likely to have a first aid certificate due to work requirements.
    d. Teachers who have first aid certificates will have a more accurate knowledge of HI than those who do not.
    e. Parents who have first aid certificates will have a better knowledge of HI than those who do not.
    f. Collectively, teachers and parents who have first aid training will have a better overall knowledge of HI than those who are not first aid trained. This is on the basis that those who have first aid training are more likely to have read material and participated in activities that teach people how to deal with situations around HI.

2. Accuracy of Knowledge
    a. Teachers or parents who have had experience in dealing with a child in their care who has had a HI will have better knowledge about HI than those who haven't had any experience.
    b. Those with personal experience with HI's (i.e. themselves, close friends or family) will have a better knowledge of HI than those who do not.
    c. Parents and teachers will have similar levels of knowledge to previous studies, i.e., both parents and teachers will answer most accurately in the areas of general knowledge, and will be least knowledgeable regarding the effect that HI can have on memory. As this is the first study of this kind known to the researcher that is based in New Zealand, it is assumed that New Zealanders knowledge of HI symptoms is similar to other western countries such as the US and UK.
    d. Teachers will have more accurate knowledge of HI than parents. This hypothesis is based on the premise that teachers work with more children on a daily basis and therefore are more likely to have cared for, or know of, a child who has had a HI. This experience may give them a greater knowledge of HI. Also, teachers have training in human development during their teacher training and this too could also help increase knowledge of HI. If more teachers than parents do in fact have first aid training this too could have an impact on the average overall accuracy for the teacher group.
    e. Teachers who hold teaching qualifications will have a better knowledge of HI symptoms than those who are not trained.
    f. Teachers who have more years of teaching experience will have a better knowledge of HI symptoms than those who are not trained.

3. Accessing Information/knowledge
    a. Collectively, those that access information about HI through media sources will have a poorer knowledge of HI than those who do not. This hypothesis is based on previous studies (e.g., Baxendale, (2004); Swift &Wilson,

(2001); Chapman & Hudson, (2010) Willer, Johnson, Rempell & Linn, (1993) that have shown that the media impacts negatively on the accuracy of understanding about HI.

b. Daily newspapers and TV news will be popular sources of information of HI.

c. Parents are most likely to seek advice from a doctor if a child in their care has an accident involving their head. PlunketLine and the internet will also be popular sources of information.

Chapter Five: Method

Participants

Part One.

A low risk ethics application was approved by Massey University's Human Ethics Committee to approach universities and first aid course providers about the content of their courses in regards to head injury prevention and treatment.

All universities, polytechnics, and teacher training facilities offering training for the care and education of children in New Zealand were contacted. Administrators of the specific teacher training courses were asked if first aid certificates were a compulsory part of the training course. They were also asked if any components of the training courses included health and safety knowledge, specifically knowledge of HI. A selection of universities and teacher training providers in Australia were also contacted and asked about the content of their teacher training courses.

First aid training providers in New Zealand were contacted and asked specifically about the content of their courses in relation to HI and young children.

Part Two.

A human ethics application was approved by Massey University's Human Ethics Committee to approach the Board of Trustees or Management of childcare centres on the North Shore, Auckland, and ask permission to survey their team of teachers. This same application was also approved to survey parents of young children on the North Shore, Auckland.

There were two groups of participants in Part 2 – early childhood teachers and parents of young children (aged five and under) based on the North Shore, Auckland. The demographics for the respective groups are shown on Table 5.

Table 5.
Demographic Information about Participants in the Current Research

	Teachers (N)	Parents (N)
Gender		
Female	60	32
Male	4	32
Age (years)		
Under 18	0	0
18-25	12	6
26-35	23	36
36-45	15	20
46-55	8	0
56+	6	2
Ethnic group/s		
NZ European	44	37
Maori	7	18
Pacific Island	1	5
Asian	10	2
Other	8	15
Early Childhood Teaching Qualification		
Bachelors Degree	21	
Teaching Diploma	25	
Other	8	
None	10	
Years teaching experience		
Less than 5 years	26	
Five to ten years	19	
Ten to fifteen	9	
More than 15 years	10	

Procedure

Part One.

Eleven early childhood teacher training facilities in New Zealand were contacted via email. These facilities ranged from Universities and Polytechnics, to colleges/courses specifically for teacher/early childhood education training centres. The administrators or managers of these courses were asked if first aid courses were a compulsory part of their training course. They were also asked if there were other parts of their courses that could cover any aspects of first aid, specifically head injuries.

Information about teacher training courses in Australia was gathered from seven University websites. The websites were scanned for information specifically in

regards to if first aid courses were mandatory for those studying early childhood teaching. If information wasn't available from their website then course administrators were emailed as per the contact information given on the websites.

Seven first aid training providers that run courses on the North Shore were emailed and asked about the content of their first aid courses. All training providers were asked if they could also supply pages of their work books specific to head injuries, and if they ran courses specific to those caring for children.

The YMCA, Lollipops Playland and Chipmunks Playland were also contacted via email. All three facilities are popular amongst families with young children and have venues on the North Shore, Auckland. They were all asked about the first aid training their staff have, and what procedures would be followed if a child had an accident involving their head while attending their facilities.

PlunketLine was phoned to find out what they would recommend if a parent rang asking for advice, specific to caring for a child who had had an accident involving their head.

Bookshops that are part of nationwide chains (i.e. Whitcoulls, Paper Plus) and book seller websites such as Amazon or Mighty Ape were researched via their websites or in store to see what parenting books are most popular.

Using popular search engines such as Google, numerous terms were searched in an effort to find out what information is available in the public domain in regards to how to deal with a possible childhood head injury. The search terms used were 'head injury', 'head injury child', 'symptoms of head injury', and 'child head injury advice'.

Three doctors on the North Shore were spoken to, and asked about what information and advice they would give to parents if they brought in a child who had had a head injury.

Daily newspapers such as the New Zealand Herald were researched for information about HI, using their online website specific search engines. Weekly and local newspapers were also surveyed using the same method.

Popular magazines such as *Woman's Weekly*, *Woman's Day*, *New Idea*, and *That's Life!* (general interest/real life magazines aimed at women aged 25+) were searched for articles relating to brain injuries using their website specific search engines.

Part Two.

Early Childhood Teachers.

Management of ten Early Childhood Centres on the North Shore, Auckland, were approached and given an information sheet about the research (see Appendix 1-A). They were then asked for permission to invite their teaching teams to take part in the research. Six centres agreed to take part. The Management at the centres were asked the most appropriate and effective way of approaching the teachers and all centres opted for the surveys to be left at the centre for teachers to complete in their own time. Teachers were made aware that they didn't have to complete the survey even if management gave permission for them to do so. The surveys were collected from the centres one week after being delivered.

Parents.

Snow ball/convenience sampling was used to recruit parents of young children who live on the North Shore, Auckland. Parents were invited to take part while they were visiting early childhood centres and were also invited to take another survey home for their partners; many parents asked to take extra forms for friends to complete. All parents took the forms away to complete and when completed the surveys were sent back to the researcher in a prepaid envelope, or collected from the early childhood centre that their child attended.

Measures

Part Two.

Information sheets and surveys were designed in accordance with Massey University Guidelines. Parents and Teachers had different information sheets (see Appendices 1-B and 1-C) and surveys (see Appendices 2-A and 2-B.). All participants were informed that the research would take 5-10 minutes and were made aware that participation was voluntary. Participants were told they could choose not to answer any of the questions and informed consent was implied by completion of the survey. Those who participated could request a copy of the results be sent at the completion of the research, and could also go in the draw to win a $100 voucher from The Warehouse. Data from the research was entered into a database by the researcher.

The Early Childhood Teachers survey began with demographic questions (gender, age range, ethnic group), and then asked about their training and length of experience as a teacher, whether they had a first aid certificate and if they have previous experience in dealing with a child in their care who had a HI. Following this were four sections regarding various sources where they may have read or seen information about HI, who they may have talked to about HI and what if any experience they may have had with HI. Participants were able to select more than one source from each group of options (See Appendix 2-A).

The first page of the parent survey was similar to the teacher survey, covering demographics, but excluded the teacher specific questions and included 'where would you seek information if your child had an accident involving their head?' (See Appendix 2-B).

The remainder of both the parent and teacher surveys consisted of 20 statements. Fourteen of the statements were taken directly from Gouvier's (1988) survey. Of the 14, five were also included in Willer's et al (1993) study, 11 in Farmer & Johnson-Gerard (1997) and seven were included by Guilmette (2004). Eleven statements were included by Hux (2006) and were identical to those in Chapman (2010). Six statements were adapted from ACC pamphlets and one statement 'If a child has a bump or 'egg' on their head following a head injury, this means the injury hasn't been bad enough to harm the brain' was taken from conversations the researcher had with parents prior to beginning the research, as well as misconceptions identified during part one of the research. See Appendices 2-A and 2-B for the questionnaires used in the research.

Data analysis

Part Two.

Scoring for the second page of the questionnaire was conducted in two ways, and therefore each participant was attributed two scores. Participants were able to select one option for each statement - true, probably true, probably false, or false. The accurate answers for all statements were either 'true' or 'false' - there were no accurate answers that were 'probably true' or 'probably false'.

The first method of scoring involved calculating the number of accurate answers they gave ('true' or 'false', whichever was correct), divided by the number of statements (20). This was calculated into a percentage and is referred to as their 'accurate score'.

To enable comparisons with previous studies, a second method of scoring was also used. All answers that were 'probably true' and 'true' were treated as the same (i.e. true), as with 'probably false' and 'false answers' (i.e. false). Each participant was given another score out of 20 which was calculated from the amount of answers they answered correctly (true or false, whichever was correct). This score is referred as the 'correct dichotomized score'.

These accurate scores were used to show comparisons between individual participants and were averaged to show differences between various groups of participants.

Chapter Six: Results

Part One

1. Teachers will get first aid training as part of their teaching qualifications and regulations regarding first aid training will be similar to those in Australia.

The eleven New Zealand teacher training facilities contacted offer a mix of Bachelor of Teaching/Education degrees, or Diplomas. Completion of any of these qualifications is seen as qualified status for a teacher in early childhood education in New Zealand. Two facilities ran courses for qualifications of childcare certificates or Nanny certificates. Of the eleven facilities, only one provided first aid training as part of their courses, eight did not, with the remaining two expecting students to complete first aid courses on their own accord, usually when they were ready to seek employment (D. Cornhill, personal communication, May 15, 2010; H. Aitken, personal communication, July 5, 2010).

Of the eight that that did not cover first aid training one did say that they covered 'accidents and first aid kit requirements as part of a broader and more general discussion in the early childhood context' (D. Cornhill, personal communication, May 15, 2010). One other course did previously have first aid training as a requirement but had changed this in recent years, although the reason for this was unclear.

Information obtained from Australian university websites was similar to that from New Zealand teacher training facilities. One website said a first aid course was a compulsory requirement, one said it was not a compulsory requirement, but would be run during the course of the training programme. Five said it was not compulsory during the training course, but did note that it was sometimes a requirement of employers.

2. First Aid training providers will teach general knowledge about HI, and in particular how to deal with a HI immediately following the injury.

Three of the seven first aid training providers contacted ran child specific courses, and the remaining four had workplace training courses which could be tailored to suit specific workplaces. i.e. childcare centres. Of the seven facilities surveyed four sent part of their training booklet that was specific to HI's for review. Each of these four first aid course booklets give clear guidelines on what to look for if a

child does have an accident involving the head – i.e. vomiting, loss of consciousness, change in behaviour, drowsiness, memory loss, excessive bleeding from the head. Recommendations of treatment were mainly to call 111 if their condition worsens. One first aid course booklet also suggested monitoring the child's pupils for changes in size, or differences between the two pupils, and any discharge of fluid from the ears or nose (Brown, 2001). Another training provider also stated they aim to 'keep the information simple using key messages – using the attendee's actual experience with managing head injury to keep the discussion relevant' (C. Mudford, personal communication, May 13, 2010).

3. All childcare services contacted will have at least one staff member who is first aid trained.

The YMCA was also asked about the training their staff have in terms of first aid, as they hold popular movement classes for young children. Management said that with any injury they would err on the side of caution, and would recommend a hospital visit or doctors check up. If the child was showing any signs of distress or had lost consciousness they would call an ambulance. In children's programmes they ensure that at least half of the staff are first aid trained – i.e. a gym class of 30 children would have 3-4 staff and at least two would be first aid trained (M. Lacey, personal communication, July 21, 2010).

Other places such as Chipmunks and Lollipops (popular children's playgrounds) were asked about their staff's first aid training but did not to respond.

4. The information about HI in the public domain will be easily accessible and reasonably accurate with information provided by doctors and PlunketLine most accurate.

PlunketLine.

When PlunketLine is phoned parents or caregivers would be put through to the 'Well Child Line' (specifically for children who are unwell), and a nurse working at the call centre would follow their guidelines for assessment including asking the following details – the child's level of consciousness; any loss of consciousness; type of injury; any seizures; any changes in speech/motor/memory/skills; any lumps/bumps or open

wounds; has the child been vomiting and if so have they been vomiting clear liquid (could possibly be cerebral spinal fluid); is there blood coming from their nose or ears; dents in skull; headaches; or blurred vision. Their aim is to rule out every emergency symptom, gaining as much information about the injury as they can to enable them to advise the parent appropriately. If the child has any serious symptoms such as seizures they are to call 111; if the child's situation worsens within 24 hours of the injury they are to be taken straight to their nearest hospitals emergency department. If they have any concerns they are to take their child straight to the doctor or emergency department. They are to monitor the child carefully for the next three days, and if there are any changes in their condition they are to seek medical attention as soon as possible (Well Child Line Nurse, personal communication, May 11, 2010).

Books.

A popular book among parents is 'What to expect – the first year', and is aimed at those expecting a child. This book has a comprehensive first aid section. Recommendations for parents in regards to HI's include checking for bruises, monitoring changes in pupil size (i.e. unequal pupil size), convulsions, vomiting, oozing of blood or clear liquid from the ears or nose, dizziness, unusual paleness or pain that persisted for a longer than expected period of time (no longer than one hour), indentations in the skull, difficulty being roused, or loss of consciousness. Parents and caregivers are recommended to observe their child carefully for six hours following a HI, and if any of the above symptoms apply to their child they are to phone emergency services immediately (Eisenberg, 2010).

Internet.

All search terms used while searching 'Google' produced similar results, with a mix of news items (i.e. sports players injuries), Wikipedia entries ('traumatic brain injury and 'head injury') and numerous brain injury/head injury societies or resource centres websites. The term 'head injury child' resulted in more sites that offered advice on how to deal with a possible head injury such as monitoring the child closely for 24 hours following the accident and if there was any vomiting, loss of consciousness, or further concerns parents were recommended to seek medical attention. The term 'concussion' was also searched and this had similar results to the head injury searches.

Many misconceptions about HI were found during these searches. Some searches also brought up web pages which were forums for parents to ask questions about their child's development. One question that was often raised was about 'goose eggs' (a raised bump/swelling at the site of impact). There were common concerns about a bump or swelling that has occurred on their child's forehead following an accident involving the head. There seems to be some confusion about whether or not a goose egg is a sign of the child suffering serious injury, or if it is a sign that the injury has 'come out' and not impacted on the brain.

Doctors.

All doctors said they would assess the child for any immediate dangers or signs they need to be taken to a hospital, and if the child appeared okay to return home without further medical attention parents would be given an ACC pamphlet titled 'caring for your child after a head injury'. This pamphlet outlines warning signs to watch for, and common symptoms that parents do not need to be overly concerned about. Various aspects of a child's routine such as sleep, play and school/childcare are also identified and ways in which the head injury can affect these activities are outlined. Doctors also have pamphlets specific to mild traumatic brain injury titled 'Knowing about your mild traumatic brain injury (TBI)'. This pamphlet is aimed at adults, but has helpful definitions and guidelines applicable to both adults and children. Both of these pamphlets are published by ACC.

Newspapers.

In regards to daily newspapers articles, those that mentioned HI were generally related to car accidents, crime, or court appearances, with many articles mentioning HI but not outlining the symptoms or consequences in detail. This is also common in weekly newspapers such as the Sunday Star Times. Campaigns raising awareness of HI are common in regional newspapers such as the North Shore Times and Devonport Flagstaff.

Magazines.

Popular types of stories in magazines include personal accounts of HI, some with positive outcomes despite a previously, and some with devastating outcomes. These personal accounts of HI provide readers with an accurate insight into the long term affects of HI. In particular many articles also show that HI is an injury that does

not resolve when the physical symptoms have gone. Ongoing difficulties with fatigue, headache, memory, attention, and depression/anxiety are commonly outlined. These magazines also have medical sections in which key topics are chosen each week and written about by medical professionals. Readers can also write in and ask advice or for further information about various medical problems.

Part Two

1. First aid training.

a. At least 45% of teachers will hold first aid certificates.

Approximately 79.7% of teachers had first aid certificates (see Table 6).

b. At least 35% of parents will hold first aid certificates.

Approximately 62.5% of parents had first aid certificates. The most popular reason for having a first aid certificate was 'work requirement', with 90% stating this as their reason (see Table 6).

c. Parents are most likely to have a first aid certificate due to work requirements.

The most common reason for having a first aid certificate was work requirements, with 37 parents (58%) giving this as their reason (see Table 6).

d. Teachers who have first aid certificates will have a more accurate knowledge of HI than those who do not.

Teachers with first aid certificates averaged a score of 35.29% (SD=20.01) and those without averaged a score of 42.31% (SD=24.29). When correct dichotomized scores were averaged teachers scored 72.35% (SD=11.76) for those with first aid certificates, and 73.85% (SD=9.39) for those without.

There was no significant difference in accuracy scores between teachers who had first aid certificates and those who did not (U(64), Z = -.575, .*p*=.566).

Table 6.

Number of Teachers and Parents Responding to Each Question

Question	Teachers (N)	Parents (N)
First Aid Certificate		
Yes	51	40
No	13	24
Reason for first aid certificate		
Work requirement		37
Personal/family medical needs		3
Personal interest		2
Personal experience with head injury		
Myself	7	12
Close family member/s	20	27
Friends	19	13
Other	15	4
None	25	19
Have read		
Daily newspapers	34	38
Weekly newspapers	11	7
Weekly magazines	29	22
Books	27	19
Other sources	33	22
None	3	7
Have seen		
TV news	42	43
Documentaries	33	29
Talk shows	20	16
Movies/drama	27	33
Other sources	15	16
None	1	4
Have talked to		
Friends	19	28
Family	23	22
Professionals	33	26
Other	4	14
Experience child in care with head injury		
Yes	29	25
No	33	39
No answer	2	
Seek advice from?		
Previous Experience		12
PlunketLine		27
Friend/Family		13
Internet		14
Books		6
Doctor		63

e. Parents who have first aid certificates will have a better knowledge of HI than those who do not.

Parents with first aid certificates averaged a score of 37.25% (SD=19.48), and those without first aid certificates averaged a score of 41.25% (SD=26.34). When scores that were correct but uncertain were added parents who had first aid certificates averaged 76.75% (SD=12.94) and those without averaged 73.75% (SD=13.61).

There was no significant difference in accuracy scores between parents who had first aid certificates and those who did not (U(64), Z = -1.084, *.p*=.278).

f. Collectively, teachers and parents who have first aid training will have a better overall knowledge of HI than those who are not first aid trained.

The average accurate score of those with a first aid certificate was 36.15% (SD=19.69) and the average accurate score of those without a first aid certificate was 41.62% (SD=25.31). When correct dichotomized scores were averaged the score for those who have a first aid certificate was 74.29% (SD=12.42). When the same was done with those without a first aid certificate scores averaged 73.78 (SD=12.16). Only two people who had first aid certificates scored more than 80%, compared with four people scoring over 80% who didn't have first aid certificates. The median score for both first aid certificate holders and non first aid certificate holders was 35%.

There was no difference in teachers and parents accuracy of knowledge of HI overall with and without first aid training (U(128), Z = -.796, *.p*=.426).

2. Accuracy of Knowledge

a. *Teachers and parents who have had experience in dealing with a child in their care who has had a head injury will have better knowledge about head injury than those who haven't had any experience.*

The mean score for those who have had experience in dealing with a child in their care who has had an accident involving the head was 40.93% (SD=18.23) and the mean score for those who have not is 35% (SD=23.18). When correct dichotomized scores were averaged those that had had experience with a child in the care averaged

a score of 76.11% (SD=10.80) and those that had not averaged 72.6% (SD=13.23). There was no difference in accuracy of teachers and parents knowledge of HI overall whether or not they had experience in dealing with a child in their care who had experienced HI (U(128), Z = -1.096, .*p*=.057).

When the correct dichotomized scores of parents who had a child in their care who had had a HI were averaged, the mean was 80.4% (SD=10.6, N=25), and for those that hadn't, the score was 72.56% (SD=13.85, N=39). When accurate scores were averaged parents score was 40.80% (SD=19.72), and for those that hadn't the score was 37.44% (SD=23.78). There was no difference in accuracy of knowledge of HI for parents with and without first aid training (U(64), Z = -.704, .*p*=.482).

When the correct dichotomized score of teachers who had had a child in their care who had had a head injury was averaged the mean was 72.41% (SD=9.69, N=29), and for those that hadn't the score was 72.65% (SD=12.69, N=34). Accurate scores for those that had had the experience were averaged to 41.03% (SD=17.80), and those that hadn't 32.21% (SD=22.50). There was no difference in accuracy between teachers with and without first aid training (U(64), Z = -.377, .*p*=.706).

b. Those with personal experiences with HI's (i.e., themselves, close friends or family) will have better knowledge of HI than those who do not

Having spoken to two or more people (friends, family or professionals), or having had personal experience with head injuries (myself, close family member, friends or other) resulted in higher average scores than those who had had one or less discussions or personal experiences. See Table 10 for scores.

c. Parents and teachers will have similar levels of knowledge to previous studies, i.e., both parents and teachers will answer most accurately in the areas of general knowledge, and will be least knowledgeable regarding the effect that HI can have on memory.

When the percentage of teachers and parents who answered accurately was averaged by domain (general knowledge, consciousness, memory, recovery, and ACC - see Table 7) it showed that more parents and teachers answered accurately in the 'general knowledge' domain with the 'memory' domain being the least accurate

domain (the domain 'consciousness' was excluded from this analysis as there was only one question). When the correct dichotomized scores were averaged, general knowledge again was the domain that had the highest percentage of parents and teachers who answered correctly and memory was again the lowest.

Table 7

Percentage of Parents and Teachers Who Answered Correctly in Each Domain

	Questions 1-4 – General Knowledge (%)	Question 5 – Consciousness (%)	Questions 6-9 – Memory (%)	Questions 10-14 – Recovery (%)	Questions 15-20 – Other sources (%)
Parents	90.63	42.19	57.03	70.94	87.5
Teachers	87.11	46.88	53.91	66.25	86.98

Scores from the current study were also compared to those of previous studies (see Table 8), and teacher and parent accurate and correct dichotomized scores were compared for the remaining questions (see Table 9).

d. Teachers will have more accurate knowledge of HI than parents.

This hypothesis was not proven. Although overall, parents had higher scores of accuracy and correct dichotomized scores when compared to teachers, the difference was not significant (U(128), Z = -1.521, *.p*=.128).

Parents scores when comparing correct dichotomized scores averaged 75.63% (SD=13.17%). When only accurate scores were averaged parents scored 38.75% (SD=22.18). Teachers average correct dichotomized scores was 72.66% (SD=11.27). When accurate scores alone were averaged teachers scored 36.72% (SD=20.94)[2].

2. Accurate score - the number of accurate answers ('true' or 'false', whichever was correct), divided by the number of statements (20). This was calculated into a percentage for each participant.

'Correct dichotomized score' - all answers that were 'probably true' and 'true' were treated as the same (i.e. true), as with 'probably false' and 'false answers' (i.e. false). Each participant was given another score out of 20 which was calculated from the amount of answers they answered correctly (true or false, whichever was correct). This was then calculated into a percentage score for each participant.

Table 8.

Percent of Participants Answering Correctly From Past and Current Studies

Question	Gouvier, Presthol, and Warner (1988)	Willer, Johnson, Rempel, and Linn (1993)		Farmer and Johnson-Gerard (1997)		Guilmette and Paglia (2004)	Hux, Schram, and Goeken (2006)	Chapman and Hudson (2010)	Current study (2011)	
	Louisiana, USA (%)	New York, USA (%)	Ontario, Canada (%)	Educators (%)	Rehab. specialists (%)	Rhode Island, New England, USA (%)	Nebraska, USA (%)	United Kingdom (%)	North Shore, Auckland, NZ Teachers (%)	Parents (%)
A head injury can cause brain damage even if the person is not knocked out. (T)	72.85			88	96.4	91.7	98.74	95.00	93.75	92.19
Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head. (T)	54.75			75.1	83.8	64.3	90.25	64.80	81.25	89.06
A little brain damage doesn't matter since people only use a part of their brains anyway. (F)	86.88	95.5	95.6	98.4	100	82.6			96.88	100.00
Emotional problems after head injury are usually not related to brain damage. (F)	74.21						83.65	67.80	76.56	81.25
When people are knocked unconscious, most wake up shortly with no lasting effects. (F)	40.72			66.1	64		51.89	22.90	46.88	42.19

People can forget who they are and not recognize others, but be normal in every other way. (F)	17.65	11.00	17.6	35.5	57.8	25.00	6.60	8.60	17.19	34.38
Sometimes a second blow to the head can help a person remember things that were forgotten. (F)	54.30	62.40	60.3	94	98.2	58.20	71.38	74.10	76.56	84.38
People with amnesia for events before the injury usually have trouble learning new things too. (T)	57.01						51.89	31.20	62.50	57.81
People usually have more trouble remembering things that happen after an injury than remembering things from before. (T)	49.32			51.4	71.8				59.38	51.56
People who have had a head injury are more likely to have a second one. (T)	26.24	18.80	11.80	18.2	62.2	31.90	32.08	10.60	28.13	45.31
A person who has recovered from a head injury is less able to withstand a second blow to the head. (T)	83.26	65.70	67.60	67.2	74.8	63.20	70.13	48.50	78.13	82.81
Once a recovering person is 'back to normal' the recovery process is complete. (F)	52.94			96.2	96.4		97.58	91.70	84.38	85.94

It is good advice to rest and remain inactive during recovery. (F)	39.37		92.6	99.1		60.06	83.10	48.44	42.19
'No pain – no gain' is good advice for a person recovering from a brain injury. (F)	78.73							92.19	98.44

Note. 'Rehab specialists' refers to rehabilitation specialists. Any spaces in cells are where no data was available.

Questions adapted from "A survey of common misconceptions about head injury and recovery," by W.D Gouvier, P.H. Prestholdt, and M.S. Warner, 1988, *Archives of Clinical Neuropsychology 3*(4), p.335. Copyright 1988 The National Academy of Neuropsychology. Results from "A survey of common misconceptions about head injury and recovery," by W.D Gouvier, P.H. Prestholdt, and M.S. Warner, 1988, *Archives of Clinical Neuropsychology 3*(4), p. 335. Copyright 1988 by The National Academy of Neuropsychology; "A note concerning misconceptions of the general public about brain injury," by B. Willer, W.E. Johnson, R.G. Rempel, and R. Linn, 1993, *Archives of Clinical Neuropsychology, 8*(5), p.464. Copyright 1993 by The National Academy of Neuropsychology; "Misconceptions about Traumatic Brain Injury among educators and rehabilitation staff: A comparative study," By J.E Farmer and M. Johnson-Gerard, 1997, *Rehabilitation Psychology, 42*(4), p.279. Copyright 1997 by the American Psychological Association; "The public's misconceptions about traumatic brain injury: A follow up survey," by T.J. Guilmette, and M.F Paglia, 2004, *Archives of Clinical Neuropsychology, 19*, p. 186. Copyright 2004 by The National Academy of Neuropsychology. "Misconceptions about brain injury: A survey replication study," by K. Hux, D. Schram, and T. Goeken, 2006, *Brain Injury, 20*(5), p.549. Copyright 2006 by Taylor & Francis; "Beliefs about brain injury in Britain," by R.C. Chapman and J.M. Hudson, 2010, *Brain Injury, 24*(6), p.799. Copyright 2010 by Taylor & Francis.

Table 9:
Percentage of Participants Answering Questions Adapted From Other Sources

Question	Teachers		Parents	
	Accurate (%)	Correct (%)	Accurate (%)	Correct (%)
A child who has had a head injury may want to sleep more following their injury. (T)	54.69	95.31	46.88	92.19
If a child has a bump or 'egg' on their head following a head injury, this means the injury hasn't been bad enough to harm the brain. (F)	34.38	76.56	42.19	79.69
If a child has had a head injury they should avoid rough sports for at least three weeks following the injury. (T)	53.13	90.63	56.25	96.88
If a child's injury is mild then they should start to feel better in three to four days after the injury. (T)	28.13	78.13	23.44	78.13
Fatigue is a common side effect of a mild traumatic brain injury. (T)	54.69	92.19	59.38	92.19
Memory problems, attention/concentration difficulties, and slowed thinking are all side effects of mild traumatic brain injury. (T)	48.44	89.06	48.44	85.94

Note. Questions adapted from "Knowing about your mild Traumatic Brain Injury (TBI)" [Brochure], by the Accident Compensation Corporation, 2006, New Zealand Guidelines Group. Copyright 2006 by New Zealand Guidelines Group; "Caring for your child after a Head Injury," [Brochure] by the Accident Compensation Corporation, 2007, New Zealand Guidelines Group. Copyright 2007 by New Zealand Guidelines Group.

As a group parents answered the question 'whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head' more accurately than teachers (43.75% vs. 29.69%). However when correct dichotomized scores were averaged the difference between the two groups is less (89.06% vs. 81.25%).

Parents also answered the question 'sometimes a second blow to the head can help a person remember things that were forgotten' more correctly than teachers (84.38% vs. 76.56%) when correct dichotomized scores were compared.

On average parents also answered more accurately for the question 'people who have had a HI are more likely to have a second one' with 18.75% of parents

answering accurately, and only 7.81% of teachers answering accurately. When correct dichotomized scores were compared there is still a large difference between the groups (parents=45.31% semi accurate vs. teachers 28.13%).

The accuracy of answers for the question 'a person who has recovered from a head injury is less able to withstand a second blow to the head' also varied when parents and teachers were compared (40.63% vs. 26.56%).

e. Teachers who hold teaching qualifications will have a better knowledge of HI symptoms than those who are not trained.

Teachers with bachelor's degrees had the lowest average score (30.24%, SD=18.54), and those with other qualifications and teaching diplomas scoring slightly higher (33.13%, SD=12.23 and 38.20%, SD=21.69, respectively). However those with no qualification scored the highest with an average score of 49.50% (SD=25.22). When correct dichotomized scores were added those with bachelor's degrees scored 70.95% (SD=11.79), diplomas 72% (SD=10.21), other 76.88% (SD=7.04) and none 74.5% (SD=15.36). Using the Kruskal-Wallis Test no significant difference was found between the groups based on the level of qualification on total accuracy score ($\chi^2(3, N = 64) = 5.907, p = .116$).

f. Teachers who have more years of teaching experience will have a better knowledge of HI symptoms than those who are not trained.

Teachers with less than five years experience had the lowest average scores (29.62% SD=23.62), whereas those with 5-10 years experience had average scores of 41.32% (SD=19.28). Teachers with 10-15 years experience had average scores of 43.33% (SD=18.37) and those with more than 15 years experience scored 40.5% (SD=14.99) on average.

When scores that were accurate and those that were uncertain but correct were added those with less than five years experience averaged 69.23% (SD=12.47), five to ten years 76.84%, SD=10.3), ten to fifteen years 76.11%, (SD=6.97), and fifteen years and more averaged 70.5 (SD=10.66).

Using the Kruskal-Wallis Test no significant difference was found between the groups based on the level of qualification on total accuracy score ($\chi^2(3, N = 64) = 7.139, p = .068$).

Accessing information/knowledge

a. Collectively, those that access information about HI through media sources will have a poorer knowledge of HI than those who do not.

Participants were asked where in the media they had read or seen information about HI's. Table 10 shows the average scores from individual media sources, the average from each group (written media, visual media etc), the average score for those who had selected two or more from each category, and the average score of those who had selected one or less from each category. This shows that on average those who have seen or read information about HI from two or more sources have a higher score of accuracy when compared to those who have seen or read info in one or no sources. This was true for both parents and teachers, across both visual and written media. Overall parents also had slightly higher scores on average than the teachers, where comparing media categories.

b. Daily newspapers and TV news will be popular sources of information on HI

Daily newspapers were the most popular type of written media and TV News was the most popular type of viewing media for information about HI for both parents and teachers. Least utilised were weekly newspapers and other sources of viewing media.

Professionals were the most popular social source of information and the most common type of personal experience was with close family members. Approximately 39% of teachers surveyed had no personal experience with HI's.

c. Parents are most likely to seek advice from a doctor if a child in their care has an accident involving their head. PlunketLine and the internet will also be popular sources of information.

Doctors were the most popular source of advice if a child in their care had an accident involving their head. The most popular type of media that parents had read about HI's was daily newspapers, and the most popular type of viewing media was TV news. Friends were the most popular source of social information, and the most popular source of personal experiences was close family members. Nineteen parents had no personal experience with HI's.

Table 10.

Average Scores for Parents and Teachers in Regards to Media Sources

Category	Average of each source (%)		Average of each category scores (%)		Average from those who selected more than two from category (%)		Average score of those who selected zero or 1 from category (%)	
	Parents	Teachers	Parents	Teachers	Parents	Teachers	Parents	Teachers
Written Media								
Daily newspapers	41.84	41.62						
Weekly Newspapers	61.43	50.00						
Weekly Magazines	42.50	40.69	48.95	42.45	46.09	42.32	31.41	26.74
Books	50.79	41.30						
Other sources	48.18	38.64						
Visual Media								
Programmes TV news	41.40	40.24						
Doc	50.52	40.61						
Talk shows	35.63	39.75	43.10	41.67	42.86	41.54	30.91	29.20
Movies/drama	40.76	40.74						
Other	47.19	47.00						
Spoken to								
Friends	44.64	38.33						
My family	46.59	44.57	44.51	41.22	51.25	42.39	33.07	33.54
professional	42.31	40.76						
Personal Experience								
myself	50.00	43.57						
close family members	42.78	43.00	45.14 (Not including 'none')	42.51 (Not including 'none')	50.00	44.44	35.00	33.70
friends	36.52	45.79						
other	51.25	37.67						
none	32.63	29.00						

Note. Adapted from "A survey of common misconceptions about head injury and recovery," by W.D Gouvier, P.H. Prestholdt, and M.S. Warner, 1988, *Archives of Clinical Neuropsychology 3*(4), p. 335.

Post Hoc Comparisons

Age groups.

When each teacher's correct dichotomized scores were averaged for each age group the results were as follows: 18-25 – 66.67% (SD=8.62, N=12); 25-35 – 76.52% (SD=12.92, N=23); 36-45 – 74.97% (SD=6.11, N=15); 46-55 – 71.25% (SD= 11.26, N=8); 56+ - 66.67 (SD = 14.38, N=6).The average score of each age group for those who were accurate is as follows: 18-25 – 29.58% (SD=17.51, N=12); 26-35 – 35.43% (SD=23.35, N=23); 36-45 – 40.67% (SD=19.45, N=15); 46-55 – 51.25% (SD=18.66, N=8); 56+ 26.67% (SD=16.33, N=6).

When each parent's correct dichotomized scores for each age group were averaged the results were as follows: 18-25 – 73.33% (SD=10.80, N=6); 25-35 – 74.44% (SD=14.77, N=36); 36-45 – 79.5% (SD=10.5, N=20); 56+ - 65% (N=2). The average score of each age group for those who were accurate is as follows: 18-25 – 38.33%, (SD=18.89%, N=6); 26-35 – 41.67%, (SD=24.87%, N-36); 36-45 – 35.5% (SD=17.98%, N=20); 56+ - 20%, (SD=14.14, N=2).

Using the Kruskal-Wallis Test no significant difference was found between the age groups on total accuracy score ($\chi^2(3, N = 128) = 2.290, p = .514$.

Gender.

There were a higher proportion of females than males taking part in the survey. Females mean score was 37.5% (SD=20.76) and males mean score was 38.33% (SD=23.60). When correct dichotomized scores were averaged females had slightly higher scores than men (mean = 76.56%, SD = 12.01 vs. 74.69%, SD=14.37). When only accurate scores were taken into account female parents still averaged slightly higher scores (mean = 40.47, SD=21.72 vs. 37.03 SD=22.86).

However, there was no significant difference between males and females in their accuracy of knowledge about HI scores (U(64), Z = -.900, p=.368).

Chapter Seven – Discussion

The current study aimed to explore the nature, accuracy, and source of the knowledge that parents and teachers of young children have about HI.

For those caring for young children, knowledge of the general aspects of HI is crucial, especially considering young children may not be able to verbalise or articulate their possible symptoms. The prevalence for this age group is high (Bruns & Hauser, 2003) and it is through knowledge of the various aspects of HI that any incidences may be better managed in the short and long term. Therefore this study examined the information available to the public in regards to HI, and surveyed parents and teachers of young children about their knowledge of HI, as well as finding out the main sources of their knowledge base.

First Aid Training

Many of the first aid providers offer courses tailored to those working with children, which appear to give relevant information to those attending, and also provides opportunities to discuss previous experiences. All first aid courses cover HI's, though the focus is on the immediate treatment and not the long term consequences.

Although it is not a requirement in New Zealand for all teachers to hold first aid certificates, it is reassuring that approximately than 80% of the teachers surveyed do. This proved true the hypothesis that more than 45% of teachers surveyed would hold first aid certificates.

While a significant number of parents have first aid training, there were slightly fewer parents than teachers who had first aid training. Nearly all of the parents gave their reason for having a first aid certificate as 'work purposes'. There are many types of first aid courses that parents could have completed although it is most likely that courses are directed towards various work places, , and may not have been specifically designed for those caring for children. It was also not made clear if the courses that were undertaken were of a basic or higher level, which could again influence the kind of information taught on the courses.

Having first aid training does not necessarily mean that people have a higher knowledge of HI; in fact, the current study found that both teachers and parents who did not have first aid certificates scored higher, on average, than those who did.

Although these results were not significant, it may illustrate a trend that shows that having a first aid certificate may not be the key factor in understanding the various aspects of HI.

While first aid training may not give parents and teachers a complete knowledge of HI, it may be that the knowledge gained on the courses they undertake give them the skills to react appropriately in the first instance, particularly in ensuring a person rests immediately following an accident, and preventing a second accident occurring. Previous studies have found that having a first aid certificate is likely to heighten people's knowledge and awareness of how to be a 'first responder' (Steele, 1994). The resources provided to first aid course attendees may also be stepping stone to resourcing more information, particularly if they are made aware how prevalent such injuries are and therefore how important knowledge is.

Accuracy of knowledge

This study found that teachers and parents of young children still hold some misconceptions about HI. Previous studies (Chapman & Hudson, 2010; Gouvier, et al., 1988; Guilmette & Paglia, 2004; Hux, et al., 2006; Swift & Wilson, 2001; Willer, et al., 1993) have also found similar misconceptions to be endorsed, which shows these misconceptions are not limited to one geographical location.

There were no significant differences between teachers and parents average scores. Even though teachers have more contact with a higher number of children on a daily basis than parents do, this did not improve teachers overall scores. The knowledge about HI that teachers gain from the daily exposure to children may be cancelled out by the likelihood that the parents are the caregivers for a child following an accident, not a teacher. It is more likely that the accident occurs during times when a parent is more likely to be present (during the school holidays, in the evenings and at home as suggested by Boll (1983)) and that a parent takes the child to the doctor and receives the appropriate information about symptoms and recovery. The current study also shows that more parents than teachers discuss head injuries with their friends. This could be a valuable source of information which is delivered in an informal way and is relevant to the individual concerned. Information is therefore more likely to be understood and taken note of.

The question 'a little brain damage doesn't matter since people only use a part of their brains anyway' had the highest percentage of both teachers and parents answering correctly. This shows that parents and teachers have an understanding of the impact that head injury can have and the importance of the brain in regards to everyday functioning. This question was also answered well in previous studies (Farmer & Johnson-Gerard, 1997; Gouvier, et al., 1988; Guilmette & Paglia, 2004; Willer, et al., 1993) so it is reassuring that this is a continuing trend, applicable to various geographical locations and to specific (i.e., teachers and parents) and general audiences.

Another question that was answered well by both teachers and parents was that '"no pain – no gain" is good advice for a person recovering from a brain injury'. This question was included in the research as it is similar to the attitude prevalent in New Zealand culture about 'hardening up'. This 'harden up' attitude is likened to being tough no matter what the situation and 'acting like a man'. This particularly resonates with the male youth population regarding sporting accidents. While many of the parents and teachers surveyed answered this question correctly, there was a large difference between those who answered correctly (answering probably false and false) and those who answered accurately (answering only false). This shows that the attitude of 'hardening up' may still be prevalent in New Zealand culture, which is an issue that organisations such as the Brain Injury Association are working on addressing. There is a need for those who are acting as role models for children to show the importance of preventing head injuries, and the attitudes they have towards safety can be a way to do this. Encouraging children to wear bicycle helmets and role modelling the behaviour is an example of this. There is also a need to educate older children on the long term consequences of HI, in order to lower the likelihood that those who do suffer a HI become bullying victims (Crother, et al., 2007)

Parents

Many parents were unsure about the length of time it takes before a child starts to feel better following a mild HI. One person left the comment 'much sooner' next to this question, which shows that peoples definitions of 'mild' varies, and therefore there could be more than one interpretation of this question. The answering

of this question can be easily skewed by each individuals own experiences with HI. If the injuries they had witnessed or suffered were milder comparative to someone else and they have recovered quicker than others they may then expect that to be the case with all injuries.

Teachers

Specific to teachers, there seemed to be considerable confusion about what the impact of amnesia for events can be on further learning. A high percentage of teachers answered correctly (probably true) but not accurately (true), showing a lot of confusion about this question. This is a concern given the role of a teacher is to educate and help children learn - the impact of their lack of understanding in this area could have a detrimental effect on a child who has suffered a HI.

As the people surveyed in the present study are caring for young children, it is particularly worrying that there is a lack of understanding of the dangerous consequences of a second blow to the head. It also seems there is a difference between teachers and parents in this area, with more parents than teachers answering correctly. This could mean that parents need to make sure teachers are aware if a child has suffered a HI at home - even a mild HI - to ensure that teachers pay special attention to that particular child's mood and behaviour while in their care. If a child is allowed to continue play following an injury it could lead to further injury and potentially irreversible damage; this can be true for hours or days following an incident. This is one aspect of HI's that needs to be further emphasized when educating the public. The possibility and necessity of including this information in teacher training should also not be overlooked given the high rate of mild HI's that occur in early childhood.

While teachers in the current study were not asked specifically if they hold any specialised role within their workplaces (particularly in regards to caring for children with head injuries) it is thought that due to the small sizes of many surveys (averaging ten teachers per centre) there would be no need for people to be specifically overseeing these areas. Therefore the present study is more likely to represent an average sample of teachers in early childhood settings.

It was thought that those teachers with teaching qualifications would have the highest average score, because their training had been focussed on children. However those that did not have any training at all actually scored better than others. While the difference in scores were not significant, it could be that those without teaching qualifications held qualifications in other areas such as nursing, or had worked in other areas that gave access to information about head injuries. This stems from a comment from one untrained teacher who noted that she had nursing qualifications but not teaching qualifications.

Domains

Given the results of previous studies, it is not surprising that there were low numbers of both parents and teachers who answered accurately in regards to memory and recovery. This is consistent with previous studies which show that this is an area that the general public is least knowledgeable (Gouvier, et al., 1988). Specifically a high percentage of both parents and teachers appear to believe that a person can have problems remembering who they and others are, but will otherwise be fine. This is somewhat concerning as even though both groups seem to understand that relatively mild HI's can still be harmful, the actual damage that is occurring to the person seems to be less understood.

Given that memory and attention are common areas of brain functioning that are affected following a HI (Blosser & DePompei, 2003), and that they are also the most common aspects of HI that are identified by teachers and parents (rather than the child themselves) (Baron, et al., 1995), it is important that the effect HI's can have on these aspects of brain functioning is widely known. Without knowing about more specific aspects of HI's, parents and teachers may overlook possible symptoms and attribute them to something else (i.e., tiredness). This is particularly true when HI's are mild, and therefore seem harmless (Tellier, et al., 1999).

It is also important that parents and teachers are aware of the impact they can have on a child's recovery from a HI. The critical part that family plays in the course of recovery is becoming better known (McKinlay, 2010), however the current study shows that there are specific aspects of recovery that parents and teachers are confused about. Parents and teachers need a good understanding of how important

the recovery phase is for a child, and how they can then support the child in their recovery process. It is likely that this knowledge is common amongst those who have had a close family member suffer a HI, due to the knowledge gained through experience. There is a need for this information to be timely, accurate, and applicable. Children who have suffered a HI will then be better understood in terms of their recovery phase, which would hopefully lead to a better outcome for both the child and their family. These inaccuracies can also impact negatively on the recovery of those who have sustained a HI. A lack of understanding can lead to unrealistic expectations being placed on the recovery of the head injury sufferer. For example interventions that the family may think are helpful (pushing a person to try harder at their recovery) may actually cause more stress for the individual concerned and may lead to poorer recovery outcomes (Springer, et al., 1997).

Assessing information knowledge

Doctors and PlunketLine were the most popular place for parents to seek information regarding HI's, and this is reassuring. While other sources of information (such as the internet or books) can provide valuable information, doctors and PlunketLine are the only sources (given as options in this survey) who can check a child for possible complications that occur following a HI. Is it also likely that information and advice given from these sources is accurate. Information on the internet is not validated and can be written by anyone, so there is the possibility that advice given in this form is incorrect (Diaz, et al., 2002).

Consistent with previous studies (Gouvier, et al., 1988) the most popular sources of information about HI in the current study were daily newspapers and TV news. One source that was not as popular in the current study as it was in a previous study were talk shows (Gouvier, et al., 1988). This could be a cultural difference, and it is possible that there are more talk shows in the USA, or that talk shows were more popular when the previous survey took place (1988) comparative to today.

When media were divided into media types (i.e. written and visual) it was found that those who access two or more types of media (from either 'written' or 'visual' categories) had a higher rate of accuracy when compared to those who accessed only one or none. Given that previous studies have found that the media has

a negative influence on peoples knowledge of HI (Willer, et al., 1993), the current results are surprising. While these results should be taken with caution due to the small sample sizes used, it could be that in the time since previous studies took place information disseminated via the media has become more accurate.

One key aspect that could cause variance in levels of understanding of HI is the differing terms which are used to describe HI. When parents and teachers are finding information regarding HI there are many sources from which to draw information from. These sources describe HI using various terms and could therefore be confusing for the reader. As was the case in this study, many parents and teachers were using doctors as sources of advice in regard to HI's and should continue to do so as and when the need arises.

Limitations of the current study

The current study had several limitations. Small sample sizes meant that while the results may be reasonably true of the population of the North Shore, Auckland, the extent to which the results would generalise to other parts of Auckland and New Zealand is unclear.

The time allocated for data collection was a significant limitation to the research. Data collection for this study took place in December meaning many childcare centre managers, teachers, and parents did not want to take part in the research due to it being a busy time of year. This was a limitation for the research as it meant many of those who did not participate may have been available and more willing to participate at other times during the year. It also meant surveys were only left at the childcare centres for little over a week, and were collected within days of the centres closing for the holidays. In one case the surveys had been misplaced completely due to it being such a hectic time of the year. There were also no opportunities to introduce the study to staff in person as their time was limited, and any meeting times were allocated to end of year planning.

This also had an impact on accessing parents. Again, due to the time of the year there were limited opportunities to access parents at events such as parents coffee groups, as intended. This meant the collection of data from parents relied on snowball

sampling and was dependent on parents returning the data via post or in person within two weeks of completing the survey.

A further limitation of the study could be the requirement that participants spoke and read English well. This means that some cultural groups may have been unintentionally excluded from the study and therefore the results are not able to be generalised reliably.

The design of the study could also have been a limitation of the research. The questionnaire was a shortened version of Gouvier's (1988) study. It may be that if the full questionnaire was used then the data may have been more conclusive about the areas in which teachers and parents are knowledgeable, and any areas in which they differ. The longer version was not used in this study in an effort to the keep the time commitment from participants to a minimum.

On the questionnaire some demographic options were only available to parents, and some only to teachers. This limited the ability to draw conclusions from the study, particularly in regards to finding out where people seek advice from if a child in their care had an accident involving their head.

Small administrative changes would be made to the questionnaire also; all items would use the term child or children as opposed to person or people to ensure continuity.

The option for teachers to note if they were currently studying, and if they had read about HI's in course notes would also be included. For both teachers and parents an option of 'internet' as a place in which they had read about HI's would also be included. Participants would be allowed the option to disclose if they had any medical qualifications or experience which could impact on their level of knowledge. Both teachers and parents would be asked for the education level, similar to previous studies.

Specific questions would also be altered in response to feedback received from participants during the research process. Question 13 ('It is good advice to rest and remain inactive during recovery') would be clarified, as feedback from the current study noted that it was not clear as to how severe the injury was, or if it was referring to immediately following the injury, or sometime later.

It was misleading to have the first page of the survey read 'this survey is about mild traumatic brain injury', and the second page to begin with 'this survey is about traumatic brain injury regardless of severity'. This would need to be clarified, as it would have influenced how people interpret the questions, particularly when severity was referred to.

Using terms such as head injury and traumatic brain injury interchangeably could have been confusing for some people, and could have also meant that people interpreted the question to mean something different than what was intended.

Recommendations for future research

Future research examining the knowledge of HI could include surveying the general public, in order to give a baseline to compare to further studies in this area. It would also provide data in which to compare to previous studies based in the UK and US.

It could also be beneficial to survey more groups who are directly responsible for children such as coaches of sports teams. Is the training that coaches of children's sports teams receive adequate enough for a child's head injury to be recognised?

The impact of first aid training on HI knowledge could be examined closely, with a survey focussing more on symptom knowledge and immediate post injury care than recovery and long term consequences.

As there is a lack of data regarding HI in young children in New Zealand research into the epidemiology of HI in young children would be valuable. It would provide much needed information about the causes of HI, and more specifically mild HI relative to New Zealand culture. It could also provide much needed information about the cause and both short and long term consequences of HI than what is currently available.

Research aimed at specific cultural groups may be beneficial, particularly in the Māori community due to the high incidences of Māori suffering from HI. It might also be appropriate to survey parents and teachers similar to the current study, with a focus on teachers in Kohanga Reo (Māori preschool).

Conclusions

This study examined the knowledge base of parents and teachers of young children regarding HI which has one of the highest rates of death and disability worldwide. Young children in particular have the highest rates of mild head injury. It is for this reason that education in the area of HI is extremely important, not only for medical professionals, but for the public as well. Those who are caring for young children have a responsibility to ensure they are able to advocate for the child's care and recovery, and education about HI is essential to be able to do this.

It was found that while parents and teachers have a good understanding of many aspects of HI, there are still misconceptions that are being endorsed, particularly in regards to the aspects of memory and recovery. While media sources have been previously blamed for promoting incorrect information about HI, and while there is some information in the public domain that is incorrect, it seems media sources and people in general are becoming more aware of the importance of promoting correct information.

The questionnaire used in this research acted as a catalyst for further conversations about head injury among two key groups of people – teachers and parents of young children. The current research showed that parents and teachers who care for young children hold similar misconceptions to previous studies of the general public. This study was the first of its kind known to the researcher to take place in New Zealand and focus on the knowledge base of those who care for young children. This is comparative to previous studies taking place in various other countries which have examined HI knowledge in the general population. The current research therefore builds on the previous research studies, adding valuable information to the current literature.

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Appendix 1: Information Forms for Parents, Teachers and Board of Trustees/Management

Note: Information sheets given to Parents, Teachers, and Board of Trustees/Management were printed on Massey University letterhead. The margins of the following documents have been changed slightly to fit on bound pages. The font on the Board of Trustees/Management letter has been reduced slightly for the same reason.

Appendix 1-A - Traumatic Brain Injury Symptom Knowledge Survey – Letter for Board of Trustees/Management of Early Childhood Centres

Dear Board of Trustees/Management

My name is Erin McKay and I am a graduate student at Massey University, currently writing my Master of Arts (Psychology) thesis. I am doing a small survey of parents and teachers of young children and am writing to invite your teaching team to take part.

Participating in this survey will take 10 minutes of your teachers' time to complete short individual questionnaires about their knowledge of traumatic brain injury symptoms. The focus of this research is Parent and Teacher knowledge of mild traumatic brain injury symptoms in children. The aim of this research is to find out what parents and teachers know about mild traumatic brain injury symptoms, how many parents and teacher have first aid training, and if being first aid trained influences symptom knowledge.

Attached is an information sheet that will be given to all participants inviting them to take part in the research. All participants are able to enter a draw to win a $100 Warehouse voucher.

The information collected in this study will only be used for this study and will be kept confidential. There will be no information collected that could identify individuals or Early Childhood Centres, as all information will be grouped together. It will be stored in a secure location.

If you would like to accept this invitation to take part, please contact me at erinmckay@hotmail.com or 0272809806 to arrange a time suitable for the survey to be carried out.

My supervisor for this research is Janet Leathem, she can be contacted on (09) 414 0800 ext 62035 if you have any queries upon consideration of this research.

Although the responses of individuals and specific centres will be kept confidential, a copy of the general research findings will be available at the conclusion of the study and forwarded to you if you wish.

Thank you for your consideration in taking part in this research.

Kind regards

Erin McKay
Researcher

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 10/63. If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email humanethicsouthb@massey.ac.nz

Appendix 1-B - Traumatic Brain Injury Symptom Knowledge Survey Information - Parents

Hello,

My name is Erin McKay and I am a graduate student at Massey University currently conducting research on knowledge of traumatic brain injury in children.

You are being invited to take part in this research as you have a young child in your care. It will only take ten minutes of your time and you can choose not to answer any of the items. Feel free to ask me any questions while completing the questionnaire.

Completion of this questionnaire puts you into a draw to win a $100 Warehouse voucher.

All information collected from this study will be kept confidential and will only be used for this study. There is no information that can identify individuals so your details are kept anonymous. Completion of the questionnaire implies consent.

The data collected will be analysed as part of my Master of Arts (Psychology) thesis. The focus of this research is parent and teacher knowledge of mild traumatic brain injury symptoms in children. The aim of this research is to find out what parents and teachers know about mild traumatic brain injury symptoms, how many parents and teachers are first aid trained, and if being first aid trained influences symptom knowledge.

My supervisor for this research is Janet Leathem and can be contacted on J.M.Leathem@massey.ac.nz or (09) 414 0800 ext 62035 if you have any queries about this research. I can be contacted at erinmckay@hotmail.com or 0272 809 806.

If you would like to receive a summary of the results please write your email address or phone number on the form provided.

Thank you for your participation in the research.

Erin McKay

Researcher

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 10/63. If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email humanethicsouthb@massey.ac.nz

Appendix 1-C - Traumatic Brain Injury Symptom Knowledge Survey Information - Teachers

Hello,

My name is Erin McKay and I am a graduate student at Massey University currently conducting research on knowledge of traumatic brain injury in children.

You are being invited to take part in this research as you are a teacher of children under five years of age. It will only take ten minutes of your time and you can choose not to answer any of the items. Feel free to ask me any questions while completing the questionnaire.

Completion of this questionnaire will enable you to go into the draw to win a $100 Warehouse voucher.

All information collected from this study will be kept confidential and will only be used for this study. There is no information that can identify individuals so your details are kept anonymous. Completion of the questionnaire implies consent.

The data collected will be analysed as part of my Master of Arts (Psychology) thesis. The aim of this research is to find out what parents and teachers know about mild traumatic brain injury symptoms, how many parents and teachers are first aid trained, and if being first aid trained influences symptom knowledge.

My supervisor for this research is Janet Leathem and can be contacted on J.M.Leathem@massey.ac.nz or (09) 414 0800 ext 62035 if you have any queries about this research. I can be contacted at erinmckay@hotmail.com or 0272 809 806.

If you would like to receive a summary of the results please write your email address or phone number on the form provided.

Thank you for your participation in my research.

Erin McKay

Researcher

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 10/63. If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email humanethicsouthb@massey.ac.nz

Appendix 2: Questionnaires for Parents and Teachers

Note: The margins and font size of the following documents have been changed slightly to fit on bound pages.

Appendix 2-A - Questionnaire for Teachers

Teachers - this questionnaire is about your knowledge of traumatic brain injury symptoms in children. Please tick the relevant boxes below.

❑ Female ❑ Male

❑ Under 18 ❑ 18-25 ❑ 26-35 ❑ 36- 45 ❑ 46-55 ❑ 56+

What ethnic group/s do you identify with?
❑ New Zealand European ❑ Maori ❑ Pacific Island ❑ Asian
❑ Other

Early Childhood Teaching Qualification
❑ Bachelors Degree ❑ Teaching Diploma ❑ Other
❑ None

Are you a registered teacher?
❑ Yes – Provisionally registered ❑ Yes – Fully registered ❑ No

How many years teaching experience do you have?
❑ Less than five years ❑ Five to ten years
❑ Ten to fifteen years ❑ More than 15 years

Do you hold a current first aid certificate?
❑ Yes ❑ No

Do you have previous experience in dealing with a child in your care who has had a head injury?
❑ Yes ❑ No

I have read about head injuries in
❑ Daily news papers ❑ Weekly papers ❑ Weekly magazines
❑ Books ❑ Other sources

I have seen
❑ Programmes about head injuries on TV news ❑ Documentaries about head injuries
❑ Programmes about head injuries on talk shows ❑ Movies/drama about head injuries
❑ Programmes about head injuries from other sources

I have talked to
❑ Friends about head injuries ❑ My family about head injuries
❑ Professionals about head injuries

Personal experience with head injuries
❑ Myself ❑ Close family members ❑ Friends

Below are some statements about brain injury regardless of severity. Some of these statements are true and some are false. Please indicate whether you think these statements are true, probably true, probably false, or false.		True	Probably True	Probably False	False
1.	A head injury can cause brain damage even if the child is not knocked out	❑	❑	❑	❑
2.	Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head	❑	❑	❑	❑
3.	A little brain damage doesn't matter since people only use a part of their brains anyway	❑	❑	❑	❑
4.	Emotional problems after head injury are usually not related to brain damage	❑	❑	❑	❑
5.	When people are knocked unconscious, most wake up shortly with no lasting effects	❑	❑	❑	❑
6.	People can forget who they are and not recognize others, but be normal in every other way	❑	❑	❑	❑
7.	Sometimes a second blow to the head can help a person remember things that were forgotten	❑	❑	❑	❑
8.	People with amnesia for events before the injury usually have trouble learning new things too	❑	❑	❑	❑
9.	People usually have more trouble remembering things that happen after an injury than remembering things from before	❑	❑	❑	❑
10.	People who have had a head injury are more likely to have a second one	❑	❑	❑	❑
11.	A person who has recovered from a head injury is less able to withstand a second blow to the head	❑	❑	❑	❑
12.	Once a recovering person is 'back to normal' the recovery process is complete	❑	❑	❑	❑
13.	It is good advice to rest and remain inactive during recovery	❑	❑	❑	❑
14.	'No pain – no gain' is good advice for a person recovering from a brain injury	❑	❑	❑	❑
15.	A child who has had a head injury may want to sleep more following their injury	❑	❑	❑	❑
16.	If a child has a bump or 'egg' on their head following a head injury, this means the injury hasn't been bad enough to harm the brain	❑	❑	❑	❑
17.	If a child has had a head injury they should avoid rough sports for at least three weeks following the injury	❑	❑	❑	❑
18.	If a child's injury is mild then they should start to feel better in three to four days after the injury	❑	❑	❑	❑
19.	Fatigue is a common side effect of a mild traumatic brain injury	❑	❑	❑	❑
20.	Memory problems, attention/concentration difficulties, and slowed thinking are all side effects of mild traumatic brain injury	❑	❑	❑	❑

Appendix 2-B - Questionnaire for Parents

Parents - this questionnaire is about your knowledge of mild traumatic brain injury symptoms in children. Please tick the relevant boxes below.

❑ Female ❑ Male

❑ Under 18 ❑ 18-25 ❑ 26-35 ❑ 36- 45 ❑ 46-55 ❑ 56+

What ethnic group/s do you identify with?
❑ New Zealand European ❑ Maori ❑ Pacific Island ❑ Asian
❑ Other

Do you hold a current first aid certificate?
❑ Yes ❑ No

What was your reason for getting a first aid certificate?
❑ Work requirement ❑ Personal/Family medical needs ❑ Personal interest
❑ Other

Where would you seek advice from if a child in your care had an accident involving their head? (tick as many as relevant).
❑ Previous experience ❑ Plunket Line ❑ Friend/Family member
❑ Internet ❑ Books ❑ Doctor

Do you have previous experience in dealing with a child in your care who has had a head injury?
❑ Yes ❑ No

I have read about head injuries in (tick as many as relevant):
❑ Daily news papers ❑ Weekly papers ❑ Weekly magazines
❑ Books ❑ Other sources

I have seen (tick as many as relevant):
❑ Programmes about head injuries on TV news ❑ Documentaries about head injuries
❑ Programmes about head injuries on talk shows ❑ Movies/drama about head injuries
❑ Programmes about head injuries from other sources

I have talked to (tick as many as relevant):
❑ Friends about head injuries ❑ My family about head injuries
❑ Professionals about head injuries

Personal experience with head injuries (tick as many as relevant):
❑ Myself ❑ Close family members ❑ Friends
❑ Other ❑ None

Below are some statements about brain injury regardless of severity. Some of these statements are true and some are false. Please indicate whether you think these statements are true, probably true, probably false, or false.	True	Probably True	Probably False	False
21. A head injury can cause brain damage even if the child is not knocked out	❑	❑	❑	❑
22. Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head	❑	❑	❑	❑
23. A little brain damage doesn't matter since people only use a part of their brains anyway	❑	❑	❑	❑
24. Emotional problems after head injury are usually not related to brain damage	❑	❑	❑	❑
25. When people are knocked unconscious, most wake up shortly with no lasting effects	❑	❑	❑	❑
26. People can forget who they are and not recognize others, but be normal in every other way	❑	❑	❑	❑
27. Sometimes a second blow to the head can help a person remember things that were forgotten	❑	❑	❑	❑
28. People with amnesia for events before the injury usually have trouble learning new things too	❑	❑	❑	❑
29. People usually have more trouble remembering things that happen after an injury than remembering things from before	❑	❑	❑	❑
30. People who have had a head injury are more likely to have a second one	❑	❑	❑	❑
31. A person who has recovered from a head injury is less able to withstand a second blow to the head	❑	❑	❑	❑
32. Once a recovering person is 'back to normal' the recovery process is complete	❑	❑	❑	❑
33. It is good advice to rest and remain inactive during recovery	❑	❑	❑	❑
34. 'No pain – no gain' is good advice for a person recovering from a brain injury	❑	❑	❑	❑
35. A child who has had a head injury may want to sleep more following their injury	❑	❑	❑	❑
36. If a child has a bump or 'egg' on their head following a head injury, this means the injury hasn't been bad enough to harm the brain	❑	❑	❑	❑
37. If a child has had a head injury they should avoid rough sports for at least three weeks following the injury	❑	❑	❑	❑
38. If a child's injury is mild then they should start to feel better in three to four days after the injury	❑	❑	❑	❑
39. Fatigue is a common side effect of a mild traumatic brain injury	❑	❑	❑	❑
40. Memory problems, attention/concentration difficulties, and slowed thinking are all side effects of mild traumatic brain injury	❑	❑	❑	❑