

Original Article

Supportive Systems Needed for the Functioning of People with Traumatic Brain Injury: An Exploratory Study

Abstract

Introduction: People with traumatic brain injury (TBI) have been found to have significant cognitive challenges which negatively impact their psychosocial life. This calls for efficient supportive systems and coping mechanisms to enable them to function in the society. This study, therefore, examined the (1) supportive systems that affect people with TBI and (2) essential coping mechanisms for psychosocial activities among people with TBI. **Methods:** A total of forty participants with a mean age of 35.30 (standard deviation = 11.90) years, mostly males (70%) and married (55%) were recruited for this cross-sectional study. They completed measures on TBI severity, coping strategies, social support, religious coping activities, and psychosocial activities. **Results:** There were significant interrelationships between coping strategies, social support, religious coping activities, psychosocial activities, and severity of TBI. Coping strategies, religious coping, and psychosocial activities were the supportive systems that affect people with TBI. Coping strategies was the only factor that affects the psychosocial activities of people with TBI. **Conclusion:** Based on these findings, different supportive systems may be needed for different functional abilities of people with TBI. Hence, clinicians may have to individualize assessment in order to offer bespoke support systems needed for improvement.

Keywords: Coping mechanism, religious coping, social support, traumatic brain injury, psychosocial activity

Introduction

Traumatic brain injury (TBI) causes clinical and functional impairment in cognition which negatively affects the quality of life and life satisfaction of the patients.^[1-5] TBI is classified based on the severity (mild [brief loss of consciousness for a few seconds or minutes], moderate [loss of consciousness for hours], or severe [loss of consciousness or coma for more than a day]),^[6,7] mechanism (open or closed),^[6,8] and/or other features (e.g. localized or diffused).^[8] It is one of the emerging global health problems with annual estimate of 69 million people worldwide. The overall incidence was greatest in North America (1,299/100,000 people) and Europe (1012/100,000 people) and least in Africa (801/100,000 people) and Eastern Mediterranean (897/100,000 people). Road traffic collision and falls are reported to be the most significant contributing factors of TBI.^[8,9] Given the adverse effects of TBI, it is important for

researchers and clinicians to understand how people with TBI live and cope with the condition in the society.

People with TBI are primarily faced with significant cognitive challenges which directly or indirectly affect their psychosocial lifestyles. They, therefore, need adaptive supportive systems that may equip them with managing their lives. Coping mechanisms such as coping strategies, religious coping, and social support could potentially be systems that may help people with TBI to adapt and manage their lives better. Researchers have classified coping strategies into problem focused and emotion focused^[10-12] which may be used by individuals with TBI to deal with their psychosocial problems. Hence, coping strategies are important in the management of the outcomes of TBI, especially during a period of distress.^[13] Problem-focused coping which includes defining the problem (i.e. TBI outcomes), weighing and generating alternative solutions are deemed to be more analytic and cognitive in nature.^[14] Therefore, when individuals

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with TBI use problem-focused strategy, they can effectively manage or change their resources to manage the deficit that was caused by their injury.^[15,16] On the other hand, emotion-focused coping is characterized by the use of wishful thinking, escape-avoidance behavior, self-blame, denial, worrying, crying, and substance abuse to deal with psychosocial problems.^[17] Problem-focused coping has been identified as adaptive or proactive task oriented coping while emotion-focused coping is seen as maladaptive or avoidance oriented.^[12] Sasse, Gibbons^[5] reported that people with TBI often adopt both adaptive (action/distraction) and maladaptive (trivialization/resignation) coping strategies which affect their quality of life. This is consistent with other findings that people with TBI have challenges with appropriate coping strategies to use which presents further challenges on their lives.^[18,19]

Furthermore, the relationship with spiritual beings (religious coping) and social support has been noted to help the rehabilitation of people with TBI.^[20,21] It was identified that people with TBI needed family and friends to have patience and understanding toward them and to offer more support.^[19,22] Hence, knowing the specific support systems and coping strategies used by people with TBI may help clinicians to better intervene by improving their coping strategies and supportive systems as well as psychosocial activities needed to improve their lives. Thus, this study aimed to examine the (1) supportive systems that affect people with TBI and (2) essential coping systems for psychosocial activities among people with TBI. It was, therefore, hypothesized that (1) several supportive systems would affect people with TBI and (2) coping systems would significantly affect psychosocial activities of people with TBI.

Methods

Participants and procedures

The neurosurgery and neuropsychiatry units at Korle-Bu Teaching Hospital and 37 Military Hospital were used as the setting for recruiting the participants with TBI [Table 1]. The medical doctors assessed and appropriately diagnosed the TBI cases. The researchers further assessed them to know the extent and severity of TBI using the Galveston orientation and amnesia test (GOAT; see the measures section for full details). A total of forty participants were recruited for this study based on the following inclusion criteria:

1. Have sustained a mild, moderate, or severe level of TBI
2. Be at least 18 years of age
3. Not experienced any neurologic deficits before their accident,
4. No comorbid spinal cord injuries, serious burns, serious facial disfigurement, and/or amputations.

The study measures (scales) were piloted in order to ascertain its suitability among Ghanaian samples using 15 people with TBI. The reliability coefficients arising

Table 1: Participant characteristics (n=40)

	Mean (SD) or, n (%)
Age	35.30 (11.90)
Years of education	10.30 (3.90)
Glasgow coma score	11.60 (3.45)
Gender (male)	28 (70)
Relationship status	
Single	18 (45)
Married	22 (55)
Divorced	0
Widowed	0
Employment status (employed)	19 (47.5)
Injury severity (PTA)	
Mild	17 (42.5)
Moderate	17 (42.5)
Severe	6 (15)
Injury source	
RTA	32 (80)
Falls and assaults	8 (20)
TBI duration	
Less than a year	31 (77.5)
A year	5 (12.5)
2 years	1 (0)
3 years	3 (7.5)

SD: Standard deviation, RTA: Road traffic accident, PTA: Posttraumatic amnesia, TBI: Traumatic brain injury

from the pilot study have been reported under each respective measure. Their data were not included in the main study. For the main study, participants who met the criteria for inclusion were formally invited to take part in the study. An initial assessment was conducted by the researcher to obtain basic demographic along with brain injury history. The participants were then assessed on the GOAT. Afterward, the participants completed a booklet of self-report questionnaires with the help of the researcher. For participants who had difficulty reading or focusing on text, the researcher assisted them by reading the questions aloud and marking the answers. Participants who were too fatigued to complete the entire procedure in one sitting were given the option to schedule an additional appointment to finish the questionnaires or to complete them independently. Data collection lasted for 4 months. The sample size may be small based on the rule of thumb of Tabachnick and Fidell^[23] but well within the limit of an exploratory study.^[24] The study adhered to other ethical principles and codes of conduct such as explaining the purpose of the study and the procedures involved, obtaining written informed consent, anonymity, and confidentiality.

Measures

Galveston orientation and amnesia test

The level of injury severity was assessed using GOAT.^[25] It consists of ten items that assess posttraumatic amnesia (PTA) in victims of TBI, especially on memory

and orientation. The GOAT's total score is achieved by subtracting the total amount of error scores from 100 (total score = 100 - the total amount of error scores). Scores lower than 75 indicate that the victim is still experiencing amnesia. It has acceptable reliability ($\alpha = 0.76$) and validity indices.^[25] The reliability coefficient for the Ghanaian sample was $\alpha = 0.77$.

Brief cope scale

TBI-related coping strategies were measured using the Brief Cope Scale.^[26] It is a 28-item scale that assesses a broad range of coping responses among adults for all diseases and is rated on a four-point Likert scale, ranging from "I haven't been doing this at all" (score of one) to "I have been doing this a lot" (score of four) (Carver, 1997). In total, 14 dimensions are covered by this scale. These are self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioral disengagement, venting, positive reframing, planning, humor, acceptance, religion, and self-blame. Every dimension has two items. Written instructions were slightly modified to direct the participant to base their responses specifically on coping with TBI. In this study, the higher score represents greater coping strategies used by the respondents. It has an acceptable reliability coefficient for the general scale and its subscales (Cronbach's alpha of 0.5–0.90) as well as for and validity.^[26] Among the Ghanaian sample, the Cronbach's alpha coefficients ranged from 0.62 to 0.70.

Religious coping activities scale

The use of religious coping mechanisms among people with TBI was assessed using religious coping activities scale.^[27] This 29-item scale assesses the extent to which people turn to religion to cope with stressful life circumstances through six subscales. The response is rated on a four-point Likert scale ranging from "not at all" (score of 1) to "a great deal" (score of 4). Its reliability (Cronbach's alpha) coefficients range from 0.61 to 0.92 and acceptable validity.^[27] The psychometric properties of the subscales for the Ghanaian sample ranged from Cronbach's alpha coefficients 0.65 to 0.73.

Multidimensional support scale

The level of social support available to people with TBI was assessed using multidimensional support scale (MDSS).^[28] The availability and adequacy of social support from various sources such as confidants (family and closest friends, i.e. attachment figures), peers (people who are facing the same challenges), and experts (those who have an official role to provide specialist help for whatever challenge it is) constitute the main items of this scale. The 16 items on the MDSS include emotional, practical, and informational support which are scored on a four-point Likert scale response format ranging from never (1) to usually or always (4). It had an acceptable reliability

coefficient ($\alpha = 0.75$).^[28] The reliability coefficient for the Ghanaian sample was $\alpha = 0.89$.

Mayo-portland adaptability inventory

The mayo-portland adaptability inventory (MPAI-4) is a 35-item inventory used to assist in assessing the psychosocial activities of people during the post acute (posthospital admission – evaluation of rehabilitation programs and to better understand the long-term outcomes of TBI) period following TBI.^[29,30] MPAI-4 items represent the range of physical, cognitive, emotional, behavioral, and social problems that people may encounter after TBI. It has three subscales, namely, ability (i.e. sensory, motor, and cognitive abilities); adjustment (i.e. mood and interpersonal interactions); and participation (e.g. social contacts, initiation, and money management). The first 29 items indicate current status or "outcome" after TBI, while items 30–35 measure other preexisting or coexisting conditions that are present and may be contributing to restrictions rated in the first 29 items.^[29,30] It is rated on a Likert scale response format from 0 (no problem) to 4 (severe problem; interferes with activities more than 75% of the time). The higher the individual score, the poorer the outcome. Its Cronbach's alpha coefficients range from 0.76 to 0.83.^[29,30] The Cronbach's alpha for the Ghanaian sample was 0.91 in general and between 0.69 and 0.85 for the subscales.

Ethical consideration

Ethical clearance for the study was obtained from Noguchi Memorial Institute of Medical Research, University of Ghana (NMIMR-IRB CPN 037/10-11).

Statistical analysis

Data were analyzed using SPSS version 22 software (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp). Pearson r was used to examine the relationship between the variables. Multiple linear regression was used to analyze the supportive systems that affect people with TBI and coping systems that significantly affect psychosocial activities of people with TBI.

Results

Table 1 shows that participants ($n = 40$) had a mean age of 35.30 (standard deviation = 11.90) years and an average of 10.30 years of education. Majority of the participants were males (70%), married (55%), and unemployed (52.5%). Majority of the participants had either mild (17%) or moderate (17%) level of severity for PTA (or TBI) with the major injury source being from road traffic accidents (80%) and TBI duration of less than a year (77.5%).

Table 2 shows the interrelationships between the coping strategies, social support, religious coping activities, psychosocial activities, and severity of TBI. Specifically, there were positive significant relationships between coping strategies and social support ($r = 0.426$, $P = 0.006$), and coping strategies and religious coping ($r = 0.375$,

$P = 0.017$) but negative significant relationship between coping strategies and psychosocial activities ($r = -0.515$, $P = 0.001$). Furthermore, there was a negative significant relationship between psychosocial activities and severity of TBI ($r = -0.400$, $P = 0.011$).

Table 3 shows the supportive systems that significantly affect people with TBI. In all, the factors accounted for about 32.5% of all supportive system factors that affect people with TBI ($F [4, 39] = 4.207$, $P = 0.007$). Coping strategies (standardized coefficient $[\beta] = -0.486$, $P = .014$), religious coping ($\beta = 0.318$, $P = 0.043$), and psychosocial activities ($\beta = -0.604$, $P = 0.001$) are the factors that significantly affect people with TBI in this study.

Table 4 shows the coping mechanisms that significantly affect psychosocial activities of people with TBI. The factors used in this study accounted for 27.7% of all the coping mechanism factors needed for effective psychosocial activities among people with TBI ($F [3, 39] = 4.591$, $P = 0.008$). Coping strategies are the only significant factor ($\beta = -0.530$, $P = 0.003$) in this study.

Table 2: Correlations between the coping systems, psychosocial activities, and severity of traumatic brain injury

	1	2	3	4	5
Coping strategies	-				
Social support	0.426**	-			
Religious coping	0.375*	0.082	-		
Psychosocial activities	-0.515**	-0.269	-0.105	-	
Severity of TBI	-0.035	0.032	0.204	-0.400*	-
Mean	70.75	39.10	88.20	24.85	76.75
SD	4.91	4.72	7.45	6.51	16.73

* $P < 0.05$, ** $P < 0.01$. SD: Standard deviation, TBI: Traumatic brain injury

Table 3: Supportive systems essential for people with traumatic brain injury

	B	SE	B	P	95% CI for B
Coping strategies	-1.656	0.637	-0.486	0.014	-2.948--0.364
Social support	0.178	0.548	0.050	0.748	-0.934-1.290
Religious coping	0.714	0.340	0.318	0.043	0.025-1.404
Psychosocial activities	-1.552	0.420	-0.604	0.001	-2.404--0.699
R^2 (adjusted R^2)	32.5% (24.7%)				

SE: Standard error, CI: Confidence interval

Table 4: Coping mechanisms needed for psychosocial activities among people with traumatic brain injury

	B	SE	B	P	95% CI for B
Coping strategies	-0.702	0.224	-0.530	0.003	-1.156--0.247
Social support	-0.071	0.217	-0.052	0.745	-0.511-0.369
Religious coping	0.085	0.134	0.098	0.529	-0.187-0.357
R^2 (adjusted R^2)	27.7% (21.6%)				

SE: Standard error, CI: Confidence interval

Discussion

The present study examined the supportive systems needed for normal functioning of people with TBI and how these (supportive systems) are associated with their psychosocial activities. The correlation results revealed that coping strategies related positively to social support and religious coping activities. These significant positive relationships with medium effect sizes signify that the coping strategies, social support, and religious coping activities belong to the same cluster of coping mechanisms. This suggests that, when one variable increases, the other also increases and vice versa. This supports a previous finding.^[22] Furthermore, it was found that coping strategies related negatively to psychosocial activities. This significant relationship with large effect size, although inverse, signifies that an increase in coping strategies relate to improvement in the psychosocial activities (as higher scores of psychosocial activities indicate poorer psychosocial activities) of people with TBI and vice versa. This supports previous findings that indicated that appropriate coping strategies improve the functional abilities of people with TBI and the opposite is true.^[5,19] Severity of TBI related negatively with psychosocial activities. This significant negative relationship with medium effect size signifies that higher severity levels of TBI reduce the psychosocial activities of people with TBI and vice versa.

The regression analysis showed that coping strategies, religious coping activities, and psychosocial activities were the significant supportive systems needed by people with TBI. The findings indicated that coping strategies and psychosocial activities were negatively associated with severity of TBI, while religious coping activities were positively associated with severity of TBI. This implies that an increase in coping strategies and psychosocial activities may decrease the adverse effects associated with the severity of TBI. However, more religious coping activities are needed to mitigate the increasing severity effect of TBI condition. The findings on coping strategies are consistent with previous studies.^[5,18,19] Religious activities are one of the main coping strategies among Ghanaians and Africans in general.^[31-33] Hence, it was expected that people with TBI would engage in religious activities to cope with their condition. However, social support was not a significant supportive factor among people with TBI which is not reassuring as it insinuates that family member, friends, and significant others may have been detached or indifferent about their condition.

Furthermore, coping strategies were particularly used by people with TBI to improve their psychosocial activities. That is, adaptive coping strategies seem to be beneficial to psychosocial activities of people with TBI and these strategies may be different for different severities of TBI.^[5,19,22] Thus, coping strategies may not fit all different TBI severities which further suggests that different coping

systems may be needed for different severity level of TBI with respect to their psychosocial activities. Other factors such as social support and religious coping activities were not of significant importance in predicting the psychosocial activities of people with TBI. In all, the factors used in this study accounted for only 27.7% of all coping systems needed for psychosocial activities among people with TBI. Hence, future studies may further explore these factors.

Limitations

This research is one of few studies in Ghana that addresses the gap relating to the role of coping strategies, religious coping activities, and social support among people with TBI which remains unclear among Ghanaian population. This is the strength of our study. However, the small sample size limited the generalizability of the findings as only TBI survivors who attend clinical reviews were used in this study. Furthermore, the data were collected at the same time point. Hence, changes in outcome over time could not be identified in this study. Future study may use a longitudinal research design to address this problem.

Conclusion

This cross-sectional study revealed that there were significant interrelationships between the coping strategies, social support, religious coping activities, psychosocial activities, and severity of TBI. Furthermore, coping strategies, religious coping, and psychosocial activities predicted the severity of TBI among participants. However, coping mechanisms were the only coping system that predicted psychosocial activities among people with TBI. These findings suggest that different supportive systems may be needed for differential functional abilities of people with TBI. Hence, clinicians may have to thoroughly assess them to know which support system works best for which activities needing improvement.

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Conflicts of interest

There are no conflicts of interest.

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