A Model of Factors Influencing Depressive Symptoms among Caregivers of Survivors with Traumatic Brain Injury

Unraun Kaewphinit, Manee Arpanantikul, Pisamai Orathai, Supreeda Monkong, Esther Bay*

Abstract: Caring for moderate to severe traumatic brain injury survivors with physical disability and cognitive dysfunction is challenging for caregivers, and it can lead to depression. Understanding the factors influencing depressive symptoms is necessary to develop specific interventions to reduce depression among caregivers. This cross-sectional correlational study examined the causal relationships among behavioral problems, role strain, preparedness, family hardiness, and depressive symptoms among caregivers of survivors with moderate to severe traumatic brain injury. Two hundred caregivers from three university hospitals in Thailand were recruited. Questionnaires used for collecting data were the Revised Memory and Behavioral Problems Checklist; the Preparedness for Caregiving Scale; the Family Hardiness Index; the Caregiver Role Strain Scale; and the Center for Epidemiologic Studies Depression Scale. Descriptive statistics and path analysis were used to analyze data.

The results revealed that the hypothesized model fitted the empirical data and explained 17.2% of the variance of depressive symptoms. Preparedness had an indirect effect on depressive symptoms through decreased role strain and increased family hardiness. Behavioral problems had a significant direct effect on depressive symptoms. These results can help nurses work to develop effective nursing interventions to prepare the caregivers and decrease behavioral problems by using a combination of providing health education, counseling, and skill building. This will increase capability of caregivers to provide quality home-based care and to manage health behavioral problems for survivors of moderate to severe traumatic brain injury.

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Introduction

Traumatic brain injury (TBI) is a health problem that provides consequences on both survivors with TBI (STBI) and their family caregivers. After injury the direct consequences on STBI include cognitive changes (such as disorientation, poor concentration and attention, poor memory, or slowed thinking).[1] Physical changes can occur after a brain injury such

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as headache, dizziness, blurred vision, balance problems, weakness, poor vision, change in speech, or sleep disorders.[2] Psychological and personality changes can also occur including irritability, sadness, nervousness, mood swings, or depression and many STBI have functional deficits including loss of ability to perform activities of daily living (ADL).[3] To recover from TBI takes a long time depending on the severity levels of TBI. The more severe people with TBI are, the heavier psychological pressure is on their family caregivers.[4] After discharge from the hospital survivors of moderate to severe TBI who have multiple impairments often rely on their family caregivers for continuing care at home for long periods of time.[5] Needs of moderate to severe TBI survivors were practical support by helping them to perform ADLs including feeding, bathing, dressing, toileting, walking, transferring, voiding, feeding, doing other self-cares and errands.[6] Those survivors also need caregivers for emotional support by assisting them to manage psychological and emotional problems (anxiety or depression).[3] Communication problems such as slurred speech make it harder to communicate well, causing STBI to need assistance from caregivers.[3] In addition, STBI also need help and support from caregivers to improve their cognition and behavioral problems that lead them to poor cooperation and decreased participation in performing ADLs.[2]

Family apostrophe can experience stress providing care for survivors of moderate to severe TBI, since increased severity of symptoms and disability of moderate are related to an increased dependence on family caregivers.[7] This can raise the workload of family caregivers and cause them stress and depression.[7] The burdens of providing long-term care also increase family caregivers' risk for psychological disorders,[8] as shown in a study with caregivers in Columbia where excessive caretaking responsibility result in mental health problems of caregivers of STBI.[7] Other studies also report increased depression and mental health problems among family caregivers of survivors with moderate to severe TBI.[7-11] During the first year post-injury, inexperienced caregivers face neurobehavioral and mood disturbances and experience a high level of burdens and distress with such survivors.[5] Other studies revealed some caregivers had depression in the first year after providing care for STBI at home.[9-10,12] Depressive symptoms can change overtime and become clinical depression in the first year of caring if care and treatment is not given to reduce such symptoms.[9-10] Consequently, caregivers with depressive symptoms are at risk of depression that causes them to become patients and unable to be caregivers. Caregivers need effective assistance from other family members and health care providers to reduce their burden and maintain their psychological well-being and their role as caregivers. To date, there is a paucity of knowledge on factors influencing depressive symptoms among caregivers of moderate to severe TBI survivors. Previous studies focused on factors affecting the caregiver burden[13] or factors related to depression or risk of depression among patients with TBI.[14-15] The purpose of this study was to validate the causal model that displays the relationships among behavioral problems as perceived by caregivers of STBI, preparedness, family hardiness, and role strain on depressive symptoms of caregivers of moderate to severe TBI survivors. The findings will guide development of an intervention to prevent caregivers from depression while caring for STBI at home.

Literature Review and Conceptual Framework

The Stress Process Model (SPM) of Pearlin and colleauges[16] was employed as the conceptual framework of this study since it was developed to observe how causes of stress, stress mediators, and stress symptoms join together to form a process of stress. There are interrelated conditions that are involved with caring for moderate to severe TBI survivors and cause family caregivers' stress. The SPM is a model that provides the structure to examine factors that could predict family caregiver stress.[16] This model comprises interrelated factors, including the background and context, stressors, mediators, and outcomes.[16] Background and context refers to socioeconomic status, characteristics of caregivers, and caregiving history resources. In this study, there was a focus on the background and preparedness of family caregivers. Preparedness is a caregiver's perception of how ready they are to provide care for survivors of moderate to severe TBI, and preparedness has been found to be significantly negatively related to depressive symptoms of caregivers during palliative care.[17] Unprepared caregivers have less confidence in providing care for STBI at home. They cannot manage or adjust their roles, leading to increase role strain, which is positively associated with depressive symptoms.[18] Simultaneously, preparedness is related to caregivers' resilience, which is associated with family resilience (the ability of the family to overcome life or stressful events).[19] Family resilience is constitutive of family hardiness for adapting to stressful events and maintaining well-being.[20] Being well prepared increases family hardiness which is related negatively to depression.[21]

The stressors in the SPM refer to situations, experiences, and activities as stimuli to induce stress as perceived by individuals.[16] For this study, the variables as stressors were behavioral problems. Behavioral problems of survivors with moderate to severe TBI are unpredictable and increase the amount of care required. As perceived by caregivers, this causes them to have depressive symptoms within the first year after the TBI happened.[12,19-21]

The mediators of stress in the SPM refer to conditions or activities that had a mediated effect on stressors through direct and indirect pathways.[16] Family hardiness and role strain were selected as mediators of this study. Family hardiness is described as how families react and adapt to stressful life events of caring for STBI and is a protective factor to buffer against negative, stressful life events.[17] Family hardiness comprises perceived commitment, challenge, and control,[22] and includes internal family strength and endurance.[23] Family hardiness is also recognized as a mediator in the relations between personality traits, illness, and stress.[19] It has been found that caregivers with high family hardiness have low depressive symptoms.[12,23] Concurrently, behavioral problems of people with cognitive impairment indirectly influence the caregiver's depression through caregiver burden,[24] which is described as caregiver role strain.[18] Another study of the mediating effect of perceived burden/role strain on the relationship between stressors and depression in caregivers of elderly dependent people revealed that behavioral problems had indirect effects on depression mediated by perceived burden/role strain.[25]

The outcome of the SPM is psychological well-being. In this study, the focus was on depressive symptoms, referring to signs and symptoms of mental health issues, including bad temper due to depression, guilt feeling and low self-esteem, helplessness and despair, fatigue, anorexia, and disturbed sleep patterns,[26] which were experienced by caregivers of STBI. TBI is a stressful situation for inexperienced TBI caregivers. Long-term care for physical and cognitive dysfunction of STBI with behavioral problems at home in the first year is associated with more depressive symptoms.[9-10]

From literature reviews, there were a lot of western studies about depression and caregiving.[9-10,21,25] However, little is known about depressive symptoms as the outcome of caregiving by Thai family caregivers of survivors with moderate to severe TBI. There are only a few studies on Thai caregivers in the first phase after STBI were discharged from the hospital[18,27] It is vital to study depressive symptoms as an outcome of family caregivers who care for survivors of moderate to severe TBI because, when compared to others, family caregivers of survivors with moderate to severe TBI have a high rate of problems such as stress, anxiety, and depression.[11] The depression rates in TBI caregivers are quite high from 22% to 77%, and depressive symptoms can persist for years[11] affecting family caregivers' quality of life.

Therefore, this study was conducted to develop and to test a model of factors influencing depressive symptoms of caregivers of moderate to severe TBI survivors that was guided by the SPM and evidence from literature reviews. The hypothesized model of factors influencing depressive symptoms among caregivers of STBI is shown in **Figure 1.** Behavioral problems as perceived by caregivers of survivors with moderate to severe TBI and preparedness were considered as antecedents; role strain and family hardiness were considered as mediators; and depressive symptoms of caregivers of survivors with moderate to severe TBI was considered as the outcome. As a result, the empirical knowledge from this study will be used to develop nursing interventions to prevent TBI caregivers from having depressive symptoms.

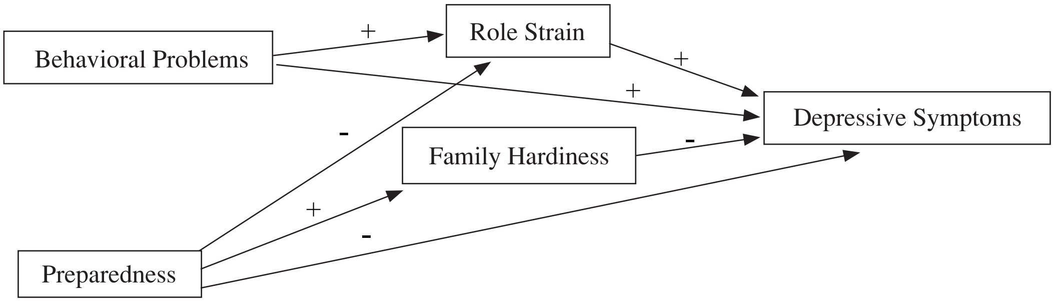


Figure 1. A hypothesized model of factors influencing depressive symptoms among caregivers of survivors with traumatic brain injury

Methods

Design: A cross-sectional, correlational design was employed to enable the investigation of the causal relationships among several variables at the single point of time.[28] The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist was used as a guide for reporting this study.[29]

Sample and Setting: Purposive sampling was used in this study. The sample size was based on the general rules using the ratio of cases to an estimated parameter, and a ratio of 10:1 to 20:1 is commonly suggested for a minimum recommendation.[30] The sample size was calculated using 15 participants per one estimated parameter. Thus, 180 participants were a minimum recommendation. However, 10% extra participants were added to increase the accuracy of standard errors and parameter estimates and result in reliable results.[30] Two hundred Thai caregivers who cared for moderate to severe TBI survivors were recruited from three university hospitals in Thailand. All participants met the inclusion criteria: 18 years of age or older; self-report having a good memory and not having a chronic illness or mental health problems; being an unpaid primary caregiver providing care for moderate to severe TBI survivors at home; having experience of providing continuous care for more than one month after hospital discharge to one year; being willing to participate in this study, and able to speak, read, and understand Thai.

The characteristics of research settings selection were: 1) having the neurological outpatient departments and neurosurgical wards and having specialist doctors in the neuro-surgical field; and 2) having a similar process of health care service such as giving health education regarding caring for persons with moderate to severe TBI before discharging from hospital to home and giving health care service during the follow-up period. Therefore, three university hospitals were purposively selected.

Ethical Considerations: This study received the approval from the Institutional Review Boards (IRB) of the Faculty of Medicine Ramathibodi Hospital, Mahidol University (MURA2018/886), and Srinakharinwirot University (SWUEC/E-066/2562). After obtaining permission from the hospital settings, the principal investigator (PI) screened the eligible potential participants and approached them to explain the purposes and processes of the study confidentiality, potential risks and benefits, and their right to take part in or decline or withdraw from the study at any time. If moderate to severe TBI survivors were not able to give consent due to their cognitive disorders, their family caregivers gave permission to collect information and were representatives to answer the questions instead. To assure anonymity and confidentiality of participants, a code number was used in place of each participant's name. The participants who were willing to join the study were asked to sign an informed consent form.

Research instruments: These were a demographic questionnaire form, the Center for Epidemiologic Studies Depression Scale (CES-D),[26,31] the Revised Memory and Behavioral Problems Checklist (RMBPC),[24,32] the Preparedness for Caregiving Scale (PCS),[18,33] the Family Hardiness Index (FHI),[17,22] and the Caregiver Role Strain Scale (CRSS).[18,33] In this study, the content validity of all research instruments was done by five experts who taught or conducted caregiving research. Those experts consisted of two faculty members of adult nursing, a faculty member of community health nursing, a faculty member of psychiatric nursing, and a doctor of family community medicine. Written permission to use research instruments was obtained from each developer before being used in this study. A pilot study with 30 cases meeting the inclusion criteria, was undertaken to test the validity and reliability of each instrument. The reliability of each instrument was also tested with the 200 participants in the main study. The details were described in each instrument.

A *demographic questionnaire form* was developed by the researchers to collect personal information of people with moderate to severe TBI and their caregivers including, age, gender, education level, religion, marital status, occupation, family income, relationship, and duration of caring.

The Center for Epidemiologic Studies Depression Scale (CES-D), measuring depressive symptoms among caregivers, was developed by Radloff,[26] translated into Thai by Trangkasombat et al., and had Cronbach's alpha coefficient of .92.[31] It consists of 20 statements rated on a 4-point Likert scale, ranging from 0 (rarely or none of the time) to 3 (most or all of the time). In this study, the criteria of the cut point to assess caregivers who had depressive symptoms that were tested with Thai adults, and were found to be 19. Therefore, a score ≥19 indicated depressive symptoms and a score <19 indicated normality.[24] The higher the overall scores, the more severity of depressive symptoms. Examples of items are: "I was bothered by things that usually don't bother me"; "I did not feel like eating"; and "My appetite was poor." The Cronbach's alpha coefficients of the CES-D in the pilot and main studies were .80 and .79, respectively.

The Revised Memory and Behavioral Problems Checklist (RMBPC) was used to measure behavioral problems of people with moderate to severe TBI as perceived by their caregivers. It was developed by Teri et al.,[2] translated into Thai by Ondee, and the Cronbach's alpha coefficient was .93.[24] It contains three domains, memory-related problems, depression, and disruptive behaviors. The RMBPC (Thai version) was used to measure people with dementia and was selected for this study because the behavioral, emotional, and psychosocial problems in people with moderate to severe TBI were similar to those with dementia, such as having memory changes, impairment of body function, mood changes, depression, aggressive behavior, suicidal behavior, difficulty for adaptation, and communication problem. The RMBPC consists of 24 items. Each item is rated on (1) the frequency of behavioral problems during the past week (0 = never occurred, 4 = daily or more often, 9 = do not know/ not applicable) and (2) the reaction of behavioral problem (0 = not at all, 4 = extremely, 9 = do not know/not applicable). The score of each item is calculated by scores of the frequency of behavioral problems during the past week multiplied by the affected levels of caregivers. The possible scores of RMBPC range from 0 to 96. A high score means a high level of frequency of behavioral problems and the responses of caregivers to behavioral problems. Examples of items are: "Asking the same question over and over"; "Forgetting what day it is"; "Difficulty concentrating on a task"; "Destroys property"; "Aggressive to others"; and "Appears sad and depressed." The Cronbach's alpha coefficients of the RMBPC in the pilot and main studies were .90 and .86, respectively.

The Preparedness for Caregiving Scale (PCS), measuring preparedness perception of caregivers, was developed by Archbold et al.,[33] translated into Thai by Wirojratana, and the Cronbach's alpha coefficient was .82.[34] It consists of eight items which ask caregivers how well prepared they are for multiple domains of caregiving. Responses are rated on a 5-point scale ranging from 0 (not at all prepared) to 4 (very well prepared). The scale is scored by calculating the mean of all items answered with a score range of 0 to 4. Possible scores range from 0 to 32. A higher score means the more prepared the caregivers feel for caregiving. Questions asked include "How well prepared do you think you are to take care of your family member's physical needs?" and "How well prepared do you think you are to respond to and handle emergencies that involve him or her?" The Cronbach's alpha coefficients of the Preparedness Scale in the pilot and main studies were .94 and .95, respectively.

The Family Hardiness Index (FHI) measuring the construct of family hardiness as perceived by caregivers, was developed by McCubbin et al.,[17] and was translated into Thai by Niyomthai et al., achieving a Cronbach's alpha coefficient of .80.[22] It consists of 20 items using a 4-point Likert scale: false = 0, mostly false =1, mostly true = 2, and true = 3. The total score ranges from 0 to 60. A high score reflects a high level of family hardiness. Item examples are "We strive together and help each other no matter what" and "We work together to solve problems." The Cronbach's alpha coefficients of the FHI in the pilot and main studies were .88 and .91, respectively.

The Caregiver Role Strain Scale (CRSS) was developed by Archbold et al.[33] translated into Thai by Wirojratana, and achieved Cronbach's alpha coefficient of .74.[34] It consists of four items, which ask caregivers about their different experiences while giving care. This scale has a 5-point response format ranging from 0 (not at all) to 4 (a great deal), and possible scores range from 0-16. A high score reflects a high caregiver role strain from doing caregiving activities.[33] Examples of questions asked are: "How often would you say that taking care of people with moderate to severe IBI is hardship?" and "How much stress do you feel because of all your obligations, including taking care of your family member?" The Cronbach's alpha coefficients of the CRSS in the pilot study and in this study were .81 and .81, respectively.

Data collection: The data collection was carried out from June 2019 to September 2019. After gaining IRB approvals, the primary investigator (PI) contacted the director of the study settings to ask for data collection permission by explaining the research project, purpose, and data collection procedures. After this, permission and cooperation were given by the head nurses and nurses at the neurological outpatient departments and wards that cared for neurological patients. The nurses helped the PI to contact the outpatients with moderate to severe TBI survivors and their family caregivers, and recruitment began after explanations were given and consent was obtained. It took 40-60 minutes to complete all of the questionnaires. At the neurological outpatient departments, the PI arranged the waiting room for the STBI while they waited for their doctors' visits or the home medicine. The PI, other health providers, or other family members caring for the STBI were in a separate room while caregivers completed the instruments. The PI checked the completion of the questionnaires.

Data analysis: The IBM Statistical Package of the Social Science (SPSS) version 22.0 (License: D0EJ9LL) was used for statistical analysis, and the collected data were checked for missing information and cleaned to ensure accuracy. Demographic data were analyzed using descriptive statistics (frequency, percentage, mean, standard deviation). All study variables were analyzed by descriptive statistics (minimum, maximum, mean, standard deviation, skewness, and kurtosis).

Regarding assumptions of path analysis, linearity, homoscedasticity, and multicollinearity were tested. The results showed that these three assumptions were met. However, the assumption of multivariate normality was violated, and the maximum likelihood with robust standard errors (MLR) estimation using the asymptotic variance-covariance matrix was used to conduct path analysis.[35]

Results

The demographic data of participants are shown in **Table 1**. Their ages ranged from 30 to 58 years, and most participants were female, Buddhist, and married. More than half had a bachelor's degree or above. The relationships between participants and STBI were as spouses. The majority of participants had never experienced taking care of others who had disabilities and cognitive problems, and 95.50% spent about 10 hours or more per day for providing care at home, and 83.50% had been providing care for 2 to 6 months. Moreover, 41.50% of participants were employees and 40% had monthly income for 33,001 to 55,000 baht (922.33-1,537.17 USD; 1 USD = 35.78 Baht). Less than half of them had financial problems.

Table 1. Demographic data of caregivers of moderate to severe TBI survivors (N = 200)

Characteristics	Number	Percentage
Gender		
Male	19	9.50
Female	181	90.50
Age (year old) ranged 30-58 (Mean = 41.88, SD = 8.40)		
30-40	106	53.00
41-50	56	28.00
51-60	38	19.00
Religion		
Buddhist	195	97.50
Muslim	5	2.50
Marital status		
Single	45	22.50
Married	146	73.00
Widowed	6	3.00
Divorced or separated	3	1.50

Table 1. Demographic data of caregivers of moderate to severe TBI survivors (N = 200) (Cont.)

Characteristics	Number	Percentage
Education level		
Primary school	2	1.00
High school	88	44.00
Bachelor degree or above	110	55.00
Relationship with TBI survivors		
Spouse	97	48.50
Parents	51	25.50
Sons/Daughters	31	15.50
Siblings	17	8.50
Other (daughter in law, friends)	4	2.00
Monthly income (Baht): 1 USD = 35.78 Baht		
10,000 to 15,000 (279.49-419.23 USD)	1	0.50
15,001 to 22,500 (419.26-628.84 USD)	41	20.50
22,501 to 33,000 (628.87-922.30 USD)	63	31.50
33,001 to 55,000 (922.33-1,537.17 USD)	80	40.00
55,001 to 85,000 (1,537.20-2,375.63 USD)	15	7.50
Financial problems		
Yes	45	22.50
No	155	77.50
Experienced taking care for disabled persons with cognitive problems		
No	198	99.00
Yes	2	1.00
Occupation		
None	2	1.00
Employee	83	41.50
Merchant	33	16.50
Agriculturist	4	2.00
Government officer	44	22.00
Other (own business, freelance)	34	17.00
Hours/Day for providing care ranged 8-24 (Mean = 11.55, SD = 2.69)		
Less than 10 hours	9	4.50
10 hours or more	191	95.50
Duration of providing care (months) ranged 2-11 (Mean = 4.62, SD = 2.69)		
2 to 6	167	83.50
7 to 12	33	16.50

The demographic data of moderate to severe survivors with TBI are shown in **Table 2**. Most were male and their ages ranged from 19 to 88 years. Many of them were young adult aged 18 to 40 years, 52.50% were married, and 51.50% had a high school education level. Most were Buddhist. The severity levels of survivors of TBI were at moderate and severe levels. The majority of the survivors (77%) had TBI from traffic accidents. Moreover, before their TBI happened, nearly half of moderate to severe TBI survivors were students.

Table 2. Demographic data of moderate to severe TBI survivors (N = 200)

Characteristics	Number	Percentage
Gender		
Male	159	79.50
Female	41	20.50
Severity level of TBI		
Moderate TBI	169	84.50
Severe TBI	31	15.50
Age (years old) ranged 19-88 (Mean = 40.12, SD = 16.79)		
18-40	127	63.50
41-60	43	21.50
More than 60	30	15.00
Causes of TBI		
Traffic accidents	154	77.00
Falling down	34	17.00
Other (accident at work)	12	6.00
Education level		
None	1	0.50
Primary school	12	6.00
High school	103	51.50
Bachelor degree or above	80	40.00
Other (vocational education)	4	2.00
Religion		
Buddhist	197	98.50
Muslim	3	1.50
Marital status		
Single	69	34.50
Married	105	52.50
Widowed	24	12.00
Divorced or separated	2	1.00
Occupation		
None	1	0.50
Employee	75	37.50
Merchant	11	5.50
Agriculturist	2	1.00
Government officer	14	7.00
Retired government	4	2.00
Other (students)	93	46.50

Table 3 displays a mean score for each variable compared with the mean of possible score of each research instrument. The results of all variables revealed that caregivers' perception of the behavioral problems of their relatives with moderate to severe TBI in this study was at a low level. The participants had been somewhat well-prepared, and they perceived a high level of family hardiness. Moreover, the participants had a moderate level of role strain. The participants in this study had a low mean score for the level of depressive symptoms.

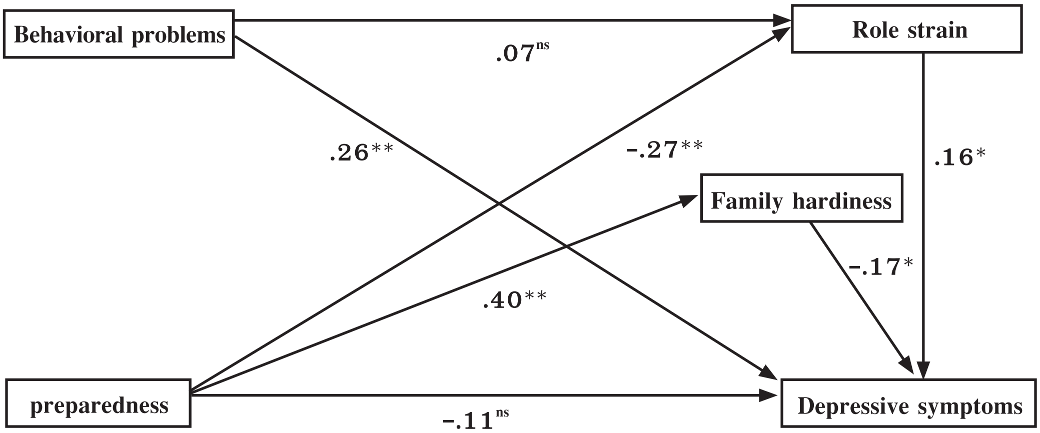
Table 3. Descriptive statistics of variables (N = 200)

Variables	Possible Range	Actual Range	Mean	SD	Level of score
Behavioral problems	0-96	1-81	27.89	13.63	Low
Preparedness	0-32	6-25	15.56	4.22	Well prepared
Family hardiness	0-60	35-60	46.39	4.86	High
Role strain	0-16	4-13	8.45	1.64	Moderate
Depressive symptoms	0-60	13-28	19.65	3.23	Low

Model testing

The hypothesized model comprised two exogenous variables (behavioral problems and preparedness) and three endogenous variables (role strain, family hardiness, and depressive symptoms). The overall fit of the hypothesized model to the empirical data was assessed by goodness-of-fit measures based on published criteria.[30,36]

Regarding model testing, the hypothesized model fitted the empirical data and explained 17.2% of the variance in depressive symptoms of caregivers of moderate to severe TBI survivors (**Figure 2**). The results also showed that behavioral problems ($\beta = .26$, $p < .01$), role strain ($\beta = .16$, $p < .05$), and family hardiness ($\beta = -.17$, $p < .05$) had significant direct effects on depressive symptoms. Preparedness ($\beta = -.11$, $p < .01$) had a significant indirect effect on depressive symptoms. But the total effect of behavioral problems and preparedness had significant effects on depressive symptoms ($\beta = .27$, $p < .01$, $\beta = -.22$, $p < .01$, respectively). In conclusion, behavioral problems and preparedness are important exogenous variables in this model. Preparedness decreased depressive symptoms through decreased role strain and increased family hardiness. The causal effects of the variables on depressive symptoms in terms of direct, indirect, and total effects are presented in **Table 4**.



$\chi^2 = 1.32$ ($df = 3$, $p = .724$), $\chi^2 / df = .44$, GFI = .997, AGFI = .986, CFI = 1.000, RFI = .953, RMESA = .000, SRMR = .022

Note: χ^2 =Chi-Square, df = Degree of Freedom, GFI = Goodness of Fit Index, AGFI = Adjusted Goodness of Fit Index, RMSEA = Root Mean Square Error of Approximation, SRMR = Standard Root Mean Square of Residual

*$p < .05$, ** $p < .01$, ns = non-significance

Figure 2. A hypothesized model of factors influencing depressive symptoms among caregivers of survivors with traumatic brain injury

Table 4. Standardized direct effect (DE), standardized indirect effect (IE), and standardized total effect (TE) of study variables in a final model (N = 200)

Effect variables **Causal variables**	**Role strain**			**Family hardiness**			**Depressive symptoms**		
	DE	**IE**	**TE**	**DE**	**IE**	**TE**	**DE**	**IE**	**TE**
Behavioral problems	.07^{ns}	-	.07^{ns}	-	-	-	.26**	.01^{ns}	.27**
Preparedness	-.27**	-	-.27**	.40**	-	.40**	-.11^{ns}	-.11**	-.22**
Family hardiness	-	-	-	-	-	-	-.17*	-	-.17*
Role strain	-	-	-	-	-	-	.16*	-	.16*

Note: *$p < .05$, **$p < .01$, ns = non-significance

Discussion

Findings from this study indicated that caregivers of family members with TBI had a low level of depressive symptoms. Preparedness indirectly affected depressive symptoms through decreasing role strain and increasing family hardiness, whereas behavioral problems directly affected depressive symptoms. This is in line with the previous studies, which indicated that women (90.50% of family caregivers in this study were females) expected to help their families to care for other family members; thus, female caregivers may feel more prepared for caregiving roles.[37-38] In addition, family caregivers who received support from their family had low depressive symptoms and a high score of family hardiness, as found in a previous study.[37]

Even though the hypothesized model of this study fitted with the empirical data, it accounted for only 17.2% of the variances in depressive symptoms. This finding might be because we measured the depressive symptoms as an outcome instead of psychological well-being as proposed in the SPM.[16]

Behavioral problems of relatives with moderate to severe TBI had *a* significantly positive and direct effect on depressive symptoms of caregivers. This is consistent with the previous studies showing that behavior problems are a predictor of depression.[12,38] It was found that the severity of behavioral problems could increase depressive symptoms and the burden felt by caregivers[12,38] and they were powerless to cope with those behavioral problems at home.[21] According to the demographic data, most caregivers were in the early adulthood in the age range of 30-40 years, and the majority of them (99 %) had no experience caring for STBI. Managing an STBI with behavioral changes involves dealing with agitation, appetite and eating disorders, anxiety, depression, irritability, elation, apathy, and motor disturbances; this is a stressful task for less experienced caregivers, and they require more time and energy to care for someone with behavioral changes.[39] Similar to the findings of this study, the studies have revealed that cognitive, behavioral, and functional impairments of STBI are found to be related to caregiver stress and depressive symptoms.[9-11,38]

From the model, role strain had a significantly positive direct effect on depressive symptoms, and the caregivers in this study had moderate role strain. Due to their new role of caring, this could cause high levels of depressive symptoms in caregivers of STBI.[22] Moreover, the time spent by caregivers affected the role strain and contributed to their high stress level or high prevalence of depression symptoms.[40] The majority (95.5%) of caregivers in this study spent 10 hours or more per day providing care and many caregivers (83.5%) had provided care for 2-6 months influencing caregiver role strain. This is congruent with an earlier study which reported that the duration of providing care is a major factor in influencing role strain levels.

In this study, the mean score of role strain of caregivers was at a moderate level. Caregivers who cared for STBI for many months or even years were increasingly adapting to their caregiving role, and those caregivers had developed knowledge, skills, experience, and attitudes. This could help minimize the role strain[40] and conversely, this could also lead to caregiver burnout.

The result of this study also showed that family hardiness had a significantly negative direct effect on depressive symptoms; family caregivers with high family hardiness had low depressive symptoms. This was congruent with previous studies, which revealed that the family hardiness had a negative effect on depression of TBI caregivers[12,21] and was negatively correlated to depression of caregivers.[12] Family hardiness was a stress buffer to lessen the impact of negative life events on a person's well-being as well as a family strength and resource of support when coping with the stressful life event.[41] Regarding the demographic data, it was found that 73% of caregivers were married, and the relationship with STBI was spouse (48.50%), parent (25.50%), and sons/daughters (15.50%), respectively. When faced with caring for a family member with cognitive impairment and behavioral changes, caregivers talked with other family members, solved problems together, and helped each other, causing effective adaptation and decreasing stress and depression.[17,27] Therefore, getting good support and encouragement from family together with having strong family hardiness were good resources for caregivers that helped them adapt and cope with a family member with traumatic brain injury.[22,27]

Limitations

Some limitations of this study must be considered. Firstly, due to the long and strenuous questionnaires, participants had to spend more time completing all questionnaires. Secondly, the samples were obtained from three university hospitals; thus, the results may not generalize to the whole TBI caregiver population. Thirdly, this study did not use biological testing to confirm human stress/depression, and it only used self-report. Thus, future studies should include biological measures. Fourthly, the majority of the participants had a bachelor's degree or higher. Perhaps this higher education provided them with a better ability to ask questions or seek out information or resources than those with lower education. Fifthly, the length of time that the caregivers had been immersed in their caregiving role was quite short. If they have caregiving role for a longer period of time, they would have different findings, and future studies might need to control for this point, such as having at least one year in the caregiving role. The final limitation is that we measured the depressive symptoms as the outcome of SPM instead of psychological well-being as proposed in the theory; thus, further studies should develop and test the model of psychological well-being among caregivers in this population and other chronic illnesses.

Conclusions and Implications for Nursing Practice

Our results provide further evidence to increase our understanding of factors influencing depressive symptoms among caregivers of STBI. The hypothesized model highlights that preparedness of family caregivers is very important to increase family hardiness and reduce role strain as well as behavioral problems. It suggested that preparing caregivers before moderate to severe TBI survivors are discharged from the hospital will build caregivers' confidence and sense of security in providing effective care to those survivors at home. TBI caregivers should know about behavioral problems of moderate to severe TBI survivors so that they would be familiar with those symptoms and can adapt themselves and manage them. Nurses should inform caregivers about behavioral problems of STBI to understand and manage behavioral problems. Nurses need to provide knowledge and train the skills of care to TBI caregivers before discharging moderate to severe TBI survivors from the hospital to home.[18] Nurses need to develop proper nursing intervention programs containing appropriate caregiver education, caregiving skills, problem-solving skill, and family involvement. Therefore, caregivers could manage and control behavioral problems of moderate to severe TBI survivors and enhance family hardiness and support. A prior study reported that caregivers felt more prepared to care for STBI at home when they felt more supported, gained access to knowledge/information and supportive resources, and felt more protected in the caregiving roles.[6,18,33] The results also indicated that family hardiness is an issue of concern. When TBI caregivers have knowledge and skills training, they can manage the care for moderate to severe TBI survivors. This was a way to build hardiness for caregivers who are part of the family. Well-prepared caregivers can enhance family hardiness, which helps to redefine crises as a challenge and a position of controlling over the stressful life event within the family. A previous study presented that higher levels of family hardiness are related to better coping and adaptation because hardiness is a resource for coping; family hardiness is about the buffer role. The more family members feel connected and collaborative, solve problems, and cope with the stressors together, the less difficulty they feel in caring for an ill person; thus, family hardiness can help reduce stress, anxiety, and depression.[21] However, those interventions should be tested for effectiveness before application to practice.

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แบบจำลองของปัจจัยที่มีอิทธิพลต่ออาการซึมเศร้าของญาติผู้ดูแลผู้รอดชีวิตจากสมองบาดเจ็บ

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บทคัดย่อ: การดูแลผู้รอดชีวิตจากสมองบาดเจ็บในระดับปานกลางถึงรุนแรงที่มีความพิการทางร่างกายและมีความผิดปกติทางการรู้คิดเป็นสิ่งที่ท้าทายสำหรับญาติผู้ดูแล และสามารถนำไปสู่ภาวะซึมเศร้าได้ การเข้าใจถึงปัจจัยและการทำงานของปัจจัยประกอบกันจนพัฒนาเป็นอาการซึมเศร้าเป็นสิ่งจำเป็นในการพัฒนาวิธีการที่เฉพาะเจาะจงเพื่อลดภาวะซึมเศร้าของญาติผู้ดูแลได้ อย่างไรก็ตาม การศึกษาจำนวนมากที่ผ่านมาจนถึงปัจจุบันนี้ยังไม่เคยมีการศึกษาในกลุ่มปัจจัยเหล่านี้อย่างเพียงพอ การศึกษาวิจัยแบบภาคตัดขวางเชิงสหสัมพันธ์นี้มีวัตถุประสงค์เพื่อตรวจสอบความสัมพันธ์เชิงสาเหตุระหว่างปัญหาด้านพฤติกรรมของผู้ป่วยสมองบาดเจ็บ ความเครียดในบทบาทผู้ดูแล ความพร้อมในการดูแล ความเข้มแข็งในครอบครัว และอาการซึมเศร้าของญาติผู้ดูแลผู้ป่วยสมองบาดเจ็บในระดับปานกลางถึงรุนแรง โดยผู้ดูแลผู้ป่วยสมองบาดเจ็บในระดับปานกลางถึงรุนแรงจำนวน 200 คนที่ได้รับการคัดเลือกเข้าร่วมในการศึกษานี้มาจากโรงพยาบาลมหาวิทยาลัยในประเทศไทยจำนวน 3 แห่ง แบบสอบถามที่ใช้ในการเก็บรวบรวมข้อมูลได้แก่ แบบวัดปัญหาด้านความจำและพฤติกรรมของผู้ป่วยที่ได้รับบาดเจ็บที่ศีรษะ แบบประเมินความพร้อมในการดูแล แบบวัดความเข้มแข็งของครอบครัว แบบประเมินความเครียดในบทบาทผู้ดูแล และแบบวัดความซึมเศร้าของผู้ดูแล การวิเคราะห์ข้อมูลใช้สถิติเชิงพรรณนาและสถิติการวิเคราะห์เส้นทาง

ผลการวิจัยพบว่า แบบจำลองสมมุติฐานนี้เหมาะสมสอดคล้องกับข้อมูลเชิงประจักษ์และสามารถอธิบายความแปรปรวนของอาการซึมเศร้าของญาติผู้ดูแลได้ร้อยละ 17.2 ความพร้อมในการดูแลมีผลโดยอ้อมมากที่สุดต่ออาการซึมเศร้า โดยที่ความพร้อมในการดูแลสามารถลดอาการซึมเศร้าได้โดยมีผลผ่านการลดความเครียดในบทบาทผู้ดูแลและการเพิ่มความเข้มแข็งของครอบครัว จากผลการศึกษานี้พยาบาลควรพัฒนาโปรแกรมทางการพยาบาลที่มีประสิทธิภาพเพื่อเตรียมความพร้อมในการดูแลของญาติผู้ดูแลและลดปัญหาด้านพฤติกรรมของผู้ป่วยสมองบาดเจ็บด้วยการให้ความรู้ด้านสุขภาพ การให้คำปรึกษาและการฝึกทักษะการดูแล เพื่อเพิ่มความสามารถของญาติผู้ดูแลในการดูแลที่บ้านอย่างมีคุณภาพและสามารถจัดการปัญหาด้านพฤติกรรมของผู้รอดชีวิตจากสมองบาดเจ็บในระดับปานกลางถึงรุนแรงได้

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คำสำคัญ: อาการซึมเศร้า ญาติผู้ดูแล ผู้รอดชีวิตจากสมองบาดเจ็บ สถิติการวิเคราะห์เส้นทาง

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