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ΠΕΡΙΛΗΨΗ

Κάθε χρόνο, ένας μεγάλος αριθμός παιδιών και εφήβων στις Ηνωμένες Πολιτείες της Αμερικής υπόκειται σε κρανιοεγκεφαλική κάκωση (ΚΕΚ) ως αποτέλεσμα πτώσεων, επιθέσεων, αθλητικών ατυχημάτων ή αυτοκινητιστικών δυστυχημάτων. Η ΚΕΚ μπορεί να προκαλέσει σημαντικές αλλαγές στη γνωστική κατάσταση ενός ατόμου, όπως επιπτώσεις στη μνήμη και στις εκτελεστικές λειτουργίες. Μπορεί να προκαλέσει επίσης αλλαγές στη συναισθηματική κατάσταση και αισθητηριακές διαταραχές. Οι εκπαιδευτικοί αποτυγχάνουν να αναγνωρίσουν έγκαιρα παιδιά με ΚΕΚ, γεγονός το οποίο μπορεί να επιφέρει φτωχή ακαδημαϊκή επίδοση. Επιπλέον, εσφαλμένα μπορεί να διαγνωστούν παιδιά με μαθησιακές, συναισθηματικές ή συμπεριφορικές διαταραχές, ενώ στην πραγματικότητα οι οποιεσδήποτε δυσκολίες τους να απορρέουν από ΚΕΚ. Η παρούσα έρευνα εξετάζει τη συχνότητα των πιθανών παιδιατρικών ΚΕΚ σε παιδιά δημοτικής σχολικής ηλικίας, καθώς και τις μακροχρόνιες συναισθηματικές, προσαρμοστικές, συμπεριφορικές και γνωστικές επιπτώσεις τους στον Κυπριακό παιδιατρικό πληθυσμό. Ο στόχος της παρούσας έρευνας ήταν διπλός: πρώτον, διερευνήθηκε η συχνότητα των πιθανών ΚΕΚ στο σχολικό πληθυσμό μέσω της χορήγησης του Brain Injury Screening Questionnaire (BISQ) σε ένα τυχαίο δείγμα 2088 παιδιών ηλικίας 5 με 13 χρόνων. Δεύτερον, η έρευνα προσπάθησε να διερευνήσει τις επιπτώσεις των πιθανών ΚΕΚ μέσω της χορήγησης μιας ευαίσθητης νευροψυχομετρικής μπαταρίας σε 31 παιδιά με συμπτώματολογια που σχετίζεται με ΚΕΚ και σε 29 παιδιά χωρίς συμπτωματολογία που να σχετίζεται με ΚΕΚ. Για το σκοπό της παρούσας έρευνας, τα ερωτηματολόγια BISQ και DEX-R, μεταφράστηκαν και προσαρμόστηκαν βάση του Κυπριακού πληθυσμού. Διαφάνηκε ότι το 5.8% των μαθητών που φοιτούν σε σχολεία Δημοτικής Εκπαίδευσης στην Κύπρο παρουσιάζουν αυξημένη πιθανότητα να έχουν υποστεί κρανιοεφκεφαλική κάκωση. Το BISQ είναι ένα αξιόπιστο εργαλείο για την ανίχνευση συμπτωμάτων σε παιδιά που σχετίζονται με ΚΕΚ, και το DEX-R ένα αξιόπιστο εργαλείο για την ανίχνευση συμπτωμάτων που αφορούν ελλείψεις στον στρατηγικό σχεδιασμό. Χτυπήματα στο κεφάλι ήταν η κυριότερη αιτία για την παρουσία των συμπτωμάτων, κυρίως κατά τη διάρκεια αθλητικών δραστηριοτήτων, σε παιδότοπους, μετά από πτώσεις και μετά από χτυπήματα από αντικείμενα ή εξοπλισμό. Περισσότερα αγόρια παρά κορίτσια, βρέθηκαν να είναι ευάλωτα σε ΚΕΚ, κυρίως επτάχρονα παιδιά. Επιπλέον, παιδιά τα οποία έχουν χάσει τις αισθήσεις τους ή έχουν βιώσει θολωμένη ή αργή σκέψη κατά τη διάρκεια επεισοδίου, μπορούν να θεωρηθούν ότι βρίσκονται σε μεγαλύτερο κίνδυνο για ΚΕΚ. Εβδομήντα τοις εκατόν των περιστατικών που διερευνήθηκαν έτυχαν ιατροφαρμακευτικής περίθαλψης. Παρόλη την συμπτωματολογία των παιδιών με πιθανό ΚΕΚ, η στατιστική ανάλυση δεν ανέδειξε

οποιεσδήποτε σημαντικές διαφορές μεταξύ των δυο ομάδων (παιδιών με ΚΕΚ και παιδιών χωρίς) στα αποτελέσματα νευροψυχομετρικής μπαταρίας.

ABSTRACT

Each year, a vast number of children and adolescents in the United States of America sustain brain injury as a result of falls, assaults, sports accidents or motor vehicle accidents. Brain injury may cause a wide range of changes in cognition, including memory and executive functioning deficits. It may also lead to changes in emotional behavior and sensory disorders. Teachers often fail to recognize children with traumatic brain injury (TBI) which in return could lead to poor academic performance. Furthermore, children may be wrongly diagnosed as having learning disabilities and emotional or behavioral disorders, when in fact the cause of their impairment is TBI. This study aimed to investigate the incidence of probable pediatric TBI in elementary school age children and examine long-term pediatric emotional, adaptive, behavioral and cognitive malfunctioning in the Cyprus pediatric population. The purpose of this study was twofold: First, the study investigated the incidence of school age children with a probability of having sustained a TBI by administering the Brain Injury Screening Questionnaire (BISQ) to a random sample of 2088 children ages 5 to 13 years. Second, the study tried to determine the long-term effect of probable TBI by administering a sensitive neurocognitive battery to the 31 children who were identified with a positive screen for TBI and to 29 children with a negative screen for TBI. For the purposes of the present study, the BISQ and DEX-R questionnaires were adapted to the Greek Cypriot population. It was found that 5.8% of the children enrolled in public elementary schools in Cyprus have an increased probability of having sustained a TBI. The BISQ is a reliable measure in identifying symptoms in children positive to TBI and DEX-R is a reliable measure in detecting executive function deficits. Blows to the head were the predominant cause of probable TBI, mostly during sports and playground activities, falls, and being hit by falling objects and equipment. More boys than girls were found to be vulnerable for sustaining a TBI, and especially seven-year-olds. Additionally, children who had experienced loss of consciousness and being dazed and confused are considered to be at greater risk to TBI. Seventy percent of all incidences did request medical help. Despite the subjective symptomatology of children with a positive screen for TBI, the statistical analysis did not reveal any significant group differences (children with a positive screen Vs children with a negative screen for TBI) through the neurocognitive battery.

To my mother and father

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CHAPTER 1
INTRODUCTION TO TRAUMATIC BRAIN INJURY (TBI)

Traumatic Brain Injury

The Brain Injury Association of America defines traumatic brain injury (TBI) as the psychosomatic change of the brain that results from an outer source (a foreign object hits violently the head, or the head hits violently a foreign object) or an inner trauma of the head (the acceleration or deceleration of the brain within the skull) (www.biausa.org; French & Parkinson, 2008) . The term TBI is not used to describe a person who is born with an injury or an injury occurring during birth, but an acquired brain injury associated with a trauma to the brain due to external causes.

According to the National Institute of Neurological Disorders and Stroke, there are two categories of brain injury: (a) open brain injury (or a penetrating skull fracture), which is caused by an intrusion of a foreign object in the brain and (b) closed brain injury, which results from the fast, repetitive movement of the brain within the skull (http://www.ninds.nih.gov).

Each year over 1.5 million people in the United States sustain traumatic brain injury. Fifty thousand of those incidents result in death. Two hundred and thirty thousand are hospitalized and 1.1 million are treated in the emergency room of a hospital setting and released soon after (Thurman, Alverson, Dunn, Guerrero, & Sniezek, 1999; Corrigan, Selassie, & Orman, 2010). World statistics are also staggering. For example, over 1 million Europeans are hospitalized due to TBI each year and the estimated world statistics indicate that 10 million individuals sustain TBI each year (Langlois, Rutland-Brown, & Thomas, 2006). The number of TBI survivors who do not seek medical attendance remains unknown. The above numbers are considered to be an underestimation. A lot of people who sustain mild TBI (MTBI) seek treatment from their personal doctor, sometimes even days after the accident or never seek treatment at all (Kay, Newman, Cavallo, Ezrachi, & Resnick, 1992).

Mild TBI, mostly known as concussion, is the most common type of TBI. Eighty percent of all documented TBIs are mild (Ponsford et al., 1999); 10% fall in the range of moderate and another 10% are classified as severe (Kraus, McArthur, Silverman, & Jayaraman, 1996).

Diagnosing MTBI is not as simple as one may think, because of the rapid improvement of its symptomatology. The diagnostic criteria of mild brain injury, as they appear on the 1993 American Congress of Rehabilitation Medicine Special Interest Group on MTBI are the following:

According to The American Congress of Rehabilitation Medicine (ACRM) , a patient with MTBI is a person who has had a traumatically induced physiological disruption of brain function as manifested by at least one of the following:

1. Any period of loss of consciousness
2. Any loss of memory for events immediately before or after the accident
3. Any alteration in mental state at the time of the accident,
4. Focal neurological deficits that may or may not be transient but where the severity of the injury does not exceed (a) loss of consciousness of approximately 30 minutes or less, (b) an initial Glasgow Coma Scale (GCS) of 13-15 after 30 minutes, and (c) post traumatic amnesia (PTA) not greater than 24 hours (Nampiaparampil, 2008).

The most frequent symptoms fall into the following categories of symptomatology:

1. Somatic, such as headaches, dizziness, feeling of nausea, sleep related problems, tiredness
2. Cognitive, reduced ability for attention and concentration, reduced mental speed, reduced short-term memory
3. Behavioral, irritation, emotional instability, depression, and stress.

The clinical picture of most people who sustain MTBI improves within days of the injury and continues to resolve up to three months. Some people may continue to show symptoms for a longer period of time and a small percentage of MTBI will sustain permanent deficits (Ponsford et al., 1999) .

Moderate TBI is characterized by a loss of consciousness which may last from a few minutes to a few hours and it may also cause confusion for many days, even weeks. It is also characterized by positive neurological signs, abnormal imaging findings and a GCS score between 9-12. People who sustain moderate TBI usually exhibit somatic, cognitive and behavioral consequences, which may last a few months or may even become permanent. Return to employment and productive living is unsuccessful even months and years post moderate TBI for many survivors (Constantinidou, Thomas, & Robinson, 2008).

Severe TBI is characterized by prolonged loss of consciousness lasting from days to weeks or even months. Large percentages of patients with moderate to severe TBI continue to be unemployed several years post injury (Doctor et al., 2005). Neurocognitive deficits and psychosocial factors contribute to the lack of participation and disability. It is characterized by an initial GCS score of 8 or less.

Pediatric Traumatic Brain Injury

Each year approximately 1 million to 2 million children and adolescents sustain brain injury as a result of falls, assaults, sport accidents or motor vehicle accidents. Traumatic brain injury in childhood is viewed as a major cause of morbidity and mortality, leading to more than 100 000 hospitalizations each year (Anderson, Catroppa, Haritou, Morse & Rosenfeld (2005). Trauma centers, hospitals and ministries of education have failed to create universal guidelines for the proper identification and report of trauma, based on specific and universal criteria (Rubin, Christian, Bilaniuk, Zazyczny & Durbin, 2003). Therefore, there are a huge number of incidents that are not reported due to the absence of a universal definition of brain injury or due to the inability to evaluate appropriately each incident that takes place at school, at home or in the community. In 1982, the US National Center for Health Statistics stated that TBI is the leading cause of death and disability in children between the ages of 1 and 14. Approximately, 85% of children who sustain an injury are diagnosed with MTBI injuries. Two hundred thousand require hospitalization and about 18,000 are diagnosed with moderate or severe injury. The mortality rate from head trauma is estimated as 10 per 100,000 children per year. There are more identified and unidentified children with TBI than adults.

Causes or Factors Associated with Pediatric Brain Injury

In the literature the term “vulnerable families” is used to describe families that are characterized by social or personal deficits. On the other hand, “strong constructed families” are families whose members exhibit positive behaviors with one another, demonstrate understanding, have stable boundaries and communicate. The presence of brain injury may cause vulnerability in a strong constructed family, but it could immensely change a “vulnerable family”.

Based on a research conducted by Goldstrohm and Arffa (2005), it is suggested that preschoolers who suffer from a mild or a moderate brain injury, most often exhibit behavioral problems prior to the incident, as compared to children who have never sustained a head trauma.

Causes of incidents differ depending on age. Bicycle and car accidents are placed high on the list of causes when referring to preschool children, children and adolescents (Sosin, Sacks, & Webb, 1996; Durkin, Olsen, Barlow, Virella, & Connolly, 1998). Violence is also viewed as a common cause of injury during infancy and it is often known by the term “shaken baby syndrome (SBS)” (Duhaime, Christian, Balian Rorke, & Zimmerman, 1998). There is a national annual incidence of SBS in the United States of 750 to 3,750 cases. One third of those children die, one third experience permanent

impairments that last a life time and one third survive with few or no sequelae (Wyszynski, 1999). Children of families who live at or below the poverty level are at increased risk for shaking injuries as well as any other type of child abuse. Children who survive a shaking episode may develop one or more of the following problems: partial or total blindness, hearing loss, seizures, developmental delays, impaired intellect, speech and learning difficulties, problems with memory and attention, severe mental retardation and cerebral palsy. In less severe cases a child may experience: lethargy, irritability, vomiting, poor sucking and swallowing, decreased appetite, lack of smiling or vocalizing, rigidity, seizures, difficulty breathing, altered consciousness, unequal pupil size, an inability to lift the head and an inability to focus the eyes or track movement (Perez-Arjona et al., 2003).

Most of the brain injuries that occur during late childhood or right before adolescence are caused by car accidents, bicycle accidents and during athletic or recreational activities. Additionally, falls are the leading cause of brain injury in children regardless of race and gender (Bruns & Hauser, 2003). According to the Northern Manhattan pediatric study, motor vehicle accidents and falls were each responsible for neurological injuries. Seventy percent of motor vehicle accidents were pedestrian related (Bruns & Hauser, 2003). According to Wright (2003), firearms are responsible for 10% of all TBIs and 44% of TBI-related deaths.

Consequences and Problems Following a Traumatic Brain Injury

The prevalence of TBI worldwide is estimated at 2%. The United States National Center for Injury Prevention and Control suggests that 5.3 million Americans are living today with disabilities resulting from TBI (www.cdc.gov).

Health complications can arise soon after a TBI, depending on the severity of the trauma, the age and the general health of the patient. According to the National Institute of Neurological Disorders and Stroke, consequences include seizures, hydrocephalus or post-traumatic ventricular enlargement, cerebrospinal fluid leaks, infections, vascular injuries, cranial injuries, cranial nerve injuries, pain, bed sores, multiple organ system failure in unconscious patients, and complications from polytrauma (trauma to other parts of the body in addition to the brain) (www.ninds.nih.gov). There is a strong relationship between severity of TBI and risk of epilepsy (Annegers & Pasternak Coan, 2000). Survivors of TBI have a higher risk for neuropathologies, such as Alzheimer's disease in their elderly years, since TBI constitutes as one of the many risk factors that lead to the development of the disease (Lye & Shores, 2000).

In addition to health consequences, TBI may cause a wide range of changes in cognition (such as memory, reasoning, and speed of processing deficits), sensation (touch,

taste, and smell disorders), verbal abilities (communication, expression, comprehension, and pragmatics deficits) and psychosocial disorders (anxiety, depression, personality changes, anger, socially inappropriate behavior and emotion discontrol).

The human brain, particularly the pediatric brain is characterized by neural plasticity. Hence, it is often and mistakenly believed that a young child will have a better outcome after a TBI as compared to an adult. However, serious consequences are evident in the pediatric population as well. The repercussions on children's adoptive skills after a TBI and the persistence of the symptomatology seem to be associated with age, with previous injuries on the head and the severity of the injury. Children who survive a severe head injury exhibit behavioral difficulties that tend to increase over time (Catroppa, Anderson, Morse, Haritou, & Rosenfeld, 2008). In addition, children's neurobehavioral outcomes seem to be greatly affected by environmental factors. Schwartz et al., (2003) discussed the impact of vulnerable environments of families on children, causing difficulties to overcome the stressful conditions that are formed after a TBI.

The consequences of an earlier pediatric TBI may become evident later in childhood. Long-term follow-up studies of children conducted during the K-12 school years suggest that problems associated with TBI tend to persist or worsen as children progress through school (Glang, 2008). Therefore, due to the persition and the changing nature of the condition children who have a history of TBI should be identified and evaluated annually for cognitive, physical, emotional, social, behavioral, communicative, and fine motor abilities. In addition, academic achievement should be closely monitored by the teacher and the evaluation team. This process will ensure early identification and the implementation of intervention programs as indicated. The following section will present more information on the impact of TBI on school outcomes.

Consequences Related to Learning and School Success

There are certain, well accepted universal developmental milestones which can be expected to occur at different stages of development. At the same time, there is acknowledgement of the influence of individual experiences, and historical, gender, class and cultural influences on such development (Collings, 2008). Children surviving a TBI during crucial periods of development show evidence of impairments on specific cognitive skills that could have enormous impact on their ability to learn and on academic achievement. Catroppa et al., (2008) write: "Age and developmental level at the time of injury influences outcome in educational areas, with children who sustained injuries during preschool years or in early primary grades, most at risk for global reading difficulties, and

demonstrating a deceleration in growth curves over time when compared to children injured at an older age".

Research on the long-term effects of pediatric TBI indicates that survivors of severe TBI demonstrate significant impairments in verbal learning, in retrieving verbal information after a delay, in visual memory, in visual recognition memory, in visual learning, in sound-symbol learning and in recall of geometric designs (Lowther & Mayfield, 2004). Other cognitive problems are also recognized mostly in school settings soon after the injury. Attention deficit, memory impairment, slowed processing speed, word finding difficulties, impaired executive function, behavioral disinheriting and emotional liability are a few of the problems. Although there are indications in the literature that some children with TBI have higher rates of premorbid attention deficits, there is substantial evidence that significant TBI is associated with the onset of new attention problems in children (Wozniak et al., 2007).

Mild or minor TBI poses more challenges in terms of symptom identification because children who sustain a MTBI are often hard to distinguish from children with other learning difficulties. Teachers do not recognize or associate problematic behavior with brain injury. They often mistake these children as having a learning disability, cognitive delay or emotional disturbance (Savage, 1991). In some school systems, children with TBI may never receive appropriate educational support.

In addition to coping with cognitive changes, pediatric survivors need to cope with the emotional and social changes associated with TBI. Psychosocial disorders, such as emotional discontrol, anxiety and depression are common sequlae. Furthermore, we need to consider that children are part of a family system. The consequences of their injury affect their parents and siblings as well. Hence, the family of the child with TBI often requires psychosocial support for their loss and also strategies on how to facilitate their child's treatment. More importantly the behavior of the family is a crucial determinant of outcomes of TBI (Taylor et al., 2001; Verhaeghe, Delfloor, & Grypdonck, (2005).

The child with TBI who is able to return to the school environment may often demonstrate behavioral and cognitive changes soon after the injury, which could lead to a cascade of negative consequences affecting successful academic and social reintegration. As the child develops, she may display new and different types of neuropsychological problems. For example, difficulties with abstract reasoning abilities for a child who sustained a TBI at age 6 might not be noticed until later in childhood, when these abilities are expected to develop. By identifying children with TBI we can intervene early and hopefully prevent problems from arising.

As medical care improves and more children survive childhood accidents and injuries, it is vital for schools to build up the required expertise and efficiently identify and manage the educational needs of TBI survivors. Previous studies have already shed some light on evident neuropsychological deficits after a TBI, but failed to associate the effect of these problems on consequent educational performance. The current study was designed to investigate the occurrence of neuropsychological and neurobehavioral deficits amongst children who possibly may have survived a TBI. In addition, this study provides information on the epidemiology of probable TBI in the elementary school age population in Cyprus. The Individuals with Disabilities Education Act (IDEA) (1990), previously known as the Education for All Handicapped Children Act (U.S Public Law 94-142), makes special education provisions for children and adolescents with TBI. The law points out the importance of offering opportunities to children with TBI for school adjustment and success. It also proposes that professionals should show sensitivity towards these children's special needs and that they should develop programs that demonstrate familiarity with the law, that is specific to the education of these children. In contrast, the Special Education Act of the Cypriot legislation (113(I)1999) does not make any reference regarding children with TBI. Instead it concentrates on children with developmental or genetic disorders resulting in mental retardation and dyslexia. Unfortunately, most schools do not have personnel trained to identify TBI and outcomes are misattributed to other etiologies. Schools provide inappropriate classroom accommodation and children with TBI have an increased risk for academic underachievement and psychosocial challenges (Savage, 1991).

Screening for Pediatric TBI

The identification of children with TBI is problematic and many factors may potentially influence the extend and the nature of recovery (Anderson, Catroppa, Haritou, Morse & Rosenfeld, 2005). Screening for TBI is an effective method for identification of potential characteristics and it is a first step in improving the lives of individuals who may or may not have been diagnosed with TBI. A positive screen will help establish a probable basis for neuropsychological testing which may ultimately lead to an official, medical diagnosis. Identifying pediatric TBI is very important for implementing appropriate services to those who need them.

Screening instruments are extremely important because traumatic brain injuries are often overlooked or misdiagnosed frequently from a lack of awareness of brain injuries and the resulting consequences. Screening helps enormously in defining the size of the population with a probable TBI as well (Hux, Schneider, & Bennett, 2009; US Department

of Health and Human Services, 2006). Awareness about instances of possible TBI is crucial to ensure children have the opportunity to reach their maximum potential regarding academic, cognitive, social, emotional, and behavioral development. Performing simple screening procedures on a routine basis during preschool years improves the likelihood that parents and professionals are aware of events potentially contributing to later developmental challenges. Knowledge about possible instances of TBI identified may alert parents and professionals about children at risk for cognitive and psychosocial challenges. The early identification and awareness is particularly important regarding TBI, because effects of early neurological traumas often do not appear until several years later when children must synthesize, integrate and manipulate substantial quantities of information in rapid and efficient manners (Schifsky, Reisher, Pierce, Hux, & Dymacek, 2010; ASHA Convention 2010, poster presentation).

The probable incidence of TBI in the pediatric population of Cyprus was unknown prior to the present study. Screening for TBI in Cypriot elementary schools provided the opportunity to gather important information regarding the size of the population that possibly is currently affected and the characteristics of the specific population. Information regarding the tool, the process of identification and the characteristics of the population will be described in subsequent chapters.

CHAPTER 2
LITERATURE REVIEW

Basic Brain Anatomy

In the next section the literature review will begin with some general historical information about the human brain and move on to basic neuroanatomy and neurophysiology. It will then proceed to discuss specific neurobehavioral and neurocognitive effects of TBI.

Physicians and researchers of the 21st century are not the first to speak of the brain. The brain has been of interest to many known historians and important figures in literature, science and philosophy, for many centuries. The brain has been a primary interest of many cultures and writings from the pre-historic to the modern years in an effort to explain and understand its functions. The first written specimen is known by the name of "Edwin Smith Surgical Papyrus" and it contains the description of twenty-six different cases of brain injury and its treatments by an unknown physician. Archeological evidence suggests that an ancient form of brain surgery, today known as "trephining" or "trepanation", was performed on children and adults, mostly males, to get rid of or to let in spirits, treat headaches, or treat insanity. In 300 B.C., Herophilus and Erasistratus, wrote that intelligence is found in the brain and testified to the discovery of the central nervous system. In 1649, the renowned philosopher and mathematician Rene Descartes proposed that the brain functions like a machine and argued for a dualistic system in which the organ of the brain is distinguished from the immaterial "mind".

The study of modern behavioral neurology and neuropsychology began developing in the nineteenth century with discoveries by Paul Broca and Carl Wernicke. Broca linked left hemisphere stroke with language production (i.e. Broca's area); later on, Wernicke identified the role of the superior temporoparietal area to language comprehension (i.e. Wernicke's areas). In 1817, James Parkinson in his essay on the shaking palsy described a disorder of the central nervous system which is characterized by tremor or trembling of the body and/or the face and instability of movement. In his assessment, mental clarity and function were not affected by the disorder; whereas modern day research identifies patterns of cognitive decline and dementia in subtypes of Parkinson's diseases.

Since the 1950's there has been an explosion of research in the cognitive sciences, neurobiology, neurology, and neuropsychology. Part of this development is attributed to advancements in technology and interfaces with bioengineering, cognitive science, and neuroimaging. Researchers use animal models as well as human lesion data from patients

who sustained injuries and disease to the brain in order to understand normal functioning, the effects of trauma/disease, neuroplasticity, and reorganization after injury.

The brain is "built" in a way that allows some protection from injury or trauma. The outer part of the brain, the skull, protects the brain against traumas and injuries. The meninges are the three layers of membranes below the skull, the dura mater, the arachnoid and the pia mater that also protect the brain. The colorless liquid between the arachnoid and pia layers, the cerebrospinal fluid also functions in a protective manner. Sadly, not all injuries are prevented by the skull, the membranes and the cerebrospinal fluid. Hundreds of neurons that are located in the brain are often destroyed after an injury. Unlike other cells in the body, neurons do not have the ability to rebuild themselves. When neurons are damaged, they stop receiving, transporting and generating messages through the synaptic conduction process. This inability has a great impact on the way a person thinks and functions, both cognitively and emotionally, after an injury. Depending on the area of the brain that is mostly affected, a person may exhibit the analogous deficits on the abilities that are guided by the specific area.

The brain is divided and separated in three interrelated areas; the cerebral hemispheres, the brain stem and the cerebellum. The cerebral hemispheres are covered by the cortex or neocortex and are connected by the corpus callosum. The corpus callosum helps the two hemispheres to connect with one another. The surface of the brain, the gyri, is not leveled, but it's uneven and bumpy. The occipital, the parietal, the temporal and the frontal lobes are the four areas of the right and the left hemispheres that are responsible for all the abilities and functions of the human being.

As has already been mentioned, the cortex of the human brain is divided anatomically into two cerebral hemispheres, the left and the right. The hemispheres have different information processing abilities and propensities, with the differences sometimes being very striking. For example, the left hemisphere is usually superior to the right for processing phonetic, syntactic, and certain semantic aspects of language, whereas the right hemisphere is usually superior to the left for processing pragmatic aspects of language. The existence of such hemispheric asymmetry raises important questions about how it is that the two differently organized processing systems coordinate their activities in service of a common goal (Hellige, 1993).

The nervous system, the brain, the spinal cord and an immeasurable group of nerves is an intelligent communication network that sends electrochemical messages throughout the body. The central nervous system (CNS) is the most interesting structure of the human body. Its complexity is imitated by today's technology and each year new

technological advances are discovered based on the viewing and the studying of the functions of the CNS. Everything, from thinking, speaking, walking and going out with friends is forced or facilitated directly or indirectly by the activities of the central nervous system. Both cognition and behavior are not separate from the central nervous system.

As has been mentioned above, neurons are cells responsible for receiving, transporting and generating messages through the synaptic conduction process. Information from the nervous system is passed through billions of neurons by an electrical current. Dendrites are the short fibers that receive impulses from other neurons, and the axon is the long strand that sends the message to the next neuron. The synaptic gap is the gap that separates the axon from the dendrite of the other neuron that receives the information. The neurotransmitters are the chemicals that carry the signals from one neuron to the other. Synaptic transmission is a fundamental process by which neurons communicate with each other. This communication occurs at synapses, which are specialized intercellular junctions formed between pre-synaptic nerve terminals and their post-synaptic targets. In the mammalian CNS, synaptic transmission is primarily chemically mediated and falls broadly into two opposing types: excitatory and inhibitory. Excitatory synaptic transmission causes an increase in the likelihood that the post-synaptic neuron will produce an action potential and, conversely, inhibitory transmission renders the postsynaptic neuron less likely to generate an action potential (Kalia, Gingrich, & Salter, 2004).

Each human is born with a vast amount of neurons and undifferentiated synapses. As a person develops, more and more neurons begin to activate and correlate with other neurons. The neurons that never get to form a synapse die, living behind important and activated neurons that facilitate to every action of the human brain. The more a group of neurons is activated the stronger the synapse. The more synapses are fired, the stronger the survival of the neurons. Same as the brain, neurons are protected by the myelin sheaths. Myelination is a process in which the neurons are sheathed in a protective layer of proteins and lipids not unlike the covering found on common electrical cords. This sheathing facilitates efficient transmission of impulses through synapses. The myelination process begins before birth and continues throughout the early developmental years into early adulthood (Lehr, 1990).

Plasticity of the Human Brain

Plasticity of the brain is an important concept in infants and children, which to a certain extent enables them to reorganize and recover after injury (Van Pelt et al., 2011). Research has demonstrated that the young brain has a better prognosis in recovering

neurons that are hurt and destroyed. The child, due to the plasticity of the brain, shows a better recovery and a better stimulation of the affected neurons. “Plasticity in the physical development of the brain presents one of the most striking examples of resilience in the development process. It is as if evolution has provided the developing brain with a margin of error that gives the child an edge in the face of traumatic injury” (Krantz, 1994). Recovery of brain function after a TBI is an instance of plasticity, the ability of the brain to support old behavior and acquire new behavior. Plasticity for recovery supports the restitution and reorganization of functions lost or disrupted by brain insult; plasticity for development supports the young brain in acquiring new functions, skills, and knowledge. In the mature brain, functional recovery primarily involves plasticity for recovery; however, after damage to an immature brain, plasticity for recovery coexists with plasticity for development and both contribute to long-term cognitive outcome (Hetherington & Dennis, 2004).

While plasticity of the immature brain is often inferred to lead to less serious consequences of early TBI in the pediatric group, young brains are also at risk for severe injury (Benz, Ritz & Kiesow, 1999). The disturbance may have an effect on cognitive, emotional and physical development. For example, damage to the left hemispheres early in life, before children acquire language fully (i.e. before age 3) can result in devastating language deficits.

Findings in literature suggest that developmental change after TBI in childhood takes place in a continuum, with both chance of long-term catching up, and risk of poor development (Jonsson et al., 2013). Hence, young children who sustain severe TBI in early childhood or moderate or severe TBI in infancy may be particularly vulnerable to significant residual cognitive impairment (Anderson, Catroppa, Morse, Haritou, Rosenfeld (2005).

Neurobehavioral Consequences in Relation to School Performance

Closed head injuries, especially severe ones, can produce deficits in various domains: alertness and orientation, intellectual functioning, language skills, nonverbal skills, attention and memory, executive functions, corticosensory and motor skills, academic achievement, and adaptive functioning and behavioral adjustment (Yeats, Ris, & Taylor, 2000). It is not always evident immediately after an injury how the injury may affect the patient in the long-term. Each person’s recovery process depends mostly on the severity of the injury and the areas of the brain affected, as well as complicating factors such as increased intracranial pressure, anoxia, and other secondary neuropathologies associated with TBI. It would be wrong to assume that recovery or the healing process will

be so great that it will bring the person to a pre-injury state of normal functioning. Even if they show a tremendous recovery, once they return to school most children and their families begin to notice problems that were not evident before because of the social and academic demands of the school environment.

Behavioral Problems

Premorbid function needs to be taken into account when factors related to behavioral functioning are investigated. Research suggests that the presence of premorbid behavior problems increases the risk of traumatic brain injuries. Thus, although severe head injuries increase the risk of behavioral disturbance, it is also likely that behavioral disturbance increases the risk of head injury (Yeats, Ris, & Taylor, 2000).

Each child may present his own pattern of behavior after an injury. Social behavior may turn out to be an easy task to accomplish when a child returns to school, but attending to previous activities may become frustrating and difficult. Common consequences of brain injury include problems with impulsivity, inattention, and restlessness. Preschool children and elementary school-aged children often exhibit hyperactivity, distractibility, impulsivity and temper tantrums after brain injury. However, some young children may exhibit reduced initiative and sparsity of behavior (Mayfield & Homack, 2005). After an injury most children realize the change they are exhibiting and know how they are viewed by others in their environment. Some of them begin to misbehave as a reaction to the changes they are experiencing. They feel helpless in controlling their emotions and find inappropriate ways to deal with their feelings.

Impulsivity in children may appear in a number of ways such as grabbing an object without asking, making insulting remarks without thinking and avoiding people or social situations, such as conversation with other people, in a non-polite manner. In general, there is poor social judgment which is evident by many people in the person's imitate and peripheral environment.

Other behavioral problems are conduct problems, aggressiveness, poor impulse and anger control, inappropriate sexual behavior and risk taking behaviors. During adolescence, these behaviors facilitate further injuries, causing more problems to the person at risk.

As one might expect, pre-injury functioning plays a major role in post-injury behavior. Results of previous research identify premorbid vulnerabilities as significant risk factors following a TBI (Anderson et al., 2001). Family background, family characteristics and way of living are associated with incidents of TBI in the literature. Children and adolescents who did not exhibit behavioral difficulties prior to injury are sometimes less

likely to develop behavioral difficulties following a TBI than those children who had behavioral difficulties before the injury (Mayfield & Homack, 2005).

Behavioral functioning followed by childhood TBI may impact academic performance and social integration. Certain types of behavioral difficulties (such as emotional discontrol) may result irrespective of the cognitive abilities. Previous research has not shown a strong relationship between cognitive performance and behavioral adjustment, adaptive functioning, or the onset of psychiatric disorders in children with traumatic brain injuries (Fletcher, Ewing-Cobbs, Miner, Levin, & Eisenberg, 1990). However, certain behaviors can be related to cognitive limitations resulting from TBI. Behaviors such as lack of initiation (difficulty beginning a task), inability to stay focused in the classroom or during a specific task, inability to remember useful information, inability to carry out assignments and exhibiting slow speed during silent activities are directly connected to cognition. Furthermore, fight or flight reaction may be caused by cognitive limitations such as decline in information processing speed and difficulty integrating multiple sensory stimuli, resulting in overstimulation. Activities such as lunch time, recess, physical education, and music class may cause the child to experience an unpleasant feeling and may force him to become agitated or act inappropriately.

In the current literature, rating scales such as the Child Behavior Checklist (Achenbach, 1991) are used to investigate pre- or post-injury behavioral problems. Unfortunately, such scales are not always sensitive enough to differentiate the effects of TBI (Drotar, Stein, & Perrin, 1995; Perrin, Stein, & Drotar, 1991). Standardized interviews are also used in some studies to investigate the appearance of psychiatric disorders following head injuries.

Emotional and Social Competence

In this part of the literature review the dissertation will emphasize the role of parents in the development of emotional and social competence and the disruptive role of TBI.

Emotional and social development

Emotional and social development begins in infancy. Infants and parents begin to communicate in order to meet basic needs. Parents are trying to understand the baby's sounds and reactions and the baby tries to interpret the parent's communication and emotion. During the first months of a child's life, communication and interaction are very important. They facilitate the development of emotional and social competence, which in the future will be important for everyday verbal and non-verbal transactions with the environment. The Cognitive Emotions Theory (Sroufe, 1979) emphasizes that infants must

ultimately learn to express themselves emotionally in social situations. Based on the research of cognitive emotion theorists, parents teach their babies what to feel and in which context and babies in return reinforce their parent's teachings by displaying or imitating the emotions taught. As a child grows older her display of emotion becomes clearer and more appropriate. The baby begins to know how she is supposed to feel in specific situations. Emotional development relates to social development. The nurturing effects of socialization lay within the development of emotional communication.

The development of social competence is directly and indirectly influenced by the family. Parents facilitate the development of social competence with the type of relationship they choose to form with their children or with deliberate actions that promote and influence its development.

Attachment theory proposes that children's social development depends on the quality of their relationships with their parents (Bowlby, 1988). The child's relationship to the mother during the early years influences the development of social skills and continues to affect the development of social competence in the future. As children grow older, their attachment to their parents changes. They acquire language and this facilitates the communication with parents in a more distant manner. They do not need to be in close proximity to share feelings and wants. Also, a mental representation of the relationship that the child has, allows her to feel secure and stress-free even when the parent is not close. Preschool children feel free and secure as they leave their parent to attend school. The feeling of independence becomes stronger as the child continues to build relationships with peers and other adults at school. Positive and secure relationships with parents facilitate the development of social competence and the ability to attach and communicate effectively with others.

Social competence facilitates the formation of relationships. Relationships assist the formation of adaptive and resilient skills that are important for the development of the ability to adjust during challenging and stressful circumstances that are expected to occur during the course of a person's life. Bonding, relating and attaching to others is an ongoing process that builds up and strengthens with time, depending on the nurturing that the person receives from caregivers and her interaction with the immediate environment. It is a normal and an anticipated process that mirrors the child's cognitive abilities as well as the child's temperament and personality.

For children to learn more effectively during interactions with more competent others, a broad range of social-communicative behaviors including appropriate use of gaze, verbalization, gestures, and affect are required. The acquisition of these behaviors follows

a predictable course that lead to the development of social behaviors. Competence in the social domain therefore allows children to participate in learning interactions with others including the ability to successfully engage others in order to meet their needs and interests (Landry & Swank, 2004).

A study by Landry and Swank (2004) examined the social and cognitive competence in 25 infants aged 3 to 23 months who sustained moderate to severe TBI and in 22 healthy community comparison children. A toy centered activity with the examiner was used to capture joint attention and social behavior and an exploratory toy play situation was used to measure independent goal-directed play. The inflicted TBI group showed significant reduction in both social and cognitive domains relative to the comparison group. TBI was associated with reduction in (a) initiation of social interactions (b) responsiveness to interactions initiated by the examiner (c) positive affect and (d) compliance. It is understood that early brain injury causes significant disruption in behaviors regulating initiation and responsiveness in social context, and in a more general sense, early brain injury may intervene in the development of emotional, social and cognitive competence. Expected milestones are accomplished at a later stage and dissimilarity with other children of the same age becomes apparent both at school and the neighborhood.

Emotional recognition and interpretation of social cues

A basic principle for social interaction is being able to recognize and understand the emotions of others. Three easily identifiable emotion recognition skills are: (i) reading emotions from eyes and understanding of gaze, (ii) vocal analysis, and (iii) facial expression analysis (Turkstra, Williams, Tonks, & Frampton, 2008). Children or adults who are unable to read facial or vocal expressions are at risk of behaving in a non-sociable manner. There is evidence that children with TBI are often unable to identify facial or social clues and generate responses, an inability that intervenes with their adjustment effort in the social scene.

Alexithymia, a psychological disorder that inhibits the person to identify and choose the right words to describe feelings and emotions or to read and recognize the verbally proposed emotions of others, is related with TBI. It involves both cognition and regulation of emotion. Emotional and cognitive impairments after a TBI may cause the appearance of the disorder, which will make the person appear cold and without empathy for others. Persons with alexithymia seem to rely on concrete facts and precise words when communicating, they fail to dream and experience fantasies and have difficulty building

and maintaining relationships. Alexithymia may also be inborn or it may appear after a trauma or an unpleasant experience in early childhood.

Williams et al., (2001) conducted a study to identify the relationship between head injury and alexithymia. Specifically, researchers administered the Toronto Alexithymia Scale (TAS) to 135 patients attending a family practice residency facility and found that 50% of the patients reported a history of head injury and 50% were alexithymic compared with patients without a history of head injury. Henry, Phillips, Croford, Theodorou, and Summers (2006) compared 28 individuals with TBI with 31 demographically matched healthy controls on the TAS-20. Patients and controls also completed measures of anxiety, depression, quality of life and measures of fluency to assess executive function. Patients showed greater levels of alexithymia, in terms of difficulty identifying emotions and reduced introspection. Difficulty in identifying emotions was associated with poorer quality of life, even when depression and anxiety were controlled. Difficulty in identifying emotions was also uniquely associated with executive function deficits.

Psychiatric consequences

Parents of patients with TBI report that their children experience psychiatric consequences after injury, such as feelings of depression and anxiety. Max, Smith, Sato, Mattheis, Castillo, Lindgren, Robin, and Stierwalt, (1997) examined psychiatric outcomes in a group of children, with mild to severe TBI. It was estimated that 50% of all children that participated in the study suffered a psychiatric disorder after the injury. The most common diagnosis was organic personality syndrome, major depression, attention deficit/hyperactivity disorder and oppositional defiant disorder (Yeates, Ris, & Taylor, 2000).

Alterations in mood can arise as the individual recognizes that the impairments associated with the injury have not been resolved. Although, emotional distress, most commonly in the form of depression and anxiety, is the most prevalent psychiatric disorder immediately after injury, some resolution of psychological symptoms typically occurs over time. However, longitudinal studies have suggested that a substantial proportion of individuals with TBI either continue to experience or develop late-onset psychiatric disorders for as long as 30 years after injury (Ashman, Gordon, Cantor, & Hibbard, 2006).

Cognitive and Language Development

This section will discuss the normal development of cognition and language in children and the interruption of this development after TBI.

Cognitive development

It would be wrong to speak of cognitive development without mentioning Jean Piaget. Piaget's theory had a great impact on many fields, especially in the study of human development. His theory lives through the years and it is considered to be the foundation of study to many psychologists and teachers all over the world. It serves as the basis for product design and services design for children and also for the development of teacher and parental approaches regarding the cognitive development of children.

Piaget contributed to the development of several new fields of science: developmental psychology, cognitive theory and what came to be called genetic epistemology. Although not an educational reformer, he championed a way of thinking about children that provided the foundation for today's education-reform movements. It was a shift comparable to the displacement of stories of "noble savages" and "cannibals" by modern anthropology. One might say that Piaget was the first to take children's thinking seriously (Papert, 1999).

For Piaget, the way children develop knowledge, think and examine the world is considered a universal process which changes as the child moves from infancy to maturity. The child learns by acting instead of reacting to the world. The child understands the world by experimenting, exploring, touching, tasting, hitting and banging. That inner knowledge of what to do is driven by the child's curiosity and energy. Children seek problems that need to be solved with the purpose of improving their understanding of the world. They do not wait for problems to arise. They seek challenge and find solutions to difficult problems that are incorporated in an "inner bank of information". The environment in which the child lives and grows older needs to be rich of stimuli that will serve as a motivating tool for exploration. Children that are passive from birth and uninterested by their surroundings need to be considered as atypical for parents and teachers, since they lack curiosity and appear intellectually unmotivated.

Piaget's theories reflect two distinct and sometimes contradictory views: infants as constructing their activities with real objects, events, and people in particular contexts versus infants as unfolding through a fixed sequence of developmental stages that are defined by patterns of action but seem relatively impervious to contextual influence (Fischer & Hencke, 1996). Fischer and Hencke (1996), attempt to describe Piaget's theories on early development as a dynamic interplay between an infant's assimilation of environmental events to preexisting schemes and her adjustment to those schemes. They write that Piaget states in his books that infants develop through specific stages (from simple reflexive actions toward representational thinking). They build up schemes of

action through circular reactions, in which they repeat similar activities to build increasingly complex organizations of action and perception. During these activities, children generalize actions to specific objects and events (assimilation) and particularize the actions to those particular objects and events (accommodation).

Piaget identified four stages of cognitive development; each stage being derived from a previous stage but being enhanced with more complicated capabilities. All children, from all cultures go through these stages, some with a faster pace than others. Those children that go through the stages unhurriedly may never reach the final stage. Here is a brief description of the four stages proposed:

1. Sensory motor stage (0-24 months): Infants think and understand the world around them through their senses using their eyes, ears, mouth, and hands. At this level, infants develop their abilities from coordination of sensation and their physical movements and actions in the environment (Cohen & Kim, 1999). This stage is characterized by action-oriented problem solving. Infants develop sensorimotor schemas resulted from a combination of reflective body movement and sensation. With time, movements become more sophisticated and purposeful especially as the child learns to internalize what is learned and tries to accommodate the knowledge to the environment. Just a couple of months after birth, infants are able to manipulate their environment with gestures and movements, such as pushing, banging, squeezing and crushing. By the end of the first stage, children are able to manipulate their arms in a useful and decisive manner. They are able to grasp a fork when they are hungry and squeeze a toy when they feel like playing.
2. Preoperational stage (2-7 years): Preschool children begin to represent the world with symbols. Children at this stage have increased capacity for symbolic thinking and can go beyond their earlier sensorimotor discoveries through the use of language and images. However, their thinking is not yet logical (Cohen & Kim, 1999). There is no action-oriented problem solving in the second stage. Children are now able to think and use words and images to overcome obstacles and solve problems. They develop symbolic reasoning and understand the existence of objects even when are not there. They have the ability to create mental images and use them as primitive concepts to organize their actions. Piaget talked about centration. With the term he tried to describe the inability of the child to see the whole picture.

Instead the child stays focused on the detail. Centration describes the child's tendency to focus on only one aspect. The preoperational child is said to be concrete and perceptually bound, reaching conclusions by how the world looks rather than by systematic reasoning; perceptual cues and supersede logical principles (Holbrook, 1992). During the preoperational years irreversibility is another inadequacy of thought. It describes the child's inability to mentally reverse a physical action (Holbrook, 1992), to think herself in a situation but to be unable to get out, to reverse the thought process.

3. Concrete operational stage (7-11 years): During the concrete operational stage, children are able to think logically, conserve, classify and organize events or objects into different classes or sets. They can decenter and thus recognize others' points of views. However, they are not yet able to think abstractly (Cohen & Kim, 1999). A child can decide how to build a puzzle before she chooses to break it apart. Even though thought is reversible, abstract concepts or objects are hard to manipulate. The child needs real objects to solve a mathematical equation and theoretical complicated situations are hard to triumph over. Cognitive development at this stage is apparent by the child's ability to discover or reinvent previously unknown concepts with the help of concrete objects (Glennon & Callahan, 1975). It should be noted that children participating in the present study fall in the range of the preoperational and concrete operational stages.
4. Formal operational stage (12 years and up): Adolescents think in more logical and abstract ways. They can reason with symbols that are beyond the world of concrete experiences. They can imagine many possible combinations, separate real from the possible, deal with hypothetical propositions, and combine elements in a systematic way (Cohen & Kim, 1999). The child is able to grasp abstract concepts, reason with moral issues, and think about philosophy and science. Communication skills reach a new level and social relationships are formed based on understanding and taking to account the feelings and thoughts of others. During this period, there is a process of experimentation combined with logical analysis, where each hypothesis is either confirmed or rejected (Hawkins, 1982).

The forth level of cognitive development is the hardest to reach since many children are deprived challenging experiences usually offered by their close environment.

For Piaget, there are four factors that determine cognitive growth: maturation of the nervous system, social interactions, experiences based on interactions with the physical environment and equilibration (Piaget, 1977). TBI can certainly interrupt several aspects of the above aforementioned factors. Normal development is combined by a magnificent range of capabilities, which enhance what is already there and prepare the child for what is coming next. When the process is interrupted it is only safe to understand that many changes will occur to the child, changes that are there to influence among others, the cognitive development of the child.

An injury during an early stage of development might not display effects to the development of the child immediately. However, during a later developmental milestone a child with a previous TBI may exhibit deficits in areas that are related to the specific developmental stage. Severe injury in early childhood may also influence the development of general cognitive skills, which may then also impact on the development of more specific skill areas (Catroppa et al., 2008).

TBI and cognitive deficits

Cognitive complaints after TBI are typically reported in the areas of memory, attention, and executive functioning. Cognitive problems following TBI include impaired attention and concentration, reduced processing speed, word finding difficulties, altered academic abilities (i.e., errors in simple math computation, spelling difficulties, and difficulties understanding what ones reads) decreased memory and learning abilities, and impaired executive functioning (i.e., reduced ability to plan, sequence, prioritize, think flexibly, abstract or problem solve). Impairments of higher level thinking or executive functioning are common. Memory problems are almost always present following TBI, either due to direct effects on memory systems or secondary to disrupted attention and concentration (Ashman et al., 2006). Cognitive abilities such as memory, attention, executive function and processing speed are analyzed in detail below.

Memory

The Baddeley and Hitch memory model that divides memory into long-term memory, working memory or short-term memory is widely used in brain injury research and clinical neuropsychology. Long-term memory is considered to have unlimited storage capacity. Working memory is related to verbal recall, recognition, application and association with previous stored information. Short-term memory (sometimes referred to as “primary” or “active memory”) refers to the capacity for holding a small amount of information in an active, readily available state for a short period of time (www.en.wikipedia.org/wiki/information). The duration of short-term memory (when

rehearsal or active maintenance is prevented) is believed to be in the order of seconds. Estimates of short-term memory capacity limits vary from about 4 to 9 items, depending upon the experimental design used to estimate capacity. In fewer words, short-term memory or immediate memory may be defined as the simple retention of information over a short duration (Anderson & Catroppa, 2007).

The impact on memory depends once again upon injury severity. However, using traditional 'span' tasks, it has been reported that children with mild, moderate and severe TBI perform similarly to controls on verbal and spatial immediate memory tests. Working memory might be less resilient to TBI-inflicted interference, for both adults and children (Anderson & Catroppa, 2007). Studies suggest that memory deficits are evident in a variety of memory components, such as storage, retention and retrieval. Yeats, Blumenstein, Patterson, and Delis (1995) found that children with severe injuries display poorer learning, less retention over time and better recognition than recall, when compared with controls. Fewer studies are contacted to investigate memory deficits in relation to pediatric population.

Attention

Attention abilities and specifically divided attention along with the executive control of attention are directly related to working memory performance (Constantinidou, Thomas & Best, 2004). Clinical neuropsychology views attention along a continuum of stages beginning with focused attention, selective attention, sustained attention, divided attention, alternated attention, alertness and distractibility (Sohlberg & Mateer, 2001).

Attention problems are common long-term outcomes of childhood TBI. Existing research on attention problems in childhood TBI reflects two distinct foci: behavioral symptoms (e.g., inattention, impulsivity, hyperactivity) and cognitive functioning (e.g. sustained, focused and divided attention as well as related aspects of executive functions) (Yeats et al., 2005). In the TBI research literature, symptoms of ADHD are apparent in children with TBI in high rates when compared with children without TBI. Premorbid attention problems in children before injury may predict secondary ADHD symptomatology after injury. Premorbid attention problems act as a potent moderator of long-term attention problems after childhood TBI (Yeats et al., 2005).

Attention deficit hyperactivity disorder (ADHD) is a psychiatric disorder that affects up to 6% of children (Szatmari, Offord, & Boyle, 1989). Post-injury ADHD, often referred to as secondary ADHD (SADHD) develops in TBI children. A study conducted by Max et al. (2004) suggests that SADHD is a clinically important syndrome after severe TBI in children and adolescent. Outcome data were available for 118 children, ages 5

through 14. Thirty-seven children were diagnosed with severe TBI, 57 were diagnosed with mild to moderate and 24 had suffered an orthopedic injury. The diagnosis of SADHD was mutually exclusive with pre-injury ADHD, which occurred in 13 of 94 TBI participants and 4 of 24 orthopedic injury patients. SADHD occurred in 13 of 34 participants with severe TBI but resolved in 4 of those participants. SADHD also occurred in 1 of 8 moderated TBI participants, only in the presence of ADHD traits and 3 out of 39 of MTBI cases. SADHD occurred in 1 of 20 participants with orthopedic injury without any brain injury.

Executive functions

Executive functions (EF) are a complex system of high level abilities incorporating abilities such as self-direction, self-regulation, decision making and problem solving, monitoring, and effective behavioral regulation. From a developmental framework, significant improvements in EF are expected in late elementary school and during secondary education years. TBI can certainly interrupt development and also affect already developed EF abilities (Anderson, 2002; Anderson, 1998).

EF deficits are manifested as impairments in reasoning, monitoring, concept formation and mental flexibility. Inhibitory control and working memory are also interrupted as it is supported in the literature (Ewing-Cobbs, Prasad, Landry, Kramer, & DeLeon, 2004). A study by Nadebaum, Anderson and Catroppa (2007) that aimed to assess long term effects of early TBI on executive functioning outcomes, five years post injury, and to explore predictors of executive functioning (including impact of injury, child and family related factors) found the presence of long-term executive functioning deficits following severe TBI. However, children who suffered mild or moderate injuries performed similarly to normally developing children. Furthermore, analysis of pre-injury characteristics found that the TBI group did not differ in terms of gender, age, socioeconomic status, pre-injury adaptive ability or family functioning. In the same study it was suggested that executive functioning is not globally affected by TBI. Instead certain domains of executive functioning appear vulnerable after TBI: intentional control, cognitive flexibility, goal setting (organization, reasoning abilities), information processing, and behavioral outcome (short attention span, lack of initiative, difficulty adapting to new situations).

Processing speed

Processing speed is greatly affected in TBI and it is a primary symptom of MTBI. The ability to process information efficiently is typically measured in simple reaction time tasks and decision making activities. Speed of processing deficits are manifested by slower

speed (i.e. requiring more time to complete a task). Processing speed efficiency implies that the patient is able to complete tasks at the required speed with good accuracy. TBI often interferes with speed and efficiency resulting in high error rates.

Kenneth, Marko, Peggie, and Serena (2009) conducted a cross-sectional observational study and evaluated the processing speed performance in outpatients with moderate to severe TBI. They specifically measured "simple reaction time", "movement time" and "mental processing speed" at a single time occasion and compared results with 20 matched healthy subjects. Results suggested significant differences in speed but not accuracy of work between outpatients with TBI and healthy subjects. Simple reaction time was sensitive to predicting patients with moderate to severe TBI as opposed to healthy counterparts. They concluded that outpatient clinics should consider measuring simple reaction time in outpatients after a TBI. Processing speed and working memory deficits are common neurocognitive deficits associated with TBI.

Cognitive abilities, intelligence and TBI

All abilities described above are necessary and important for learning and for everyday functioning. When children are attending school, focus in on cognitive abilities. Nevertheless, cognitive abilities can be viewed and examined in a less formal environment, that of the school yard or the neighborhood. Social-emotional behavior is inhibited when there is a deficit in memory or in attention. If a child with TBI acts impulsively; when she fails to control and interpret her emotions and the emotions of others, then she may appear not only socially awkward but intellectually as well. When we talk about social intelligence, we talk about learning, adjusting, being socially appropriate, being able to build relationships, understand settings and environments.

Language development

Somewhere between the ages of 10 to 14 months, a child begins to demonstrate language capacity. The child is able to formulate specific words to express a wish or to associate real objects to the world. By two years of age, a child is able to put together words and formulate sentences. The sentences are no longer than three words, but are proper enough for conducting a simple and understandable conversation.

Language development correlates to comprehension. For a child to be able to produce language, she first needs to understand language. A child nods before she produces words, follows instructions, reacts when she hears her name and smiles when she is praised. It is obvious, even when the child still communicates with body movements and gestures, that she knows and comprehends words and that she associates words with happenings, names with objects and names with persons. A child has an inner bank of

words. She "saves" language and uses language only when it seems secure to do so. The production of language incorporates different kinds of intellectual abilities. The child produces language not only when she is able to comprehend words, but also when she is able to produce and continue comprehensive conversations with others.

Language is a complicated ability. It involves many components which seems to be the focus of scientists when they study the development and understanding of language. The components of language are phonology, morphology, semantics, syntax, and pragmatics and are briefly described below:

1. Phonology: It is known that a child is able to produce a large amount of sounds, especially during infancy. As the child grows older, she narrows down the sounds that are most useful for producing the mother language. Those sounds are known as phonemes and each letter, of any language, is associated with a single phoneme. Furthermore, the combination of letters allows the creation of differed phonemes.
2. Morphology: Morphemes are the combination of phonemes that express the meaning of a word for the spoken language. There can be words of a single syllabus, or a short combination of morphemes attached to different morphemes for the purpose of producing a meaning. Morphology, in any language, is the combination of rules that need to be conformed in order to produce meaningful words.
3. Semantics: With the word we indicate that a child has an ability to gather and use words appropriately in both spoken and written language. With the term "appropriately" it is implied that a child is able to convey a meaning in the sentences she chooses to use.
4. Syntax: A child's vocabulary builds up with time. As soon as a child enriches her vocabulary, she begins to put words together and form sentences. Syntax is the ability to arrange words into phrases and then into sentences.
5. Pragmatics: Using a language phonologically, morphologically and syntactically correct, does not mean that we offer to the listener an understandable statement or conversation. In order for all the rules of language to work correctly and convey a meaning, we first need to use a socially appropriate manner. With the term "pragmatics" we mean the socially appropriate use of language. That means that a child is able to begin or continue a conversation without changing the subject, waits for her turn

> to speak when she holds a conversation, gestures appropriately and answers with proper timing. The language of each person sets the pragmatic rules. Those rules are taught by family and environment when the child experiences and becomes exposed to spoken language. All language components are taught simultaneously in a social, informal context. A child understands the rules when they are reinforced and shaped. She models language behavior and imitates only to achieve language acquisition.

In the present study tests were administered that assessed verbal language skills, such as phonemic verbal fluency, word knowledge, concept formation, language development, and reading words and pseudowords. This was done in order to investigate which areas of language were mostly affected by TBI.

Acquiring language

Appropriate to the spoken language phonemes, are reinforced by the caregiver of the child each time she produces the language correctly. Inappropriate language behavior and meaningless sounds are ignored and fade away. Sounds become the basis of words and words become the basis of sentence formation.

Sentence imitation is not as easy as one may think. Children fail to imitate the long, complicated sentences of the adults. They find it difficult to do so, even when there are simplified or broken into pieces. The child imitates the rules of the language, rather than the language they hear. Children study language by listening and observing. At some point they understand the syntactic rules and they become ready to use and produce adult-like spoken language. At this point the caregiver steps in and expands the child's language by restating the statement. The caregiver completes the sentences if there are missing words and adds more complex elements within those sentences. With recasting, the caregiver changes the syntactic form of a sentence without alternating its meaning. This not only improves the syntactic ability of the child, but the language development as a whole.

Language changes after TBI

Most studies commenting on children's verbal abilities after TBI have addressed school-aged populations, and report general language findings, usually in the form of verbal subtests results from standardized intellectual assessment batteries such as the Wechsler Scales, the Clinical Evaluation of Language Functions (CELF), and others (Morse et al., 1999).

Hough (2008) writes that the extent of word retrieval problems after TBI has not been clearly defined. Impaired confrontational naming is considered to be one of the most frequent symptoms after TBI and TBI adults have been found to produce "a remarkable

amount of superordinate errors (e.g. “furniture” for “table”)”. Furthermore, it is stated that general organizational deficits, particularly in the areas of categorization and sequencing, may contribute to this type of error pattern.

Leblanc, De Guise, Feyz, and Lamoureux (2006) write that there are also other “cognitive-communicative impairments” that influence a TBI patient and his environment, than word retrieval difficulties. Those include disorganized and tangential oral or written discourse, imprecise as well as disinhibited and socially inappropriate language and difficulties in comprehending extended oral or written language. Also, communicating in distracting or stressful environments, reading social cues and adjusting interactive styles to meet situational demands are obscurities that are mentioned. In addition, problems in understanding abstract language as well as inefficient verbal learning and verbal reasoning can also be observed. The authors conducted a study aiming to isolate specific factors collected in the acute care setting after injury, which would predict outcome in the areas of language expression and comprehension for patients with TBI. They suggested that patients with less education had a greater chance of presenting deficits in all of the language skills evaluated, which was naming ability, auditory comprehension, verbal reasoning and verbal fluency. They hypothesized that people who had more years of schooling were probably more intellectually active. They also explained education as a predictive factor which could be related to the fact that more educated individuals tend to expose a wider vocabulary and read more. In the study, it is suggested that the more severe the TBI, the greater the likelihood that the patient would show word-finding deficits, auditory comprehension deficits (including difficulty with verbal reasoning) and have problems with semantic category naming in the early days post-TBI. Lastly, age was the second most important variable predicting deficits in semantic category naming.

The term “communication” does not just imply an ability to convey a verbal message. It implies an ability to send meanings and emotions through facial expressions. An individual’s ability to recognize, interpret, and respond to facial cues is fundamental for achieving effective communication and social interaction (Watts & Douglas, 2006). As a result, any deficit to the specific ability is expected to have a serious impact on a person’s competence for social interaction. The literature suggested that patients with TBI experience significantly more difficulty both naming and recognizing the emotion depicted by facial expression than participants without TBI. Watts and Douglas (2006) demonstrate in their study that individuals with TBI who experience difficulty in interpreting facial expression have difficulties with communication.

It is evident that children's language difficulties prevent meaningful communicative exchanges, which limit social opportunities and therefore impact the child's social behavioral development (Lindsay, Dockrell, & Strand, 2007). Language impairment in early childhood is associated with increased risk of poor linguistic and academic outcome later on in a child's life (Beitchman, Wilson, Brownlie, Walters, & Lancee, 1996).

Statement of the Problem and Purpose of the Study

TBI is the leading cause of injury and death in children between the ages of 0 and 14 in western societies (Guerrero, Thurman, and Sniezek, 2000). Unidentified TBI can lead to mismanagement of cognitive, social, and behavioral challenges often noted in the young TBI survivors.

Prior to this study, the percentage of students with TBI enrolled in Cyprus public, elementary schools was unknown. It was estimated to be approximately 8-10%, similar to that of other Western nations. Cypriot children with TBI are part of a population group of children with special needs that is often overlooked and not investigated properly. TBI is not included as an etiology in the Cyprus special education data base which mostly focuses on children with other developmental and genitical disabilities.

The main purpose of the study was to estimate the percentage of students with a probability of TBI in the elementary school age population in Cyprus and to identify the effects of possible TBI on neurocognitive abilities in school age children.

Part of the investigation of the incidence of students with a probability of having sustained a TBI focused on the investigation of the characteristics of the participants, for example on the number of times they experienced a blow to the head, the causes of the blows, whether they lost consciousness or whether they were ever dazed and confused after a blow to the head. Important information was obtained about the participants' everyday day functioning, the participants' medical history (use of medication, conditions associated with functional problems, i.e., low birth weight, premature birth, fetal alcohol syndrome, learning disability, attention deficit disorder, psychiatric or alcohol/substance abuse history) both in the experimental and the control group. Furthermore, adaptation of the BISQ in the Greek Cypriot population and adaptation of the DEX-R questionnaire in the Greek Cypriot population was also carried out during the investigation of hypothesis one and hypothesis two.

Cognitive ability is a more accurate predictor of functional outcome after moderate to severe TBI than demographic and injury severity variables, (Spitz, Ponsford, Rudzki, & Maller, 2012). Even though the current study did not aim to investigate the functional

outcome as it is related to injury severity or to the age of incidence experienced, it wished to suggest that specific cognitive domains, such as memory, processing speed and executive functions could be significantly affected after a possible TBI, resulting in poor academic accomplishments and in the presence of misbehavior in children. This was the first attempt ever made to focus on the pediatric Greek Cypriot population and its possible history of TBI in relation to neurocognitive outcomes. Within the Cypriot context, citizens are more familiar with the consequences of severe TBI, than the consequences of moderate or mild TBI due to media exposure of motor vehicle crashes involving motorcycles. Hence, there is familiarity with the effects of severe TBI resulting in coma and significant deficits in cognitive, physical, and psychosocial functioning. On the other hand, the term "concussion", which is often found in the literature to characterize MTBI, does not have the same negative connotation as the term TBI. Also, often times, people fail to make the connection between TBI and concussion. In order to avoid possible negative reactions associated with the term TBI, the main instrument implemented in the study to identify TBI, the Brain Injury Screening Questionnaire (BISQ) as well as the letter of participation that was sent to the parents of the subjects, avoided the use of the term TBI. Instead, it incorporated the term "blows to the head", prompting the subjects to complete the questionnaire and participate in the study.

This present study is based on a study contacted by Cantor, Gordon and Ashman (2006). The researchers examined the BISQ's utility as a screening measure for TBI in children. They hypothesized that, a) the BISQ could be used to identify public school children with an increased probability of having sustained a TBI and b) children identified by the BISQ as having an increased probability of having sustained a TBI would have more cognitive impairments and more behavioral, and physical symptoms than those with a low probability of having sustained a TBI. They gathered data from a sample of 174 children aged 12–19 recruited in 3 urban public schools. The BISQ was completed by the parent and the student and forty-eight percent of the sample completed a neuropsychological testing battery. Results indicated that 9% of the participants had a "high probability" of having sustained a TBI and more cognitive, behavioral, and physical symptoms were reported in the children in the "high probability" group than in the "low probability" group. Eighty percent of the "high probability" children tested had neuropsychological evidence of cognitive impairment. The findings of the study supported the utility of the BISQ as part of a screening process to identify children who may have experienced a TBI. The present study implemented the Greek version of the BISQ in order to test the following hypotheses.

Primary Research Hypotheses

The primary research hypotheses were:

1. The percentage of children with a positive screen on a probability that symptoms reported are TBI-related will be at 8-10% similar to that of other western nations.
2. Children with a positive screen will have lower performance on neuropsychological and behavioral measures as compared to children with a negative screen on a probability that symptoms reported are TBI-related.

CHAPTER 3
RESEARCH DESIGN AND METHODOLOGY

Participants

In order to investigate the research hypotheses, the study was divided in two Phases: Phase A (for hypothesis 1) and Phase B (for hypothesis 2).

Phase A

During Phase A, out of the 2088 questionnaires that were sent home, 706 subjects demonstrated an interest on participating and giving important information about the history of blows to the head that their child may have experienced.

A random sample of boys and girls, between the ages of 5 to 13 years, enrolled in public elementary schools were recruited for this study from the following schools in Cyprus:

1. Pevkios Georgiadis Elementary School, Nicosia
2. Athienou CA' Elementary School, Larnaka
3. Athienou CB' Elementary School, Larnaka
4. Kathari Elementary School, Larnaka
5. Drosia CA' Elementary School, Larnaka
6. Derinia A' Elementary School, Famagusta
7. Photi Pitta Elementary School, Dasos Ahnas, Famagusta
8. Paralimni C' Elementary School, Famagusta

Out of the 2088 letters, consent forms and BISQ questionnaires that were sent to the parents of public elementary school children in order to declare interest for participation, 706 agreed to participate and returned the completed questionnaires. Thus data from 706 participants were included in the present study and were used for the statistical analyses.

All participants were residents of Cyprus. Among them, 81.3% (N= 574) were Greek Cypriot students and 4.1% (N= 29) were students from other national backgrounds. All of them resided in the areas of Cyprus controlled by the Republic of Cyprus. Two hundred and eighty four (40.2%) were male students and 319 (45.2%) were female students. The majority of the families (24.5%) reported an income of 35,000 euro and above which implies an above-average income as compared to the median family salary in the Republic of Cyprus.

Phase B

Children who screened positive for TBI and demographically matched controls were invited to participate in the second phase of the study. During the second phase of the

study, a battery of tests was administered to students in Greek, on an individual basis. Most of the students were tested in their school setting during morning hours. In some cases, parents desired for their children to be evaluated at an independent setting, other than their school, during afternoon hours.

All tests were administered and scored by graduate psychology students, who had been trained in the administration and interpretation of the neuropsychological tests by the researcher, a licensed school psychologist. The parents of 60 students agreed for their children to participate in Phase B of the study. Twenty nine out of the 60 students (48.3 %) had a negative screen for TBI and 31 students (51.7%) had a positive screen for TBI, based on the screening questionnaire used in the first phase of the study. The two groups were matched according to gender, age, school and class of attendance. Their ages ranged from 5 to 13 years (M = 8.9), 35 (58.3%) were male and 25 (41.7%) were female. Fifty-five students were Greek Cypriot, 2 were of other ethnicity and ethnicity was not reported for 3 students. The majority of the 60 parents (or guardians) reported an income of over 35,000 euro (33.3%). Four parents reported an income of 0-10,000 euro, five parents reported an income of 10,001-15,000 euro, five parents reported an income of 15,001-20,000 euro and five parents 20,001-25,000 euro. An income of 25,001-35,000 euro was reported by 11 parents (18.3%). The family income was not reported for 10 children.

Procedures

The Ministry of Education and Culture, the Center of Educational Research and Evaluation and the National Bioethics Committee, Republic of Cyprus reviewed the protocol and approved the procedures for this study. The investigator obtained permission from elementary school participants in order to secure their collaboration. A cover letter, providing information about the study, accompanied with the BISQ questionnaire and a consent form was mailed to parents of students, informing them of the study and requesting their voluntary participation in the project.

Phase A

The "Brain Injury Screening Questionnaire (BISQ), was created by the Research and Training Center on Community Integration of Individuals with TBI (1997), to determine whether a person or a group of persons exhibit a symptomatology indicative of TBI. Adaptation into Greek was conducted by Constantinidou (2009) upon permission from the authors for both versions of the scale: Pediatric and Adult. Forward and blind backwards translation procedures by licensed professional translators were implemented. In addition, demographic information was adapted to be consistent with the Cypriot

culture. The final version of the test was administered to 20 volunteers for further refinement. Appendix A contains the 2 versions of the BISQ.

The Pediatric version of the BISQ was used for the present study. Initially, 2088 questionnaires were sent home to all the students of the eight public schools that were selected for participation. Since it was structured to be completed by adults for children up to l2 years of age, it was sent home to the guardian, who in most cases was a parent. An introductory cover letter accompanied the questionnaire, introducing the parent to the study procedures and was also used to obtain the parents' voluntary informed consent. Seven hundred and six questionnaires were properly completed by parents/guardians on behalf of their children and were returned to the school by the students. Six hundred questionnaires (85%) were completed by a parent, 5 (0.7%) by a relative and 1 (0.1%) by another person serving as a guardian (other than a parent or a family member). The relationship of the respondent to the child was not reported in 100 questionnaires.

All parents were asked to answer the second part of the BISQ questionnaire. By answering the second part of the BISQ important information was provided regarding the symptomatology experienced during the last month, on a daily basis, by the child. Symptomatology focused on the physical, cognitive and behavioral health of the child. Even though Part B of the questionnaire was not mandatory for participants to answer when no signs of TBI were reported during the earlier part of the questionnaire, parents or guardians were prompted to continue to complete all parts of the questionnaire, so that any important information would not be missed out.

The BISQ was scored electronically through MS ACCESS. The software generates a report for each subject separately. It provides information regarding the history of the subject for blows to the head, it includes the duration of any changes in mental status and any functional problems resulting from brain injury. The report ends with an indication whether the screening is negative or positive. A positive screen is based upon specific necessary elements: one or more incidents that are associated with a changed mental status and persisting challenges that are similar to challenges faced by individuals with brain injury. A positive screen does not mean that a person's problems are necessarily due to a brain injury. Instead, it means that the person's challenges may be due to a brain injury. In the case in which the screening is positive to TBI, the report provides the level of probability that symptoms may be a result of a brain injury (low, moderate, high). For a positive screen the number of incidents reported is considered, as well as the context of the duration of the longest period of loss of consciousness or of feeling dazed and confused. Thus, any loss of consciousness of more than 20 minutes, classifies the person as reporting

moderate to severe brain injury (Hibbard, Brown & Gordon, 1999). The Pediatric version of the BISQ questionnaire is described in more detail under the Experimental Materials section.

Phase B

Phase B began when Phase A was completed, a time period of at least months. After the BISQ identified students with a history of TBI, parents were notified both in writing and via phone. Children were invited by the researcher for an in-depth investigation of their neurocognitive profile. Phase B consisted of 3 hours of assessment of oral verbal abilities, verbal working memory abilities, attention and executive abilities, behavioral and emotional status, fine motor coordination, psychomotor speed, analysis and synthesis. The Dysexecutive Questionnaire (DEX-R) and The Achenbach System of Empirically Based Assessment (ASEBA)- CBCL was sent home to both parents for completion. In addition to the experimental control, a group of pair-matched controls was recruited to participate in the study.

Materials

Phase A

The Brain Injury Screening Questionnaire (BISQ) was created by the Research and Training Center on Community Integration of Individuals with TBI (1997) at Mount Sinai School of Medicine. It is intended to be used as a screening tool for the detection of prior brain injury. It was created based on the HELPS card developed by Picard, Scarisbrick, & Paluck (1991) and the symptom checklists developed by Lehmkuhl (1988) at The Institute of Rehabilitation and Research (TIRR) and the Medical College of Virginia. Cantor et al. (2004) described the BISQ as the only measure of its kind that documents: 1. Events that can result in a brain injury, 2. Functional difficulties and symptoms associated with brain injury, and 3. Events and conditions other than brain injury that might lead to symptoms similar to those seen in brain injury. Thus, it provides crucial information for use in determining whether American Congress of Rehabilitation Medicine criteria are met for mild brain injury (i.e. blow to the head, altered mental status) for documenting what functional impairments are present and how frequently they occur, and for assessing whether these impairments are likely associated with factors other than head injury (e.g. psychiatric disorders, medication use, substance abuse). It has been shown to reliably distinguish between brain injury and other conditions (e.g. spinal cord injury) including the absence of disability (Cantor et al., 2004; Gordon, Haddad, Brown, Hibbard, & Sliwinski, 2000; McFadden et al., 2011).

The BISQ investigates whether a person has experienced an alteration in mental status, a loss of consciousness or a period of being dazed and confused following an event or a medical condition. Changes in everyday functioning relative to brain injury may also become evident after administering the instrument, since it requires the examinee to answer a series of questions regarding the person's behavior after the incident. As mentioned previously, the pediatric version is completed by an adult on behalf of the child. The adult, most often the parent or the legal guardian, completes the questionnaire in writing. An alternative way for completion is through a verbal interview by an administrator.

The BISQ is divided in four sections: Introduction, Part 1, Part 2, and Part 3. The introductory section inquires general and personal information about the child or the family such as date of birth, date of examination, age and gender of the child, nationality or ethnic background, current annual income in the child's household. Part 1 (Injuries and Hospitalizations) lists 19 situations in which a child may have suffered a blow to the head and asks whether the child had ever experienced a blow to the head in any of those situations. Some of the situations described are: a blow to the head after a car/van/truck accident, as a pedestrian hit by a vehicle, being hit by a falling object, falling down stairs, falling during a fainting spell. Part 1inquires the number of times the person may had experienced any of the situations described (0,1,2,3 or more),whether they lost consciousness and the number of times they had and whether they were ever dazed or confused after the situation and the number of times they might had. In the later section of Part 1 there are three cross questions to be answered that confirm the testimony of the person completing the questionnaire regarding whether they had ever experienced a blow to the head, a medical emergency or whether they had ever felt dazed or confused after an incident. Following those questions, there are three more questions focusing on the amount of time the person may have lost consciousness, or may have felt dazed or confused and also the age of the person when he or she experienced the blow to the head or the medical emergency.

Part 2 is entitled "Problems and Difficulties in Daily Living". It consists of 100 questions divided into 3 subscales: a physical scale of 19 symptoms (e.g. sleep difficulties, sensory changes, headaches, clumsiness); a cognitive scale of 48 symptoms (e.g. forgetting names, forgetting to take medication, problems with concentration, difficulty learning, problem solving); and a behavioral scale of 33 symptoms (e.g. feeling moody, hitting or pushing others, feeling angry, heedless to danger) (Hibbard et al., 2004). Participants are asked to identify symptoms that interfered with their ability to function on most days

during the prior month using a six-point anchored Likert scale. All of the questions are related to behaviors often experienced after a brain injury and begin with the phrase "In the past month how often has this been a problem in your daily life". Some examples of these questions are: "In the past month how often has this been a problem in your daily life:1. Having trouble staying awake?, 2. Being clumsy, dropping or tripping over things?, 3. Having double vision or blurred vision?, 4. Friends or relatives seeming unfamiliar?, 5. Difficulty following instructions, written or oral?".

The idea behind such screening is that the BISQ may help identify students with a "hidden" or unreported TBI, which may be associated with persisting cognitive and behavioral challenges that lead to underachievement (Gordon, 2004). In Part 3 (Additional Questions) there are questions built to examine whether the subject is on any medication currently, or whether there is a history or a diagnosis of a condition which its symptomatology resembles TBI's symptomatology. All questions are answered through a checklist of three possible answers (yes, no, don't know).

Phase B

A battery consisting of neuropsychological measures (assessing oral verbal abilities, verbal working memory abilities, attention and executive abilities, behavioral and emotional status, fine motor coordination, psychomotor speed, analysis and synthesis) sensitive to the deficits associated with TBI was administered to 31 children identified with TBI and to 29 normal controls (See Table 1). A description of those measures follows below:

The Achenbach System of Empirically Based Assessment (ASEBA)- CBCL. The Youth Self-Report (YSR) and the Child Behavior Checklist (CBCL) are used respectively to assess adolescent's behavior and parent's report of the behavioral and emotional problems of the child or adolescent during the preceding six months (Reijneveld et al., 2003). The Achenbach System of Empirically Based Assessment (ASEBA) is used worldwide in different contexts, including medical clinics, psychological clinics, and in research. It is the most widely used and researched system of its kind, with some 6,000 publications reporting findings in 67 different cultures (Achenbach & Rescorla, 2007). For the purpose of the study, guardians were asked to complete the "Child Behavior Checklist" (CBCL/6-18) in order to investigate whether the student experiences problems in the clinical range, in relation to a wide range of emotional, behavioral or social disturbances.

The CBCL can used to screen for potential Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000), including (a) Affective Problems, (b) Anxiety Problems, (c) Somatic

Problems, (d) Attention Deficit/Hyperactivity Problems, (e) Oppositional Defiant Problems, and (f) Conduct Problems.

The Dysexecutive Questionnaire-DEX-R. The Dysexecutive Questionnaire (DEX; Wilson et al., 1996) was designed to sample a range of problems typically associated with executive dysfunction within the acquired brain injury (ABI) population. The 20-item scale captures changes across emotional, behavioral and cognitive domains (Simblett et al., 2012). It is a standardized measure built to investigate behavioral difficulties associated with executive functioning such as impulsivity, inhibition control, monitoring, and planning (Mooney, Walmsley, & McFarland, 2006). Each item is rated on a five-point Likert scale (0–4) ranging from "never" to "very often" (Simblett et al., 2012) with a higher score indicating higher frequency of dysexecutive behavior in everyday life (Chan, 2001). DEX is a sensitive and ecologically valid questionnaire for tapping dysexecutive symptoms, even among patients with different neurological disorders (Chan, 2001). There are two versions of the DEX questionnaire: the "DEX" which is a self-rated tool and the "DEX-R" which is an informant-rated tool. The DEX-R was used for the study upon permission from the authors. It was translated and adopted by Constantinidou (2011) using a forward and blind backward translation process incorporating professional licensed translators.

Digit Span Subtest of the Weschler Mental Scales of Intelligence-III (WMS-III). Based on the Baddeley and Hitch (1974) working memory paradigm, digits forward assess auditory memory span capacity, whereas digits backward taps into working memory abilities. Research indicates that individuals with memory disorders perform about as well as unimpaired individuals on the digits forward task (Rogers, 2008; Vakil, 2005). The subtest is "considered a robust and relatively insensitive to many forms of brain damage and dysfunction". However, digit span backward performance is impaired in adult patients after TBI (Vakil, 2005). It is assumed that recalling digits backwards is more demanding of working memory processing and is therefore more sensitive to the effects of ageing or brain dysfunction than the recalling of digits forward.

Rey– Osterrieth Complex Figure. The Rey–Osterrieth Complex Figure (ROCF) stands out as one of the most widely used instruments in both clinical and experimental settings to evaluate visual planning and organization, visuoconstructional abilities and nonverbal memory (Spreen & Strauss, 1998).

Patients are asked to first copy a complicated geometric figure and then reproduce it from memory. There is also a delayed recognition trial. There is no time limit set for copy and recall. Rey – Osterrieth evaluates not just the memory abilities of the patients, but

also their visuospatial abilities, their attention, their planning skills and their organization abilities during the copy trial. The patient is evaluated based on the correct reproduction of eighteen specific design elements. Research on memory functioning following TBI has focused mostly on verbal memory even though visuospatial memory may be important to recovery. Processing speed, motor functioning, working memory and attention are also considered to influence visual memory test performance (Schwartz, Penna, & Novack, 2009).

The Greek Version of the Trail Making Test A & B (Constantinidou, Papacostas, Nicou, & Themistocleous, 2008; Zalonis, Kararizou, Triantafyllou, Kapaki, Papageorgiou, Sgouropoulos, & Vassilopoulos, 2008). A test from the original Halstead Reitan Battery (Reitan & Wolfson, 1985), the Trail Making Test (TMT) consists of two parts, part A and part B and it is expected of the examinee to be quick and efficient. Part A consists of encircled numbers from one to twenty-five randomly spread across a sheet of paper. The examinee is asked to connect the numbers together, beginning with one and ending with twenty-five. Part B, requires the examinee to connect numbers and letters in an alternating pattern (1-A-2-B-3-C…) as quickly as possible, thus shifting between two cognitive sequences. Scores are calculated by adding the time it took the examinee to correctly complete both part A and part B. The Trail Making Test A & B are believed to measure a variety of cognitive functions such as attentional capacity, sequencing, visuomotor speed, cognitive flexibility, and set shifting ability. Although Trail B involves speeded processing and visual scanning abilities, it has a strong cognitive flexibility component (Chaytor, Schmitter-Edgecombe, & Burr, 2006; Lezak, 1995; Spreen & Strauss, 1998) and has consistently been used in previous ecological validity research (Chaytor, Schmitter-Edgecombe, & Burr, 2006; Burgess, Alderman, Wilson, Evans, Emslie, 1996; Chan, 2001).

It is an integral part of most neuropsychological evaluations, perhaps as a consequence of its economy of administration time, ease of scoring, and demonstrated clinical utility. The TMT is also well established as a sensitive measure of cognitive problems associated with TBI (Lange, Iverson, Zakrzewski, Ethel-King, & Franzen, 2005). Lange et al. (2005) examine whether performance on the TMT is related to brain injury severity and found a linear relation between injury severity and test performance. Individuals with more severe injuries tended to perform worse than those with less severe injuries.

The Symbol Search Subtest of the WISC-III. The Symbol Search subtest of the WISC-III requires the subject to observe an abstract, meaningless symbol and then observe

a row of similar symbols and decide whether the first symbol exists in the row. The subtest measures perceptual discrimination, speed accuracy, attention and concentration, short-term memory and cognitive flexibility.

Letter Cancellation Task. The Letter Cancellation Task is a self-administrable, brief task, completed in five to fifteen minutes with simple instructions for subjects. The test requires the search for letter targets within a matrix of alphanumeric stimuli written using the same character fonts. Length and difficulty of the test can easily be changed by varying the number of targets and/or the dimension of the matrix. The search and cancellation task allows the recording of several dependent variables, number of hits, number of misses, and number of false positives.

Completion time may be recorded or a fixed completion time may be given (Casagrande, Violani, Curcio, & Bertini, 1997). Anderson and Pentland (1998) conducted a study incorporating among other measure the letter cancellation task, as an attempt to examine residual attentional and information processing abilities in a group of adolescents with a history of moderate to severe head injury. They compared their performances to those of non-injured peers and results showed that head-injured adolescents exhibited deficits on a wide range of summary variables extracted from attention tasks. Difficulties were also identified on measures incorporating a speeded component, and on tasks requiring complex processing or higher-order attentional skills.

Rey Auditory Verbal Learning Test (RAVLT; Lezak, 1983; Greek Version: Constantinidou & Evripidou, 2012). The RAVLT was built to assess the process of verbal learning and the memory ability of children and adolescents. It is suitable to use on populations with TBI, as well as on individuals with learning disabilities, attention-deficit disorders, mental disabilities or other neurological disorders. For the recall and recognition of words, a subject has to go through a number of trials where he or she will need to recall words from two lists after presentation.

The RAVLT is administered using five acquisition trials, an interference trial, a short delay recall immediately after the interference trial, twenty minute delayed recall, and recognition memory testing after the twenty minute delayed recall (Binder, Villanueva, Howieson, & Moore, 1993).

For the first five trials, all fifteen words from List A are read by the examiner and subsequently the child is asked to recall as many words as possible. This sequence of presentation and recall is repeated 5 times. List B is then presented to the child and is asked to do the same; to recall as many words possible from List B. A short delay follows List B, following which the child is asked to recall items from the original list, List A, without

hearing the words again. Words from List B are harder to remember, since words from List Aare still active in memory (proactive interference). The "Long Delay" trial takes place twenty minutes after the "Short Delay Free Recall" trial finishes. Within those twenty minutes, the subject is occupied by non-verbal tasks. The subject is first asked to recall as many words as possible from List A and then is asked to recall words from List A with the use of category cues. From a list of forty-five words that are read aloud (fifteen words heard from List A and thirty random words for distractibility purposes), the subject needs to recall and recognize words (with a "yes" or "no" answer) that are included in List A. There are two learning strategies that can be calculated from List A: the "semantic clustering" and the "serial clustering". With the term "semantic clustering" we mean the total number of words that are remembered together from the same category. With the term "serial clustering", we mean the words that are remembered by the order they were presented. Subjects that are considered "active learners" remember words from the beginning and the middle of the list, a task that is considered to be more difficult than the task achieved by the "passive learners". "Passive learners", tend to remember words from the end of the list. During the administration of the test, the examiner may view the "consistency measure" of the subject; his or her ability to remember the same words during the course of all consecutive trials. If the "consistency measure" is high, it means that the child was able to use a strategy for organizational purposes. The "learning slope", is the number of new words learned by the child during the course of the trials. "Retention rate" is the number of words recalled by the child on the final Trial (5th trial) of List A and are also recalled after the short delay interval. "Response bias" refers to the tendency to favor "yes" or "no" answers on recognition tasks and "recognition discriminability" examines the ability of the subject to identify previously heard words (with the use of a "yes" answer), relative to the ability to discard words with a "no" answer. Subjects that may be found to encounter problems in "encoding" (the process by which new information enters memory systems) (Lichtenberger, Kaufman, & Lai, 2002), or "retrieval" (the process by which stored information is recalled) (Lichtenberger, Kaufman, & Lai, 2002) will exhibit a difference in performance of delayed free-recall with delayed recognition memory. Poor free recall and sufficient recognition of words may suggest satisfactory ability to encode information, but unsatisfactory ability to retrieve it. Inadequate ability on recall and recognition tasks, suggest insufficient ability to encode information. Inability to recognize words given form a list, testifies an inability to store word from previous trials.

Grooved Pegboard Test. The Grooved Pegboard is a manipulative dexterity test. It consists of 25 holes with randomly positioned slots. Pegs, which have a key along one

side, must be rotated to match the hole before they can be inserted. The examinee is asked to put the pegs into the boards as quickly as possible, using only his dominant hand. To score the test, the examiner must record the length of time required to perform the task, from the beginning, until the last peg is put in the slot. A second score is derived by the number of "drops" made by the examinee. A "drop" is any involuntary drop of a peg from the time the examinee picks up the peg from the try until it is placed correctly in the hole. It measures distal, complex fine motor coordination and psychomotor speed (Meyer and Sagvolden, 2006).

Controlled Oral Word Association Test (COWAT). Research has found that verbal fluency is reduced in head-injured patients. These word-finding difficulties result in a slowing or halting of speech, paraphrasing and circumlocutions (Ruff & Evans, 1986). The Controlled Oral Word Association Test (COWAT) is one of the most commonly used measure of the phonemic verbal fluency. Verbal fluency is the term used to describe a person's capacity to generate words according to a category or subcategory in a limited amount of time. Phonemic fluency is the ability to generate words according to a letter of the alphabet (Ross, 2003). The test is divided into three trials, sixty seconds each, and uses the letters C, F and L. The examiner has to calculate the total number of words produced across all three trials, minus any unacceptable responses, such as words starting with the wrong letter or a repetition of a previous word (Benton, Hamsher, & Sivan, 1983).

A study conducted by Iverson, Franzen, & Lovell (1999) hypothesized that COWAT results would be associated with brain injury severity. The sample was sorted in groups, according to head injury severity and results indicated that a) the uncomplicated mild head injury group performed better than the patients with mild complicated, moderate and severe injuries, b) the mild complicated group with skull fractures performed better than the mild complicated group and the patients with severe injuries, c) the mild uncomplicated group and the mild complicated group with skull fractures were not significantly different, d) the mild complicated group with skull fractures did not differ from the group with moderate injuries, and e) the mild complicated, moderate, and severe groups did not differ in their COWAT performance. Those results suggest that brain injury severity may be predicted using the COWAT which is more sensitive in detecting mild, moderate and severe head injuries.

WISC-III (Greek Version; Georgas, Paraskevopoulos, Bezevegis, & Giannitsas, 1997). The Wechsler Intelligence Scale for Children (WISC) was developed by Dr. David Wechsler for children aged 6 to 16.It may be used as part of an assessment battery, either by administering all subtests of the test, or part of the test. It takes from an

hour to an hour and half to administer depending on the child's abilities, mental speed and concentration. The test contains 13 subtests that make up the verbal and nonverbal scales. Administrators of the WISC can generate a verbal IQ score, a performance IQ score or a general IQ score which represents a child's general cognitive ability.

Subtests of the Greek version of the WISC-III were used to assess different kinds of cognitive abilities often related to brain injury. The Greek version of the WISC-III was created based on the 1992 British version of the WISC-III and the 2001 American version of the WISC-III. The Greek adapted version included several changes in verbal items and was standardized in a stratified, representative sample of the Greek population aged 6-16 years in the early '90s. Research with the WISC-III had demonstrated particular sensitivity of its perceptual organization and processing speed indexes to the severity of TBI (Donders & Janke 2008; Dondres, 1997; Tremont, Mittenberg, & Miller, 1999). The following subtests were administered:

Similarities requires the subject to answer questions about how objects or concepts are alike. It contains 19 pairs of words and the subject must state the similarity between the two items in each pair. The subtest asks from the subject to perceive the common elements together into a concept, thus it measures verbal concept formation; the ability to place objects and events together into a meaningful group. The subtest also measures well-automatized verbal conventions and memory (Sattler, 2001). The "similarities" subtest is an important tool for researchers or mental health professionals because it measures the ability to store information in the long term memory by categorizing and clustering information. It is a measure of conceptual skills; how a person changes concrete information to abstract.

Vocabulary requires from the subject to explain the meaning of each word they are given verbally. It tests word knowledge, learning ability, richness of ideas, memory, concept formation, and language development (Sattler, 2001). The test also requires retrieval of information from long term memory, which is to be presented in a meaningful and fluent order. The subject's language environment and the subject's experiences may be reflected through the administration of the subtest.

Comprehension requires the subject to explain situations, actions, or activities that relate to events familiar to most children. The questions cover several content areas, including knowledge of one's body, interpersonal relations, and social norms. It measures the ability to use facts in a pertinent, meaningful, and emotionally appropriate manner (Sattler, 2001). It measures social understanding, social skills and ethical judgment, abilities greatly influenced by a person's environment.

Block Design requires the child to reproduce designs, using three-dimensional blocks that have a red surface, a white surface, and a surface cut diagonally into half red and half white. The subject uses the blocks to assemble a design identical to a model constructed by the examiner or a two-dimensional, red and white picture. It measures a process called "analysis" and "synthesis"; which expects the subject to perceive and analyze forms by breaking down a whole into its parts and then assembling the components into the identical design. It also measures visual-motor coordination, visual organization, perceptual organization, spatial visualization and abstract conceptualization (Sattler, 2001).

Object Assembly requires the subject to put together pieces of puzzles to form objects. There are five puzzles to complete: a girl, a car, a horse, a ball and a man's face. This subtest measures the subject's abilities in synthesis, visual-motor coordination, visual organization, perceptual ability and long-term visual memory. Low scores on the Object Assembly subtest may be indicate of visual-motor difficulties, visuoperceptual problems, poor planning ability, difficulty in perceiving a whole, minimal experience with construction tasks, limited interest in assembly tasks, limited persistence, difficulty working under time pressure, or impulsivity (Sattler, 2001).

Symbol Search requires the subject to observe an abstract, meaningless symbol and then observe a row of similar symbols and decide whether the first symbol exists in the row. The subtest measures perceptual discrimination, speed accuracy, attention and concentration, short-term memory and cognitive flexibility.

Word and Pseudoword Reading Fluency. The subject is asked to read correctly relatively familiar words consisted of a list of 112 high-frequency words, printed on a single sheet in 4 columns in order of increasing length (1–6 syllables). The test requires the subject to read aloud words, as fast as possible, within a time frame of 45 seconds, starting from the top of each column. Words were initially selected on the basis of frequency of appearance in the "Hellenic National Corpus" (Hatzigeorgiu et al., 2000; hnc.ilsp.gr), a corpus of (at the time) approximately 34 million words (tokens) compiled from a wide selection of texts (mainly popular Greek books published after 1990 and daily newspapers). All 112 items in the word list were among the 1000 most frequent word forms in the corpus. To further ensure that a sufficient number of words visually familiar to the youngest students in the study were included in the list, 30 items were among those appearing in the basic vocabulary selection of the second grade reading textbook used nationwide.

A list of 70 1-6 syllable pseudowords printed in 3 columns in order of increasing length was used to assess pseudoword reading efficiency (PsWRE). Pseudowords were constructed by altering one or two letters in 70 words matched on mean frequency of appearance with those included in the word list.

The two tests have been developed originally in Greek and standardized in the adult and school-aged population (Protopapas, Sideridis, Mouzaki & Simos, 2011; Simos, Sideridis, Kasselimis & Mouzaki, 2013). Several studies have used word-level reading tests to evaluate academic skills following TBI. Research has demonstrated that despite some increase in achievement scores over time, children with severe TBI continued to score significantly lower than children with lesser injuries when evaluated six months to several years after the injury (Ewing-Cobbs, Fletcher, Levin, Iovino, & Miner, 1998; Chadwick, Rutter, Shaffer, & Shrout, 1981; Jaffe, Fay, Polissar, Martin, Shurtleff, Rivan, & Winn, 1993; Knights et al., 1991; Levin & Benton,1985).

Math Screening Test. Mathematics skills were assessed using a recently standardized test of Arithmetical Ability (Papaioannou, Mouzaki, Sideridis and Simos, 2010; Proceeding of the II Special Education Conference, Athens). This test has two parts. The first part includes 15 oral questions-tasks that assess the abilities of counting (mentally and with finger's use), mental arithmetic problem solving and, of number recognition and comparison. The second part includes written arithmetic facts, like computation, subtraction, multiplication, division, and simple fractions, are presented with ascending difficulty. Students may stop solving the questions at any point during the test, if they decide that the level of difficulty is too high to carry it out. The examiner encourages the student to try and solve as many exercises as possible and leave behind all the ones that he or she finds difficult. Each exercise is scored with one point if it is correct and with zero points if it is incorrect. The total score is calculated by adding all the correct responses. Test's internal reliability was high (Cronbach's a = 0.91) and test-retest reliability (Pearson's r = 0, 81, n = 194) demonstrated adequate stability of test scores over time.

Data Analysis

To test the hypothesis about the proportion of children with a positive screen for TBI, data were analyzed using the SPSS (19). All of the BISQ data were first analyzed in MS ACCESS. A written report was generated regarding the probability of symptoms reported and according to the electronic analysis system provided by the authors of the questionnaire. Then all date were entered into SPSS for further statistical analyses. To specify the limitations on the performance of children with a positive screen for TBI on the

neuropsychological measures a series of Descriptive Statistics and Multiple Analysis of Variance Statistics was executed.

CHAPTER 4

RESULTS

Statistical Procedures

The current project implemented several statistical procedures in order to test the primary research hypotheses. The following section provides a brief description of the procedures implemented during Phases A and B of the project.

Descriptive Statistics

Descriptive statistics were used to extract information on the characteristics of the sample (i.e. demographic elements) and to provide aggregated data in relation to the description of the sample's tendency for each variable.

Crosstabulation Analysis

Crosstabulation was used to analyze data of categorical variables included in the study. The main target was the examination of the variables in combination to other related characteristics of the sample. The Crosstabulation analysis was used for the analysis of data collected by the BISQ. The analysis also provides the statistical significance of the difference between the means of the variables under examination, providing a χ^2 index.

Multivariance Analysis of Variance MANOVA

Multivariate analysis of variance (MANOVA) tests was used for the examination of any differences between the means of the two groups (with vs without probability for TBI) in terms of their achievement in the various neuropsychological measurements.

Factor Analysis

Factor analysis was used to examine the structure of the questionnaires used in the present study. The analysis was used to examine whether any clusters of symptoms might come up from the parents' answer to the BISQ. In addition it was used to examine the factorial structure of the DEX-R which was translated and used in Greek for the first time.

Phase A

Hypothesis 1

The percentage of children with a positive screen on a probability that symptoms reported are TBI-related, will be at 8-10% similar to that of other western nations.

Responses from the BISQ were entered into the MS ACCESS database provided by the test developers. For each participant, a report was generated with important demographic information, prior injury, symptomatology exhibited and other important information. The analyses provided information on whether the participant's history and symptom profile indicated high, moderate or low probability for TBI (i.e. positive screen) or no probability for TBI (i.e. negative screen). Due to the small number of participants

falling in each of the three probability level groups, all positive screens were grouped together and formed one single group and were subsequently compared to the negative screens. Data from each participant was subsequently analyzed in SPSS using the χ^2 analysis (Crosstabs) to determine epidemiological factors of pediatric TBI in Cyprus, such as risk factors, causes, implications, and demographic variables.

Incidence and cause of TBI. Out of the 706 participants of Phase A, 41 students were rated as positive for TBI. Out of the 41 who were rated positive, 36 children were rated as low probability, 4 as moderate probability and 1 as high probability. Two hundred and forty three (34%) students reported having sustained at least one blow to the head. The number of blows reported varied widely among parents (0-24 blows) with an average of 1.06±2.08 (Table 2). Out of the 243 children, 139 were male and 104 were female students ($\chi^2(1) = 16.99$, $p<.001$). Of the 243 students with a positive history of blows to the head, 34 or 14% were screened positive for TBI (Table 3). Only 6 children out of 363 (1.7%), who did not report a blow to the head, were screened positive for TBI by the BISQ, with a probability of Brain Injury not being excluded. There was a significant difference between the two groups (positive Vs negative screened children) regarding the number of blows to the head ($\chi^2(14) = 93.55$, $p<.001$). Clearly, having sustained a blow to the head increases the risk for TBI.

Most of the blows were reported by parents of seven-year old students ranging in frequency from 1 to 10 blows. Specifically, twenty-one seven-year olds were reported as sustaining 1 blow to the head, eleven seven-year olds 2 blows to the head, nine seven-year olds 3 blows, two seven-year olds 4 blows, three seven-year olds 5 blows, two seven-year olds 6 blows, one seven-year old 7 blows, and one seven-year old 10 blows (See Table 4).

Causes of blows to the head. As mentioned above out of the 706 children, 41 (5.8%) were screened positive for TBI. Eighty-seven blows to the head were reported for the children who screened positive for TBI, of varying causes. Most of the blows to the head were reported to have occurred during a sport or playground activity and following a fall (See Table 3).

Medical conditions and TBI. Out of the 706 respondents, the parents of 138 children (19.5%) reported that their children had been hospitalized or seen in an emergency room for various reasons, at least once, with an average of 1.76±0.43 hospitalizations. Data regarding hospitalization for the 41 students screened as positive to the probability of TBI was included in this data. A more detailed analysis indicated that 28 of these children had been hospitalized or seen in an emergency room whereas 12 had never been hospitalized or seen in an emergency room.

More specifically, five students were hospitalized one time and one student was hospitalized two times for concussion. For fracture of the head five students were hospitalized one time and two students, two times. For seizures five students were hospitalized one time and one student two times. During high fever, seven students were hospitalized one time and six students three times. Two students were hospitalized one time after a near drowning incident or poisoning. One student was hospitalized one time after an electrical injury or after been hit by lightning and one student was hospitalized one time after a brain infection or tumor. Six students were hospitalized one time and one student two times for "other reasons".

For all incidences requiring hospitalization there were significant differences between the two groups with children with a positive screen for TBI being hospitalized significantly more often ($\chi^2(1) = 54.05$, $p<.001$).

Number of episodes of Loss of Consciousness (LOC) and Being Dazed and Confused (DAC) as reported by parents. Significantly more episodes of been dazed or confused, or losing consciousness, were reported for children with a positive screen for TBI as compared to children with a negative screen for TBI ($\chi^2(2) = 361.28$, $p<.001$). The parents of 34 students responded positively to a question investigating whether their children had ever been dazed and confused or lost consciousness after an incident of a blow to the head or after an emergency medical condition (See Table 5). Twenty-eight (82.4%) of these children were screened positive for TBI whereas six (17.6%) children were screened negative for TBI.

The majority of students (N = 21) having lost consciousness remained in that condition for less than 20 minutes. Loss of consciousness of one to twenty-four hours was reported for one student and loss of consciousness for a period of over 24 hours was reported for two students. The majority of the twenty-five students being dazed and confused (N = 11) were reported as experiencing this condition for 1-10 minutes. Six students were dazed and confused for less than 1 minute and 2 students for 11-20 minutes, 21minutes-1hour, 1-24 hours and more than one day respectively.

Symptom report (Part 2 of the BISQ). Part 2 of the BISQ refers to the symptoms related to TBI. Parents were asked to report whether they noticed each of the 100 symptoms being exhibited by their children. In the current section the frequency of the symptoms among the two groups and the differences between them are described.

The response choices relating to symptoms were assigned to two categories: responses "never", "don't know", "not applicable" formed one category and the responses "daily or almost daily", "several times", "one or two times" formed a second category. The

total number of symptoms reported by all parents ranged between 0 and 85 with a Median of 2 and a mean of 9.15 (sd=13.87).

The reader is reminded that all respondents were encouraged to answer the symptom rating list of the BISQ. Three hundred and ninety-four parents reported at least one symptom, with the most frequent report concerning 3 symptoms by 3.8% of the parents (N = 27). The number of symptoms reported by parents of children identified with a positive screen for TBI was significantly higher than the corresponding number by parents of children identified with a negative screen for TBI ($\chi^2(1) = 28.17$, $p<.001$).

A significant difference between the two groups was found for several symptoms according to the results of chi-square (χ^2) analysis. Due to multiple tests, the α-level was set at .01. Significant differences were noted in a number of symptoms relating to neurological (such as dizziness, ringing in the ears, taste changes), bodily (fatigue, sleep difficulties), cognitive (difficulty in concentration, thinking more slowly, poor attention span), and behavioral-psychosocial (sadness, low frustration threshold) symptomatology. A detailed description is included in Tables 6 and 7 (See Appendix A).

A factor analysis was conducted in regards to the symptoms reported by the parents in the BISQ. This analysis was not directly related to the present study's aims and hypotheses. Rather it was executed in pursuit of the investigation of possible clusters of symptoms being noted after the parents' answers. Reliability analysis yielded a Cronbach's Alpha index of .997 indicating that the BISQ is a reliable measure of TBI-related symptoms. No item appeared to lower this index and therefore needed to be excluded from analyses. The factor analysis (with varimax rotation) indicated the existence of 5 factors with Eigenvalues > 1, explaining a total of 86.6% of the variance. The items' loadings appeared to be distributed to the 5 first factors as seen in Table 8 (Appendix A). The items comprising the first factor appeared to relate to sensory impairments (e.g. hearing, smelling, seeing, feeling, balance, motion, tiredness etc.) and recent memory. The second factor consisted of items describing emotional impairments, in the form of internalized problems (e.g. sadness, difficulties in interpreting social signs, difficulty in social relationships etc.). The items regarding attention, concentration and long term memory appeared to be the ones forming the third factor (e.g. not listening when being spoken to, difficulty concentrating, losing train of thought). The fourth factor consisted of items relating to the learning/academic procedures (e.g. reading slowly, writing slowly, difficulty in understanding what is read) and the fifth factor consisted of items relating to the children's organization abilities (e.g. difficulty planning future events, difficulty handling personal affairs and finances).

Since the BISQ was used as a screening tool, objective data were incorporated in order to provide an objective representation of the measure. In addition, the index provided additional information given the lack of differentiation of probability ratings among children who were identified at risk for TBI based on the BISQ. The severity index was calculated taking into consideration the frequencies at the parameters of having lost consciousness and being hospitalized after head trauma. The children with both a positive history of having lost consciousness and a positive history of being hospitalized after a head trauma were thought to be a high-risk group for receiving a diagnosis of TBI. Children for which only loss of consciousness was reported were assigned as the moderate-risk group and children who were only reported as hospitalized without having lost consciousness were considered to be the low-risk group. The calculation for the creation of the severity index included the original screening sample (N=706). Out of the 41 children screened positive in phase A, 3 were assigned in the low-risk group, 8 in the moderate-risk group and 20 in the high-risk group according to the above mentioned classification. Out of the 665 children screened negative during phase A, 99 were assigned in the low-risk group, 2 in the moderate-severity group and 9 in the high-risk group. A significant positive correlation was traced between the level of risk and the number of symptoms indicating high consistency between the reports of the first two parts of the BISQ ($r = .21$, $p<.001$).

Parent's reports on Part 3 of the BISQ. Part 3 of the BISQ consists of eight questions intended to gather information regarding the child's developmental history and current medical status. The analyses provided evidence of a significant difference between the two groups as far as medication taking (χ^2 (1) = 6.77, $p<.05$) is concerned. A percentage of 21.7 of children screened positive for TBI were reported as taking medications without indication of the purpose. In contrast, the corresponding percentage amongst children screened negative for TBI was 78.3%. A significant difference between the two groups was also noted between the reports for presence of a learning disorder or ADD (χ^2 (2) = 25.12, $p<.001$) with more children with a negative screen for TBI reported as having a learning disorder or ADD (26 out of 29 or 89.7%) as opposed to children with a positive screen for TBI (3 out of 29 or 10.3%). A significant difference was also noted regarding the reception of medication for psychiatric conditions (χ^2 (2) = 16.63, $p<.001$) with a percentage of 75.0% for the negative screened group and with a percentage of 25.0% for the positive screened group. No significant differences were noted in variables such as low birth weight baby, premature birth, fetal alcohol syndrome, history of psychiatric hospitalization or history of treatment for substance abuse (See Table 9).

Comparison of the control sample with the initial screening sample. Descriptive analysis was executed comparing the control sample of Phase B (children whose parents consented to be evaluated with the neuropsychological battery) with the initial screening sample. Information obtained by the BISQ indicated that 24 of the children screened negative for TBI (total N = 635 including missing values) in the initial screening sample were diagnosed with a Learning Disability or Attention Deficit Disorder. The corresponding number of children in the control group of Phase B was 2 (total N = 30 including missing values). As far as medication taking is concerned, 18 children out of 635 of the initial screening sample were reported as taking medication, whereas 25 children out of the 30 were reported in the control group for the same indication. In an attempt to specify whether medication was prescribed for psychiatric conditions, parents of 2 children of the screening sample reported that their children received medication for psychiatric conditions. The corresponding number of children in the control group of Phase B was 1.

Phase B

Hypothesis 2

Children with a positive screen will have lower performance on neuropsychological and behavioral measures as compared to children with a negative screen on a probability that symptoms reported are TBI-related.

Sixty children were included in the second phase; of which 29 children were recruited from the control group. Out of the total sample of 41 children at risk for TBI, 31 consented to participate in Phase B; 28 with low probability and 3 with moderate probability. The analyses comparing the two groups on several tasks included in the neuropsychological battery administered have provided no evidence of differences between the two groups.

The Achenbach System of Empirically Based Assessment (ASEBA) - CBCL. The CBCL was sent home to be completed by both parents of the second phase participants and only 39 questionnaires were returned (22 for children with a positive screen for TBI and 17 for children with a negative screen for TBI). No differences were noted between the parents who returned and the parents who did not return the questionnaires in terms of demographic or other characteristics. The analyses showed that no significant differences were noted between the groups (Negative Vs Positive screened group), χ^2 (2) = 1.66, p = .436 in terms of reception of a diagnosis. Out of the 22 children with a positive screen for TBI, only four presented with clinically significant indications in the scales examined by the questionnaire, according to the cut-off scores provided by the developers of the Greek version of the questionnaire. Two of them fell into the category of

emotional problems and two fell into the category of stress related problems. Out of the seventeen children with a negative screen for TBI, only two presented with clinically significant symptoms which fell into the category of emotional problems (See Table 10).

The Dysexecutive Questionnaire-DEX-R. The DEX-R was sent for completion by both parents of the 60 participants of Phase B. Thirty-nine questionnaires were returned (22 with a positive screen and 17 with a negative screen).

A control for reliability was executed to test the Greek translation of the test. Reliability analysis yielded a Cronbach's Alpha index of .95. No item was noted to lower this index; therefore they were all retained for further analyses.

According to Loschiavo-Alvares et. al., (2013) the items of the questionnaire can be grouped in four general categories: Metacognitive/Social Cognitive problems, Executive Cognitive problems, Behavioral-Emotional/Self-Regulatory problems and Activation problems. The analyses were conducted according to the 4 factors obtained by Loschiavo-Alvares et. al., (2013). The MANOVA analysis showed that no significant differences were present between the groups on the individual items or the total score extracted from the DEX (See Tables 11 and 12). These results do not seem to replicate the predicted theoretical domains reported in Loschiavo-Alvares et. al., (2013), as the factors obtained differentiated in the items that loaded onto them. A correlation analysis was conducted between the DEX-R (four factors and the Total Score derived) and the results of the sample in the rest of the neuropsychological tests. No significant correlations were found between any of the indexes in terms of the sample's achievement (Table 13). No significant correlations were traced either between the results obtained by the DEX (the four categories and the total score of the DEX) and the severity index calculated and described above.

Rey Verbal Learning Test (auditory verbal learning test-AVLT). No significant differences were found between the two groups in relation to the number of words recalled, in any of the 5 first conditions of the AVLT or the Total Score obtained (See Table 14). A similar procedure was followed for the second condition of the test where the participants were presented with a new list of words that they were asked to recall. No differences were found for this condition either between the two groups [$F(2, 58) = .000$, $p = .985$, partial $\eta^2 = .000$]. The comparison falling in the third condition, where the participants were asked to recall words from the first condition in short delay, revealed no significant differences between the groups [$F(2, 58) = .061$, $p = .806$, partial $\eta^2 = .001$]. No significant differences were noted in the corresponding long delay recall condition either [$F2, 58) = .583$, $p = .448$, partial $\eta^2 = .010$]. In addition to the above mentioned conditions, a calculation of the

number of words recognized from each list was made. The differences between the two groups were again not significant with $F(2, 58) = .397$, $p = .531$, partial $\eta^2 = .007$ for List A and $F(2, 58) = .131$, $p = .719$, partial $\eta^2 = .002$ for List B. Both groups appeared to report equal number of words not originally included in the list of words presented $F(2, 58) = .627$, $p = .432$, partial $\eta^2 = .011$. The number of words repeated during recall also appeared to range at similar levels [$F(2, 58) = .458$, $p = .501$, partial $\eta^2 = .008$].

Digit Span Subtest of the WMS-III. There appeared to be no significant differences between groups in relation to their auditory memory ability. According to the results of the analysis the means ranged at similar levels $t(58) = -.636$, $p = .527$. Similarly, no significant differences were traced as far as working memory capacity is concerned [$t(58) = -.191$, $p = .850$]. The lack of significant differences was present at the level of total score comparison $t(58) = -.466$, $p = .643$. (See Table 15).

Rey Osterrieth Complex Figure. Several subtests were included in the specific task. No significant differences were found in any of the subtests between the two groups. The first task, which requested copying of the geometric figure, resulted in $F(2, 58) = .914$, $p = .364$, partial $\eta^2 = .092$ between the two groups. This lack of significant differences was also observed when the time needed to complete the task was taken into account [$F(2, 58) = .442$, $p = .523$, partial $\eta^2 = .047$]. No significant differences were noted in the immediate recall condition [$F(2, 58) = .2.807$, $p = .128$, partial $\eta^2 = .238$, even when comparing the groups in terms of time needed to complete the task [$F(2, 58) = 2.009$, $p = .190$, partial $\eta^2 = .183$]. The same applied for the delayed recall condition [$F(2, 58) = 2.645$, $p = .138$, partial $\eta^2 = .227$]. A result of $F(2, 58) = 1.299$, $p = .284$, partial $\eta^2 = .126$ was found when the groups were compared for the time required to complete the delayed recall task. The differences remained non-significant for items recalled correctly $F(2, 58) = .077$, $p = .787$, partial $\eta^2 = .009$ and items recalled falsely $F(2, 58) = .818$, $p = .389$, partial $\eta^2 = .083$. The number of items recalled correctly did not differ significantly between the groups either [$F(2, 58) = .400$, $p = .543$, partial $\eta^2 = .043$].

Trail Making Test A & B. Two conditions were included in the specific task. The comparison between the groups did not indicate any significant differences in either of the trials $F(2,58) = .718$, $p = .419$, partial $\eta^2 = .074$ for Trial A and at $F(2, 58) = .021$, $p = .888$, partial $\eta^2 = .002$ for Trial B.

Grooved Pegboard Test. The test was executed by the participants using both their dominant and the non-dominant hand. The comparisons concerning the dominant hand resulted in $F(2, 58) = .818$, $p = .389$, partial $\eta^2 = .083$ for the general achievement, $F(2, 58) = .074$, $p = .792$, partial $\eta^2 = .008$ for the time needed to complete the test, $F(2, 58)$

= .024, p = .880, partial η^2 = .003 for drops during completion of the test and F(2, 58) = .205, p = .662, partial η^2 = .022 for use of hand during placement of the pegs.
The comparisons related to the use of the non-dominant hand resulted in F(2, 58) = 2.045, p = .186, partial η^2 = .185 for the general achievement, F(2, 58) = .000, p = .985, partial η^2 = .000 for the time needed to complete the test, F(2, 58) = 1.116, p = .318, partial η^2 = .110 for drops during completion of the test and F(2, 58) = .205, p = .662, partial η^2 = .022 for use of hand during placement of the pegs.

Controlled Oral Word Association Test (COWAT). Two conditions were tested with no significant differences being noted in either of them. The first condition included naming as many animals can be recalled in one minute. The comparison of the groups resulted in F(2, 58) = .030, p = .866, partial η^2 = .003. The second condition included naming words starting with F in one minute. The results showed an indication of F(2, 58) = .036, p = .854, partial η^2 = .004.

WISC-III subtests.

Similarities. The scores of the groups on the Similarities subtest did not appear to differ significantly. The comparison resulted in F(2, 58) = .228, p = .644, partial η^2 = .025.

Vocabulary. There appeared to be no significant differences in the comparison of the groups' scores on the Vocabulary subtest. The results indicated F(2, 58) = .041, p = .845, partial η^2 = .004.

Comprehension. No significant differences were noted between the groups on the Comprehension subtest. The two-group comparison provided F(2, 58) = .477, p = .507, partial η^2 = .050.

Block design. The Block Design subtest scores were not significantly different between groups. The two-group comparison resulted in F(2, 58) = 6.702, p = .029, partial η^2 = .427.

Object assembly. The scores of the Object Assembly subtest did not appear to differ significantly between the groups. The results of the comparison indicated F(2, 58) = .353, p = .567, partial η^2 = .038.

Symbol search. No significant differences were noted between the groups at the Symbol Search subtest. The comparison between the two groups resulted in F(2, 58) = 1.926, p = .199, partial η^2 = .176.

Word and Pseudoword Reading Fluency. The first list administered included the real words. No differences between the groups were observed in any of the parameters examined as indicated on Table 16 (See Appendix A). Similar results were observed after the analyses conducted for the second list which included the pseudo-words.

Math Screening Test for Grades 1-6. The comparison of the two groups appeared to show no significant differences between them at the scores of the Math Screening Test. The group comparison resulted in $F(2, 58) = .129$, $p = .727$, partial $\eta^2 = .014$.

Letter Cancellation Task. No significant differences between the groups were found after the comparison in Letter Cancellation Task. The first comparison was executed with respect to the time taken to complete the task and resulted in $F(2, 58) = .538$, $p = .482$, partial $\eta^2 = .056$. The second parameter regarded omissions during completion of the test and the results showed a significant difference between the two groups $F(2, 58) = 11.69$, $p = .008$, partial $\eta^2 = .565$. The third parameter regarded the inclusions and no significant differences were obtained [$F(2, 58) = .000$, $p = .000$, partial $\eta^2 = .000$].

Table 17 shows the means and standard deviations of the two groups (positive and negative screen for TBI) in all the above tests. Table 18 displays the reliability index for each test. Reliability indexes appeared to range at moderate levels for the majority of the tests indicating adequate but not excellent internal consistency of the tests included in the battery. A low reliability was indicated for the Rey Osterrieth Complex Figure Test (r=.421) which appeared to rise to (.600) after the time variables were excluded from the analysis. Similarly, the Grooved Pegboard test also appeared to range at low levels of reliability but no item appeared to contribute significantly to the decrease of the internal consistency. The reliability of the Letter Cancellation test appeared to range at unacceptable levels, indicating very low consistency of the index relating to its measurements.

CHAPTER 5
FINDINGS, CONCLUSIONS, AND IMPLICATIONS

To date, there is lack of systematic research on the incidence of TBI in the Republic of Cyprus. Therefore, there is no policy on the identification and management of deficits associated with TBI. The present study is part of a larger systematic effort to investigate the incidence and effects of TBI within the Cypriot population.

The purpose of this study was twofold: First, the study investigated the incidence of school age children with a probability of having sustained a TBI and second the study tried to determine the long-term effect of probable TBI.

The project consisted of two phases. In Phase A, a random sample of 2088 children between the ages of 5-13 were recruited to complete the Brain Injury Screening Questionnaire (BISQ). Out of the 706 responders who returned the BISQ, 41 (5.8%) children were screened positive of a probability of TBI as measured by the BISQ. In Phase B, children with a positive screen for TBI on the BISQ during Phase A were grouped to matched controls and participated in an in-depth investigation of their neurocognitive profile.

Adaptation of the BISQ in the Greek Cypriot population

For the purposes of the present study, the BISQ was adapted on the Greek Cypriot population, using a large cohort of 706 children enrolled in public elementary schools in Cyprus. The scientific implications of this adaptation are that the BISQ as a screening tool for TBI, is useful in other countries and cultures besides the United States, proving its usefulness and generalizability to other populations.

Prior to this study, a diagnostic screening tool for TBI had not been available to healthcare professionals in Cyprus. This made it difficult for teachers, school psychologists and other healthcare professionals to easily, correctly and promptly screen and refer children suffering from TBI.

Adaptation of the DEX-R in the Greek Cypriot population

DEX-R was translated and blindly back-translated into the Greek language for the purposes of adaptation to the Greek Cypriot population. A preliminary administration was carried out using a sample of 20 students. It was then administered further, using a sample of 60 students, participants of Phase B of the study.

It emerged that the DEX-R is a sensitive tool in the Greek language as well, for deriving conclusions about a person's executive functions, and therefore any changes in their emotional, behavioral and cognitive domains (Simblett et al., 2012).

First Hypothesis

Percentage of children with a positive screen on a probability that symptoms reported are TBI-related.

By administering the BISQ to parents, important information was obtained about the number of children with a probable TBI attending public elementary schools their medical history as well as information about any prior injury and hospitalization related to TBI. The current study indicates that over one third of children (n=234, 34%) in the Cypriot public school system experience one or more incidents potentially resulting in brain injury before the completion of elementary school. Out of those children, about 5.8% (41 children out of 706) have actually sustained a probable TBI. The present findings are consistent with previous research conducted in the US. Hux et al., (2013) administered a questionnaire to the parents and guardians of 692 first to fifth grade students in a metropolitan school district of a Midwestern State in order to determine the prevalence of potential brain injury incidents in a non-clinical population of elementary school age children. Similarly to the current study, results demonstrated that 5.6% of the regular education students received positive screens for brain injury. Additionally, 25.4% of the special education students in the Hux et al., (2013) study received positive screens for brain injury.

The present findings indicate that blows to the head was the predominant cause of TBI. The risk for sustaining a TBI increased with subsequent blows to the head as a number of parents of children with a positive screen for TBI reported one or more blows to the head during an involvement in specific situations or activities. Within our population more boys sustained a blow to the head compared to girls. This is consistent with the literature where Durkin et al., (1998) and Guerrero et al., (2000) reported that boys were more often affected than girls at every age by head injuries. Additionally, Bruns and Hauser, (2003) reported that males were uniformly at higher risk of TBI than females.

The predominant causes of blows to the head in Cyprus included injuries during sports or playground activities, falls, and hit by falling objects and equipment. The present study was consistent with Cantor et al., (2004) who also reported that sports was the primary cause of blows to the head, while Bruns and Hauser (2003) also reported that falls were a primary cause of injury in children. On the other hand, activities not appearing often within the Cypriot culture resulted in no injuries or testified no occurrence (e.g. falling while roller blading or skate boarding, falling while horseback riding, falling while skiing or snowboarding).

Students with a positive screen for TBI had experienced one or more blows to the head. Hence, children who sustain blows to the head and especially those who are prone to multiple injuries are at risk for TBI. This is comparable to Moser, Iverson, Echemendia, Lovell, Schatz, Webbe, Ruff, and Barth (2007), who state that multiple head injuries increase the risk of having another head injury resulting in TBI. Additionally, this finding supports Peron and Howard (2008), who state that minor blows to the head can result in brain damage, especially if they are recurrent.

From the analysis, it is apparent that parents of seven-year old students are more likely to report a history of injury at some point in their life. However, seven- year olds cannot be considered as a more vulnerable age group for sustaining a TBI when compared with any other age group, even though seven-year olds do tend to be active and engage more in sports and playground activities.

While the reason of head injury was specified for almost all children screened positive to TBI, 6 children (2.4% of the 41 children) were reported to have sustained a blow to the head by other means reported as 'other injury'.

Medical conditions and TBI

As it has already been suggested in the literature, children and adults do not always seek medical help after a head injury. The BISQ revealed that out of the 41 children who were screened positive for TBI by the BISQ, 28 (70%) were hospitalized or seen in an emergency room. This information has significant value since the BISQ has the ability to identify individuals with a symptomatology that is TBI-related who have never been formally treated after a head injury. The percentage reported above does not fall far from the percentages reported in the literature of individuals who seek medical help following a head injury. In the case of Setnik and Bazarian (2007), 58% of the adult sample tested sought medical help, and those less likely to seek care were older, suffered a MTBI or were injured in the home. The percentage of individuals requesting medical help in the present study may be higher, due to the fact that the population consisted of children, and parents may be more alert to a child's injuries therefore, rushing them to the emergency room.

Children with a positive screen for TBI were hospitalized or seen in an emergency room significantly more often than children with a negative screen for TBI. More specifically children with a positive screen appeared to seek medical help more often because of a concussion, a fracture of the head/neck or face, seizures, high fever, drowning or poisoning, electrical injury or hit by lightning, brain infection or tumor, or other reason. The BISQ also differentiated those that had sustained either an open or a closed head injury.

Number of episodes of Loss of Consciousness (LOC) and Being Dazed and Confused (DAC) as reported by parents

More episodes of having been dazed or confused, or losing consciousness were reported for children with a positive screen for TBI as compared to children with a negative screen for TBI. The majority of students having lost consciousness remained in that condition for less than 20 minutes suggestive of a probability of mild concussion. This result is consistent with research showing that 80% to 90% of TBIs are mild. It also agrees with the research conducted by Cantor et al. (2004) which suggests that episodes of loss of consciousness did not last long. These children who had experienced LOC and DAC are considered to be at greater risk for TBI.

Symptom report (Part 2 of the BISQ)

In the current study, the exploration of symptoms using factor analysis, showed that children with a positive screen exhibited more symptoms of the clusters of sensory impairments and recent memory, emotional impairments in the form of internalized problems, attention, concentration, long term memory, learning and academic procedures and organizational abilities than children negative to TBI. The majority of the participants, according to the BISQ, were rated with a low probability for TBI. Nevertheless, it is important to note, that participants screened with a low probability for TBI do show symptomatology on an everyday basis that may intervene with functions of everyday life. Awareness of the specific symptomatology may prevent deterioration of a child's condition. Health care professionals, teachers, and parents, need to be aware of the symptoms and potential significant effects on blows to the body that can be strong enough to cause neurological disruption. This is in accordance to Masel and DeWitt (2010), who emphasize that TBI needs to be managed as a chronic disease, and defined as such by healthcare and insurance providers. The second part of the BISQ addresses all those symptoms that are associated with TBI and suggests that the BISQ is a reliable measure in identifying symptoms in children with a probable TBI.

These results are consistent with the literature, where Mayfield and Homack (2005) wrote about inattention, restlessness, hyperactivity and impulsivity in preschool and elementary school aged children after a brain injury. Ashman et al. (2006) wrote about late onset psychiatric disorders for as long as 30 years after a head injury and Yeats et al. (2005) wrote about deficits in behavioral and cognitive functioning after an injury. Additionally, Paniak et al. (2002) found great differences in a variety of symptoms between patients with MTBI and a control group. They found differences in symptoms

such as “doing things slowly”, “fatigue”, “poor balance”, “difficulty thinking clearly” and “dizziness”.

Catroppa et al. (2008) wrote that the persistence of symptomatology seems to be associated with the severity of injury. While in this study most children were screened with a low probability for TBI (28 with low probability and 3 with moderate probability) parents still reported the presence of TBI-related symptoms.

Parent’s reports on Part 3 of the BISQ

A significantly greater proportion of children with a negative screen for TBI reported using medication, without mentioning the purpose. Learning disorder or ADD was also reported in children with a negative screen for TBI and reception of medication for psychiatric conditions.

These findings are not consistent with other literature suggesting that symptoms from TBI relating to information processing and attention deficits can be termed as secondary ADHD symptoms (Slater, 2008).

Overall, results concerning the BISQ suggest that there is a significant number of children with a probable undetected brain injury in schools and the BISQ is a useful tool to identify children at risk for having sustained a brain injury. However, results reveal a slightly lower percentage (5.8%) than the rates reported by Cantor et al. (2006). In their study, which was conducted in US public schools, 9% of their sample had a high probability of having sustained a TBI . One possible difference in the percentage could be attributed to sample age differences. Cantor et al. (2006) recruited 137 children between the ages of 12-19 years. Participant’s age in the current study ranged between the ages of 5-13 years. Based on the existing literature, the risk for concussion increases during late adolescence and early adulthood. Hence, future studies in Cyprus should expand to include secondary school children.

Second Hypothesis

Children at risk for a TBI reportedly exhibited a greater number of neurocognitive symptoms as compared to children not at risk for a TBI. Based on the parent responses, children had attention, learning, speed of processing, memory and other difficulties. The neuropsychological battery was constructed in order to objectively assess the aforementioned cognitive areas. Despite the subjective symptomatology, the statistical analyses did not reveal any significant group differences. Nevertheless, despite the non-significant results found in the present study, the literature suggests a strong association between injury severity and outcomes across all domains (Anderson, Catroppa, Dungeon, Morse, Haritou, and Rosenfeld, 2006).

Nadebaum, Anderson and Catroppa (2007) in a study that explored the long term effects of early TBI found that children who suffered mild or moderate injuries performed similarly to normally developing children on a neuropsychological battery. Furthermore, analysis of pre-injury characteristics found that the TBI group did not differ in terms of gender, age, socioeconomic status, pre-injury adaptive ability or family functioning. It can be concluded that due to the low probability rate that characterized most of the participants in the experimental group, no important differences were found when participants were compared with the negative screened group.

While there were no detectable statistical differences in objective performance, the reader should be cautioned regarding two important issues relating to the specific sample. First, a large percentage of children participating in the control sample of Phase B were on medication (25 out of 30 or 83%) for various reasons. This could be implying the existence of several problems that could be negatively affecting their performance on the subtests of the neuropsychological battery. In addition, several children of the positive to TBI group (experimental group) (4.5%) were reported as receiving medication possibly to improve attention-like symptoms. The combination of the two conditions, i.e. decrease of the performance of the control group and increase of the performance of the experimental group could constitute a causal reason for the absence of significant differences between the two groups in the neuropsychological battery. Furthermore, the high numbers of children receiving medication in the control group could also be indicative of a potential bias on the part of the parents who might have consented to their children's participation because of the existence of several problems, in pursuit of a full evaluation specifying the domains of their difficulties. Hence, the neuropsychological results may not have been indicative of the real potential of a representative control group and therefore the comparisons did not yield significant results. Second, most children had a low probability screen for TBI. Children screened with a low probability rating when compared with a group of children with learning disabilities and attention deficits may reveal similar difficulties in specific abilities. Furthermore, lack of statistically important limitations in performance at this stage of development does not guarantee normal performance during adolescence when working memory and abstract reasoning abilities are expected to be more developed. As mentioned by Catroppa et al. (2008), children who sustain injuries during an early developmental level, are at risk of presenting educational difficulties at a later developmental level. Therefore, future re-evaluation of the specific group of participants may reveal different results due to the fact that the consequences of early pediatric TBI may become evident later in childhood.

The age, ethnic background and TBI probability of the sample used by Cantor, Gordon, & Ashman (2006), a study focused on similar hypotheses to the present study, differed to the sample used in the present study. Firstly, an older group of students, aged 12-19 years was used, secondly the students were ethnically diverse, and lastly they had a high probability for TBI. It can therefore be assumed, that a population sample that is developmentally older may exhibit deficits due to an injury that happened years earlier. In contrast to the diverse ethnic sample used in the Cantor, Gordon, & Ashman (2006) study, the present study focuses and provides information about the Greek Cypriot population only. Finally, the population in the present study mostly had a low probability for TBI in contrast to the high probability group used by Cantor, Gordon, & Ashman (2006).

The Special Education Act of the Cypriot legislation (113(I)1999) focuses on the detection of children with special educational needs, their assessment and the development of an individualized educational program. It emphasizes the importance of being educated within the mainstream classroom with the support of the classroom teacher and the teacher of the special education class. It is believed that results of the current research were influenced by the fact that children with learning disabilities or difficulties could have been included within the control group which was randomly chosen based on age, sex, class level and familial socioeconomic background. Results demonstrated similar means on scores obtained by the neuropsychological battery between the positive screen group and the control group, hence similar strengths and weaknesses in academic, behavioral and emotional performance.

The Achenbach System of Empirically Based Assessment (ASEBA)- CBCL

The statistical analyses showed no differences between the groups. However, out of the 22 children with a positive screen for TBI, only four presented with clinical indications of emotional problems and stress related problems. Out of the seventeen children, with a negative screen, only two presented with clinical symptoms which fell into the category of emotional problems. These results come in conflict with the results suggested by Mayfield and Homack (2005) who speak of hyperactivity, distractibility, impulsivity, temper tantrums or reduced initiative and sparsity of behavior after a TBI, behaviors that may be detected by the CBCL.

Results may also be viewed as agreeable with the results of Drotar, Stein and Perrin (1995) and Perrin, Stein and Drotar (1991), who found that scales such as the Child Behavior Checklist are not sensitive enough to the effects of TBI, even though it is used to investigate pre- or post-injury behavioral problems.

The Dysexecutive Questionnaire-DEX-R

The present study was the first study incorporating the DEX-R in children with a probability of TBI and without. Factor analyses conducted by Loschiavo-Alvares et. al., (2013) yielded four general categories: Metacognitive/Social Cognitive problems, Executive Cognitive problems, Behavioral-Emotional/Self-Regulatory problems and Activation problems. There were no significant differences between the two groups on the symptom scores. Similarly, Nadebaum, Anderson and Catroppa (2007) who aimed to asses long term effects of early TBI on executive functioning outcomes, five years post injury, found that children with mild or moderate injuries performed similarly to normally developing children.

DEX-R may be more sensitive in detecting symptoms in severe TBI and in acute TBI. Specifically, Bennett, Ong, and Ponsford (2005) support that the DEX questionnaire can be used as a screening instrument to identify executive dysfunction in an acute rehabilitation setting, provided it is completed by professional personnel, trained to be sensitive to the cognitive and behavioral concomitants of TBI. Anderson (2002) and Anderson (1998) wrote that TBI can certainly interrupt the development and also affect already developed executive function. Finally, similarly to the other neuropsychological findings, the DEX results could have been confounded by control sample bias.

Implications

The current study contributes to the literature investigating the incidence of unreported TBIs in elementary school children. Additionally, it is the first systematic effort to investigate the epidemiology of TBI in school-aged children in Cyprus. Based on the current findings with 706 children, almost 6 percent of elementary school children in Cyprus have had injuries that place them at risk for a TBI. Future research should replicate these findings and expand the scope of the study to include older children. The present study supports the hypothesis that a significant proportion of children engage in activities that result in TBI and teachers, parents, and school personnel should be informed in identifying the symptoms of TBI. Furthermore, a proportion of unidentified children at risk for TBI attend public schools in Cyprus. These children are at risk for the psychosocial and cognitive manifestations of TBI. The Greek version of the BISQ is a useful tool to be used for the identification of children at risk.

Similar to studies in the US, boys are more prone to girls in sustaining a head injury (Langlois, Rutland-Brown, & Thomas, 2006). Furthermore, children with repeated blows to the head, are at a greater risk for concussion. This could be attributed to the types of

activities that elementary school children are engaged in, such as sports, cycling and other activities that could result to blows to the head.

Children in the present study had a low probability for TBI. Despite that fact, their parents reported an array of neurological, cognitive and psychosocial symptoms as is evident through their responses in the BISQ. Interestingly, several of the children with a negative screen were diagnosed with co morbid disorders such as learning disorders or ADD and were taking medication (without indication of purpose). This fact suggests that children with a negative screen could have been diagnosed at some point in their lives with learning disorders or ADD. Furthermore, symptoms of TBI that resemble ADHD are important to investigate, because it is possible that their long-term course and treatment may differ from those of ADHD.

Through the present study, the BISQ was adopted in the Greek population and could be used in future studies investigating the risk of TBI in children and adults. This current research gives valuable information regarding the percentage of students with symptoms that are TBI related enrolled in elementary public schools, and about their cognitive, behavioral and emotional functioning after a TBI.

Due to the symptomatology of TBI and due to the changing nature of the symptoms, it is important that trauma to the head is not viewed as a single incident but rather as a chronic condition, which significantly interferes with an individual's everyday activities. Because of this, the Special Education Act of the Cypriot legislation (113(I)1999), should include TBI as a condition which requires special attention and care. School personnel should receive the appropriate training regarding symptoms and problems that are apparent after a TBI (since most accidents happen during sports and playground activities) via continuing education workshops. They also need to be aware of how negative outcomes can be reduced. Interventions and special education should be implemented where necessary. Parents and primary care providers should also be informed regarding potential consequences of a TBI and the immediate care that needs to be taken (i.e. rushed to a hospital).

The Educational Psychology Services (EPS) of the Ministry of Education in Cyprus, should include TBI as a condition in their database, and educational psychologists should use structured screening questionnaires, such as the BISQ, to assess children. Children with a history of TBI, should be followed and monitored by the school system for their academic, social and emotional performance. EPS is to be responsible for the training of school personnel and primary care providers through specialized workshops, as well as the creation of educational material (i.e. in the form of booklets). Their work with children

and parents should be part of an interdisciplinary team, which should include healthcare and school personnel.

Limitations of the study

In addition to the selection bias that potentially confounded the performance of the control group, "Time of injury" was an important piece of information that could not be obtained by the parents. Even though the specific question was built in the BISQ questionnaire, parents completing the questionnaire failed to reveal this information (possibly because they could not remember). We know that the battery was administered at least 12 months post injury, a time period between the screening process of the study (Phase A) and the administration of the neuropsychological battery (Phase B). It is possible that after all these months the children tested may have been reinjured or even resolved and recovered from most of their symptoms, an aspect that has been proposed in the literature as well (Ponsford, Willmott, Rothwell, Caemron, Ayton, Nelms, Curran, and Ng, 2001; Anderson, Catroppa, Morse, Haritou, Rosenfeld, 2005).

Future research

Children of the current study should be followed in order to assess their overall cognitive and academic status in the future and further support or reject evidence of no significant differences between the positive screened group and the control group.

The current findings should be reduplicated in future research. Furthermore, future research should exclude children with learning disabilities and should include older children in secondary school to determine the incidence and neurobehavioral deficits associated with adolescents and young adults. Finally, a formal TBI surveillance system needs to be established in the Republic of Cyprus. Given the size of the island and the small population (less than 1 million), a comprehensive surveillance system would be easily manageable. This system would provide important information not only to Cypriot policy makers, but also to the international research and health community on the effects and outcomes of TBI.

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Table 1:

Battery Assessing Language, Memory, Attention, Executive Function, Behavioral and Emotional Status, Motor Coordination and Speed.

Oral Verbal Tasks	Similarities (WISC-II) Vocabulary (WISC-III) Comprehension (WISC-III) Rapid Reading of Words, Pseudowords
Verbal Working Memory Tasks	Auditory Verbal Learning Test Digit Span Forward Digit Span Backward Controlled Oral Word Association Test Math Screening Test
Attention and Executive Tasks	Digit Span Forward Digit Span Backward The Dysexecutive Questionnaire-DEX-R Rey–Osterrieth Complex Figure (ROCF) Trail Making Test A & B Symbol Search (WISC-III) Letter Cancellation Task
Behavioral and Emotional Tasks	The Achenbach System of Empirically Based Assessment (ASEBA)- CBCL
Fine Motor coordination, psychomotor speed, analysis and synthesis	Grooved Pegboard Test Block Design (WISC-III) Object Assembly (WISC-III)

Table 2:

Number of Blows to the Head.

Valid	Frequency	Percent
0	6	14.6
1	11	26.8
2	6	14.6
3	9	22.0
4	3	7.3
5	2	4.9
8	1	2.4
10	1	2.4
12	1	2.4
24	1	2.4
Total	41	100.0

Table 3:

Number of Children with a Positive to TBI Screen (N=41) for Each Blow Type.

Type of blow to the head	0 blows	1 blow	Multiple blows
Blow in a car/van/bus crash	36	4	0
In a motorcycle or all-terrain vehicle crash	39	0	1
As a pedestrian hit by a vehicle	0	2	0
Being hit by a falling object	0	4	3
Being hit by equipment	0	7	
Falling down stairs	0	7	1
Falling from high place	0	7	3
Falling during a fainting spell	0	5	2
Falling during a drug or alcohol blackout	0	0	0
While biking	0	5	3
While roller blading or skate boarding	0	3	1
While skiing or snow boarding	0	0	0
In sport	0	9	1
While on the playground	0	8	2
While diving into water	0	0	1
Being assaulted or mugged	0	1	1
Being physically abused	0	0	1
Other	0	2	3

Table 4:

Number of Blows for Each Age Group.

		Number of blows to the head															
Age	Statistics	0	1	2	3	4	5	6	7	8	9	10	11	12	14	24	Total
5	Count	3	0	1	0	3	0	0	0	0	1	0	0	0	0	0	8
6	Count	69	21	6	4	3	2	3	0	0	0	0	1	0	0	1	110
7	Count	49	21	11	9	2	3	2	1	0	0	1	0	0	0	0	99
8	Count	52	27	5	4	3	6	0	0	0	0	0	1	0	0	0	98
9	Count	83	15	6	6	2	1	4	0	1	1	0	0	0	1	0	120
10	Count	62	17	8	6	2	3	0	1	0	0	1	0	0	0	0	100
11	Count	75	16	8	7	2	2	5	0	0	1	0	0	0	0	0	116
12	Count	16	6	1	1	2	1	0	0	1	0	0	0	0	0	0	28
13	Count	3	2	0	0	0	0	0	0	0	0	0	0	1	0	0	6
Total Count		412	125	46	37	19	18	14	2	2	3	2	2	1	1	1	685

Table 5:

Number of Episodes of LOC and DAC as Reported by Parents.

		Being dazed and confused or lost consciousness			
		never	yes happened	don't know	Total
Negative screen for TBI	Count	549	6	9	564
Positive screen for TBI	Count	7	28	4	39
Total	Count	556	34	13	603

Table 6:

Number of Children in the Negative Screened Group Vs Number of Children in the Positive Screened Group Regarding the Frequency of Symptoms.

		Frequency	
		Positive	Negative
Having trouble staying awake	Non-TBI	29	430
	TBI	4	36
Having trouble falling asleep or staying asleep	Non-TBI	35	427
	TBI	5	34
Having trouble waking up after sleep	Non-TBI	59	402
	TBI	9	30
Having nightmares	Non-TBI	129	331
	TBI	13	24
Blacking out or having seizures	Non-TBI	6	456
	TBI	2	37
Being clumsy, dropping or tripping over things	Non-TBI	45	460
	TBI	5	32
Feeling cold	Non-TBI	35	423
	TBI	1	38
Feeling dizzy	Non-TBI	33	427
	TBI	7	33
Losing balance	Non-TBI	11	127
	TBI	1	37
Experiencing ringing in the ears or trouble hearing	Non-TBI	17	444
	TBI	4	35
Having double vision or blurred vision	Non-TBI	5	453
	TBI	1	37
Eating too much	Non-TBI	50	409
	TBI	7	32
Having little or no appetite	Non-TBI	84	376
	TBI	8	31
Food not tasting right	Non-TBI	40	420
	TBI	8	30
Having difficulty smelling things	Non-TBI	4	456
	TBI	0	39
Having headaches	Non-TBI	104	358
	TBI	13	25
Feeling tired	Non-TBI	132	329
	TBI	16	22
Moving slowly	Non-TBI	33	424
	TBI	8	31

Continued

Table 6:

Negative Screened Group Vs Positive Screened Group Regarding the Frequency of Symptoms (Continued).

		Positive	Negative
Increased or decreased sexual interest	Non-TBI	7	448
	TBI	0	39
Friends or relatives seeming unfamiliar	Non-TBI	1	459
	TBI	0	38
Thinking slowly	Non-TBI	38	421
	TBI	9	30
Becoming confused in familiar places	Non-TBI	6	454
	TBI	1	37
Difficulty concentrating, having poor attention span	Non-TBI	83	377
	TBI	13	27
Being easily distracted	Non-TBI	115	345
	TBI	22	17
Losing train of thought	Non-TBI	60	397
	TBI	8	29
Forgetting what just said	Non-TBI	48	412
	TBI	6	33
Forgetting what happened yesterday or recent events	Non-TBI	38	422
	TBI	6	33
Forgetting names of objects, trouble expressing thoughts	Non-TBI	41	419
	TBI	8	32
Forgetting names of people, including family members	Non-TBI	5	458
	TBI	0	39
Forgetting well-known phone numbers or addresses	Non-TBI	9	451
	TBI	2	37
Forgetting to eat	Non-TBI	22	440
	TBI	4	13
Forgetting to take medications	Non-TBI	13	445
	TBI	3	36
Forgetting if things are done	Non-TBI	88	371
	TBI	12	27
Forgetting doing chores, homework, work at home	Non-TBI	77	385
	TBI	8	31
Forgetting, missing or being late for appointments	Non-TBI	22	439
	TBI	3	36
Losing track of time	Non-TBI	38	421
	TBI	4	35
Getting lost	Non-TBI	3	459
	TBI	0	39

Continued

Table 6:

Negative Screened Group Vs Positive Screened Group Regarding the Frequency of Symptoms (Continued).

		Positive	Negative
Being disorganized	Non-TBI	42	417
	TBI	6	31
Misplacing things, forgetting where things are	Non-TBI	95	369
	TBI	7	32
Forgetting to turn off appliances	Non-TBI	40	418
	TBI	6	33
Difficulty making decisions	Non-TBI	69	389
	TBI	12	27
Difficulty solving problems	Non-TBI	84	375
	TBI	15	24
Difficulty planning future events	Non-TBI	41	421
	TBI	5	32
Difficulty setting priorities	Non-TBI	65	398
	TBI	6	31
Difficulty following instructions, written or oral	Non-TBI	73	388
	TBI	11	28
Difficulty learning from experience	Non-TBI	39	417
	TBI	4	34
Difficulty learning new skills and new information	Non-TBI	40	419
	TBI	5	34
Learning slowly	Non-TBI	59	401
	TBI	8	31
Reading very slowly, having difficulty reading	Non-TBI	57	403
	TBI	6	33
Forgetting what just read	Non-TBI	52	407
	TBI	7	32
Having difficulty understanding what read, or what is read to	Non-TBI	79	382
	TBI	11	28
Writing slowly	Non-TBI	84	376
	TBI	9	30
Writing illegibly, poor handwriting	Non-TBI	81	379
	TBI	7	31
Making spelling mistakes	Non-TBI	213	247
	TBI	27	12
Difficulties with reading, writing and math	Non-TBI	84	375
	TBI	13	26
Handling personal affairs and finances	Non-TBI	35	422
	TBI	6	42

Continued

Table 6:

Negative Screened Group Vs Positive Screened Group Regarding the Frequency of Symptoms (Continued).

		Positive	Negative
Unexplained changed in performance at work or school	Non-TBI	289	432
	TBI	2	35
Difficulty in performing chores	Non-TBI	70	389
	TBI	7	31
Difficulty in understanding jokes and humor	Non-TBI	32	428
	TBI	4	34
Difficulty making conversation	Non-TBI	26	436
	TBI	3	35
Talking too much	Non-TBI	186	276
	TBI	16	21
Not listening when being spoken to	Non-TBI	131	332
	TBI	15	23
Speech difficulties, trouble understanding conversation or difficulty pronouncing words	Non-TBI	38	421
	TBI	5	32
Speaking in ways that others can't make sense of	Non-TBI	21	437
	TBI	5	34
Talking too fast or too slow	Non-TBI	40	168
	TBI	6	33
Repeating what others say	Non-TBI	44	418
	TBI	10	29
Experiencing others as talking too fast	Non-TBI	11	449
	TBI	24	38
Feeling moody	Non-TBI	43	415
	TBI	7	31
Experiencing rapid changes in mood	Non-TBI	55	400
	TBI	8	29
Feeling impatient or irritable	Non-TBI	105	355
	TBI	13	24
Feeling frustrated	Non-TBI	82	378
	TBI	12	24
Being heedless to danger, as in driving recklessly	Non-TBI	70	392
	TBI	11	27
Feeling angry	Non-TBI	361	287
	TBI	23	16
Breaking or throwing things	Non-TBI	41	421
	TBI	8	29

Continued

Table 6:

Negative Screened Group Vs Positive Screened Group Regarding the Frequency of Symptoms (Continued).

		Positive	Negative
Screaming or yelling, having temper outbursts	Non-TBI	161	299
	TBI	20	19
Cursing at or threatening others or self	Non-TBI	49	412
	TBI	10	29
Hitting or pushing others	Non-TBI	66	395
	TBI	11	28
Sitting around doing nothing, feeling bored	Non-TBI	55	404
	TBI	9	30
Having repeated thoughts	Non-TBI	62	395
	TBI	7	31
Having difficulty getting started on things	Non-TBI	63	393
	TBI	9	30
Laughing for no reason	Non-TBI	19	440
	TBI	4	35
Making comments that are inappropriate	Non-TBI	26	428
	TBI	3	34
Behaving inappropriately	Non-TBI	35	423
	TBI	3	34
Feeling jumpy, restless or unable to stay still	Non-TBI	83	175
	TBI	11	28
Crying easily or for no reason	Non-TBI	94	367
	TBI	10	29
Feeling lonely	Non-TBI	43	415
	TBI	10	29
Feeling sad or blue	Non-TBI	50	408
	TBI	9	29
Not feeling confident	Non-TBI	88	368
	TBI	11	25
Feeling misunderstood	Non-TBI	60	399
	TBI	8	31
Feeling hopeless, worthless	Non-TBI	39	420
	TBI	7	31
Feeling life is not worth living, expressing thoughts about wanting to die	Non-TBI	4	454
	TBI	2	37
Feeling scared or frightened	Non-TBI	63	393
	TBI	11	28
Doing things without thinking them through, being impulsive	Non-TBI	88	368
	TBI	10	28

Continued

Table 6:

Negative Screened Group Vs Positive Screened Group Regarding the Frequency of Symptoms (Continued).

		Positive	Negative
Difficulty coping with unexpected changes	Non-TBI	49	407
	TBI	6	32
Avoiding family members or friends	Non-TBI	11	448
	TBI	1	37
Arguing	Non-TBI	163	297
	TBI	19	20
Being rude to others, interrupting others	Non-TBI	95	364
	TBI	10	29
Dealing with people	Non-TBI	52	408
	TBI	6	33
Feeling uncomfortable around others	Non-TBI	39	419
	TBI	6	32
Experiencing difficulties being in crowds	Non-TBI	32	426
	TBI	6	32
Any other problem	Non-TBI	10	180
	TBI	3	10

Table 7:

Differences Between Groups (Children with a Positive Screen Vs Children with a Negative Screen) Regarding the Symptoms.

	χ^2	df	Sig.
Having trouble staying awake	27.21	5	.000
having trouble falling asleep or staying asleep	29.57	5	.000
Having trouble waking up after sleep	32.30	5	.000
Having nightmares	13.79	5	.017
Blacking-out or having seizures	22.81	5	.000
Being clumsy, dropping or dripping over things	26.58	5	.000
Feeling cold	12.78	5	.026
Feeling dizzy	25.35	5	.000
Losing balance	21.43	5	.001
Experiencing ringing in the ears or trouble hearing	17.10	5	.004
Having double vision or blurred vision	24.65	5	.000
Eating too much	41.08	5	.000
Having little or no appetite	37.77	5	.000
Food not tasting right	16.74	4	.002
Having difficulty smelling things	10.67	3	.014
Having headaches	12.35	5	.030
Feeling tired	18.10	4	.001
Moving slowly	27.40	5	.000
Increased or decreased sexual interest	7.97	4	.093
Friends or relatives seeming unfamiliar	5.59	3	.133
Thinking slowly	34.83	5	.000
Becoming confused in familiar places	10.96	3	.012
Difficulty concentrating, having poor attention span	24.64	5	.000
Being easily distracted	27.26	5	.000
Losing train of thought	17.69	5	.003
Forgetting what just said	33.30	5	.000
Forgetting what happened yesterday or recent events	22.29	5	.000
Forgetting names of objects, trouble expressing thoughts	34.23	5	.000
Forgetting names of people including family members	13.43	4	.009
Forgetting well-known phone numbers or addresses	11.95	4	.018
Forgetting to eat	8.19	4	.085
Forgetting to take medications	36.94	5	.000
Forgetting if things are done	21.07	5	.001
Forgetting doing chores, homework, work at home	10.90	5	.053
Forgetting, missing or being late for appointments	42.00	5	.000

Continued

Table 7:

Differences Between Groups (Children with a Positive Screen Vs Children with a Negative Screen) Regarding the Symptoms (Continued).

	χ^2	df	Sig.
Losing track of time	22.73	5	.000
Getting lost	1.83	3	.608
Being disorganized	5.08	4	.279
Misplacing things, forgetting where things are	6.24	5	.284
Forgetting to turn off appliances	18.25	5	.003
Difficulty making decisions	29.25	5	.000
Difficulty solving problems	17.03	5	.004
Difficulty planning future events	2.38	5	.795
Difficulty setting priorities	1.59	5	.902
Difficulty following instructions written or oral	16.44	5	.006
Difficulty learning from experience	6.18	5	.290
Difficulty learning new skills and new information	13.70	4	.008
Learning slowly	9.37	5	.095
Reading very slowly, having difficulty reading	10.71	5	.057
Forgetting what just read	24.62	5	.000
Having difficulty understanding what read, or what is read to	9.54	5	.090
Writing slowly	6.77	5	.238
Writing illegibly, poor handwriting	16.32	5	.006
Making spelling mistakes	16.32	5	.006
Difficulties with reading, writing and math	18.32	5	.003
Handling personal affairs and finances	18.00	5	.003
Unexplained change in performance at work or at school	2.93	4	.569
Difficulty in performing chores	17.01	5	.004
Difficulty in understanding jokes and humor	10.15	5	.071
Difficulty making conversation	7.84	5	.165
Talking too much	6.37	5	.272
Not listening when being spoken to	11.41	5	.044
Speech difficulties, trouble understanding conversation or difficulty pronouncing words	46.08	5	.000
Speaking in ways that others can't make sense of	26.73	5	.000
Talking too fast or too slow	10.03	5	.074
Repeating what others say	32.73	5	.000
Experiencing others as talking too fast	7.44	4	.114
Feeling moody	5.08	5	.406
Experiencing rapid changes in mood	7.75	5	.171
Feeling impatient or irritable	9.16	5	.103

Continued

Table 7:

Differences Between Groups (Children with a Positive Screen Vs Children with a Negative Screen) Regarding the Symptoms (Continued).

	χ^2	df	Sig.
Feeling frustrated	12.57	5	.028
Breaking or throwing things	29.48	5	.000
Being heedless to danger as in driving recklessly	22.89	5	.000
Feeling angry	34.71	5	.000
Screaming or yelling, having temper outbursts	23.10	5	.000
Cursing at or threatening others or self	24.03	5	.000
Hitting or pushing others	13.47	5	.019
Sitting around doing nothing feeling bored	27.95	5	.000
Having repeated thoughts	13.37	5	.020
Having difficulty getting started on things	6.41	5	.269
Laughing for no reason	11.14	5	.049
Making comments that are inappropriate	7.85	5	.165
Behaving inappropriately	4.02	4	.404
Feeling jumpy, restless or unable to stay still	11.51	5	.042
Crying easily or for no reason	10.59	5	.060
Feeling lonely	20.58	5	.001
Feeling sad or blue	7.25	4	.123
Not feeling confident	4.03	5	.545
Feeling misunderstood	8.16	4	.086
Feeling hopeless, worthless	8.04	4	.090
Feeling life is not worth living, expressing thoughts wanting to die	13.57	4	.009
Feeling scared or frighten	6.64	5	.249
Doing thinks without thinking them through, being impulsive	6.85	5	.232
Difficulty coping with unexpected changes	4.09	4	.395
Avoiding family members or friends	.850	5	.974
Arguing	4.64	5	.461
Being rude to others, interrupting others	12.77	5	.026
Dealing with people	.836	4	.934
Feeling uncomfortable around others	18.49	4	.001
Expressing difficulties being in crowds	16.67	4	.002
Any other problem	21.27	4	.000

Table 8:

Factor Loadings for the BISQ Symptoms- Rotated Component Matrix.

	Component				
	1	2	3	4	5
Feeling cold	.808				
Blacking out or having seizures	.793				
Losing balance	.785				
Having double vision or blurred vision	.783				
Feeling dizzy	.778				
Having difficulty smelling things	.756				
Experiencing ringing in the ears or trouble hearing	.752				
Becoming confused in familiar places	.745				
Being clumsy, dropping or tripping over things	.740				
Having trouble staying awake	.738				
Eating too much	.732				
Having trouble falling asleep or staying asleep	.714				
Friends or relatives seeming unfamiliar	.709				
Having little or no appetite	.689				
Forgetting names of people, including family members	.686				
Moving slowly	.663				
Food not tasting right	.657				
Feeling tired	.654				
Forgetting names of objects, trouble expressing thoughts	.647				
Thinking slowly	.636				
Forgetting to eat	.627				
Having nightmares	.613				
Increased or decreased sexual interest	.592				
Getting lost	.590				
Having trouble waking up after sleep	.569				
Forgetting what happened yesterday or recent events	.565				
Having headaches	.547				
Forgetting what just said	.537				
Forgetting if things are done	.506				
Any other problem	.485				
Feeling sad or blue		.710			

Continued

Table 8:

Factor Loadings for the BISQ Symptoms- Rotated Component Matrix (Continued).

	Component				
	1	2	3	4	5
Feeling lonely		.703			
Feeling moody		.700			
Feeling hopeless, worthless		.689			
Feeling scared or frightened		.684			
Experiencing others as talking too fast		.681			
Experiencing rapid changes in mood		.672			
Feeling life is not worth living, expressing thoughts about wanting to die		.671			
Laughing for no reason		.669			
Feeling misunderstood		.662			
Experiencing difficulties being in crowds		.662			
Feeling uncomfortable around others		.658			
Crying easily or for no reason		.638			
Difficulty coping with unexpected changes		.636			
Behaving inappropriately		.632			
Speaking in ways that others can't make sense of		.621			
Sitting around doing nothing, feeling bored		.611			
Avoiding family members or friends		.610			
Difficulty learning from experience		.608			
Making comments that are inappropriate		.606			
Having repeated thoughts		.605			
Hitting or pushing others		.602			
Having difficulty getting started on things		.602			
Breaking or throwing things		.594			
Feeling impatient or irritable		.589			
Repeating what others say		.583			
Difficulty learning new skills and new information		.582			
Difficulty in understanding jokes and humor		.580			
Dealing with people		.580			
Feeling frustrated		.575			

Continued

Table 8:

Factor Loadings for the BISQ Symptoms- Rotated Component Matrix (Continued).

	Component				
	1	2	3	4	5
Unexplained changed in performance at work or school		.569			
Doing things without thinking them through, being impulsive		.569			
Losing track of time		.565			
Being disorganized		.550			
Difficulty making conversation		.543			
Forgetting to turn off appliances		.541			
Not feeling confident		.520			
Speech difficulties, trouble understanding conversation or difficulty pronouncing words		.519			
Difficulty making decisions		.507			
Writing illegibly, poor handwriting		.421			
Being easily distracted			.631		
Being heedless to danger, as in driving recklessly			.631		
Feeling angry			.623		
Being rude to others, interrupting others			.619		
Not listening when being spoken to			.607		
Talking too much			.598		
Difficulty concentrating, having poor attention span			.597		
Losing train of thought			.597		
Feeling jumpy, restless or unable to stay still			.575		
Cursing at or threatening others or self			.573		
Screaming or yelling, having temper outbursts			.559		
Talking too fast or too slow			.551		
Arguing			.547		
Misplacing things, forgetting where things are			.546		
Forgetting doing chores, homework, work at home			.506		
Reading very slowly, having difficulty reading				.687	
Having difficulty understanding what read, or what is read to				.680	

Continued

Table 8:

Factor Loadings for the BISQ Symptoms- Rotated Component Matrix (Continued).

	Component				
	1	2	3	4	5
Difficulty in performing chores				.652	
Learning slowly				.640	
Writing slowly				.572	
Forgetting what just read				.569	
Difficulty following instructions, written or oral				.539	
Difficulty solving problems				.536	
Difficulties with reading, writing and math				.492	
Making spelling mistakes				.486	
Difficulty planning future events					.674
Handling personal affairs and finances					.657
Forgetting, missing or being late for appointments					.634
Forgetting to take medications					.624
Forgetting well-known phone numbers or addresses					.529
Difficulty setting priorities					.516

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 12 iterations.

Table 9:

Frequencies Regarding Children's Developmental History and Medical Status.

		Frequencies
Taking any medications*	Non-TBI	18
	TBI	5
Being a low-birth-weight baby	Non-TBI	36
	TBI	3
Being born prematurely	Non-TBI	35
	TBI	5
Diagnosed as having fetal alcohol syndrome at birth*	Non-TBI	0
	TBI	0
Labeled as having a learning disability or an attention deficit disorder*	Non-TBI	26
	TBI	3
Been medicated for psychiatric condition*	Non-TBI	3
	TBI	1
Been hospitalized for psychiatric condition*	Non-TBI	1
	TBI	1
Being in an alcohol or substance abuse treatment program or support group being a low-birth-weight baby	Non-TBI	0
	TBI	0

*Asterisk denotes statistical significance of the differences between groups

Table 10:

Frequency of Clinically Significant Indications on CBCL.

	Positive Indications	Negative Indications
Positive screen for TBI	4	18
Negative screen for TBI	2	15

Table 11:

Rotated Component Matrix of the DEX-R Questionnaire.

	Component			
	1	2	3	4
Finds that doing saying things effortful	.892			
Struggles find words	.839			
Restless can't sit still	.750			
Easily distracted	.742			
Difficulty keep information in mind at once	.704			
Problems trusting his/her memory	.692			
Will say one thing but do sth different	.666			
Hard to remember do things	.657			
Hard to complete tasks or activities without direction	.616			
Events mixed up confused about order events	.608			
Seems lethargic unenthusiastic	.582			
Difficult stop do sth even when knows shouldn't	.531			
Gets ever-exited over the top	.506			
Acts without thinking	.472			
Worrying thoughts persist	.380			
Difficult planning future		.894		
Difficulty realizing extent of problems unrealistic about future		.849		
Difficulty thinking ahead		.804		
Difficulty deciding what s/he wants		.721		
Trouble making decisions		.689		
Cries laughs uncontrollably		.655		
Difficult to notice if makes a mistake		.600		
Difficult start something		.577		
Difficult do concentrate on two things at once		.520		
Wants do something one min couldn't care less the next		.495		
Unaware unconcerned about how others feel about his behavior		.426		
Hard stop repeating do things once started			.838	
Talks about events never happened			.740	
Problems understanding what other people mean			.630	

Continued

Table 11:

Rotated Component Matrix of the DEX-R Questionnaire (Continued).

	Component			
	1	2	3	4
Loses temper easily			.608	
Does say embarrassing things			.601	
Seems unconcerned how should behave			.595	
Urges hit something or someone			.569	
Difficulty expressing emotion				-.709
Difficulty show emotion				-.673
Tells openly when disagrees				.581
Concerned when has worrying thoughts				.424

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

Table 12:

Differences Between Children with a Positive Screen and Children with a Negative Screen to TBI in the Responses to the Factors of the DEX-R.

		Mean	Std. Deviation	t	df	Sig.
Metacognitive/Social Cognitive Problems	TBI Positive	6.59	5.32	-.243	37	.810
	TBI Negative	7.00	5.09			
Executive Cognitive Problems	TBI Positive	6.64	6.08	-.525	37	.603
	TBI Negative	7.82	8.06			
Behavioral-Emotional Self-Regulatory Problems	TBI Positive	5.55	5.12	-.467	37	.643
	TBI Negative	6.47	7.25			
Activation	TBI Positive	7.59	4.35	-.502	37	.618
	TBI Negative	8.82	6.44			

Table 13:

Correlation of Performance on DEX-R with Performance on the Neuropsychological Battery.

	Metacognitive / Social Cognitive		Executive Cognitive		Behavioral & Emotionals Self-Regulatory		Activation		DEX total	
	r	Sig.	r	Sig.	r	Sig.	r	Sig.	r	Sig.
Metacognitive/ Social Cognitive	1.000		.826**	.000	.853**	.000	.853**	.000	.928**	.000
Executive Cognitive	.826**	.000	1.000		.900**	.000	.864**	.000	.955**	.000
Behavioral and Emotionals Self-Regulatory	.853**	.000	.900**	.000	1.000		.915**	.000	.959**	.000
Activation	.853**	.000	.864**	.000	.915**	.000	1.000		.950**	.000
DEX total	.928**	.000	.955**	.000	.959**	.000	.950**	.000	1.000	
AVLT Total 1-5	-.062	.707	-.006	.971	.054	.745	.062	.709	.009	.955
Rey Figure copy score	-.147	.370	-.139	.400	-.099	.548	-.010	.954	-.111	.502
Rey Figure copy time (s)	-.151	.358	-.057	.728	-.014	.930	-.111	.502	-.098	.554
Digit span-total score	-.195	.234	-.138	.401	-.156	.342	-.063	.702	-.145	.379
Trail A	.076	.645	.026	.877	.005	.976	-.015	.929	.022	.896
Trail B	.143	.387	.225	.169	.212	.196	.117	.479	.184	.262
COWAT Number of animals	.127	.439	.004	.979	.053	.749	.069	.678	.067	.685
COWAT Words from F	.187	.255	.117	.478	.015	.927	.007	.965	.095	.565
letter cancelation task time	.068	.681	.092	.576	.062	.706	.012	.942	.068	.680
CBCL emotional problems	.512**	.002	.570**	.000	.621**	.000	.648**	.000	.608**	.000
CBCL stress problems	.350*	.042	.159	.370	.158	.373	.275	.116	.253	.148

Continued

Table 13:

Correlation of Performance on DEX-R with Performance on the Neuropsychological Battery (Continued).

	Metacognitive / Social Cognitive		Executive Cognitive		Behavioral & Emotionals Self-Regulatory		Activation		DEX total	
	r	Sig.	r	Sig.	r	Sig.	r	Sig.	r	Sig.
CBCL physical problems	.637**	.000	.487**	.004	.585**	.000	.611**	.000	.607**	.000
CBCL ADHD problems	.799**	.000	.689**	.000	.687**	.000	.653**	.000	.755**	.000
CBCL oppositional defiant	.601**	.000	.364*	.034	.420*	.013	.478**	.004	.485**	.004
CBCL misconduct problems	.361*	.036	.186	.293	.274	.117	.314	.071	.294	.092
Math Screening Test	-.220	.178	-.149	.364	-.155	.345	-.080	.627	-.160	.329
Word and pseudoword - words read correct in 45'	-.179	.276	-.176	.284	-.184	.262	-.136	.410	-.178	.278
Word and pseudoword - pseudowords read correct in 45'	-.248	.139	-.141	.405	-.231	.168	-.153	.367	-.190	.261
WISC similarities subtest	.070	.670	.019	.911	-.071	.667	-.062	.706	-.017	.916
WISC understanding subtest	.080	.632	-.029	.861	.026	.875	.072	.667	.035	.836
WISC object assembly subtest	-.041	.807	-.108	.520	-.149	.373	-.003	.988	-.082	.625
WISC symbols A or B	.022	.896	.063	.705	.092	.583	.108	.519	.075	.654
pegboard dominant hand placed pegs	.202	.217	.078	.635	.068	.681	.023	.889	.096	.559
pegboard non-dominant hand placed pegs	.202	.217	.078	.635	.068	.681	.023	.889	.096	.559

Table 14:

Means of the two Groups (Positive Screen Vs Negative Screen Group) For AVLT Trials.

	Groups	Mean	SD
AVLT 1	Positive	6.00	1.41
	Negative	6.10	1.76
AVLT 2	Positive	8.39	2.58
	Negative	8.28	2.00
AVLT 3	Positive	9.00	3.09
	Negative	9.76	2.59
AVLT 4	Positive	10.35	3.14
	Negative	11.28	2.25
AVLT 5	Positive	11.58	2.54
	Negative	11.76	2.36
AVLT Total words recalled	Positive	45.32	10.81
	Negative	47.03	8.80

Table 15:
Means and Standard Deviations Regarding Digit Span Subtest.

	TBI	Mean	Std. Deviation
Digit span- forward	positive	7.2581	1.93163
	negative	7.5517	1.61657
Digit span- backward	positive	4.8387	1.89907
	negative	4.9310	1.85031
Digit span-total score	possitive	12.0968	3.41911
	negative	12.4828	2.95950

Table 16:

Two-Group Comparison – Rapid Reading of Words and Pseudowords (1, 2).

	F	Sig.	η^2
List A (Real Words)			
Words read	.002	.964	.000
Words correct in 45 secs.	.000	1.000	.000
Total Time	.818	.389	.083
Total words correct	.556	.475	.058
List B (Pseudowords)	.556	.475	.058
Words read	.003	.961	.000
Words correct in 45 secs.	.065	.804	.007
Total Time	.818	.389	.083
Total words correct	.189	.674	.021

Table 17:
Means and Standard Deviations Regarding the Scores in the Battery Administered.

		Mean	Std. Deviation
AVLT List 1	positive	6.00	1.41
	negative	6.10	1.76
AVLT List 2	positive	8.39	2.58
	negative	8.28	2.00
AVLT List 3	positive	9.00	3.09
	negative	9.76	2.59
AVLT List 4	positive	10.35	3.14
	negative	11.28	2.25
AVLT List 5	positive	11.58	2.54
	negative	11.76	2.36
AVLT List B	positive	5.65	2.27
	negative	5.66	1.86
Short delay free recall	positive	9.68	2.93
	negative	9.86	2.86
Long delay free recall	positive	9.45	3.09
	negative	10.03	2.81
AVLT Total 1-5	positive	45.32	10.81
	negative	47.03	8.80
AVLT extra words total	positive	2.48	6.38
	negative	1.52	1.64
AVLT repeated words A1	positive	6.97	7.99
	negative	8.21	5.98
AVLT recognition ListA	positive	13.97	2.82
	negative	14.31	0.81
AVLT recognition ListB	positive	0.48	1.39
	negative	0.38	0.73
AVLT recognition foilA	positive	0.26	0.51
	negative	0.17	0.38
AVLT recognition foilB	positive	0.00	0.00
	negative	0.03	0.19
letter cancellation task time	positive	110.39	41.35
	negative	95.24	32.52
letter cancellation task omissions	positive	1.29	1.19
	negative	0.59	0.73
letter cancelation task inclusions	positive	0.00	0.00
	negative	0.00	0.00
Rey Figure copy score	positive	24.79	8.64
	negative	27.14	5.84

Continued

Table 17:

Means and Standard Deviations Regarding the Scores in the Battery Administered (Continued).

		Mean	Std. Deviation
Rey Figure copy time (s)	positive	304.35	197.29
	negative	245.28	119.50
Rey figure Immediate recall score	positive	12.71	7.74
	negative	16.03	6.71
Rey figure immediate, time (s)	positive	146.23	73.88
	negative	150.17	76.79
Rey figure delayed recall score	positive	15.06	15.60
	negative	15.72	6.10
Rey figure delayed, time (s)	positive	87.16	40.48
	negative	115.66	63.15
Rey figure true recall	positive	8.74	1.83
	negative	8.07	2.12
Rey figure false recall	positive	2.65	3.33
	negative	1.86	3.18
Rey figure total recognition	positive	19.06	2.45
	negative	18.97	2.56
Digit span- forward	positive	7.26	1.93
	negative	7.55	1.62
Digit span- backward	positive	4.84	1.90
	negative	4.93	1.85
Digit span-total score	positive	12.10	3.42
	negative	12.48	2.96
Trail making test A	positive	59.61	34.37
	negative	46.41	17.68
Trail making test B	positive	136.53	59.88
	negative	118.31	52.03
COWAT – No of animals	positive	11.45	3.85
	negative	11.59	4.63
COWAT - Words from F	positive	6.29	2.60
	negative	7.28	3.19
CBCL emotional problems	positive	1.91	2.11
	negative	2.36	3.05
CBCL stress problems	positive	1.96	1.99
	negative	1.43	1.34
CBCL physical problems	positive	1.13	1.46
	negative	0.57	1.16

Continued

Table 17:

Means and Standard Deviations Regarding the Scores in the Battery Administered (Continued).

		Mean	Std. Deviation
CBCL ADHD problems	positive	2.48	2.79
	negative	2.29	2.58
CBCL oppositional defiant	positive	2.00	1.95
	negative	1.79	1.67
CBCL misconduct problems	positive	1.43	2.06
	negative	0.57	1.09
Math Screening Test	positive	16.50	7.76
	negative	19.38	6.52
Word and pseudoword words read	positive	55.48	20.65
	negative	58.21	14.44
Word and pseudoword words read correct in 45'	positive	54.48	20.45
	negative	57.52	14.18
Word and pseudoword total time	positive	112.42	127.83
	negative	93.69	49.57
Word and pseudoword words read correctly	positive	72.31	39.90
	negative	80.13	29.99
Word and pseudoword words read in 45'	positive	31.58	12.31
	negative	33.83	9.10
Word and pseudoword words read correct in 45'	positive	28.17	12.14
	negative	28.93	9.19
Word and pseudoword words total time	positive	113.08	102.51
	negative	97.25	51.61
Word and pseudoword total time correct pseudowords	positive	38.92	28.89
	negative	48.75	28.86
Pegboard dominant hand	positive	1.13	0.34
	negative	1.07	0.26
Pegboard dominant hand time in sec	positive	76.48	54.51
	negative	69.34	23.85
Pegboard dominant hand drops	positive	0.45	0.72
	negative	0.52	0.69
Pegboard dominant hand placed pegs	positive	1.35	0.49
	negative	1.24	0.44

Continued

Table 17:

Means and Standard Deviations Regarding the Scores in the Battery Administered (Continued).

		Mean	Std. Deviation
Pegboard use of non-dominant hand	positive	1.77	0.43
	negative	1.83	0.38
Pegboard non-dominant hand in sec	positive	78.26	37.86
	negative	85.86	28.18
Pegboard non-dominant hand drops	positive	0.55	0.85
	negative	1.10	1.57
Pegboard non-dominant hand placed pegs	positive	1.35	0.49
	negative	1.24	0.44
Pegboard use of dominant hand	positive	1.87	0.35
	negative	1.83	0.38
DEX-Metacognitive/Social Cognitive	positive	6.59	5.32
	negative	7.00	5.09
DEX-Executive Cognitive	positive	6.64	6.08
	negative	7.82	8.06
DEX-Behavioral and Emotional Self-Regulatory	positive	5.55	5.12
	negative	6.47	7.25
DEX-Activation	positive	7.95	4.35
	negative	8.82	6.44
DEX-Total Score	positive	24.41	17.29
	negative	26.82	21.70
WISC similarities subtest	positive	10.61	3.60
	negative	11.39	3.12
WISC Comprehension subtest	positive	10.11	3.29
	negative	10.11	2.75
WISC object assembly subtest	positive	8.80	2.63
	negative	9.17	2.93
WISC symbols subtest	positive	11.03	3.19
	negative	11.97	1.92
Block design WISC	positive	10.74	3.13
	negative	11.00	3.40
Vocabulary WISC	positive	8.77	2.86
	negative	7.96	3.23

Table 18:
Reliability Values for Each Tool Used in Phase B of the Research.

	Cronbach's Alpha
AVLT	.704
Rey Figure	.421
Digit span	.880
Trail making	.675
COWAT	.593
CBCL	.821
Word and pseudoword words read	.703
Pegboard	.504
DEX-R	.882
WISC – 6 Subtests	.784
Letter Cancellation Task	.004

APPENDIX

Ερωτηματολόγιο Ανίχνευσης Κρανιοεγκεφαλικών Κακώσεων- Έκδοση για παιδιά

- Στόχος του ερωτηματολογίου αυτού είναι να προσδιοριστεί κατά πόσον ένα παιδί που γνωρίζετε καλά έχει υποστεί, οποιαδήποτε στιγμή, κρανιοεγκεφαλική κάκωση. Οι κακώσεις αυτές είναι δυνατόν να έχουν επιπτώσεις που δύσκολα μπορούν να προβλεφθούν - επιπτώσεις που περνάνε σχεδόν απαρατήρητες μέχρι και επιπτώσεις που συνταράζουν ολόκληρη τη ζωή μας. Επίσης, μερικές φορές δεν αντιλαμβανόμαστε ότι μια κρανιοεγκεφαλική κάκωση δημιουργεί προβλήματα σ' ένα παιδί. Το **Πρώτο Μέρος** του ερωτηματολογίου θα σας βοηθήσει να φέρετε στη μνήμη σας κάποια συμβάντα κατά τα οποία είναι δυνατό να έχει συμβεί μια τέτοια κάκωση. Αν το παιδί δεν έχει βιώσει οποιοδήποτε τέτοιο συμβάν τότε η συμπλήρωση του ερωτηματολογίου έχει ολοκληρωθεί. Αν όντως το παιδί έχει βιώσει οποιοδήποτε από τα συμβάντα αυτά, θα σας ζητήσουμε να συμπληρώσετε το **Δεύτερο** και το **Τρίτο Μέρος**. Το Δεύτερο Μέρος τεκμηριώνει τα είδη των προβλημάτων που βιώνουν μερικές φορές άτομα με κρανιοεγκεφαλική κάκωση στην καθημερινή τους ζωή. Κατά τη συμπλήρωση του **Δευτέρου Μέρους** θα πρέπει να θυμάστε ότι οι περισσότεροι άνθρωποι έχουν μερικές μόνο από τις δυσκολίες που παρατίθενται. **Στο Τρίτο Μέρος** θα κληθείτε να απαντήσετε σε μερικές ακόμη σημαντικές ερωτήσεις.
- Οι πληροφορίες που συλλέγουμε μέσα από αυτό το ερωτηματολόγιο είναι σημαντικές καθώς μπορούν να μας βοηθήσουν να εντοπίσουμε μια κρανιοεγκεφαλική κάκωση την οποία ίσως αγνοείτε εσείς και το παιδί και να προσδιορίσουμε τα συγκεκριμένα προβλήματα που μπορεί να έχει προκαλέσει η κάκωση αυτή. Οι πληροφορίες αυτές μπορεί να αποβούν χρήσιμες καθώς συχνά τα προβλήματα που προκαλούνται από μια κρανιοεγκεφαλική κάκωση μπορούν να αντιμετωπιστούν, αλλά μόνο αν είναι γνωστή η αιτία των προβλημάτων αυτών.

! Παρακαλούμε όπως καταχωρήσετε πιο τις βασικές πληροφορίες που περιέχονται στις δύο επόμενες σελίδες σημειώνοντας √ στο κατάλληλο σημείο Ο.

Προσωπικά Στοιχεία
Ημερομηνία γέννησης(Μήνας/Μέρα/Έτος): ___ ___ / ___ ___ / ___ ___
Σημερινή ημερομηνία (Μήνας/Μέρα/Έτος): ___ ___ / ___ ___ / ___ ___

Α. Ηλικία του παιδιού
___ ___ ετών

Β. Φύλο του παιδιού
Ο Άρρεν
Ο Θήλυ
Σημειώστε √ στον ορθό κύκλο

Γ. Εθνική καταγωγή του παιδιού
Ο Ελληνοκυπριακή
Ο Τουρκοκυπριακή
Ο Μαρωνίτικη
Ο Αρμένικη
Ο Λατινική
Ο Άλλη. Προσδιορίστε: _____

Δ. Ποιο είναι περίπου το σημερινό ετήσιο εισόδημα της οικογένειας του παιδιού;
Ο €0 μέχρι € 10,000
Ο € 10,001 μέχρι € 15,000
Ο € 15,001 μέχρι € 20,000
Ο € 20,001 μέχρι € 25,000
Ο € 25,001 μέχρι € 35,000
Ο Πάνω από €35,000
Ο Δεν γνωρίζω

Ε. Αναφορικά με την φοίτηση σε σχολείο, επιλέξετε ποιο ισχύει για το παιδί;
Ο Το παιδί δεν πάει σχολείο
Ο Βρεφικό σταθμό, Προδημοτική ή Νηπιαγωγείο
Ο Δημοτικό σχολείο. Τάξη: _____
Ο Ειδικό σχολείο. Τάξη: _____
Ο Δεν γνωρίζω

Ζ.	**Ποια η σχέση σας με το παιδί;**
Ο	Είμαι ο γονέας του/ της
Ο	Είμαι συγγενής του, όχι όμως γονέας
Ο	Άλλο: _____
Η.	**Ζείτε μαζί με το παιδί ή περνάτε τον περισσότερο καιρό μαζί;**
Ο	Ναι
Ο	Όχι

Πρώτο Μέρος: Τραυματισμοί και Εισαγωγή στο Νοσοκομείο

- Στη **Στήλη Α** πιο κάτω παρατίθενται κάποιες περιστάσεις κατά τις οποίες ένα παιδί μπορεί να υποστεί κτύπημα στο κεφάλι. Για κάθε συμβάν που καταγράφετε, καταχωρήστε τον αριθμό των φορών που έχει υποστεί το παιδί κτύπημα στο κεφάλι στη συγκεκριμένη περίσταση (σημειώστε √). Το παράδειγμα καταγράφει ότι το άτομο έχει υποστεί κτύπημα στο κεφάλι δύο φορές σε αυτοκινητιστικό δυστύχημα.
- Για οποιοδήποτε συμβάν κατά το οποίο δεν έχει το παιδί υποστεί ΚΑΝΕΝΑ κτύπημα στο κεφάλι, καταχωρήστε μηδέν (0)
- Απαντήστε σε όλες τις ερωτήσεις στη **Στήλη Α**.
- Για κάθε κτύπημα στο κεφάλι που έχετε καταχωρήσει στη **Στήλη Α**, απαντήστε στις ερωτήσεις της **Στήλης Β**. Για οποιαδήποτε κτυπήματα στο κεφάλι για τα οποία δεν γνωρίζετε αν έχασε τις αισθήσεις του ή αν ήταν με θολωμένη/ αργή σκέψη ή συγχυσμένος/η, σημειώστε √ στο κουτί της στήλης **"Δεν Γνωρίζω"**.

ΣΤΗΛΗ Α					**ΣΤΗΛΗ Β**								
Έχει υποστεί το παιδί κτύπημα στο κεφάλι σε αυτή την περίσταση;	**Πόσες φορές;**				**Έχασε ποτέ τις αισθήσεις του; Πόσες φορές;**				**Ήταν ποτέ με θολωμένη/ αργή σκέψη ή συγχυσμένος/η; Πόσες φορές;**				**Δεν γνωρίζω**
	0	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	
Παράδειγμα: Σε αυτοκινητιστικό δυστύχημα;			✓		✓					✓			✓
1. Δυστύχημα με αυτοκίνητο / βαν / φορτηγό / λεωφορείο;													
2. Δυστύχημα με μοτοσικλέτα ή οποιονδήποτε άλλο όχημα;													
3. Κτυπήθηκε από όχημα ενώ ήταν πεζός;													
4. Κτυπήθηκε από αντικείμενο που έπεφτε;													

- Βεβαιωθείτε ότι συμπληρώσατε όλες τις ερωτήσεις 1-4 και τα σημεία της Στήλης Α και Β
- Τώρα πήγαινε στη σελίδα 5.

ΣΤΗΛΗ Α					ΣΤΗΛΗ Β								
Έχει υποστεί το παιδί κτύπημα στο κεφάλι σε αυτή την περίσταση;	**Πόσες φορές;**				**Έχασε ποτέ τις αισθήσεις του; Πόσες φορές;**				**Ήταν ποτέ με θολωμένη/ αργή σκέψη ή συγχυσμένος/η; Πόσες φορές;**				**Δεν γνωρίζω**
	0	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	
5. Κτυπήθηκε από κάποιου είδους εξοπλισμό;													
6. Έπεσε από τη σκάλα;													
7. Έπεσε από ψηλά;													
8. Έπεσε κατά τη διάρκεια λιποθυμικού επεισοδίου;													
9. Έπεσε όταν έχασε προσωρινά τις αισθήσεις του λόγω χρήσης ναρκωτικών ή αλκοόλ;													
10. Ενώ έκανε ποδήλατο;													
11. Ενώ έκανε πατίνια ή τροχοσανίδα (skateboard);													
12. Ενώ έκανε ιππασία;													
13. Ενώ έκανε σκι ή snowboarding;													
• Βεβαιωθείτε ότι συμπληρώσατε όλες τις ερωτήσεις 5-13 και τα σημεία της Στήλης Α και Β • Τώρα πηγαίνετε στη σελίδα 6.													

ΣΤΗΛΗ Α					ΣΤΗΛΗ Β								
Έχει υποστεί το παιδί κτύπημα στο κεφάλι σε αυτή την περίσταση;	**Πόσες φορές;**				**Έχασε ποτέ τις αισθήσεις του; Πόσες φορές;**				**Ήταν ποτέ με θολωμένη/ αργή σκέψη ή συγχυσμένος/η; Πόσες φορές;**				**Δεν γνωρίζω**
	0	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	
14. Ενώ έκανε κάποιο άθλημα (ποδόσφαιρο, καλαθόσφαιρα, πετόσφαιρα);													
15. Στην παιχνιδούπολη /πάρκο;													
16. Κατά τη διάρκεια κατάδυσης στο νερό;													
17. Κατά τη διάρκεια επίθεσης ή ληστείας εναντίον του;													
18. Κατά τη διάρκεια σωματικής κακοποίησής του;													
19. Αλλο; …….. ……..													

- Βεβαιωθείτε ότι συμπληρώσατε όλες τις ερωτήσεις 14-19 και τα σημεία της Στήλης Α και Β
- Τώρα πηγαίνετε στη σελίδα 7.

ΕΠΕΙΓΟΝΤΑ ΙΑΤΡΙΚΑ ΠΕΡΙΣΤΑΤΙΚΑ					• Για κάθε επείγον ιατρικό περιστατικό που έχει καταχωρηθεί στη **Στήλη Α**, παρακαλούμε όπως απαντήσετε στις πιο κάτω ερωτήσεις της **Στήλης Β**. Για οποιεσδήποτε από τις περιπτώσεις όπου δεν μπορείτε να γνωρίζετε αν έχασε τις αισθήσεις του ή αν ήταν με θολωμένη/ αργή σκέψη ή συγχυσμένος/η, σημειώστε √ στο κουτί της στήλης "**Δεν Γνωρίζω**".									
ΣΤΗΛΗ Α					**ΣΤΗΛΗ Β**									
Έχει εισαχθεί ποτέ το παιδί σε νοσοκομείο ή εξεταστεί σε τμήμα πρώτων βοηθειών για οποιοδήποτε από τους πιο κάτω λόγους ;	**Πόσες φορές;**				**Έχασε ποτέ τις αισθήσεις του; Πόσες φορές;**				**Ήταν ποτέ με θολωμένη/ αργή σκέψη ή συγχυσμένος/η; Πόσες φορές;**				**Δεν γνωρίζω**	
	0	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**		
20. Διάσειση;														
21. Κάταγμα στο κεφάλι, τον αυχένα ή το πρόσωπο;														
22. Σπασμούς;														
23. Ψηλό πυρετό;														
24. Είχε επεισόδιο πνιγμού ή δηλητηρίασης;														
25. Τραυματισμό από ηλεκτρικό ρεύμα ή από κεραυνό;														
• Αν δεν έχετε καταχωρήσει ΚΑΝΕΝΑ επείγον ιατρικό περιστατικό στη **Στήλη Α**, πηγαίνετε τώρα στη Σελίδα 8. • Βεβαιωθείτε ότι συμπληρώσατε όλες τις ερωτήσεις 20-25 και τα σημεία της Στήλης Α και Β • Τώρα πηγαίνετε στη Σελίδα 8.														

ΣΤΗΛΗ Α					**ΣΤΗΛΗ Β**								
Έχει εισαχθεί ποτέ σε νοσοκομείο ή εξεταστεί σε τμήμα πρώτων βοηθειών για οποιοδήποτε από τους πιο κάτω λόγους ;	**Πόσες φορές;**				**Έχασε ποτέ τις αισθήσεις του; Πόσες φορές;**				**Ήταν ποτέ με θολωμένη/ αργή σκέψη ή συγχυσμένος/η; Πόσες φορές;**				**Δεν γνωρίζω**
	0	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	
26. Τραυματισμό από πυροβολισμό;													
27. Εγκεφαλικό ή εγκεφαλική αιμορραγία;													
28. Λοίμωξη ή όγκο στον εγκέφαλο;													
29. Άλλο τραυματισμό; …….. ……..													

- Αν δεν έχετε καταχωρήσει ΚΑΝΕΝΑ επείγον ιατρικό περιστατικό στη **Στήλη Α**, πηγαίνετε τώρα στη Σελίδα 9.
- Αν έχετε καταχωρήσει ένα ή περισσότερα επείγοντα ιατρικά περιστατικά, πηγαίνετε στο πάνω μέρος της **Στήλης Β** και διαβάστε τις σχετικές οδηγίες.
- Αφού ολοκληρώσετε τη **Στήλη Β**, πηγαίνετε στη Σελίδα 9.

Α. Έχει υποστεί το παιδί ΟΠΟΙΑΔΗΠΟΤΕ κτυπήματα στο κεφάλι στις περιστάσεις που παρατίθενται στις σελίδες 4-6;

Ο Όχι
Ο Ναι

Β. Έχει βιώσει το παιδί ΟΠΟΙΑΔΗΠΟΤΕ από τα επείγοντα ιατρικά περιστατικά που παρατίθενται στις σελίδες 7-8;

Ο Όχι
Ο Ναι

Γ. ΓΝΩΡΙΖΕΤΕ αν το παιδί ήταν με θολωμένη/ αργή σκέψη ή συγχυσμένος/η ή αν έχασε τις αισθήσεις του μετά από κτύπημα στο κεφάλι ή ένα επείγον ιατρικό περιστατικό;

Ο Το παιδί ΠΟΤΕ δεν ήταν με θολωμένη/ αργή σκέψη ή συγχυσμένος/η και ΠΟΤΕ δεν έχασε τις αισθήσεις του ως αποτέλεσμα κτυπήματος στο κεφάλι ή επείγοντος ιατρικού περιστατικού.

Ο Το παιδί ΈΧΕΙ ΧΑΣΕΙ τις αισθήσεις του Ή ήταν με θολωμένη/ αργή σκέψη ή συγχυσμένο τουλάχιστον μια φορά ως αποτέλεσμα κτυπήματος στο κεφάλι ή επείγοντος ιατρικού περιστατικού.

Ο ΔΕΝ ΓΝΩΡΙΖΩ αν το παιδί έχασε τις αισθήσεις του Ή ήταν με θολωμένη/ αργή σκέψη ή συγχυσμένο ως αποτέλεσμα κτυπήματος στο κεφάλι ή επείγοντος ιατρικού περιστατικού.

1. Ποιο ήταν το μεγαλύτερο διάστημα κατά το οποίο το παιδί έχασε τις αισθήσεις του μετά από κτύπημα στο κεφάλι ή επείγον ιατρικό περιστατικό;

Ο Ποτέ δεν έχασε τις αισθήσεις του
Ο Λιγότερο από 20 λεπτά
Ο Από 20 λεπτά μέχρι 1 ώρα
Ο Πάνω από 1 ώρα, μέχρι 24 ώρες
Ο Πάνω από 24 ώρες, μέχρι 1 βδομάδα
Ο Πάνω από 1 βδομάδα, μέχρι 2 βδομάδες
Ο Πάνω από 2 βδομάδες, μέχρι ένα μήνα
Ο Ένα μήνα ή περισσότερο
Ο Δεν γνωρίζω

2. Ποιο ήταν το μεγαλύτερο διάστημα κατά το οποίο το παιδί ήταν με θολωμένη/αργή σκέψη ή συγχυσμένος/η μετά από κτύπημα στο κεφάλι ή επείγον ιατρικό περιστατικό;

O Ποτέ δεν ήταν με θολωμένη/ αργή σκέψη και συγχυσμένο
O Για λιγότερο από 1 λεπτό
O Από 1 μέχρι 10 λεπτά
O Από 11 μέχρι 20 λεπτά
O Από 21 λεπτά μέχρι 1 ώρα
O Πάνω από 1 ώρα, μέχρι 24 ώρες
O Πάνω από μια μέρα
O Δεν γνωρίζω

3. Πόσων χρονών ήταν το παιδί όταν είχε υποστεί το κτύπημα στο κεφάλι ή το επείγον ιατρικό περιστατικό κατά τα οποίο έχασε τις αισθήσεις του ή ήταν με θολωμένη/ αργή σκέψη ή συγχυσμένο;

Α. Αν είχε μια μόνο κάκωση:
Ηλικία κατά την κάκωση

Β. Αν είχε πάνω από μια κάκωση:
Ηλικία κατά την τελευταία κάκωση

• Τώρα πηγαίνετε στη σελίδα 11

Δεύτερο Μέρος: Προβλήματα και Δυσκολίες στην Καθημερινή Ζωή;

- Παρακαλούμε σημειώστε √ για να υποδείξετε πόσο συχνά, εντός του τελευταίου μήνα, έχει βιώσει το παιδί μια από τις δυσκολίες που παρατίθενται. Μερικά από τα προβλήματα ίσως να μην ισχύουν για το παιδί. Για παράδειγμα η δήλωση 'ορθογραφικά λάθη' δεν ισχύει για ένα παιδί που ποτέ δεν έμαθε να γράφει ή δεν μπορεί να γράψει. Σε τέτοιες περιπτώσεις, θα πρέπει να σημειώσετε την επιλογή 'Δεν ισχύει'.

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή ζωή του παιδιού;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
1. Δυσκολία να παραμείνει ξύπνιο;						
2. Δυσκολία να αποκοιμηθεί ή να παραμείνει κοιμισμένο;						
3. Δυσκολία να ξυπνήσει μετά από κανονικό ύπνο ή ένα σύντομο υπνάκο;						
4. Έχει εφιάλτες;						
5. Νιώθει να σκοτεινιάζουν τα πάντα γύρω του, έχει λιποθυμίες ή σπασμούς;						
6. Είναι αδέξιο, του πέφτουν πράγματα ή σκουντουφλάει;						
7. Νιώθει κρύο;						
8. Νιώθει ζάλη;						
9. Χάνει την ισορροπία του;						
10. Νιώθει βούισμα στα αυτιά ή δυσκολεύεται να ακούσει;						
11. Έχει διπλή ή θολή όραση;						
12. Τρώει υπερβολικές ποσότητες;						
13. Έχει περιορισμένη ή καθόλου όρεξη;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή ζωή του παιδιού;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
14. Το φαγητό δεν έχει τη σωστή γεύση;						
15. Δυσκολεύεται να μυρίσει κάποια πράγματα;						
16. Έχει πονοκεφάλους;						
17. Νιώθει κούραση;						
18. Κινείται με αργό ρυθμό;						
19. Έχει αυξημένο/η ή μειωμένο/η σεξουαλικό ενδιαφέρον ή συμπεριφορά;						
20. Φίλοι ή συγγενικά του πρόσωπα του φαίνονται άγνωστα;						
21. Σκέφτεται πιο αργά;						
22. Παθαίνει σύγχυση σε οικείους χώρους;						
23. Δυσκολεύεται να συγκεντρωθεί και να διατηρήσει τη προσοχή;						
24. Αποσπάται εύκολα η προσοχή του;						
25. Χάνει τον ειρμό των σκέψεών του;						
26. Ξεχνάει αυτό που μόλις είπε;						
27. Ξεχνάει τι συνέβη χθες ή άλλα πρόσφατα συμβάντα;						
28. Ξεχνάει ονόματα κοινών αντικειμένων ή δυσκολεύετε να βρει την κατάλληλη λέξη για να εκφράσει τις σκέψεις του;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή ζωή του παιδιού;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
29. Ξεχνάει τα ονόματα ατόμων, περιλαμβανομένων και μελών της οικογένειάς του;						
30. Ξεχνάει αριθμούς τηλεφώνου ή διευθύνσεις που γνωρίζει καλά;						
31. Ξεχνάει να φάει;						
32. Ξεχνάει να πάρει τα φάρμακά του;						
33. Ξεχνάει αν έχει να κάνει κάτι;						
34. Ξεχνάει να κάνει διάφορες δουλειές, κατ'οίκον εργασία ή εργασία στο σπίτι ;						
35. Ξεχνάει, χάνεται ή καθυστερεί στα ραντεβού του;						
36. Χάνει την αίσθηση του χρόνου;						
37. Χάνεται (δεν ξέρει πού βρίσκεται);						
38. Είναι αποδιοργανωμένος;						
39. Δεν βάζει τα πράγματα πίσω στη θέση τους, ξεχνάει πού βρίσκονται;						
40. Ξεχνάει να σβήσει ηλεκτρικές συσκευές;						
41. Δυσκολεύεται να πάρει αποφάσεις;						
42. Δυσκολεύεται να λύσει προβλήματα;						
43. Δυσκολεύεται να προγραμματίσει μελλοντικά γεγονότα;						
44. Δυσκολεύεται να καθορίσει προτεραιότητες;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή ζωή του παιδιού;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
45. Δυσκολεύεται να ακολουθήσει οδηγίες, προφορικές ή γραπτές;						
46. Δυσκολεύεται να μάθει μέσα από την εμπειρία;						
47. Δυσκολεύεται να μάθει νέες δεξιότητες και νέες πληροφορίες;						
48. Μαθαίνει αργά;						
49. Διαβάζει πιο αργά, δυσκολεύεται να διαβάσει;						
50. Ξεχνάει αυτό που μόλις έχει διαβάσει;						
51. Δυσκολεύεται να κατανοήσει αυτό που διαβάζει ή αυτό που του διαβάζουν;						
52. Γράφει αργά;						
53. Γράφει δυσανάγνωστα, με άσχημο γραφικό χαρακτήρα;						
54. Κάνει ορθογραφικά λάθη;						
55. Δυσκολεύεται στη γραφή, στην ανάγνωση και στα μαθηματικά;						
56. Δυσκολεύεται να χειριστεί τις προσωπικές του υποθέσεις και τα οικονομικά του;						
57. Βιώνει μια ανεξήγητη αλλαγή στην απόδοσή του στο σχολείο;						
58. Δυσκολεύεται να εκτελέσει κάποιες εργασίες;						
59. Δυσκολεύεται να κατανοήσει αστεία και χιούμορ;						
60. Δυσκολεύεται να κάνει μια συνομιλία;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή ζωή του παιδιού;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
61. Μιλάει υπερβολικά ;						
62. Δεν ακούει όταν του μιλούν;						
63. Έχει δυσκολίες στο λόγο, όπως πρόβλημα στην κατανόηση μιας συνομιλίας ή δυσκολία στην προφορά λέξεων;						
64. Μιλάει με τρόπο που οι άλλοι δεν μπορούν να τον κατανοήσουν;						
65. Μιλάει πολύ γρήγορα ή πολύ αργά;						
66. Επαναλαμβάνει αυτά που λένε οι άλλοι;						
67. Νιώθει ότι οι άλλοι μιλάνε πολύ γρήγορα;						
68. Νιώθει ότι είναι κακόκεφος;						
69. Βιώνει γρήγορες εναλλαγές στη διάθεσή του;						
70. Νιώθει ανυπομονησία ή ευερεθιστικότητα;						
71. Νιώθει έντονη απογοήτευση;						
72. Σπάει ή πετάει πράγματα;						
73. Αψηφά τον κίνδυνο, κάνει επικίνδυνα πράγματα;						
74. Νιώθει θυμό;						
75. Φωνάζει ή τσιρίζει, έχει ξεσπάσματα θυμού;						
76. Βρίζει ή απειλεί άλλους ή τον εαυτό του;						
77. Κτυπάει ή σπρώχνει τους άλλους;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή ζωή του παιδιού;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
78. Κάθεται όλη μέρα χωρίς να						

κάνει τίποτα, νιώθει βαριεστιμάρα;						
79. Έχει σκέψεις που επανέρχονται;						
80. Δυσκολεύεται να αρχίσει να κάνει κάτι;						
81. Γελάει χωρίς λόγο;						
82. Κάνει άτοπα/ ανάρμοστα σχόλια;						
83. Συμπεριφέρεται κατά τρόπο ανάρμοστο;						
84. Νιώθει νευρικότητα, ανησυχία ή δεν μπορεί να καθίσει ήσυχο;						
85. Κλαίει εύκολα ή χωρίς λόγο;						
86. Νιώθει μοναξιά;						
87. Νιώθει λύπη ή μελαγχολία;						
88. Δεν νιώθει αυτοπεποίθηση;						
89. Νιώθει ότι το παρεξηγούν;						
90. Νιώθει απελπισία, ότι δεν αξίζει;						
91. Νιώθει ότι η ζωή δεν αξίζει να τη ζεις, εκφράζει σκέψεις που δείχνουν επιθυμία να πεθάνει;						
92. Νιώθει τρόμο ή φόβο;						
93. Κάνει πράγματα χωρίς να τα σκεφτεί καλά, είναι παρορμητικό;						
94. Δυσκολεύεται να αντιμετωπίσει απροσδόκητες αλλαγές;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή ζωή του παιδιού;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
95. Αποφεύγει μέλη της οικογένειας ή φίλους;						
96. Καυγαδίζει;						
97. Είναι αγενείς με τους άλλους, τους διακόπτει;						
98. Δυσκολεύεται στις σχέσεις του με τους άλλους;						
99. Νιώθει άβολα όταν βρίσκεται μαζί με άλλους;						
100. Βιώνει δυσκολίες όταν βρίσκετε ανάμεσα σε πολύ κόσμο;						
101. Οποιοδήποτε άλλο πρόβλημα; _____ _____ _____						
102. Οποιοδήποτε άλλο πρόβλημα; _____ _____ _____						
103.. Οποιοδήποτε άλλο πρόβλημα; _____ _____ _____						
104. Οποιοδήποτε άλλο πρόβλημα; _____ _____ _____						
105. Οποιοδήποτε άλλο πρόβλημα; _____ _____ _____						

Τρίτο Μέρος: Πρόσθετες Ερωτήσεις

1. **Παίρνει το παιδί οποιαδήποτε φάρμακα;**

Ο Ναι
Ο Όχι

Αν Ναι, ποια είναι αυτά τα φάρμακα; (αν δεν γνωρίζετε τα ονόματά τους, για ποιες ιατρικές ή άλλες παθήσεις σάς έχουν δοθεί;)

_____
____

2. **Γεννήθηκε με χαμηλό βάρος:**

Ο Ναι
Ο Όχι
Ο Δεν γνωρίζω

3. **Γεννήθηκε πρόωρα (ένα μήνα ή περισσότερο πριν από την αναμενόμενη ημερομηνία τοκετού);**

Ο Ναι
Ο Όχι
Ο Δεν γνωρίζω

4. **Έχει διαγνωστεί κατά τη γέννηση με εμβρυϊκό αλκοολικό σύνδρομο; (αυτό μπορεί να συμβεί όταν ένα έμβρυο έχει εκτεθεί σε αλκοόλ κατά τη διάρκεια της εγκυμοσύνης).**

Ο Ναι
Ο Όχι
Ο Δεν γνωρίζω

5. **Έχει ποτέ χαρακτηριστεί ως άτομο με μαθησιακή δυσκολία ή διαταραχή ελλειμματικής προσοχής;**

Ο Ναι
Ο Όχι
Ο Δεν γνωρίζω

6. **Έχει λάβει ποτέ φαρμακευτική αγωγή για ψυχιατρική νόσο;**

Ο Ναι
Ο Όχι
Ο Δεν γνωρίζω

7. Έχει εισαχθεί ποτέ σε νοσοκομείο για ψυχιατρική νόσο; Ο Ναι Ο Όχι Ο Δεν γνωρίζω
8. Έχει κάνει ποτέ κατάχρηση αλκοόλ ή εξαρτησιογόνων ουσιών; Ο Ναι Ο Όχι Ο Δεν γνωρίζω
• **Έχετε ολοκληρώσει το ερωτηματολόγιο. Σας ευχαριστούμε!**

Ερωτηματολόγιο Ανίχνευσης Κρανιοεγκεφαλικών Κακώσεων- για 12 ετών και πάνω

- Στόχος του ερωτηματολογίου αυτού είναι να προσδιοριστεί κατά πόσον έχετε υποστεί, οποιαδήποτε στιγμή, κρανιοεγκεφαλική κάκωση. Οι κακώσεις αυτές είναι δυνατόν να έχουν επιπτώσεις που δύσκολα μπορούν να προβλεφθούν - επιπτώσεις που περνάνε σχεδόν απαρατήρητες μέχρι και επιπτώσεις που συνταράζουν ολόκληρη τη ζωή μας. Επίσης, μερικές φορές δεν αντιλαμβανόμαστε ότι μια κρανιοεγκεφαλική κάκωση μάς δημιουργεί προβλήματα. **Το Πρώτο Μέρος** του ερωτηματολογίου θα σας βοηθήσει να φέρετε στη μνήμη σας κάποια συμβάντα κατά τα οποία είναι δυνατό να είχατε υποστεί μια τέτοια κάκωση. Αν δεν έχετε βιώσει οποιοδήποτε τέτοιο συμβάν τότε η συμπλήρωση του ερωτηματολογίου έχει ολοκληρωθεί. Αν όντως έχετε βιώσει οποιοδήποτε από τα συμβάντα αυτά, θα σας ζητήσουμε να συμπληρώσετε το Δεύτερο και το Τρίτο Μέρος. **Το Δεύτερο Μέρος** τεκμηριώνει τα είδη των προβλημάτων που βιώνουν μερικές φορές άτομα με κρανιοεγκεφαλική κάκωση στην καθημερινή τους ζωή. Κατά τη συμπλήρωση του Δευτέρου Μέρους θα πρέπει να θυμάστε ότι οι περισσότεροι άνθρωποι έχουν *μερικές* μόνο από τις δυσκολίες που παρατίθενται. **Στο Τρίτο Μέρος** θα κληθείτε να απαντήσετε σε μερικές ακόμη σημαντικές ερωτήσεις.
- Οι πληροφορίες που συλλέγουμε μέσα από αυτό το ερωτηματολόγιο είναι σημαντικές καθώς μπορούν να μας βοηθήσουν να εντοπίσουμε μια κρανιοεγκεφαλική κάκωση την οποία ίσως αγνοείτε και να προσδιορίσουμε τα συγκεκριμένα προβλήματα που μπορεί να έχει προκαλέσει η κάκωση αυτή. Οι πληροφορίες αυτές μπορεί να αποβούν χρήσιμες καθώς συχνά τα προβλήματα που προκαλούνται από μια κρανιοεγκεφαλική κάκωση μπορούν να αντιμετωπιστούν, αλλά μόνο αν είναι γνωστή η αιτία των προβλημάτων αυτών.

! Παρακαλούμε όπως καταχωρήσετε πιο κάτω τις βασικές πληροφορίες που περιέχονται στις δύο επόμενες σελίδες σημειώνοντας √ στο κατάλληλο σημείο Ο.

Προσωπικά Στοιχεία

Ημερομηνία γέννησης(Μήνας/Μέρα/Έτος): ___ ___ / ___ ___ / ___ ___

Σημερινή ημερομηνία (Μήνας/Μέρα/Έτος): ___ ___ / ___ ___ / ___ ___

Α. Ηλικία

___ ___ ετών

Β. Φύλο

O Άρρεν

O Θήλυ

Σημειώστε √ στον ορθό κύκλο

Γ. Εθνική καταγωγή

O Ελληνοκυπριακή

O Τουρκοκυπριακή

O Μαρωνίτικη

O Αρμένικη

O Λατινική

O Άλλη. Προσδιορίστε: _____

Δ. Ποιο είναι περίπου το σημερινό ετήσιο εισόδημα της οικογένειας σας;

O €0 μέχρι € 10,000

O € 10,001 μέχρι € 15,000

O € 15,001 μέχρι € 20,000

O € 20,001 μέχρι € 25,000

O € 25,001 μέχρι € 35,000

O Πάνω από €35,000

O Δεν γνωρίζω

Ε. Σε ποία τάξη φοιτάς;

O Ε΄ τάξη του Δημοτικού Σχολείου

O Στ΄ τάξη του Δημοτικού Σχολείου

O Α΄ τάξη του Γυμνασίου

O Β΄ τάξη του Γυμνασίου

O Γ΄ τάξη του Γυμνασίου

O Α΄ τάξη του Λυκείου

O Β΄ τάξη του Λυκείου

O Γ΄ τάξη του Λυκείου

O Δεν γνωρίζω

Πρώτο Μέρος: Τραυματισμοί και Εισαγωγή στο Νοσοκομείο

- Στη **Στήλη Α** πιο κάτω παρατίθενται κάποιες περιστάσεις κατά τις οποίες ένα άτομο μπορεί να υποστεί κτύπημα στο κεφάλι. Για κάθε συμβάν που καταγράφεται, καταχωρήστε τον αριθμό των φορών που έχετε υποστεί κτύπημα στο κεφάλι στη συγκεκριμένη περίσταση (σημειώστε √). Το παράδειγμα καταγράφει ότι το άτομο έχει υποστεί κτύπημα στο κεφάλι δύο φορές σε αυτοκινητιστικό δυστύχημα.
- Για οποιοδήποτε συμβάν κατά το οποίο δεν έχετε υποστεί ΚΑΝΕΝΑ κτύπημα στο κεφάλι, καταχωρήστε μηδέν (0)
- Απαντήστε σε όλες τις ερωτήσεις στη **Στήλη Α**.

- Για κάθε κτύπημα στο κεφάλι που έχετε καταχωρήσει στη **Στήλη Α**, απαντήστε στις ερωτήσεις της **Στήλης Β**. Για οποιαδήποτε κτυπήματα στο κεφάλι για τα οποία δεν θυμάστε αν χάσατε τις αισθήσεις σας ή αν ήσασταν με θολωμένη/αργή σκέψη ή συγχυσμένος/η, σημειώστε √ στο κουτί της στήλης **"Δεν Γνωρίζω"**.

ΣΤΗΛΗ Α					**ΣΤΗΛΗ Β**							
Έχετε υποστεί κτύπημα στο κεφάλι σε αυτή την περίσταση;	**Πόσες φορές;**				**Χάσατε ποτέ τις αισθήσεις σας; Πόσες φορές;**			**Ήσασταν ποτέ με θολωμένη/ αργή σκέψη ή συγχυσμένος/η; Πόσες φορές;**				**Δεν γνωρίζω**
	0	**1**	**2**	**3 ή περισσότερες**	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	
Παράδειγμα: Σε αυτοκινητιστικό δυστύχημα;			✓						✓			✓
30. Δυστύχημα με αυτοκίνητο / βαν / φορτηγό / λεωφορείο;												
31. Δυστύχημα με μοτοσικλέτα ή οποιονδήποτε άλλο όχημα;												
32. Κτυπηθήκατε από όχημα ενώ ήσασταν πεζός;												
33. Κτυπηθήκατε από αντικείμενο που έπεφτε;												

- Βεβαιωθείτε πως συμπληρώσατε όλες τις Ερωτήσεις 1-4 και τα σημεία της Στήλης Α και Β.
- Τώρα πηγαίνετε στη σελίδα 4.

ΣΤΗΛΗ Α					ΣΤΗΛΗ Β								
Έχετε υποστεί κτύπημα στο κεφάλι σε αυτή την περίσταση;	**Πόσες φορές;**				**Χάσατε ποτέ τις αισθήσεις σας; Πόσες φορές;**				**Ήσασταν ποτέ με θολωμένη/ αργή σκέψη ή συγχυσμένος/η; Πόσες φορές;**				**Δεν γνωρίζω**
	0	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	
34. Κτυπηθήκατε από κάποιου είδους εξοπλισμό;													
35. Πέσατε από τη σκάλα;													
36. Πέσατε από ψηλά;													
37. Πέσατε κατά τη διάρκεια λιποθυμικού επεισοδίου;													
38. Πέσατε όταν χάσατε προσωρινά τις αισθήσεις σας λόγω χρήσης ναρκωτικών ή αλκοόλ;													
39. Ενώ κάνατε ποδήλατο;													
40. Ενώ κάνατε πατίνια ή τροχοσανίδα (skateboard);													
41. Ενώ κάνατε ιππασία;													
42. Ενώ κάνατε σκι ή snowboarding;													
• Βεβαιωθείτε πως συμπληρώσατε όλες τις Ερωτήσεις 5-13 και τα σημεία της Στήλης Α και Β. • Τώρα πηγαίνετε στη σελίδα 5.													

ΣΤΗΛΗ Α					ΣΤΗΛΗ Β								
Έχετε υποστεί κτύπημα στο κεφάλι σε αυτή την περίσταση;	**Πόσες φορές;**				**Χάσατε ποτέ τις αισθήσεις σας; Πόσες φορές;**				**Ήσασταν ποτέ με θολωμένη/ αργή σκέψη ή συγχυσμένος/η; Πόσες φορές;**				**Δεν γνωρίζω**
	0	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	
43. Ενώ κάνατε κάποιο άθλημα (ποδόσφαιρο, καλαθόσφαιρα, πετόσφαιρα);													
44. Στην παιχνιδούπολη /πάρκο;													
45. Κατά τη διάρκεια κατάδυσης στο νερό;													
46. Κατά τη διάρκεια επίθεσης ή ληστείας εναντίον σας;													
47. Κατά τη διάρκεια σωματικής κακοποίησής σας;													
48. Άλλο; …….. ……..													
• Βεβαιωθείτε πως συμπληρώσατε όλες τις Ερωτήσεις 14-19 και τα σημεία της Στήλης Α και Β. • Τώρα πηγαίνετε στη σελίδα 6.													

ΕΠΕΙΓΟΝΤΑ ΙΑΤΡΙΚΑ ΠΕΡΙΣΤΑΤΙΚΑ					• Για κάθε επείγον ιατρικό περιστατικό που έχει καταχωρηθεί στη **Στήλη Α**, παρακαλούμε όπως απαντήσετε στις πιο κάτω ερωτήσεις της **Στήλης Β**. Για οποιεσδήποτε από τις περιπτώσεις όπου δεν μπορείτε να θυμηθείτε αν χάσατε τις αισθήσεις σας ή αν ήσασταν με θολωμένη/αργή σκέψη ή συγχυσμένος/η, σημειώστε √ στο κουτί της στήλης "**Δεν Γνωρίζω"**.									
ΣΤΗΛΗ Α					**ΣΤΗΛΗ Β**									
Έχετε εισαχθεί ποτέ σε νοσοκομείο ή εξεταστεί σε τμήμα πρώτων βοηθειών για οποιοδήποτε από τους πιο κάτω λόγους ;	**Πόσες φορές;**				**Χάσατε ποτέ τις αισθήσεις σας; Πόσες φορές;**				**Ήσασταν ποτέ με θολωμένη/ αργή σκέψη ή συγχυσμένος/η; Πόσες φορές;**				**Δεν γνωρίζω**	
	0	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**		
49. Διάσειση;														
50. Κάταγμα στο κεφάλι, τον αυχένα ή το πρόσωπο;														
51. Σπασμούς;														
52. Ψηλό πυρετό;														
53. Είχατε επεισόδιο πνιγμού ή δηλητηρίασης;														
54. Τραυματισμό από ηλεκτρικό ρεύμα ή από κεραυνό;														
• Βεβαιωθείτε πως συμπληρώσατε όλες τις Ερωτήσεις 20-25 και τα σημεία της Στήλης Α και Β. • Τώρα πηγαίνετε στη Σελίδα 7.														

ΣΤΗΛΗ Α					ΣΤΗΛΗ Β								
Έχετε εισαχθεί ποτέ σε νοσοκομείο ή εξεταστεί σε τμήμα πρώτων βοηθειών για οποιοδήποτε από τους πιο κάτω λόγους ;	**Πόσες φορές;**				**Χάσατε ποτέ τις αισθήσεις σας; Πόσες φορές;**				**Ήσασταν ποτέ με θολωμένη/ αργή σκέψη ή συγχυσμένος/η; Πόσες φορές;**				**Δεν γνωρίζω**
	0	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	**0**	**1**	**2**	**3 ή περισσότερες**	
55. Τραυματισμό από πυροβολισμό;													
56. Εγκεφαλικό ή εγκεφαλική αιμορραγία;													
57. Λοίμωξη ή όγκο στον εγκέφαλο;													
58. . Άλλο τραυματισμό;													

- Βεβαιωθείτε πως συμπληρώσατε όλες τις Ερωτήσεις 26-29 και τα σημεία της Στήλης Α και Β.
- Τώρα πηγαίνετε στη Σελίδα 8.

Α. Έχετε υποστεί ΟΠΟΙΑΔΗΠΟΤΕ κτυπήματα στο κεφάλι στις περιστάσεις που παρατίθενται στις σελίδες 3-5;

Ο Όχι
Ο Ναι

Β. Έχετε βιώσει ΟΠΟΙΑΔΗΠΟΤΕ από τα επείγοντα ιατρικά περιστατικά που παρατίθενται στις σελίδες 6-7;

Ο Όχι
Ο Ναι

Γ. ΘΥΜΑΣΤΕ αν ήσασταν με θολωμένη/αργή σκέψη ή συγχυσμένος/η ή αν χάσατε τις αισθήσεις σας μετά από κτύπημα στο κεφάλι ή ένα επείγον ιατρικό περιστατικό;

Ο ΠΟΤΕ δεν ήμουν με θολωμένη/αργή σκέψη ή συγχυσμένος/η και ΠΟΤΕ δεν έχασα τις αισθήσεις μου ως αποτέλεσμα κτυπήματος στο κεφάλι ή επείγοντος ιατρικού περιστατικού.

Ο ΈΧΩ ΧΑΣΕΙ τις αισθήσεις μου Ή ήμουν με θολωμένη/αργή σκέψη ή συγχυσμένος/η τουλάχιστον μια φορά ως αποτέλεσμα κτυπήματος στο κεφάλι ή επείγοντος ιατρικού περιστατικού.

Ο ΔΕΝ ΘΥΜΑΜΑΙ αν έχασα τις αισθήσεις μου Ή ήμουν με θολωμένη/αργή σκέψη ή συγχυσμένος/η ως αποτέλεσμα κτυπήματος στο κεφάλι ή επείγοντος ιατρικού περιστατικού.

4. Ποιο ήταν το <u>μεγαλύτερο</u> διάστημα κατά το οποίο χάσατε τις αισθήσεις σας μετά από κτύπημα στο κεφάλι ή επείγον ιατρικό περιστατικό;

Ο Ποτέ δεν έχασα τις αισθήσεις μου
Ο Λιγότερο από 20 λεπτά
Ο Από 20 λεπτά μέχρι 1 ώρα
Ο Πάνω από 1 ώρα, μέχρι 24 ώρες
Ο Πάνω από 24 ώρες, μέχρι 1 βδομάδα
Ο Πάνω από 1 βδομάδα, μέχρι 2 βδομάδες
Ο Πάνω από 2 βδομάδες, μέχρι ένα μήνα
Ο Ένα μήνα ή περισσότερο
Ο Δεν γνωρίζω

5. Ποιο ήταν το μεγαλύτερο διάστημα κατά το οποίο ήσασταν με θολωμένη/αργή σκέψη ή συγχυσμένος/η μετά από κτύπημα στο κεφάλι ή επείγον ιατρικό περιστατικό;

O Ποτέ δεν ήμουν με θολωμένη ή αργή σκέψη ή συγχυσμένος/η
O Για λιγότερο από 1 λεπτό
O Από 1 μέχρι 10 λεπτά
O Από 11 μέχρι 20 λεπτά
O Από 21 λεπτά μέχρι 1 ώρα
O Πάνω από 1 ώρα, μέχρι 24 ώρες
O Πάνω από μια μέρα
O Δεν γνωρίζω

6. Πόσων χρονών ήσασταν όταν είχατε υποστεί το κτύπημα στο κεφάλι ή το επείγον ιατρικό περιστατικό κατά τα οποίο με βεβαιότητα (ή ενδεχομένως) χάσατε τις αισθήσεις σας ή ήσασταν με θολωμένη/αργή σκέψη ή συγχυσμένος/η; Αν υπήρξε πέραν του ενός τέτοιου συμβάντος, σε ποια ηλικία συνέβη το πρώτο συμβάν και σε ποια ηλικία το τελευταίο;

Α. Αν είχατε μια μόνο κάκωση:
Ηλικία κατά την κάκωση

Β. Αν είχατε πάνω από μια κακώσεις:
Ηλικία κατά την τελευταία κάκωση

• Τώρα πηγαίνετε στη σελίδα 10

Δεύτερο Μέρος: Προβλήματα και Δυσκολίες στην Καθημερινή Ζωή;

- Παρακαλούμε σημειώστε √ για να υποδείξετε πόσο συχνά, εντός του τελευταίου μήνα, έχετε βιώσει μια από τις δυσκολίες που παρατίθενται. Μερικά από τα προβλήματα ίσως να μην ισχύουν για σας. Για παράδειγμα 'ορθογραφικά λάθη' δεν ισχύει για ένα άτομο που ποτέ δεν έμαθε να γράφει ή δεν μπορεί να γράψει. Σε τέτοιες περιπτώσεις, θα πρέπει να σημειώσετε την επιλογή 'Δεν ισχύει'.

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή σας ζωή;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
106. Δυσκολία να παραμείνετε ξύπνιοι;						
107. Δυσκολία να αποκοιμηθείτε ή να παραμείνετε κοιμισμένοι;						
108. Δυσκολία να ξυπνήσετε μετά από κανονικό ύπνο ή ένα σύντομο υπνάκο;						
109. Έχετε εφιάλτες;						
110. Νιώθετε να σκοτεινιάζουν τα πάντα γύρω σας, έχετε λιποθυμίες ή σπασμούς;						
111. Είστε αδέξιοι, σας πέφτουν πράγματα ή σκουντουφλάτε;						
112. Νιώθετε κρύο;						
113. Νιώθετε ζάλη;						
114. Χάνετε την ισορροπία σας;						
115. Νιώθετε βούισμα στα αυτιά ή δυσκολεύεστε να ακούσετε;						
116. Έχετε διπλή ή θολή όραση;						
117. Τρώτε υπερβολικές ποσότητες;						
118. Έχετε περιορισμένη ή καθόλου όρεξη;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή σας ζωή;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
119. Το φαγητό δεν έχει τη σωστή γεύση;						
120. Δυσκολεύεστε να μυρίσετε κάποια πράγματα;						
121. Έχετε πονοκεφάλους;						
122. Νιώθετε κούραση;						
123. Κινείστε με αργό ρυθμό;						
124. Έχετε αυξημένο/η ή μειωμένο/η σεξουαλικό ενδιαφέρον ή συμπεριφορά;						
125. Φίλοι ή συγγενικά σας πρόσωπα σας φαίνονται άγνωστα;						
126. Σκέφτεστε πιο αργά;						
127. Παθαίνετε σύγχυση σε οικείους χώρους;						
128. Δυσκολεύεστε να συγκεντρωθείτε και να διατηρήσετε τη προσοχή;						
129. Αποσπάται εύκολα η προσοχή σας;						
130. Χάνετε τον ειρμό των σκέψεών σας;						
131. Ξεχνάτε αυτό που μόλις είπατε;						
132. Ξεχνάτε τι συνέβη χθες ή άλλα πρόσφατα συμβάντα;						
133. Ξεχνάτε ονόματα κοινών αντικειμένων ή δυσκολεύεστε να βρείτε την κατάλληλη λέξη για να εκφράσετε τις σκέψεις σας;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή σας ζωή;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
134. Ξεχνάτε τα ονόματα ατόμων, περιλαμβανομένων και μελών της οικογένειάς σας;						
135. Ξεχνάτε αριθμούς τηλεφώνου ή διευθύνσεις που γνωρίζετε καλά;						
136. Ξεχνάτε να φάτε;						
137. Ξεχνάτε να πάρετε τα φάρμακά σας;						
138. Ξεχνάτε αν έχετε κάνει κάτι;						
139. Ξεχνάτε να κάνετε διάφορες δουλειές, κατ'οίκον εργασία ή εργασία στο σπίτι ;						
140. Ξεχνάτε, χάνετε ή καθυστερείτε στα ραντεβού σας;						
141. Χάνετε την αίσθηση του χρόνου;						
142. Χάνεστε (δεν ξέρετε πού βρίσκεστε);						
143. Είστε αποδιοργανωμένος;						
144. Δεν βάζετε τα πράγματα πίσω στη θέση τους, ξεχνάτε πού βρίσκονται;						
145. Ξεχνάτε να σβήσετε ηλεκτρικές συσκευές;						
146. Δυσκολεύεστε να πάρετε αποφάσεις;						
147. Δυσκολεύεστε να λύσετε προβλήματα;						
148. Δυσκολεύεστε να προγραμματίσετε μελλοντικά γεγονότα;						
149. Δυσκολεύεστε να καθορίσετε προτεραιότητες;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή σας ζωή;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
150. Δυσκολεύεστε να ακολουθήσετε οδηγίες, προφορικές ή γραπτές;						
151. Δυσκολεύεστε να μάθετε μέσα από την εμπειρία;						
152. Δυσκολεύεστε να μάθετε νέες δεξιότητες και νέες πληροφορίες;						
153. Μαθαίνετε αργά;						
154. Διαβάζετε πιο αργά, δυσκολεύεστε να διαβάσετε;						
155. Ξεχνάτε αυτό που μόλις έχετε διαβάσει;						
156. Δυσκολεύεστε να κατανοήσετε αυτό που διαβάζετε ή αυτό που σας διαβάζουν;						
157. Γράφετε αργά;						
158. Γράφετε δυσανάγνωστα, με άσχημο γραφικό χαρακτήρα;						
159. Κάνετε ορθογραφικά λάθη;						
160. Δυσκολεύεστε στη γραφή, στην ανάγνωση και στα μαθηματικά;						
161. Δυσκολεύεστε να χειριστείτε τις προσωπικές σας υποθέσεις και τα οικονομικά σας;						
162. Βιώνετε μια ανεξήγητη αλλαγή στην απόδοσή σας στο σχολείο;						
163. Δυσκολεύεστε να εκτελέσετε κάποιες εργασίες;						
164. Δυσκολεύεστε να κατανοήσετε αστεία και χιούμορ;						
165. Δυσκολεύεστε να κάνετε μια συνομιλία;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή σας ζωή;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
166. Μιλάτε υπερβολικά;						
167. Δεν ακούτε όταν σας μιλούν;						
168. Έχετε δυσκολίες στο λόγο, όπως πρόβλημα στην κατανόηση μιας συνομιλίας ή δυσκολία στην προφορά λέξεων;						
169. Μιλάτε με τρόπο που οι άλλοι δεν μπορούν να σας κατανοήσουν;						
170. Μιλάτε πολύ γρήγορα ή πολύ αργά;						
171. Επαναλαμβάνετε αυτά που λένε οι άλλοι.						
172. Νιώθετε ότι οι άλλοι μιλάνε πολύ γρήγορα;						
173. Νιώθετε ότι είστε κακόκεφος;						
174. Βιώνετε γρήγορες εναλλαγές στη διάθεσή σας;						
175. Νιώθετε ανυπομονησία ή ευερεθιστικότητα;						
176. Νιώθετε έντονη απογοήτευση;						
177. Σπάτε ή πετάτε πράγματα;						
178. Αψηφάτε τον κίνδυνο, κάνετε επικίνδυνα πράγματα;						
179. Νιώθετε θυμό;						
180. Φωνάζετε ή τσιρίζετε, έχετε ξεσπάσματα θυμού;						
181. Βρίζετε ή απειλείτε άλλους ή τον εαυτό σας;						
182. Κτυπάτε ή σπρώχνετε τους άλλους;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή σας ζωή;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
183. Κάθεστε όλη μέρα χωρίς να κάνετε τίποτα, νιώθετε βαριεστιμάρα;						
184. Έχετε σκέψεις που επανέρχονται;						
185. Δυσκολεύεστε να αρχίσετε να κάνετε κάτι;						
186. Γελάτε χωρίς λόγο;						
187. Κάνετε άτοπα/ ανάρμοστα σχόλια;						
188. Συμπεριφέρεστε κατά τρόπο ανάρμοστο;						
189. Νιώθετε νευρικότητα, ανησυχία ή δεν μπορείτε να καθίσετε ήσυχοι;						
190. Κλαίτε εύκολα ή χωρίς λόγο;						
191. Νιώθετε μοναξιά;						
192. Νιώθετε λύπη ή μελαγχολία;						
193. Δεν νιώθετε αυτοπεποίθηση;						
194. Νιώθετε ότι σας παρεξηγούν;						
195. Νιώθετε απελπισία, ότι δεν αξίζετε;						
196. Νιώθετε ότι η ζωή δεν αξίζει να τη ζεις, εκφράζετε σκέψεις που δείχνουν επιθυμία να πεθάνετε;						
197. Νιώθετε τρόμο ή φόβο;						
198. Κάνετε πράγματα χωρίς να τα σκεφτείτε καλά, είστε παρορμητικός;						
199. Δυσκολεύεστε να αντιμετωπίσετε απροσδόκητες αλλαγές;						

Τον τελευταίο μήνα, πόσο συχνά τα πιο κάτω αποτελούσαν πρόβλημα στην καθημερινή σας ζωή;	**Κάθε μέρα ή σχεδόν κάθε μέρα**	**Αρκετές φορές**	**Μία ή δύο φορές**	**Ποτέ**	**Δεν γνωρίζω**	**Δεν ισχύει**
200. Αποφεύγετε μέλη της οικογένειας ή φίλους;						
201. Καυγαδίζετε;						
202. Είστε αγενείς με τους άλλους, τους διακόπτετε;						
203. Δυσκολεύεστε στις σχέσεις σας με τους άλλους;						
204. Νιώθετε άβολα όταν βρίσκεστε μαζί με άλλους;						
205. Βιώνετε δυσκολίες όταν βρίσκεστε ανάμεσα σε πολύ κόσμο;						
206. Οποιοδήποτε άλλο πρόβλημα; _____ _____ _____						
207. Οποιοδήποτε άλλο πρόβλημα; _____ _____ _____						
208.. Οποιοδήποτε άλλο πρόβλημα; _____ _____ _____						
209. Οποιοδήποτε άλλο πρόβλημα; _____ _____ _____						
210. Οποιοδήποτε άλλο πρόβλημα; _____ _____ _____						

Τρίτο Μέρος: Πρόσθετες Ερωτήσεις

9. Παίρνετε οποιαδήποτε φάρμακα;

O Ναι
O Όχι

Αν ναι, ποια είναι αυτά τα φάρμακα; (αν δεν γνωρίζετε τα ονόματά τους, για ποιες ιατρικές ή άλλες παθήσεις σάς έχουν δοθεί;)

_____
____

10. Γεννηθήκατε με χαμηλό βάρος:

O Ναι
O Όχι
O Δεν γνωρίζω

11. Γεννηθήκατε πρόωρα (ένα μήνα ή περισσότερο πριν από την αναμενόμενη ημερομηνία τοκετού);

O Ναι
O Όχι
O Δεν γνωρίζω

12. Έχετε διαγνωστεί κατά τη γέννηση με εμβρυϊκό αλκοολικό σύνδρομο; (αυτό μπορεί να συμβεί όταν ένα έμβρυο έχει εκτεθεί σε αλκοόλ κατά τη διάρκεια της εγκυμοσύνης)

O Ναι
O Όχι
O Δεν γνωρίζω

13. Έχετε ποτέ χαρακτηριστεί ως άτομο με μαθησιακή δυσκολία ή διαταραχή ελλειμματικής προσοχής;

O Ναι
O Όχι
O Δεν γνωρίζω

14. Έχετε λάβει ποτέ φαρμακευτική αγωγή για ψυχιατρική νόσο;

O Ναι
O Όχι
O Δεν γνωρίζω

15. Έχετε εισαχθεί ποτέ σε νοσοκομείο για ψυχιατρική νόσο;

O Ναι
O Όχι
O Δεν γνωρίζω

16. Ενταχθήκατε ποτέ σε πρόγραμμα αποθεραπείας για κατάχρηση αλκοόλ ή ουσιών ή σε ομάδα στήριξης;

O Ναι
O Όχι
O Δεν γνωρίζω

- Έχετε ολοκληρώσει το ερωτηματολόγιο. Σας ευχαριστούμε!