Educational professionals' understanding of childhood traumatic brain injury

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Abstract

Primary objectives: To determine the understanding of educational professionals around the topic of childhood brain injury, and explore the factor structure of the Common Misconceptions about Traumatic Brain Injury Questionnaire (CM-TBI).

Research design: Cross sectional postal survey.

Methods and procedures: The CM-TBI was posted to all educational establishments in one region of the United Kingdom. One representative from each school was asked to complete and return the questionnaire (N = 388).

Main outcomes and results: Differences were demonstrated between those participants who knew someone with a brain injury and those who did not, with a similar pattern being shown for those educators who had taught a child with brain injury. Participants who had taught a child with brain injury demonstrated greater knowledge in areas such as seatbelts/prevention, brain damage, brain injury sequelae, amnesia, recovery, and rehabilitation. Principal components analysis suggested the existence of four factors and the discarding of half the original items of the questionnaire.

Conclusions: In the first European study to explore this issue, we highlight that teachers are ill prepared to cope with children who have sustained a brain injury. Given the importance of

a supportive school environment in return to life following hospitalisation, the lack of understanding demonstrated by teachers in this research may significantly impact on a successful return to school.

Keywords: Education, Traumatic Brain Injury, Children, Misconceptions

Introduction

Paediatric traumatic brain injury (TBI) has been shown to impact on educational attainment through deficits in memory, attention, planning, language and behavioural control [1-3]. These deficits not only pose a problem for the child in attempting to gain an education but also for the educators who must make allowances for that child in their teaching. A number of studies point to the impact of injury severity on academic attainment [4,5], however, few have explored the impact of contextual factors in the child's learning environment [6]. Among the most important of these is the awareness and understanding of educators.

While researchers [6,7] have demonstrated the importance of a supportive school environment on a successful return to education, few studies have explored the understanding of educational professionals around paediatric brain injury. However, in a comparative study which investigated educators and rehabilitation professionals' misconceptions of paediatric TBI, educators were shown to hold more misconceptions in relation to issues such as memory, coma, anger management and recovery [8]. Utilising the common misconceptions about traumatic brain injury (CM-TBI) [9] questionnaire the authors note that educators (N = 184), from Missouri USA, held less misconceptions when compared to family members of adults with TBI from previous studies [10,11]. The authors suggest that the CM-TBI be used as a means to generate discussion with educators, and that future research should seek to refine the tool.

Given the documented consequences of childhood brain injury across multiple developmental domains [12,13,5], it is reasonable to assume that children who have acquired a brain injury may experience a Special Educational Need (SEN). Identifying SENs in a timely manner, and making the appropriate provision, is a key principle of the SEN Code of Practice [14]. Responsibility for the initial assessment and identification of SENs in the UK rests with the school [15,14] and meeting these needs is a statutory obligation [16]. As previous research has suggested that educational professionals have a limited understanding of childhood brain injury [8] the extent to which educators are able to adequately identify, and provide for the needs of children with brain injuries, presents as a cause for concern.

Following injury children may often require a phased return to school [17] or may benefit from a period of home schooling [18]. Whilst the return to full-time education may be viewed by family members as a return to normalcy, schooling may only serve to expose a new set of difficulties that the child must now face. For example, children who experience problems with disinhibition, irritability, frustration and demanding behaviour [19] can find the establishment of peer relationships extremely challenging [20]. Children with brain injuries may suffer from loneliness, low self-esteem and display aggressive behaviour [21]. The lack of a supportive social network at school may result in children dropping out of school and exposure to criminality [22]. These difficulties are not limited to the child and also include characteristics of the school environment. Poor communication, attitudes, lack of knowledge and resources, and the underestimation of the importance of return to school following TBI, have all been identified as barriers preventing successful return to school [18]. It has been demonstrated that educators are often informed about the initial brain injury on return to school but this information is not fully disseminated as the child changes year or institution [23]. This resulted in around 20% of children in this study being disciplined for behavioural infractions or being expelled from school entirely [23].

Investigation into the misconceptions and understanding of brain injury has identified many erroneous beliefs [24-26] together with indications of a developing knowledge base [27,28], Among members of the general public, adult survivors of brain injury are perceived as unproductive, untrustworthy and lacking in pride [29]. The public have also demonstrated misconceptions around issues such as recovery, coma, unconsciousness and memory deficits [28]. The CM-TBI has also been used to investigate the misconceptions of survivors of brain injury from ethnic minorities [30]. This research revealed that Hispanic, Spanish speaking participants held many more misconceptions than Hispanic, English speaking participants and African Americans. Qualitative investigations have further revealed that the complexity of behavioural and cognitive sequelae are poorly understood [31] and that members of the public tend to rely on outward indications of trauma to identify the presence of brain injury [27]. Such beliefs have also been shown to exist among friends and relatives [26], and perhaps surprisingly, among members of the healthcare profession [24,8]. It is likely that such misconceptions lead to negative perceptions of survivors of brain injury [32,33] and may result in prejudice and discrimination [34,35.]

Much of the above literature suggests the influence of diverse factors in explaining how the public and healthcare professionals perceive survivors of brain injury. These have included gender, age, injury severity [30], experience [24], education [32], and knowledge [34,31] to name a few.

As it is not possible to include all of these factors in the current research a subset of these will be considered.

Given the influential role educators play in the lives of children, they represent a key figure in return to school life following injury. It is therefore important to determine the level of understanding that educators have in regard to brain injury. As there is currently only one available study on educators understanding of paediatric brain injury in the USA [8], the purpose of the present study was to investigate this topic in a population of UK educational professionals. It was hypothesised that educators who had experience of teaching childhood survivors of brain injury would possess greater understanding, as measured by the CM-TBI, than those who had no such experience. A second hypothesis predicted that educators who had personal knowledge of brain injury would demonstrate more understanding than those with no such knowledge. A third hypothesis stated that educators who had received training around TBI would perform better than those with no training, and lastly, that differences in understanding based on school type would exist.

Method

Pilot study

Prior to conducting the full scale study it was considered good practice to trial the questions of the CM-TBI, [9] to ensure partcipants would understand them, and to provide a degree of validity. In order to increase the variablility of responses, a five point likert scale replaced the original true/false response options. This scale comprised the statements ‘very true’, ‘true’, ‘neither true nor false’, ‘false’ and ‘very false’. In addition, one of the original questions was thought to prove difficult to understand. This question read “once a child with a brain injury realizes where they are, they will always be aware of this”. The authors felt that this question lacked specificity and altered it to “once a child with a brain injury realises their degree of impairment they will always be aware of this”.

Twelve participants employed in secondary and tertiary education were asked to complete all forty items of the questionnaire. A further three statements sought these individual’s opinion on their understanding of the questions, possible ambiguities, and the intended topic of the questions. Participants were encouraged to provide qualitative feedback to explain their decisions. All participants stated that they understood the questions, but many identified problems with both the phrasing and the response scale. In order to assess the content validity of the questions particpants were asked to tick as many of the following suggested topics as they felt applied; brain injury (N = 9), education (N = 5), road saftety (N = 5), cognitive impairment (N = 5) and children (N = 10). Table 2 highlights the changes made to the questions in response to this feedback. Participants disliked the response items ‘very true’ and ‘very false’, and felt that an option to express a lack of knowledge should be included. The response scale was thus altered to one which employed the statements ‘strongly agree’, ‘agree’, ‘don’t know’, ‘disagree’ and ‘strongly disagree’.

Participants and design

A cross-sectional postal survey was employed to ensure the questionnaire could be distributed to all schools in one region of the UK (Northern Ireland). The study explored four independent variables including knowledge, experience, training and school type. Knowledge was measured at two levels (knowledge of someone with a brain injury and no knowledge), as was experience (having taught a child with brain injury or not) and training (having received training or not). School type was measured at four levels (nursery, primary, post primary, and all). Nursery referred to those schools whose children had yet to start compulsory education and who were less than 4 years of age (equivalent to preschool in the US). Primary schools were those whose children ranged in age from 4 years to around 11 years (equivalent to kindergarten to 5th grade in the US). Post primary education begins around the age of 12 and continues until around 18 years (equivalent to grades 6-12 in the US). The category of ‘all’ referred to schools where children of all age ranges were taught. These could include special educational establishments or independent schools. Three hundred and eighty-eight representatives from schools across the region returned completed questionnaires. Table 1 presents demographic information on the respondents, the majority of whom were principals, who had more than 21 years of experience in the teaching profession. One hundred and sixty-three participants reported that they knew someone who had acquired a brain injury, whilst 100 stated that they had personally taught a child who had a brain injury. Of the 100 participants who had taught a child with brain injury, 16 stated that they had received some training.

Insert table 1 about here

Materials

The common misconception about Traumatic Brain Injury questionnaire (CM-TBI) [9] is a 40 item tool which asks participants to assess whether statements on seven domains are true or false. These domains included seatbelts/prevention (4 items), brain damage (4 items), brain injury sequelae (9 items), unconsciousness (3 items), amnesia (4 items), recovery (13 items), and rehabilitation (3 items). In response to feedback obtained from the pilot study, the original response scale was altered from true/false to a five point scale consisting of the statements ‘strongly agree (1)’, ‘agree (2)’, ‘don’t know (3)’, ‘disagree (4)’, and ‘strongly disagree (5)’. All of the true responses (N = 18) were reversed scored to make them equivalent to the false items (N = 22). This procedure allowed for the production of a total score with a participant scoring in the range of 40-200. The internal consistency of the questionnaire was checked in the current study by using Cronbach's alpha. The questionnaire was shown to possess acceptable levels of reliability 0.75.

Procedure

Letters inviting one teacher from every school in Northern Ireland to take part in the survey were sent to 1288 educational establishments. Potential participants were informed that if they did not wish to take part in the research, they could contact the research team, who would remove them from the mailing list. A total of 72 requests to opt out of the research were received. The main reason given for not wishing to participate centred around a lack of available resources. Approximately two weeks later the questionnaire and information sheet were posted to the remaining 1216 schools. The principal, pastoral care teacher or special educational needs coordinator (SENCO), were asked to take responsibility for completing and returning the questionnaire. In order to increase the response rate, a reminder was emailed to all schools who had not returned their questionnaires one week following the initial receipt. A total of 388 questionnaires were returned comprising a response rate of 32%.

In UK schools the pastoral care teacher is a named lead who has responsibility for ensuring that pupils enjoy full participation in all school activities. They are required by law to ensure that the school is a safe environment and meets the social, emotional, psychological and cognitive needs of the pupils. The SENCO's role is to identify any children who might have special educational needs (SEN), with a view to supporting learning, and accessing appropriate services, to best meet the child's needs. The school principal, or head teacher, has responsibility for overall management of the school.

Ethical approval

The research protocol for the study was reviewed by two independent academics and was granted a favourable decision by the University research ethics committee. Issues of anonymity, confidentiality and the right to withdraw from the research were explained to participants by means of an information sheet included with the questionnaire.

Data analysis

Participants' responses were entered into SPSS version 17.0 which was used to run all of the statistical analyses. Twenty percent of the data was checked for accuracy by an impartial third party. Descriptive statistics were used to explore the numbers of children being taught by participants in the sample, and for a detailed examination of responses by question. Analysis of variance (ANOVA) was used to test for differences between knowledge, experience, training and school type on the total score of the questionnaire. Correlations tested the relationship between pupil numbers and total score. Lastly, an exploratory, principal components analysis (PCA) was conducted to determine the underlying structure of the questionnaire.

Results

Four one-way ANOVAs were carried out to test for the effects of knowledge, experience, training and school type on the total score of the CM-TBI. Two Pearson's correlations explored the relationships between participants' total score and the numbers of pupils under their care.

Participants were asked how many children their school taught and how many of these had special educational needs. Small, specialist schools reported the lowest number of pupils (N =12) with larger post primary schools reporting the greatest number of students (N =1,710).

Some schools reported that they had no pupils with special educational needs, whilst one school had 415 students on their SEN register. Participants in the study were responsible for a total of 115,723 pupils, 15,748 of whom had SEN.

Table 2 shows the frequency and percentage of responses participants gave to each of the 40 items of the CM-TBI. In general, participants tended to express greater confidence in their response to the false items with 35.45% and 26.61% disagreeing and strongly disagreeing respectively. This is compared to 33.52% of participants agreeing with the true items and 11.82% strongly agreeing. However, a great many participants expressed a lack of knowledge about both the true (40.42%), and false (30.27%) questions. Within the domain of brain injury sequelae, 83.5 % of respondents disagreed, or said they didn't know, if it was common for children with brain injuries to be easily angered. When asked whether children who are knocked unconscious wake up quickly with no lasting effects, 26% of respondents disagreed, 44% stated that they didn't know, and 30% agreed. Within the domain of recovery, 98.8% disagreed, or said they didn't know, that children who had one brain injury were more likely to have a second. When asked if a second blow to the head could aid in memory recall, 29.1% said they didn't know, but 69.4% disagreed.

Insert table 2 about here

Analysis of variance showed a statistically significant difference between educational professionals who knew someone with a brain injury, and those who did not, on the total score of the CM-TBI [$F_{1,\,384} = 29.31$, $P < 0.0005$]. Those participants who knew someone with a brain injury, were on average, 5 points higher (M = 147.69, SD = 9.06, *range* = 130-177) on the scale, than those who had no knowledge (M = 142.48, SD = 9.54, *range* = 67-166). The lowest score recorded for participants who did not know an individual with brain injury was 67, whilst the lowest recorded in the second condition was 130, a difference of 63 points.

A second ANOVA was conducted to explore whether teaching a child with brain injury would impact on educational professionals' knowledge of paediatric brain injury. There was a statistically significant difference between teachers who had taught a childhood survivor of brain injury and those who had not [$F_{1, 385} = 14.90$, $P < 0.0005$]. Teachers who had personally taught a child with a brain injury, were on average, 4 points higher (*M* = 147.81, *SD* = 9.20, *range* = 130-177) on the CM-TBI, than those who had no such experience (*M* = 143.55, *SD* = 9.62, *range* = 67-175).

Scores on the CM-TBI were then descriptively explored by domain for the variables of experience and knowledge. Table 3 shows that participants who knew someone with a brain injury, or who had taught a child with brain injury, scored higher on the domains of seatbelts/prevention, brain damage, brain injury sequelae, amnesia, recovery and rehabilitation. Participants who had no such experience, or knowledge, scored higher on the domain of unconsciousness.

Insert table 3 about here

No statistically significant difference was found between school types on the total score of the CM-TBI [$F_{3, 386} = 1.25$, $P = 0.292$; Nursery *M* = 143.88, *SD* = 8.83; Primary *M* = 144.24, *SD* = 10.13; Post primary *M* = 145.73, *SD* = 8.41; All *M* = 15.80, *SD* = 8.01], or in relation to those who had received training, compared to those who had not [$F_{1, 383} = 3.41$, $P = 0.066$; Training *M* = 148.50, *SD* = 7.34; No training *M* = 144.42, *SD* = 9.71].

Two Pearson's correlations demonstrated statistically significant, positive associations, between total score and number of pupils (r = 0.108, N = 386, P = 0.033, two tailed), and number of pupils with SEN (r = 0.114, N = 350, P = 0.033, two tailed). Participants whose schools had more pupils tended to score higher on the CM-TBI.

Data met the underlying assumptions for conducting a principal components analysis as shown by Bartlett's test of sphericity (χ^2 = 3088.89, df = 780, $p < 0.001$). Following orthogonal varimax rotation, 15 factors emerged with eigenvalues greater than 1, which explained 63.27% of the total variance. However, many of these factors contained only one or two items. Costello and Osborne[36] suggest that items should be retained if they do not load on multiple factors, contain a minimum of three items, and possess factor loadings greater than 0.40. Following these criteria, twenty items were discarded, leaving the remaining twenty spread across four factors. Examination of the scree plot supported this conclusion and showed a break following the fourth factor. Table 4 presents the four factor solution to the newly proposed questionnaire. Further examination of the reliability of these items, using Cronbach's alpha, revealed a slight improvement on the original scale 0.77.

Insert table 4 about here

Discussion

This is the first study to explore the understanding of UK educators on paediatric brain injury. In accordance with previous research findings [28,34], the present work showed that knowing someone with a brain injury led to increased understanding of the condition among educators. One hundred and sixty-three participants reported that they knew someone with a brain injury whilst 100 stated that they had taught a child with brain injury. This may suggest that 63 participants were referring to children who they had not taught, or were perhaps referring to adults. Clearly the issues that adult survivors of brain injury face will be different from those encountered by children, however, knowing someone with a brain injury is likely to cause individuals to seek information on the condition so they might better educate themselves. This process is likely to result in greater understanding of brain injury, and thus prepare teachers to make provision for pupils under their care.

As predicted, the present work suggested that educators who had taught a child with brain injury would exhibit a greater understanding of the condition than those who had no such professional experience. These findings are in contrast to research which showed that personal experience with TBI did not influence the misconceptions held by nursing students [24]. However, greater experience has been shown to influence the attitudes individuals hold towards people with mental health problems in both positive, [37,38] and negative, [39] directions. As with the knowledge variable discussed above, educators who knew children with brain injuries sought out information on the condition in order to meet the needs of their pupils. These individuals had not received any formal training during their education which is consistent with a finding from the only other piece of research to explore this topic [8].

Participants in the present study were responsible for the care of 115,723 pupils at the time of the study, 15,748 of who had SEN. Given the prevalence of paediatric TBI has been estimated at 280/100,000 [40] it is surprising that more educators did not have experience of, or know a child, with a brain injury. In addition, as the majority (N = 248) had more than 21 years experience in the teaching profession we would have expected many more educators to have encountered children with brain injuries. It is likely that many schools are not informed about the occurrence of a brain injury, or that information is not being forwarded to the correct individual [18,23]. Families may not wish to inform the school because they underestimate the impact of the injury, [18] or they fear their child may face ridicule for being seen as different [20].

Results failed to demonstrate a statistically significant difference between participants who had received training in childhood brain injury and those who had not. However, the mean scores did show that educators who had received some training scored 4.5 points higher on the CM-TBI total score, than those who received no training. The term ‘training’ was not proscriptively used in this study and participants (N = 20) provided widely different interpretations. Training for many referred to talking to a clinician, educational psychologist, or brain injury charity about a specific child. While special education training is available for teachers in Northern Ireland for conditions such as attention deficit hyperactivity disorder, dyslexia and Down’s syndrome, no such provision is made for brain injury [41].

Findings of this research seem to indicate that training in brain injury for teachers is organised in a reactive, versus proactive manner. The needs of childhood survivors of brain injury would be better identified, and met, were teachers and schools more proactive in questioning parents about events (e.g. infections, accidents etc) that might have an impact on a child’s learning. Given the seasonality of many of the accidents associated with brain injuries. [42] it might be helpful for enquiries from educational professionals to be repeated at intervals throughout the school year. The reactive nature of teacher training suggests that a more formalised approach be advocated. This might usefully include education regarding brain injury during teacher training, and as a component of continuous professional development. Such an approach may have the effect of raising teachers’ awareness of the potential for brain injury, help them be more proactive in monitoring children, and assist in the earlier identification, and intervention, of those children who are experiencing difficulties. Continuous professional development regarding brain injury would also enable teachers to remain abreast of the emerging evidence base regarding rehabilitation.

Correlations showed that participants from larger schools, those with more pupils and children with SEN, had a greater understanding of brain injury than smaller schools. This may have been virtue of the fact that larger schools have a greater chance of capturing a child with a brain injury due to the greater volume of students. However, it would seem logical that smaller schools would be able to detect children with brain injuries due to the more favourable staff-student ratio. Ultimately it is likely that participants from larger schools have more resources and so were able to dedicate time to learning about brain injury. The statutory obligation on schools to identify and meet the special education needs of children [14,15] suggests that all schools should be aware of the occurrence of paediatric brain injury. However, it is possible that the school may only be aware that a need exists, and not that it has arisen as the result of a brain injury. The current research suggests that educators are not well informed about the prevalence, or consequences, of paediatric brain injury.

Closer examination of the item responses showed that 29.4% of educators believed that the majority of children who were knocked unconscious would have no lasting effects, with a further 43.8% of participants stating that they did not know. There is a common held belief that children routinely receive knocks and bumps as the result of play or lack of coordination. While research has shown that falls are the most common cause of TBI in young children [40], this belief may be the source of this particular misconception. In agreement with previous research [9], participants (63.2%) disagreed with the statement that children who had one brain injury were at increased risk of sustaining a second. Professionals working in the field understand that brain injury can result in problems with impulsivity [43], inattention [12], and risk taking behaviour, [44] which increases the chance of a second injury. The lack of understanding demonstrated by educators may mean that such deficits are not taken into account on return to school, which may put these pupils at increased risk

Principal components analysis revealed that the 40 items of the CM-TBI did not load onto the seven suggested domains of the original scale. Two of the four factors to emerge resembled the recovery (factor 1) and brain injury sequelae (factor 2) domains. However, a number of the original items did not load onto these factors, and were either discarded, or showed affinity with factors 3 and 4. Factor 3 comprised two items from the original recovery, and one from the brain injury sequelae domains, while factor 4 comprised two items from the original brain damage, and one from the brain injury sequelae, domains. We suggest that factors 3 and 4 be renamed as ‘insight’ and ‘hidden injury’ respectively.

Limitations and future directions

The CM-TBI is a useful means to explore the understanding of groups of participants in regard to childhood TBI. However, an examination of its content and structure had not been undertaken prior to this work. Two main steps, the pilot study and PCA, have suggested alterations to the original scale which improve its validity and reliability. The pilot study suggested several modifications which were made to the question wording and response scale. The introduction of a five point likert scale increased the variability of responses, and allowed participants the opportunity to express their spread of knowledge, on a given question. In particular, the addition of the ‘don’t know’ item was useful as an indication of lack of knowledge. Alterations to the scale allowed for the creation of a total score which proved useful as an overall indication of understanding. It was also possible to then break down this score to achieve individual domain scores. By conducting the PCA we have added to the validity of the scale and have removed 50% of the original items to create a more concise tool. However, the newly designated ‘insight’ and ‘hidden injury’ domains have only three items each, which is considered the minimum number required to produce a stable factor[36]. The addition of a further two items each may improve the strength of these domains and the overall utility of the questionnaire. The alterations made to the scale mean that it requires further investigation to determine its validity and reliability. Testing a larger sample, across time, would provide data on reliability, while conducting a confirmatory factor analysis would add to its validity.

The current study limited its sample to principals, pastoral care teachers and SENCOs due to the increased likelihood that they would have encountered a child with brain injury. However, given that every teacher has a pastoral care remit it would have been interesting to explore the understanding of all teachers in the region. This was not possible in the current study due to a lack of resources. However, future studies could employ email or internet based surveys which would significantly reduce costs, and enable the participation of educators with diverse experience.

Conclusions

Educators exert great influence on the lives of children and play a crucial role in return to school following brain injury. This research has shown that many misconceptions exist in their understanding of the condition which are likely to adversely impact on the treatment of children under their care. Less than a third of our sample believed they had taught a child with brain injury even though the majority had been in the teaching profession for more than 21 years. Clearly work must be undertaken to raise the profile of paediatric brain injury among educators and increase the understanding of its consequences, both in general, and in relation to educational outcomes.

Whilst a number of educational interventions targeted at return to school have been developed, few of these have been rigorously evaluated [18]. Given the findings of the current work there is a need to develop and test targeted interventions to educate members of the teaching profession on paediatric brain injury.

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Table 1: Demographic information on responders

	Frequency count
Role:	
Principal	313
Pastoral care	27
SENCO	46
Missing data	2
Years of experience:	
1-5	4
6-10	20
11-15	35
16-20	78
21+	248
Missing data	3
School type:	
Nursery	40
Primary	262
Post Primary	80
All	5
Missing data	1
Knowledge of BI:	
Yes	163
No	222
Missing data	3
Experience of teaching a child with BI:	
Yes	
No	100
Missing data	286
	2
Training in BI:	
Yes	20
No	364
Missing data	4

Table 2: Frequency and percentage of participant responses for each item of the CM-TBI

	True/False	*Strongly agree*	*Agree*	*Don't know*	*Disagree*	*Strongly disagree*
1. You don't need **to wear a car** seatbelt as long as you can brace yourself before a crash	F	1 (0.3%)	-	-	5 (1.3%)	382 (98.5%)
2. It is more important to use seatbelts on long trips than **when you are** driving around town	F	17 (4.4%)	1 (0.5%)	2 (0.5%)	22 (5.7%)	345 (88.9%)
3. **In a car accident** it is safer to be trapped inside a wreck than to be thrown clear	T	43 (11.1%)	91 (23.5%)	164 (42.3%)	44 (11.3%)	44 (11.3%)
4. Wearing seatbelts causes as many injuries as it prevents	F	-	2 (0.5%)	37 (9.5%)	174 (44.8%)	175 (45.1%)
5. A head injury can cause brain damage even if the child is not knocked **unconscious**	T	125 (32.2%)	201 (51.8%)	52 (13.4%)	3 (0.8%)	7 (1.8%)
6. A little brain damage doesn't matter much, since children only use a part of their brains anyway	F	4 (1.0%)	-	2 (0.5%)	53 (13.7%)	329 (84.8%)
7. It is obvious **when a child** has brain damage because they look different from children who don't have brain damage	F	3 (0.8%)	2 (0.5%)	14 (3.6%)	107 (27.6%)	261 (67.3%)
8. Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head	T	40 (10.3%)	117 (30.2%)	205 (52.8%)	21 (5.4%)	4 (1.0%)
9. It is common for children with brain injuries to be easily angered	T	9 (2.3%)	54 (13.9%)	220 (56.7%)	79 (20.4%)	25 (6.4%)
10. **It is common for** a child's personality **to** change after a brain injury	T	55 (14.2%)	204 (52.6%)	107 (27.6%)	20 (5.2%)	1 (0.3%)
11. Problems with speech, coordination, and walking can be caused by brain damage	T	197 (50.8%)	179 (46.1%)	7 (1.8%)	2 (0.5%)	1 (0.3%)
12. Problems with irritability and difficulties controlling anger are common in children who have had a brain injury	T	42 (10.8%)	138 (35.6%)	186 (47.9%)	20 (5.2%)	1 (0.3%)
13. Most children with brain damage are not fully aware of its effect on their behavior	T	31 (8.0%)	177 (45.6%)	151 (38.9%)	27 (7.0%)	-
14. Children **who have survived a brain injury** usually show a good understanding of their problems because they experience them every day	F	1 (0.3%)	40 (10.3%)	197 (50.8%)	129 (33.2%)	20 (5.2%)
15. Brain injuries **often** cause **a child** to feel depressed, sad, and hopeless	T	12 (3.1%)	122 (31.4%)	222 (57.2%)	29 (7.5%)	2 (0.5%)
16. Drinking alcohol **usually affects** a young person differently after a brain injury	T	10 (2.6%)	89 (22.9%)	275 (70.9%)	12 (3.1%)	-
17. It is common for children to experience changes in behavior after a brain injury	T	49 (12.6%)	236 (60.8%)	95 (24.5%)	7 (1.8%)	-
18. When children are knocked unconscious, most wake up quickly with no lasting effects	F	1 (0.3%)	114 (29.4%)	170 (43.8%)	67 (17.3%)	35 (9.0%)
19. Children in a coma are usually not aware of what is happening around them	T	10 (2.6%)	69 (17.8%)	148 (38.1%)	150 (38.7%)	10 (2.6%)

20. Even after several weeks in a coma, when children wake up, most recognise and speak to others right away	F	-	37 (9.5%)	236 (60.8%)	100 (25.8%)	13 (3.4%)
21. Children usually have more trouble remembering things that happen after an injury than remembering things from before	T	10 (2.6%)	96 (24.7%)	241 (62.1%)	35 (9.0%)	4 (1.0%)
22. Sometimes a second blow to the head can help a child remember things that were forgotten	F	1 (0.3%)	4 (1.0%)	113 (29.1%)	150 (38.7%)	119 (30.7%)
23. **Children who have survived a** brain injury may have trouble remembering events that happened before the injury, but usually do not have trouble **remembering** new things	F	2 (0.5%)	57 (14.7%)	231 (59.5%)	88 (22.7%)	9 (2.3%)
24. **Children who have survived a brain injury** can forget who they are and not recognise others, but be normal in every other way	F	7 (1.8%)	110 (28.4%)	229 (59.0%)	36 (9.3%)	5 (1.3%)
25. Recovery from a brain injury usually is complete in about five months	F	-	1 (0.3%)	151 (38.9%)	153 (39.4%)	82 (21.1%)
26. Complete recovery from a severe brain injury is not possible, no matter how badly the child wants to recover	T	15 (3.9%)	73 (18.8%)	214 (55.2%)	76 (19.6%)	9 (2.3%)
27. Once a child is able to walk again, his/her brain is almost fully recovered	F	-	5 (1.3%)	105 (27.1%)	241 (62.1%)	36 (9.3%)
28. Slow recovery **often continues up to** one year after the injury	T	10 (2.6%)	173 (44.6%)	173 (44.6%)	25 (6.4%)	4 (1.0%)
29. Children who have had one brain injury are more likely to have a second one	T	1 (0.3%)	4 (1.0%)	138 (35.6%)	220 (56.7%)	25 (6.5%)
30. It is necessary for a child to go through a lot of physical pain in order to recover from a brain injury	F	-	11 (2.8%)	190 (49.0%)	167 (43.0%)	20 (5.2%)
31. Once a child with a brain injury realises **their degree of impairment** they will always be aware of this	F	1 (0.3%)	67 (17.3%)	225 (58.0%)	86 (22.2%)	7 (1.8%)
32. A child who has recovered from a **brain** injury is less able to withstand a second blow to the head	T	4 (1.0%)	96 (24.7%)	212 (54.6%)	68 (17.5%)	7 (1.8%)
33. A child who has a brain injury will be "just like new" in several months	F	1 (0.3%)	-	69 (17.8%)	217 (55.9%)	100 (25.8%)
34. Asking children who **have survived a brain injury** about their progress is the most accurate, informative way to find out how they have progressed	F	3 (0.8%)	44 (11.3%)	126 (32.5%)	188 (48.5%)	27 (7.0%)
35. It is good advice to remain completely inactive during recovery from a brain injury	F	1 (0.3%)	12 (3.1%)	142 (36.6%)	186 (47.9%)	47 (12.1%)
36. Once a child recovering from a brain injury feels "back to normal," the recovery process is complete	F	-	1 (0.3%)	71 (18.3%)	259 (66.8%)	57 (14.7%)
37. How quickly a child recovers depends mainly on how hard they work at recovering	F	-	31 (8.0%)	106 (27.3%)	203 (52.3%)	47 (12.1%)
38. "Cognitive" refers to thinking processes such as memory, attention, and learning	T	160 (41.2%)	214 (55.2%)	3 (0.8%)	8 (2.1%)	1 (0.3%)
39. "Cognitive" refers to the ability to move your body	F	4 (1.0%)	45 (11.6%)	30 (7.7%)	192 (49.5%)	113 (29.1%)
40. The **most important** goal of brain injury rehabilitation is to increase physical abilities such as walking	F	2 (0.5%)	20 (5.2%)	131 (33.8%)	195 (50.3%)	37 (9.5%)

Table 3: Mean scores on the CM-TBI for educators who had experience of teaching a child with brain injury, and who knew someone with a brain injury, by domain.

	Mean Experience Yes	*Mean Difference*	*Mean Experience No*	*Mean Knowledge Yes*	*Mean Difference*	*Mean Knowledge No*
Seatbelts/Prevention	17.32	0.21	17.11	17.34	0.28	17.06
Brain damage	17.29	0.47	16.82	17.21	0.46	16.75
Brain injury sequelae	32.62	1.18	31.44	32.78	1.76	31.02
Unconsciousness	8.80	0.33	9.13	8.96	0.17	9.13
Amnesia	13.29	0.33	12.96	13.37	0.55	12.82
Recovery	46.24	1.94	44.30	46.07	2.14	43.93
Rehabilitation	12.08	0.31	11.77	11.96	0.19	11.77

Table 4: Factor loadings for the 20 retained items

	Factor 1	*Factor 2*	*Factor 3*	*Factor 4*
Sometimes a second blow to the head can help a child remember things that were forgotten	0.4187			
Recovery from a brain injury usually is complete in about five months	0.7124			
Once a child is able to walk again, his/her brain is almost fully recovered	0.7120			
A child who has a brain injury will be "just like new" in several months	0.6972			
It is good advice to remain completely inactive during recovery from a brain injury	0.4152			
Once a child recovering from a brain injury feels "back to normal," the recovery process is complete	0.6818			
How quickly a child recovers depends mainly on how hard they work at recovering	0.4782			
The most important goal of brain injury rehabilitation is to increase physical abilities such as walking	0.4263			
It is common for children with brain injuries to be easily angered		0.7270		
It is common for a child's personality to change after a brain injury		0.6592		
Problems with irritability and difficulties controlling anger are common in children who have had a brain injury		0.7646		
Most children with brain damage are not fully aware of its effect on their behaviour		0.4407		
Brain injuries often cause a child to feel depressed, sad, and hopeless		0.6377		
It is common for children to experience changes in behaviour after a brain injury		0.6110		
Children who have survived a brain injury usually show a good understanding of their problems because they experience them every day			0.7614	
Once a child with a brain injury realises their degree of impairment they will always be aware of this			0.6259	
Asking children who have survived a brain injury about their progress is the most accurate, informative way to find out how they have progressed			0.4230	
A head injury can cause brain damage even if the child is not knocked unconscious				0.7500
Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head				0.5409
Problems with speech, coordination, and walking can be caused by brain damage				0.5593