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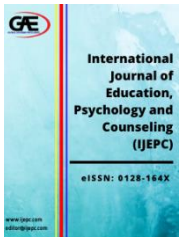

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EVALUATING THE EFFECTIVENESS OF A TRAUMATIC BRAIN INJURY AWARENESS CAMPAIGN AMONG UNIVERSITY STUDENTS

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Abstract:

Traumatic Brain Injury (TBI) remains a significant public health challenge globally, often leading to profound physical, cognitive, and psychosocial impacts. This study examined the effectiveness of a brief TBI awareness campaign within a university setting. A total of 37 participants, including students, high-risk occupation workers, caregivers, and members of the general public, took part in both online and in-person sessions. A mixed-methods approach was employed, integrating semi-structured interviews, a pre-test/post-test questionnaire based on Linden and Crothers' (2006) instrument, and thematic analysis of participants' qualitative feedback. Quantitative findings indicated no statistically significant difference in perceptions of TBI survivors before and after the campaign, potentially attributable to a short intervention duration and a modest sample size. However, qualitative data revealed that many participants perceived the campaign content to be engaging, expressed increased empathy towards TBI survivors, and reported intentions to adopt risk-reducing behaviours or advocate for TBI awareness. These results underscore the promise of targeted educational initiatives but also highlight the need for longer and more diverse campaigns to facilitate more robust knowledge retention and behaviour change. Future research should extend the campaign's duration, explore different modes of engagement (e.g., video testimonies, interactive technologies), and involve broader, more representative populations to yield more generalisable and enduring outcomes.

Keywords:

Cognitive and Psychosocial Impact, Public Health Campaign, Traumatic Brain Injury, University Community

Introduction

Traumatic Brain Injury (TBI) continues to be a leading cause of mortality and long-term disability worldwide, imposing profound implications on public health, healthcare expenditure, and socio-economic welfare (Maas et al., 2017; Dewan et al., 2019; Chen et al., 2022). Defined as an alteration in brain function or other evidence of brain pathology caused by an external force, TBIs encompass a broad spectrum of severity—from mild concussions to severe injuries necessitating intensive medical intervention and prolonged rehabilitation (Centers for Disease Control and Prevention [CDC], 2015; National Institute for Health and Care Excellence [NICE], 2014; Brain Trauma Foundation, 2023). The World Health Organization (WHO, 2022) underscores the magnitude of the challenge by categorising TBI among the most significant contributors to the global burden of neurological disorders, often resulting in persistent or lifelong cognitive, behavioural, and physical sequelae.

Despite advancements in neurosurgical techniques, acute care, and rehabilitative therapies, TBI remains a complex condition that extends beyond the immediate physical injury. Complications such as intracranial haemorrhage and diffuse axonal injury frequently lead to persistent deficits in memory, attention, cognition, motor control, and emotional regulation (Menon & Bryant, 2019; Raj et al., 2021). These deficits substantially impair daily functioning, social interactions, educational pursuits, and employment opportunities (Ponsford et al., 2016; Wilson et al., 2021), accentuating the necessity for a comprehensive approach that spans the continuum of TBI care—from prevention and early detection to acute management, long-term rehabilitation, and reintegration into community life.

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Global Epidemiology and Socio-Economic Impact

Globally, TBI represents an escalating public health concern that imposes a significant strain on healthcare systems. According to the Global Burden of Disease Study 2022, TBI contributed to over 69 million cases worldwide, with increasing trends particularly noted in low- and middle-income countries due to factors such as road traffic accidents and falls (GBD 2022 Diseases and Injuries Collaborators, 2022). The characterisation of TBI as a "silent epidemic" highlights the underdiagnosis and underreporting of many mild to moderate cases, which can still lead to considerable long-term morbidity if not promptly and adequately addressed (Lozano et al., 2021; Humphreys et al., 2023). Recent data reinforce the recognition of TBI not merely as an acute event but as a chronic condition with lingering sequelae (Wilson et al., 2017; McKee & Robinson, 2022).

The economic burden associated with TBI is substantial, reflecting elevated healthcare costs, loss of productivity, and the often lifelong need for community and family support services (Ma et al., 2019; James et al., 2022). In the United Kingdom, for example, the estimated annual cost of TBI exceeds £16 billion, including direct medical expenses and indirect costs such as lost productivity (Underwood & Rivers, 2020; NHS England, 2021). Consequently, global health agencies advocate for robust public health strategies emphasising prevention, early diagnosis, and timely treatment. These strategies range from implementing strict road safety regulations—such as mandatory seatbelt and helmet laws—to enhancing public education about risk factors in sports, workplaces, and households (Hyder et al., 2017; WHO, 2022; Patel et al., 2023). Investments in TBI prevention and awareness initiatives can yield significant returns by reducing hospital admissions, rehabilitative costs, and the risk of permanent disabilities (Feigin et al., 2019; Johnson et al., 2021).

Contextualising TBI in Malaysia

In the Malaysian context, the urgency for TBI-focused interventions is underscored by national epidemiological data. The Malaysian National Trauma Database reported that, in 2020, road traffic accidents accounted for approximately 72% of all trauma admissions, with head injuries comprising a significant proportion (Aziz et al., 2021). The prevalence of motorcyclist-related accidents, accounting for around 60% of road traffic fatalities, positions TBI as a critical public health issue (Sharma et al., 2019; Ahmad et al., 2022). Rapid urbanisation, increased vehicle ownership, and high incidences of traffic collisions collectively contribute to the escalating rates of TBI (Abdul Manan & Várhelyi, 2020; Lee et al., 2023). Although government-led campaigns on road safety have been initiated, gaps persist in public knowledge regarding early recognition of TBI symptoms and appropriate emergency responses, potentially contributing to delayed treatments and improper post-injury care (Alharfi et al., 2021; Chong et al., 2022).

Importance of Public Awareness and Education

Widespread misconceptions and limited awareness about TBI hinder prevention and optimal management. Misunderstandings may arise regarding the mechanisms of injury, the heterogeneous clinical presentation of TBI, and the importance of timely medical assessment (Caro et al., 2016; Smith et al., 2023). Research indicates that unrecognised or mismanaged mild TBI can evolve into more serious complications, including second-impact syndrome and post-concussion syndrome (McCrory et al., 2017; Turner et al., 2022). Education and public health campaigns are indispensable for bridging these awareness gaps, thereby reducing negative outcomes and healthcare burdens (Oyesanya et al., 2018; Williams et al., 2021). Well-designed awareness programmes have been shown to foster early identification of TBI

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symptoms, encourage safer practices—such as wearing motorcycle helmets or protective sports gear—and facilitate timely referral to specialist services (Sullivan et al., 2019; Yang et al., 2018; Patel et al., 2023).

Literature Review

Recent literature underscores the accelerating incidence of TBI globally and highlights the necessity for enhanced preventive measures. Maas et al. (2022) emphasise that TBI incidence is disproportionately high in low- and middle-income countries, attributing this trend to factors such as inadequate road safety measures, occupational hazards, and insufficient public awareness. In Malaysia, Abdul Rahman et al. (2022) observed a rising trend of TBI among motorcyclists, highlighting the critical need for stricter enforcement of helmet laws and targeted public education on road safety.

Advancements in acute TBI management, such as the implementation of evidence-based clinical guidelines, have improved patient outcomes in high-resource settings (Carney et al., 2017; Brain Trauma Foundation, 2023). However, disparities in access to specialised care and rehabilitation services remain significant challenges in developing countries, including Malaysia (Dewan et al., 2019; Ismail et al., 2022). Rehabilitation services are often under-resourced and lack multidisciplinary teams, leading to suboptimal recovery and increased disability among TBI survivors (Khan et al., 2017; Ismail et al., 2022).

Several studies have examined the socio-economic impact of TBI. Nguyen et al. (2016) found that TBI survivors face significant barriers to employment and social reintegration due to persistent cognitive and behavioural impairments. The long-term consequences of TBI can lead to social isolation, increased dependency, and reduced quality of life (Ponsford et al., 2016; Sloan et al., 2021). These findings stress the importance of comprehensive rehabilitation programmes that address not only physical recovery but also cognitive and psychosocial needs.

Public awareness initiatives have shown promise in reducing TBI incidence and improving outcomes. A study by Anwar et al. (2021) demonstrated that community-based education programmes significantly increased helmet use among motorcyclists in rural Malaysia. Similarly, Williams et al. (2021) reported that school-based interventions raised awareness about concussion symptoms and management among adolescent athletes, leading to earlier reporting and treatment of injuries.

Emerging research has also focused on the role of technology and digital platforms in enhancing TBI awareness and rehabilitation. Virtual reality and mobile health applications have been explored as tools for cognitive rehabilitation and patient education, with preliminary studies indicating positive outcomes (Dias et al., 2019; Lau et al., 2023). These technological advancements offer potential avenues for improving accessibility to rehabilitation services, particularly in resource-limited settings.

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Table 1: Summary of Previous Research on Traumatic Brain Injury (TBI)

Key Area	Key Findings	References
Global Epidemiology	TBI is a significant global health concern, with increasing incidence in low- and middle-income countries.	Maas et al., 2017; Dewan et al., 2019; Chen et al., 2022
Socio-Economic Impact	TBI imposes a substantial economic burden on healthcare systems and societies due to medical costs, lost productivity, and long-term care.	Ma et al., 2019; James et al., 2022; Underwood & Rivers, 2020
TBI in Malaysia	Road traffic accidents are a leading cause of TBI in Malaysia, particularly among motorcyclists.	Aziz et al., 2021; Sharma et al., 2019; Ahmad et al., 2022
Public Awareness and Education	Limited public awareness and misconceptions about TBI hinder prevention and optimal management.	Caro et al., 2016; Smith et al., 2023; McCrory et al., 2017
Acute TBI Management	Advancements in acute TBI management have improved outcomes, but disparities in access to specialised care persist.	Carney et al., 2017; Brain Trauma Foundation, 2023; Dewan et al., 2019
Long-Term Consequences	TBI survivors often experience persistent cognitive, behavioural, and physical deficits, impacting their quality of life and social integration.	Menon & Bryant, 2019; Raj et al., 2021; Ponsford et al., 2016
Rehabilitation	Comprehensive rehabilitation programmes are essential for addressing the multifaceted needs of TBI survivors.	Khan et al., 2017; Ismail et al., 2022; Nguyen et al., 2016
Public Health Interventions	Public awareness campaigns and educational initiatives can reduce TBI incidence and improve outcomes.	Anwar et al., 2021; Williams et al., 2021; Sullivan et al., 2019
Technology and Digital Health	Technology-based interventions, such as virtual reality and mobile health apps, offer potential for enhancing TBI rehabilitation and education.	Dias et al., 2019; Lau et al., 2023

Objectives of the Present Study

Assessing TBI Literacy and Awareness

This study aims to evaluate the level of TBI awareness and understanding among the general public and the International Islamic University Malaysia (IIUM) community. Such insights are vital for designing targeted educational materials and interventions, especially in high-risk groups such as student-athletes, motorcyclists, and individuals working in physically demanding occupations (McMahon et al., 2019; Tan et al., 2022).

Identifying At-Risk Demographics and Environments

Given the high incidence of traffic-related injuries and sports-related concussions, a key focus is on identifying specific groups and environments most susceptible to TBI. The study

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particularly targets IIUM Mustang athletes, motorcycle riders, and workers in high-risk occupations to better understand the contextual factors contributing to TBI incidence (Abdul Rahman et al., 2022; Lim et al., 2023).

Informing Policy and Practice

Findings from this research are expected to guide institutional and governmental bodies in refining safety regulations, such as stricter helmet policies and enhanced road safety measures. The outcomes will also inform the structuring of public health campaigns and educational programmes designed to improve the community's ability to recognise TBI symptoms and pursue immediate treatment (Ismail et al., 2022; Ministry of Health Malaysia, 2023).

Promoting Empathy and Reducing Stigma

TBI survivors often encounter social stigma, marginalisation, and misunderstandings regarding their symptoms and recovery needs (Simpson et al., 2018; Ali et al., 2022). By incorporating empathy-building components into awareness campaigns, this research strives to humanise TBI and encourage a culture of support, thereby facilitating reintegration and reducing long-term psychosocial harm (Jones & Maas, 2019; Cooper et al., 2023).

By bridging crucial knowledge gaps, this study can contribute significantly to neuropsychological and public health research in Malaysia and beyond. Enhancing TBI awareness through online and offline campaigns may reduce the incidence of preventable injuries, improve early detection and referral, and mitigate long-term disabilities (Ng et al., 2019; Tan et al., 2023). The project also has a strong pragmatic focus: it is expected that the results will guide IIUM and related institutions in implementing evidence-informed strategies for road safety, sports injury prevention, and occupational health regulation.

Moreover, examining empathy levels and public attitudes towards TBI can illuminate the psychosocial dimensions of brain injury—a frequently overlooked yet critical area for successful rehabilitation and reintegration (Turner et al., 2019; Lee & Chua, 2022). Ultimately, the endeavour to humanise TBI aligns with broader public health goals of promoting resilience, reducing stigma, and fostering inclusive communities supportive of individuals with long-term neurological conditions (WHO, 2022; Maas et al., 2022). This multifaceted approach—encompassing epidemiology, education, policy development, and advocacy—positions the current study as an essential step towards addressing the silent yet pervasive epidemic of TBI.

Methodology

Research Design

This study adopted a qualitative research design using semi-structured interviews. The interview protocol comprised predetermined open-ended questions, which facilitated a flexible conversational flow and allowed the researcher to explore emergent topics in greater depth. According to Wilson (2013), semi-structured interviews are especially effective in obtaining reliable, comprehensive data on participants' perspectives, while still preserving room for in-depth exploration of individual experiences.

An intervention designed to increase awareness, management, and intervention concerning Traumatic Brain Injury (TBI) served as the independent variable. By contrast, the dependent variable was participants' understanding and knowledge of TBI. The decision to develop and

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implement this intervention was influenced by a needs analysis, which showed the critical importance of boosting public awareness, management, and intervention regarding TBI. Guided by these findings, a specifically designed intervention aimed at spreading information and improving consciousness about TBI was implemented. Operationally, this intervention involved disseminating knowledge on the nature of TBI, its prevalence, potential impact, risk factors, and preventative measures.

The implementation of this intervention occurred both physically and through online platforms. The physical campaign consisted of a public awareness event displaying informative infographic posters and fun, interactive activities to pique public interest. Concurrently, an online focus group comprised of individuals from various backgrounds, including members of the IIUM community and athletes, was formed to precisely target outreach efforts. The online campaign encompassed educational videos, virtual seminars, and engaging Q&A sessions. By integrating both offline and online strategies, the reach and effectiveness of the TBI awareness campaign were significantly amplified.

Participants and Sampling

Firstly, for the interview the specialist was selected via purposive sampling. The primary inclusion criterion was that the individual had to be a healthcare professional specialising in TBI. This criterion was intended to ensure that the participant contributed expert insights related to the research objectives. The exclusion criterion encompassed individuals lacking expertise or specialisation in TBI, thus preventing any dilution of data quality. Consequently, one neurologist—a male—was interviewed.

For the physical awareness campaign, convenience sampling was employed to maximise outreach within the allocated resources. This method was suitable for ensuring that the essential messages regarding TBI reached a broad cross-section of the IIUM community rapidly and effectively. In contrast, the online focus group utilised purposive sampling, specifically targeting individuals most likely to gain substantial benefits from TBI awareness efforts—particularly athletes within the IIUM community. Altogether, the physical and online interventions included thirty-seven participants (N=37), comprising fifteen males (N=15) and twenty-two females (N=22).

Measures and Instruments

The study's module implementation relied on a range of materials tailored to each campaign format. In the physical awareness campaign, infographics, sticky notes, cardboards, pens, and a laptop were utilised. The infographics were prominently displayed on cardboards to ensure maximum visibility, while sticky notes and pens allowed participants to contribute their own reflections on TBI. The laptop was used for a lively charades game, adding an element of enjoyment and boosting participant engagement.

Conversely, the online focus group employed a more streamlined approach using PowerPoint presentation slides. These slides, designed to be visually appealing and highly informative, served as the foundation for interactive discussions. Through guided conversations based on the slides, participants engaged with core concepts and asked questions to deepen their understanding of TBI.

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In the needs analysis, the interview guide consisted of five sections, containing fourteen open-ended questions. Section One (three questions) addressed the participant's introduction and professional background, with a focus on motivation and daily responsibilities. Section Two (four questions) investigated the link between neurology and TBI, examining the different forms of TBI and long-term challenges. Section Three (four questions) explored community needs and possible intervention strategies, while Section Four focused on multidisciplinary collaboration between healthcare professionals. Finally, Section Five (two questions) covered matters of sustainability and future planning. Each interview was conducted face-to-face, recorded with a mobile phone, and subsequently transcribed for further thematic analysis.

To measure the effectiveness of the TBI awareness campaign, a pre-test/post-test design was implemented, using the "Questionnaire of Student and Public Perceptions of Brain Injury Survivors" devised by Linden and Crothers (2006). This instrument encompasses twenty items evaluating participants' attitudes towards and knowledge of brain injury survivors. Certain items are scored such that higher values reflect more positive perceptions (e.g., items 1, 3, 7, 8, 10, 12, 14, 17, and 18), while others require reverse scoring (items 2, 4, 5, 6, 9, 11, 13, 15, 16, 19, and 20) so that an elevated total score overall indicates a more favourable perception. This standardised measurement framework allowed for a robust assessment of any shifts in understanding or sentiment following the campaign.

Procedures

Needs Analysis

A needs analysis was undertaken by interviewing a neurologist from Hospital Sultan Abdul Aziz Shah at Universiti Putra Malaysia. After the neurologist was briefed about the study and agreed to participate, the interview date and time were established based on the neurologist's availability. At the onset of the interview, the purpose and scope of the research were reiterated, and informed consent was obtained for both participation and audio recording. The interview lasted approximately 30 to 40 minutes, during which the neurologist answered the semi-structured questions. Confidentiality measures and ethical guidelines were strictly observed throughout this process, ensuring voluntary participation and data protection. Post-interview, the recordings were transcribed and subjected to a deductive thematic analysis.

Drawing on the themes identified in this initial needs analysis, the research team subsequently developed a specialised module titled "Traumatic Brain Injury Awareness Campaign", targeting the IIUM community. This campaign included two components: a Physical Awareness Campaign and an Online Focus Group.

Physical Awareness Campaign

Comprehensive planning was undertaken to ensure that the physical awareness campaign would be both engaging and educational. This involved producing visually appealing infographics that succinctly conveyed crucial details about TBI, and these were affixed to cardboard displays. Attendees were asked to fill in a pre-test (through a Google Form) prior to examining the materials. Sticky notes and pens were provided for participants to record their opinions and observations, thereby enhancing interactivity and critical thinking. Additionally, a laptop was used to facilitate an entertaining charades game focused on TBI concepts. The session concluded with participants completing a post-test (also using a Google Form), enabling an evaluative comparison between pre- and post-intervention awareness levels. This

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campaign was held at HS Square within the IIUM campus for a duration of six hours, drawing diverse participants from the university community. Once again, ethical standards such as informed consent and voluntary engagement were upheld.

Online Focus Group

In parallel, an online focus group was conducted with participants selected via purposive sampling, emphasising IIUM athletes. These sessions were held through Google Meet, supported by PowerPoint slides that presented structured and visually compelling content. Similar to the physical campaign, participants completed a pre-test before each session and a post-test upon conclusion. The online sessions featured educational videos, virtual seminars, and interactive Q&A segments designed to deepen participants' comprehension of TBI. The open format allowed for dynamic discourse, enabling participants to voice questions, discuss their experiences, and learn collaboratively. Ethical safeguards remained paramount; each participant provided informed consent, and scheduling considerations were adapted to fit the participants' timetables.

Data Analysis

Data were analysed using IBM SPSS software for the quantitative information collected through the pre-test and post-test questionnaires. A paired sample t-test was performed to assess the campaign's effectiveness in enhancing participants' knowledge and perceptions of TBI. By comparing results before and after the intervention, the study could ascertain the degree to which the module fostered improved understanding.

Additionally, thematic analysis was employed to examine the qualitative responses to open-ended questions in the Google Form. Verbatim statements sharing similar meanings were grouped together, then assigned to sub-themes, and ultimately organised into overarching themes. This mixed-method analytical strategy facilitated a comprehensive evaluation of both quantitative shifts in awareness and the nuanced qualitative insights into participant experiences and attitudes, providing a rich understanding of the campaign's impact.

Results

Descriptive Statistical Analysis

A total of 37 participants took part in the Traumatic Brain Injury (TBI) Awareness Campaign, conducted both in person and online. Demographic information was gathered through a brief questionnaire, yielding a sample that encompassed a variety of demographic categories. Specifically, 2.7% of participants were caregivers of TBI patients, 10.8% were workers in high-risk occupations, 21.6% were student-athletes, and 32.4% were motorcycle riders, with a further 32.4% from the general public. Most participants were female (59.5%), and the mean age was 23.03 years (SD = 1.85), with 23 years old being the most common age group. Detailed demographic data are presented in Table 2.

Table 2: Demographics of Participants (N = 37)

Demographic Variables	Frequency (n)	Percentage (%)
Gender		
• Male	15	40.5
• Female	22	59.5

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Demographic Variables	Frequency (n)	Percentage (%)
Age (years)	**Mean**	**Standard Deviation**
(20–30)	23.03	1.85
Characteristics		
Caregivers of TBI patients	1	2.7
High-risk occupation workers	4	10.8
Student-athletes	8	21.6
Motorcycle Riders	12	32.4
General Public	12	32.4

Reliability Analysis

To assess participants' perceptions of brain injury survivors, this study employed the *Questionnaire of Student and Public Perceptions of Brain Injury Survivors* (Linden & Crothers, 2006) for both pre- and post-intervention measures. The questionnaire demonstrated high internal consistency, with Cronbach's alpha values of $\alpha = .915$ in the pre-test and $\alpha = .873$ in the post-test. Table 3 summarises the reliability analysis.

Table 3: Reliability Analysis for the Student and Public Perception of Brain Injury Survivors Questionnaire in Pre- and Post-Tests

Constructs	Number of Items	Cronbach's Alpha
Pre-test	20	.915
Post-test	20	.873

A paired-samples t-test was conducted to examine potential differences in the perceptions of brain injury survivors before and after participation in the TBI awareness campaign. The mean pre-test score was 66.59 (SD = 11.45) and the mean post-test score was 70.86 (SD = 10.72). While the descriptive data suggest a tendency towards more positive perceptions of TBI survivors following the intervention, the analysis revealed no statistically significant difference, $t(36) = –1.92$, $p = .063$ (two-tailed). Table 4 presents the results of the paired-samples t-test.

Table 4: Paired-Samples t-Test

Variable	df	Mean (M)	SD	t	p
Pre-test	37	66.59	11.45		
Post-test	37	70.86	10.72	–1.919	.063

Thematic Analysis

A thematic analysis was conducted on the qualitative responses provided by participants in the open-ended questions, such as "Did our campaign inspire you to take any action related to TBI awareness or prevention?", "If yes, please briefly describe what action(s) you might take", and "If no, what could we have done differently to inspire you to take action?". Two primary themes, each encompassing several subthemes, emerged from this analysis..

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Content Impact and Engagement Analysis

This first theme explores how effectively the campaign's content resonated with participants and shaped their engagement with TBI-related information.

- **Highly Engaging Content**: Several participants praised the campaign for its clear, well-delivered presentation and relatable content. They reported that the inclusion of personal stories and real-life examples of motor-vehicle accidents or caregiving experiences enhanced their understanding of TBI. For instance, Participant 13 remarked:

  > "Seronok belajar ilmu baru… banyak kes accident yang saya jumpa dekat highway contohnya macam bang grab accident dan dia tanya orang sekeliling 'bila saya buat grab'… menakutkan juga la." This comment underscores how practical anecdotes made the risks and implications of TBI more tangible. Likewise, Participant 18, a caregiver, observed that prior to this campaign, they had never received formal TBI training, stressing the value of accessible knowledge to support caregiving roles.

- **Moderately Engaging Content**: A smaller segment of participants felt the campaign could have benefited from additional or varied content. Participant 4, for instance, suggested the use of more video testimonials from TBI survivors to create a more immersive learning experience. Another participant (Participant 25) indicated difficulty in fully grasping the psychological profiles of TBI patients, suggesting a need for more detailed discussions on empathy and behavioural changes. These suggestions point to opportunities for expanding and diversifying future campaign materials.

Campaign Sustainability and Long-Term Impact

The second main theme addresses the extent to which the campaign motivated participants to engage in ongoing efforts to prevent or raise awareness of TBI.

- **Advocacy and Community Involvement**: Several participants described feeling inspired to assume active advocacy roles following the campaign. Participant 23 stated:

  > "Your campaign has truly motivated me to become an advocate for TBI awareness and contribute to creating a safer environment for everyone." Participants 4 and 35 expressed similar commitments, vowing to promote TBI risk awareness within sports communities and encourage safer training practices.

- **Personal Motivation and Preventative Action**: Many participants were likewise moved to take personal steps to safeguard against TBI. For example, Participant 34 emphasised the importance of destigmatising TBI and offering caregivers support, while Participant 7 showed an interest in joining TBI-focused intervention programmes. Participants 5 and 25, meanwhile, highlighted intentions to seek medical evaluations or adopt precautions in daily

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life. Participant 25, who had previously lost consciousness in an accident, remarked:

> "I might go to the clinic and check my head later as I was once involved in an accident that caused me to lose consciousness." This reflection underscores how the campaign's content and real-life examples of mild TBI influenced practical, preventive health measures.

Overall, the qualitative data suggest that, while there was no statistically significant increase in positive perceptions as determined by the quantitative measure, many participants were nonetheless motivated to deepen their understanding of TBI, adopt preventative measures, and share newly acquired knowledge with peers or family members. These insights highlight the strengths and limitations of the campaign, thereby indicating valuable directions for future outreach and research.

Discussion

The present study set out to meet several key objectives: to increase public knowledge of Traumatic Brain Injury (TBI), raise awareness among the IIUM community about its prevalence and potential impact, promote preventive measures, and address stigma by humanising the experience of TBI. These aims were anchored in the hypothesis that participants' perceptions of TBI survivors would differ significantly before and after engagement with the awareness campaigns. However, the quantitative findings, based on a dependent sample t-test, indicated no statistically significant changes in participant perceptions, suggesting that the hypothesised effect of the campaign on measurable attitudinal shifts was not observed.

A plausible explanation for these findings is the brevity of the intervention period, which may not have afforded sufficient time for in-depth knowledge acquisition and sustained behavioural change. Research has consistently underscored the challenges of effecting enduring attitudinal or behavioural modifications through brief interventions (Evans-Lacko et al., 2010; Khellaf et al., 2019). While short campaigns can spark initial interest and elevate awareness momentarily, they often fall short in cementing long-term retention of information or prompting lasting behaviour change (NICE, 2020). Moreover, TBI awareness is a complex subject spanning medical, psychosocial, and practical aspects; engaging learning materials and sustained effort are typically needed to transform newly acquired knowledge into consistent, empathic behaviour (Maas et al., 2022).

Another factor that may explain the absence of statistically significant differences is the relatively small and specialised sample. Although the demographic data included a spectrum of participants—among them student-athletes, high-risk occupation workers, caregivers, and members of the public—the sample size remained modest and largely localised to IIUM Gombak students and staff. Such limitations potentially reduce statistical power and restrict the wider generalisability of findings (Berwick et al., 2022). Future endeavours might address this concern by broadening the target population to include more diverse samples, thereby enabling more robust statistical analyses and enhancing the representativeness of the findings.

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Furthermore, while the content of the campaign contained visually appealing infographics, interactive sessions, and personal testimonies, it is possible that a more varied and extended programme could yield better outcomes. Longer-term interventions—which might include repeated sessions, follow-up reminders, and varied content formats—have been shown to be more effective in solidifying complex health knowledge and driving behavioural changes (Public Health England, 2021). These considerations align with calls for multi-tiered public health approaches that encompass education, policy, and community engagement in preventing and managing TBI (Silvestro et al., 2024).

Despite these limitations, the qualitative data suggest that certain participants did experience shifts in understanding and motivation to engage more deeply in TBI prevention or advocacy. Such anecdotal evidence highlights the campaign's capacity to stimulate personal reflection and offers a valuable direction for refining future interventions. Introducing longer campaign durations, tapping into digital platforms more systematically, and involving multiple stakeholders (e.g., healthcare professionals, sports coaches, policy-makers) may collectively bolster the effectiveness and sustainability of TBI awareness efforts.

Wile the current study did not observe a statistically significant improvement in perceptions towards TBI, its findings underscore the need for extended intervention periods, varied educational materials, and larger, more diverse participant pools. Further research is warranted to explore how extended and repeated awareness campaigns might foster deeper knowledge retention and more pronounced attitudinal or behavioural shifts regarding TBI.

Conclusion

Overall, this study aimed to evaluate the level of awareness and understanding of TBI among both the general public and the IIUM community, with a view to informing future interventions that could reduce stigma and foster a culture of empathy and prevention. Although descriptive data revealed some positive shifts in perceptions—evidenced by higher mean scores following the campaign—the changes were not statistically significant. The brief nature of the campaign, combined with the relatively small and localised sample, likely contributed to these findings, as knowledge sustainability and attitudinal transformation generally require more extensive and prolonged efforts (Evans-Lacko et al., 2010; NICE, 2020).

Despite the limited impact shown by the quantitative results, the study yielded valuable insights into how targeted awareness programmes can prompt individual reflections on TBI risk factors, prevention strategies, and empathy for survivors. Many participants expressed a willingness to continue engaging in advocacy or to implement practical measures in sports, road safety, or caregiving contexts. These observations point to the campaign's potential in stimulating heightened awareness, even if it fell short of demonstrable group-level changes.

Looking ahead, future initiatives aiming to advance TBI awareness may benefit from:

1. **Longer Campaign Durations**: Extending the campaign timeline to reinforce knowledge, support behaviour change, and allow participants sufficient time to internalise key messages.
2. **Diverse Content Formats**: Incorporating immersive technologies such as virtual reality simulations or patient video testimonials to deepen empathy and understanding.

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3. **Broader, More Representative Sampling**: Expanding outreach beyond university settings to include various community groups, different age ranges, and multiple demographic segments.
4. **Collaborative, Multidisciplinary Approaches**: Partnering with healthcare providers, sports organisations, and public policy-makers to create a cohesive framework of prevention and post-injury support (Arulsamy & Shaikh, 2020; Public Health England, 2021).

While the outcomes did not yield a statistically significant shift in perceptions, this study illuminates the importance of continuous, multifaceted, and community-wide education to address the wide-ranging impacts of TBI. By building on the experiences gleaned from this project—refining content, broadening audiences, and extending engagement periods—it is possible to establish a more informed, compassionate environment, one that is better equipped to identify, prevent, and manage TBI in the long term.

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