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The Prevalence of Risky Behaviours in Traffic that can Lead to Traumatic Brain Injuries

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Abstract

Introduction: Traffic accidents are a common cause of traumatic brain injuries. Such injuries are often associated with problematic behaviour i.e., violations of the Traffic Safety Act. Driving under the influence of intoxicants and non-compliance with traffic signals often cause traffic accidents, and not wearing a crash helmet or not wearing a protective seat belt increase the possibility of developing a traumatic brain injury.

Objectives: The aim of this study is to examine the prevalence of risky behaviours in traffic that can lead to traumatic brain injury and to examine differences according to gender. It is assumed that the most common risky behaviour is failure to wear a crash helmet and that the male participants will show a higher prevalence of risky behaviour compared to women.

Methods: The measuring instrument is a questionnaire consisting of nine statements. The questionnaire was filled out by a sample of 302 people in Croatia. The IBM SPSS Statistics 22 program was used for data processing. The prevalence of risky behaviours was expressed in percentages, and the Pearson's Chi-Square was used to examine the differences between male and female participants.

Results: The results show that risky behaviours in traffic are present, especially not wearing a crash helmet while riding a bicycle, running across the road on a red light, and not wearing a seat belt in a car whilst sitting in the back seat. The male participants showed a higher prevalence of risky behaviour compared to women.

Conclusion: To reduce the number of traffic accidents that can lead to traumatic brain injury, it is important to act on risky behaviours in traffic. Public health policies and legislation are one way of prevention. In addition, it is important to inform, educate and raise public awareness about this global problem. In order to implement the necessary preventative measures, one should be aware of the prevalence of the risky behaviours in traffic that can lead to traumatic brain injury and of the groups that are more willing to take risks in traffic.

Keywords: traumatic brain injuries, risky behaviours, traffic safety, prevention, speech language pathologist, awareness

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1. Introduction

A traumatic brain injury is a change in the functioning of the brain or other evidence of brain pathology caused by external forces (BIAA, 2011). There are one million new cases in Europe each year (Mauritz et al., 2011). Every year in Croatia about 8,000 people per one million inhabitants experience a traumatic brain injury, half of whom require hospital treatment, and 5% need medical rehabilitation (Bakran et al., 2015). The groups at risk are the elderly, children under the age of 4, and adolescents and young people between 15 and 29, especially those between 15 and 19 years of age (Payne et al., 2014). The causes of traumatic brain injuries are various. The most common causes are falls and road accidents (CDC, 2019). Traumatic brain injuries are twice as common amongst men (Payne et al., 2014). Thus, men are the group at risk. In Croatia, the clinical assessment classifies the presence and the severity of traumatic brain injury as mild, moderate, and severe (Bakran et al., 2015). The prognosis depends on the nature and the extent of the injury, and the recovery is affected by several factors such as age, the history of previous injuries, and the general health (Payne et al., 2014). The patients with a traumatic brain injury face physical, sensory, and cognitive disabilities, behavioural changes, speech-language difficulties, difficulties of verbal and non-verbal communication and swallowing and feeding problems (ASHA, 2020). Following traumatic brain injury, short-term neurologic complications (seizures, hydrocephalus, vascular or cranial nerve injuries, cerebrospinal fluid, tinnitus, organ failure, and polytrauma) and long-term neurologic complications (Alzheimer's disease, Parkinson's disease, dementia pugilistica, and posttraumatic epilepsy) may occur. In addition, patients may suffer from various psychiatric complications such as agitation, depression, bipolar disorder, generalised anxiety disorder, panic disorder, phobic disorders, obsessive-compulsive disorder, post-traumatic stress disorder, substance abuse or dependence, and schizophrenia (Ahmed et al., 2017). Due to the wide range of difficulties, the therapy and rehabilitation of patients with a traumatic brain injury requires a multidisciplinary team and interdisciplinary team cooperation. Traumatic brain injuries are often associated with the use of alcohol and other intoxicants, problematic behaviour, lower socio-economic status, and a lower level of education (Habus, 2013). Car accidents are the most common cause of traumatic brain injuries among young people (CDC, 2019). Most traffic accidents are caused by irresponsible, impulsive, and problematic behaviours in traffic. In 2019, the Croatian Ministry of the Interior released the Statistical Review of Basic Safety Indicators and Work Results in 2018. There were 33,402 car accidents in which 317 people died, 2,703 were seriously injured and 11,247 sustained minor injuries. Out of the total of 714,985 traffic violations, the most common were speeding (280,096) and not wearing a seat belt (85,382). There were 4,965 red-light crossings and 5,365 violations of not wearing a crash helmet (according to the Road Traffic Safety Act in Croatia, a crash helmet must be worn by cyclists under the age of 16). There were 39,023 cases of driving under the influence of alcohol (7,263 cases over 1.50 BAC). There were 299 pedestrian errors in traffic, such as non-compliance with traffic lights, not using a marked pedestrian crossing or an underground passage. According to the Statistical Review, traffic safety violations are most common amongst men. Whissell and Bigelow (2003) have reported that men are more willing to take risks in road traffic than women, and Yagil (1998) has reported that women express a more positive evaluation of the content of traffic laws and have a stronger sense of obligation to comply with traffic laws than do men. The aim of this study is to examine the prevalence of some risky behaviours in traffic that can lead to traumatic brain injury and to examine differences according to gender. It is assumed that the most common risky behaviour is failure to wear a crash helmet because it is not penalized for those over 16 years of age. In addition to that, it is expected that this study will show the difference between male and female participants. The male participants will show higher prevalence of risky behaviour compared to women.

2. Methods

2.1. Sample

A group of 302 people from Croatia were selected using a convenience sampling technique. Among the participants there were 146 men (48.3%) and 156 women (51.7%). The youngest participant was 15 and the oldest was 62 years old. The average age of the participants was 24. There were 230 (76.2%) car drivers, 107 (35.4%) motorcycle or scooter riders and 297 (98.3%) bicycle riders.

2.2. Measuring instrument

The measuring instrument is a questionnaire. The questionnaire has been designed and used only for this study and it consists of two parts. The first part contains general data, and in the second part, there are nine statements for which the participants are required to state whether they agree or disagree. The statements provide the information about a particular risky behaviour in traffic: (1) Not wearing a helmet while riding a bicycle; (2) Not wearing a helmet while riding a motorcycle or a scooter; (3) Not wearing a seat belt in the front seat of a car; (4) Not wearing a seat belt in the back seat of a car; (5) Driving under the influence of alcohol; (6) Riding with a driver who is under the influence of alcohol; (7) Driving under the influence of psychoactive substances; (8) Riding with a driver who is under the influence of psychoactive substances; (9) Running across the road on a red traffic light.

2.3. Method

The data were collected using an online questionnaire. The questionnaire was anonymous. It was created using the Google Forms program. It was set up on multiple social and institutional websites (Facebook, Forum, Blog, and Faculty of education and rehabilitation science) and anyone could voluntarily fill it out and give it up at any time.

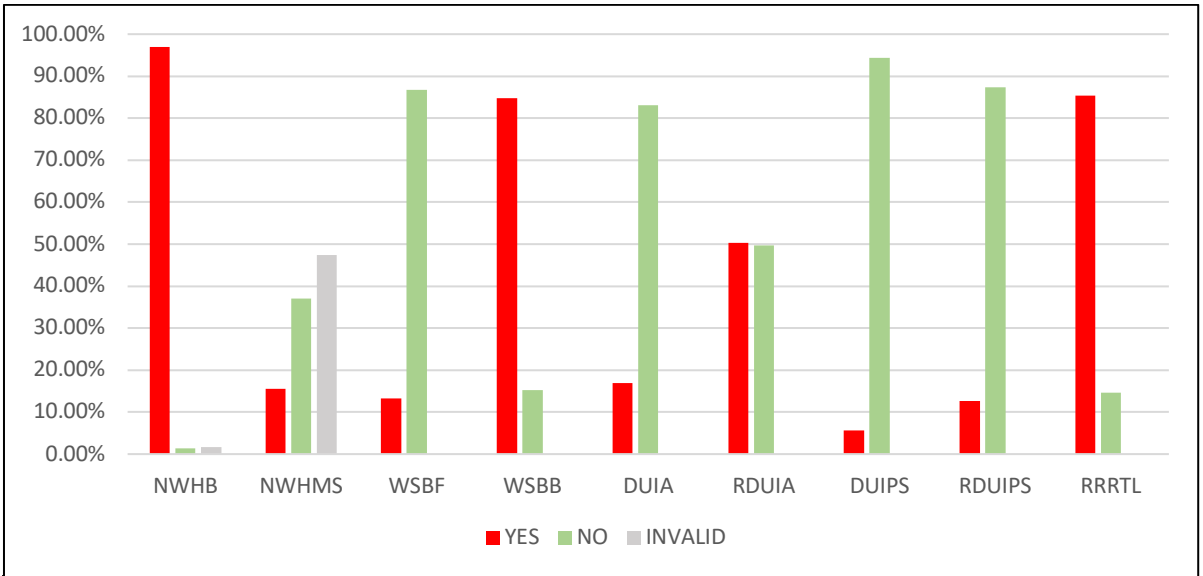
2.4. Data processing

The responses of the participants to each statement are presented in percentages, showing the prevalence of the examined risky behaviours in the population. The most common risky behaviours in traffic can be extracted by comparing the results of all statements, i.e. percentages. The Pearson's Chi-Square was used to verify the existence of statistically significant differences between male and female participants. The test also showed the expected and observed frequencies. If the observed frequencies differ significantly from the expected frequencies, the Pearson's Chi-Square will be significantly higher and the difference between the groups will be confirmed. One group will have a higher observed frequency than the expected frequency, while the other group will have a lower observed frequency than expected. The examined behaviour is higher in the group that has a higher observed frequency. The IBM SPSS Statistics 22 program was used for data processing.

3. Results

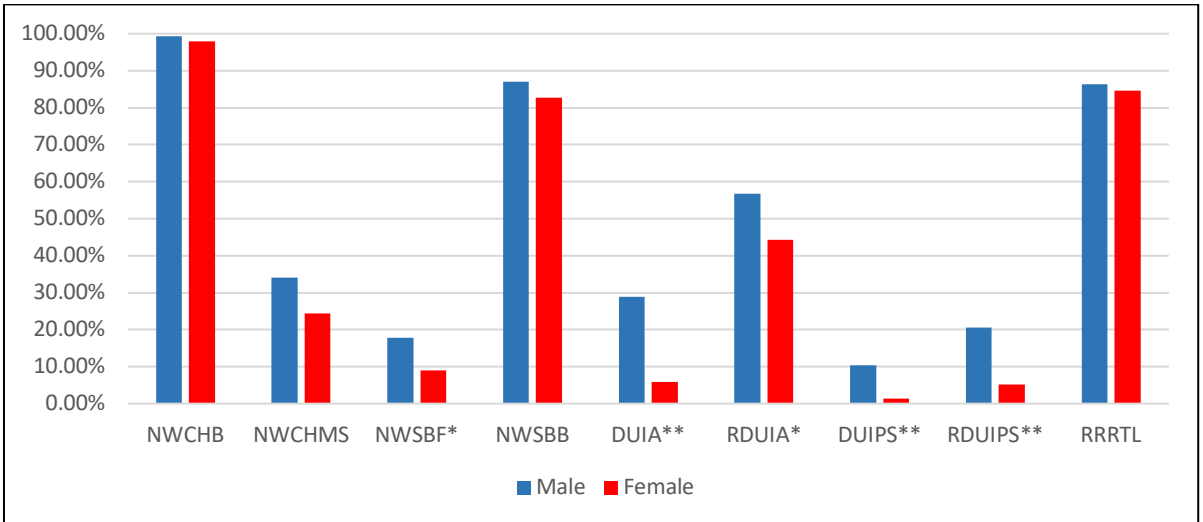
According to the results, 97% of participants do not wear a crash helmet whilst riding a bicycle. The percentage is higher for the male group but the difference between men and women is not statistically significant (Pearson's Chi-Square=0.82, DF=1, $p>0.05$). The results show that 15.6% of participants do not wear a helmet whilst riding a motorcycle or a scooter. The percentage is higher for the male group but the difference between the groups is not statistically significant (Pearson's Chi-Square=1.82, DF=1, $p>0.05$). The results show that 13.2% of participants do not wear a seat belt in a car whilst driving or sitting in the front seat. The Pearson's Chi-Square shows a statistically significant difference between men and women in this statement at a materiality level of 5% (Pearson's Chi Square=5.12, DF=1, $p<0.05$). The results show that 84.8% of participants do not wear a seat belt while sitting in the back seat of a car. There is a small difference between male and female participants that is not statistically significant (Pearson's Chi-Square=1.08, DF=1, $p>0.05$). The results show that 16.9% of participants have driven under the influence of alcohol. The Pearson's Chi-Square shows a statistically significant difference between male and female participants in this statement at a materiality level of 1% (Pearson's Chi-Square=28.42, DF=1, $p<0.01$). The results show that 50.3% of participants have ridden with a driver who was under the influence of alcohol. There is a statistically significant difference between male and female participants at the materiality level of 5% (Pearson's Chi-Square=4.8, DF=1, $p<0.05$). The results show that 5.6% of participants have driven under the influence of psychoactive substances. The Pearson's Chi-Square shows a statistically significant difference between men and women on this variable at a materiality level of 1% (Pearson's Chi-Square=11.48, DF=1, $p<0.01$). The results show that 12.6% of participants have ridden with a driver who was under the influence of psychoactive substances. There is a statistically significant difference between male and female groups at a materiality level of 1% (Pearson's Chi Square=16.3, DF=1, $p<0.01$). The results for the latest statement show that 85.4% of participants have run across the road on a red light. There is no statistically significant difference between male and female participants in this statement (Pearson's Chi-Square=0.17, DF=1, $p>0.05$). Figure 1 shows the prevalence of examined

risky behaviours in traffic. According to all statements, the male participants show higher prevalence of risky behaviour compared to women, while women, on any statements, showed no higher prevalence of risky behaviour compared to men. A statistically significant difference between males and females was noted on five statements out of nine. Figure 2 shows the difference in the prevalence of examined risky behaviours among male and female participants.



NWHB = not wearing a helmet whilst riding a bicycle; NWHMS = not wearing a helmet whilst riding a motorcycle or a scooter; NWSBF = not wearing a seat belt in a car whilst driving or sitting in a front seat; WSBB = not wearing a seat belt in a car whilst sitting in a back seat; DUIA = driving under the influence of alcohol; RDUIA = riding with a driver who is under the influence of alcohol; DUIPS = driving under the influence of psychoactive substances; RDUIPS = riding with a driver who is under the influence of psychoactive substances; RRRTL = running across the road on a red traffic light

Figure 1: The prevalence of examined risky behaviours in traffic according to the results of the questionnaire.



NWHB = not wearing a helmet whilst riding a bicycle; NWHMS = not wearing a helmet whilst riding a motorcycle or a scooter; NWSBF = not wearing a seat belt in a car whilst driving or sitting in a front seat; WSBB = not wearing a seat belt in a car whilst sitting in a back seat; DUIA = driving under the influence of alcohol; RDUIA = riding with a driver who is under the influence of alcohol; DUIPS = driving under the influence of psychoactive substances
RDUIPS = riding with a driver who is under the influence of psychoactive substances; RRRTL = running across the road on a red traffic light

Figure 2: The difference of the prevalence of some risky behaviours among men and women according to the results of the questionnaire. Marked abbreviations indicate a statistically significant difference between males and females (*p<0.05, **p<0.01)

4. Discussion

The results of this study show that people are prone to risk-taking behaviours in traffic. It is important to point out that not only risky behaviours in traffic may lead to traumatic brain injury. For example, traumatic brain injury may occur at home, at school or work, at the playground, etc., and risky behaviour may or may not be involved. This study examined few risky behaviours in traffic that can lead to traumatic brain injury. The study focuses on risky behaviours in traffic due to frequent traffic accidents, especially amongst young people. Traffic accidents are one of the most common causes of traumatic brain injury and are very often caused by risky behaviours. As assumed, this study showed that the most common risky behaviour is not wearing a crash helmet while cycling. Almost all participants have noted that they do not wear a crash helmet. According to the Road Traffic Safety Act, a crash helmet must be worn only by cyclists under the age of 16, and failure to wear the helmet is penalized (Official Gazette of the Republic of Croatia, 108/2017). Helmets have been found to reduce the risk of the traumatic brain injury by 63% to 88% for all ages (Thompson et al., 1999). There is a significant relationship between wearing a helmet and reducing the mortality and the morbidity associated with the traumatic brain injury (Dodds et al., 2019). The risk of developing a severe traumatic brain injury is 18 times higher for people who do not wear a crash helmet on a motorcycle (Javouhey et al., 2006). Thus, promoting and encouraging the wearing of a crash helmet seems to be a good preventive measure. According to the results, the second most common risk-taking behaviour is running across the road on a red light. This behaviour is dangerous because it is unexpected for other people in traffic. A car may suddenly appear, and the driver will not slow down if he/she sees a green light. At that moment, an unexpected run by a pedestrian can lead to accidents with fatal consequences. Running across the road may also cause falls. Crossing the road on a red light is considered a traffic violation. Most participants have noted that they do not wear a seat belt when sitting in the back seat, but nearly an equal percentage of participants noted that they wear a seat belt in the front seat of a car. The following example will show why not wearing a seat belt in the back seat can be dangerous. If the driver and the passenger in the front seat wear a seat belt, and if there is a sudden braking or impact, the seat belts will hold them. However, if the passengers in the back seat of a car do not wear seat belts, the force can push them forward and they may hit against the front seat. In this case, the passengers in the back seat may sustain serious head injuries, while the passengers in the front seats may suffer serious spinal injuries. Previous research has shown that child car safety seats reduce the risk of fatalities in accidents by about 70% in infants and about 55% in children aged 1-4 years. For the children over 8 years of age, the seat belts reduce the risk of an injury by about 50% (Karlo et al., 2011). More participants have noted that they have ridden with a driver who was under the influence of alcohol than that they have driven under the influence of alcohol. Driving under the influence of alcohol often leads to traffic accidents. The risk of being involved in a crash increases significantly at 0.05 BAC and above. The relative risk of being killed in a single - vehicle crash with BACs of 0.05–0.079 is 7–21 times higher than for drivers at 0.00 BAC. In numerous countries lowering the BAC limit from 0.08 to 0.05 has been a proven effective countermeasure (Fell and Voas, 2013). Alcohol abuse is associated with the higher speed and not wearing a seat belt, resulting in larger and more serious accidents (Cunningham et al., 2002). Alcohol affects cognitive abilities, therefore it is dangerous to drive any vehicle under the influence of alcohol. The results show that the least frequent risk-taking behaviour was driving under the influence of psychoactive substances. The statistically significant differences between male and female participants were confirmed on certain statements where men always exhibited a higher propensity for risky behaviour in traffic. It is more likely that men will not wear a seat belt in the front seat, that they will drive more often under the influence of alcohol and/or psychoactive substances, or ride with a person under the influence of alcohol and/or psychoactive substances. There is no statistically significant difference in performance between male and female participants in not wearing a helmet while riding a bicycle, a motorcycle or a scooter, not wearing a seat belt in the back seat, and running across the road on the red light. It is important to note that the answers obtained by the subjective method (questionnaire), regardless of the anonymity of the respondents, as such do not have to be completely accurate.

4.1. Limitation and future directions

Stated results must be interpreted with caution and a number of limitations should be borne in mind. The

way in which the data were collected and the way variables were measured has limited the ability to conduct a thorough analysis of the results. The questionnaire could have been constructed differently, e.g. different level of measurement, statement structure etc. A group of participants was selected using a convenience sampling technique. There was no emphasis on age, education, place of habitation or some other important factors that may have affected the results. The answers obtained by the subjective method do not have to be completely accurate. Deficiencies are acknowledged. Future researchers should revise their specific methods for collecting data, taking into account these limitations and missing elements.

5. Conclusion

Traumatic brain injuries, largely caused by traffic accidents, usually requires long-term care, which expensive for the health system. Therefore, various health organisations focus on developing effective preventative methods. Prevention is an important way to care for the society. Such preventative measures include reducing accidents caused by alcohol and drugs, preventing falls, promoting wearing helmets and seat belts, promoting responsible traffic behaviour, etc. To reduce the number of traffic accidents, it is important to act on risky behaviours in traffic. Reducing the number of traffic accidents will reduce the number of traumatic brain injuries. Public health policies and legislation are one way of prevention. This study showed that not wearing crash helmet is the most common examined risky behaviour in traffic. It is assumed that this is related to Road Traffic Safety Act according to which not wearing a crash helmet is not penalized. Not only penalization are needed, but informing, educating and raising public awareness about this global problem. In Croatia, people are neither sufficiently informed about the causes and consequences of traumatic brain injuries, nor about their prevention. Research on traumatic brain injury from the perspective of speech and language pathology is rare, but a speech and language pathologist is very important in their rehabilitation. In order to implement the necessary preventative measures, one should be aware of the prevalence of the risky behaviours in traffic that can lead to traumatic brain injury and of the groups that are more willing to take risks in road traffic.

6. Conflict of interests

Authors declare no conflict of interests.

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