Predictors of caregiver depression among community-residing families living with traumatic brain injury

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Abstract. Objective: To test the hypothesis that ineffective problem-solving abilities would be significantly predictive of risk for depression in caregivers of persons with traumatic brain injury (TBI) after controlling for caregiver burden, caregiver health and demographic characteristics.

Design: Correlational and logistic regression analyses of cross-sectional data.

Participants: 57 women and 3 men (M age of caregivers = 51.4, SD = 10.1) caring for a relative with a TBI.

Main outcome measure: Centers for Epidemiologic Studies – Depression scale (CES-D).

Results: Twenty-nine caregivers (48.3%) had CES-D scores that met the criteria for risk of depression. An ineffective approach to problem solving, characterized by negative, avoidant, and careless/impulsive styles, and self-reported caregiver physical symptoms were significantly predictive of caregiver depression regardless of length of time caregiving, perceived burden, or demographic variables.

Conclusions: Caregivers of persons with TBI who report physical health problems and who exhibit ineffective problem solving area at greater risk for depression, regardless of the time they have spent in their role as a caregiver.

Keywords: Caregivers, depression, traumatic brain injury

1. Introduction

Empirical research has expanded our understanding of the role family caregivers play in the health and well-being of persons who live with traumatic brain injuries (TBI) [1,2]. Although the majority of this work has relied on the description and demographic correlates of depressive symptoms [3], greater attention to cognitive-behavioral characteristics is necessary in order to further develop and refine theory-driven interventions for caregivers who may be at risk for depression [4].

Researchers and clinicians have long recognized the hardship experienced by many family members after they assume the role of caregiver for a loved one who has incurred a TBI. Reviews of this literature indicate that these caregivers are at higher risk for depression, anxiety, ill health, and use of medications to calm down and to aid sleep [5]. Recent figures estimate the incidence of depression in TBI caregivers as high as 60% [6]. Some family caregivers may exhibit greater distress over time than the person with TBI [7,8] and caregiver problems with anxiety and depression may persist years after TBI onset [9]. While some evidence indicates that neurobehavioral disturbances, including...
patient decreased self-awareness of impairment associated with TBI are a strong predictor of caregiver distress [10,11], accumulating evidence indicates that there is considerable variation in the ways family caregivers react, thereby accounting for the observed differences in caregiver adjustment. For some, caregiver distress may be due in part to subjective appraisal of their role as onerous and personally distressing [12, 13], while other caregivers appear to be predisposed to experiencing higher levels of emotional strain regardless of how their caregiving duties are objectively defined [14].

Cognitive-behavioral skills appear to be particularly influential in caregiver adjustment. Family caregivers who find a sense of meaning in their role report less distress than those who do not [15]. Among caregivers of persons with TBI, coping in an instrumental, problem-focused manner is a better predictor of caregiver adjustment than perceived social support [6] while caregivers and care recipients who rely on palliative, emotion-focused coping strategies seem to have more distress than those who use more problem-focused techniques [16]. Families that evidence effective problem solving in their interpersonal interactions exhibit less distress in cross-sectional research of children and adolescents with acquired brain injuries [17] and are able to maintain these benefits up to three years after the onset of TBI [18]. Research has shown that family coping behavior soon after the onset of TBI may be a major determinant of patient behavioral outcomes in the first year of injury [19] suggesting that family caregivers who possess specific skills in solving problems in everyday situations may be better equipped to handle the rigors of the caregiving role.

Studies of caregivers’ specific problem solving styles indicate that those who possess a negative quality in their approach to problem definition and solution, also exhibit depression, anxiety and poor emotional adjustment [20]. In contrast, caregivers who report effective problem-solving abilities are more likely to exhibit and report more optimal adjustment over time [20–22]. Along the same lines of inquiry, ineffective problem solving has been prospectively linked with caregivers’ experience of depression, anxiety and ill health over a period of a year [23]. Individuals who receive assistance from caregivers who possess ineffective problem-solving abilities may be at risk for preventable secondary complications [24].

This study was conducted to examine characteristics of caregivers who may be at risk for depression. Building on our programmatic research concerning the adaptive elements of effective social problem solving skills, we predicted that a negative problem-solving approach would be associated with greater caregiver distress. This assumption was tested in TBI caregivers who often experience burden, depression and ill health [18, 25–27]. Specifically, we hypothesized that a negative, ineffective problem-solving style would be significantly characteristic of caregivers at risk for depression after taking into account demographic information, caregiver burden, and caregiver health complaints.

2. Methods

2.1. Participant characteristics

The sample included 57 women and 3 men who had assumed caregiving responsibilities for a family member who had incurred a TBI. Caregiver ages ranged from 24 to 74 years ($M = 51.4, SD = 10.1$). There were 51 Caucasian, 7 African-American, and 2 Hispanic caregivers. Relationships of the caregivers to care recipients included 36 mothers, 3 husbands, 4 sisters, 2 grandparents, and 16 others. Length of time providing care ranged from 36 to 298 months ($M = 60.8, SD = 71.8$). Of the 60 care recipients, 44 were male and 16 were female. Ages of care recipients ranged from 19 to 76 years ($M = 36.5, SD = 14.2$).

2.2. Procedure

Family caregivers of adults with TBI were recruited from advertisements, flyers, and mailing throughout Alabama, Georgia, Mississippi, Southern Tennessee, and the Florida Panhandle. Additional criteria for participation included: providing care for at least 6 months, part-time supervision, or greater, as determined by the Supervision Rating Scale [7], and a score 24 of higher on the Folstein Mini-Mental Status Exam (MMSE) [28]. Additionally, caregivers and care-recipients had to live in the same household. Caregivers who were “fictive kin” were also eligible for the study if they met all other inclusion criteria. Eligible participants consented to participate in a longitudinal home-based psychoeducational intervention for caregivers of family members who had incurring a TBI.

2.3. Predictor variables

2.3.1. Demographic data

Caregiver age, gender, and race were included in the analyses.
2.3.2. Social problem-solving abilities

The Social Problem-Solving Inventory – Revised (SPSI-R) [29] was used to assess social problem-solving abilities. The SPSI-R determines functioning along five dimensions of problem solving. Two positive dimensions (Positive Problem Orientation, PPO; and Rational Problem-Solving, RPS) and three negative dimensions (Negative Problem Orientation, NPO; Impulsive/Careless Style, ICS; and Avoidance, AS) constitute the major scales.

Utilizing a 5-point Likert-type scale (0 = not at all true of me to 4 = extremely true of me) participants indicated how they respond to 52 questions about their problem solving style. The SPSI-R has evidenced high reliability ranging from 0.72 to 0.85 and to be moderately correlated to other measures of psychological distress and well-being [25,29]. In this study we used factor analyses (PCA, varimax rotation) to reduce the five problem-solving dimensions to two factors: A negative factor which yielded high loadings from the negative orientation (0.91), avoidant (0.77), and the impulsive/careless (0.44) dimensions, and positive factor which yielded high loadings from the positive problem orientation (0.81) and the rational problem solving (0.94) dimensions. The negative and positive factors accounted for 63.7% and 17.4%, of the variance in the measure, respectively.

2.3.3. Caregiver burden

A subset of the Caregiver Burden Scale (CBS) [30] was used to assess caregivers’ perceptions of burden. The difficulty sub-scale measures the difficulty associated with 14 direct, instrumental and interpersonal demands common to family caregivers. Difficulty of activities are rated on a 5-point Likert scale (1 = none to 5 = a great deal). The subscale possesses high reliability (0.91) and good internal consistency (Cronbach’s alpha = 0.87 – 0.91) [30].

2.3.4. Caregiver health

The Pennebaker Inventory for Limbic Languidness (PILL) [31] was used to determine caregivers’ tendency to notice and report a wide range of physical symptoms and complaints. The PILL lists 54 common physical symptoms such as nasal congestion, stiff joints, back pain and headaches. In this study, respondents simply stated whether or not they had experienced each symptom in the past week. Positive responses were summed with higher scores reflecting greater symptomatology. The PILL possesses high reliability (0.83) and internal consistency (Cronbach’s alpha = 0.91) [31].

2.4. Criterion variable

2.4.1. Depression risk status

The CES-D [32] is a 20-item self-report questionnaire used as a measure of caregiver risk for depression. Using a 4-point Likert scale (0 = rarely or None of the Time to 4 = Most or All of the Time) participants were asked to rate the frequency with which they experienced each symptom over the past week. Scores range from 0 to 60 with higher scores reflecting greater depression. Used extensively as a depression screen, the CES-D has high internal consistency with community samples (Cronbach’s alpha = 0.85) and acceptable reliability [32].

2.5. Statistical analyses

To determine the relationships between self-report variables and demographic characteristics, correlational procedures were used. A logistic regression analysis was conducted to test our hypothesis that ineffective problem-solving abilities would be significantly predictive of caregivers’ risk for depression when controlling for demographic and other caregiver characteristics. Demographic variables, and caregiver burden, health and problem-solving style (constructive and ineffective) were successively entered in separate blocks to predict the criterion variable.

3. Results

Of the 60 caregivers, 29 (48.3%) had CES-D scores that met the criteria for risk for depression. Table 1 presents data by risk status on caregiver demographic, burden, physical health, and problem-solving variables. There were no significant demographic differences between the at-risk and low risk groups. Caregivers at risk for depression were significantly higher than low-risk caregivers on physical symptoms (as measured by the PILL) and negative orientation to problem solving.

To obtain efficient indicators of constructive and dysfunctional problem-solving abilities, we conducted a principal components analysis with orthogonal (varimax) rotation on the 5 problem-solving scales. Two factors were extracted, which accounted for 81.1% of the original score variance. Consistent with the social problem-solving model [6], a negative problem-solving factor (63.7% variance) had high loadings from Negative Problem Orientation (0.91), Avoidant Style (0.77), and Impulsive Style (0.44). A positive problem-solving
Table 1
Means, standard deviations, and significance tests for demographic and self-report variables for caregivers at risk and low risk for depression

<table>
<thead>
<tr>
<th>Depression Status</th>
<th>At Risk (n = 29)</th>
<th>Low Risk (n = 31)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td><strong>Caregiver Demographics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>51.3</td>
<td>11.0</td>
<td>51.6</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>28</td>
<td>(97%)</td>
<td>29</td>
</tr>
<tr>
<td>Men</td>
<td>1</td>
<td>(3%)</td>
<td>2</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>26</td>
<td>(90%)</td>
<td>25</td>
</tr>
<tr>
<td>African-American</td>
<td>3</td>
<td>(10%)</td>
<td>4</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0</td>
<td>(0%)</td>
<td>2</td>
</tr>
<tr>
<td>Time Caregiving (Months)</td>
<td>51.1</td>
<td>44.9</td>
<td>70.1</td>
</tr>
<tr>
<td>Caregiver Burden</td>
<td>35.4</td>
<td>8.6</td>
<td>31.7</td>
</tr>
<tr>
<td>PILL</td>
<td>18.8</td>
<td>7.0</td>
<td>10.5</td>
</tr>
<tr>
<td><strong>Social Problem Solving Scales</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PPO</td>
<td>13.4</td>
<td>3.69</td>
<td>13.6</td>
</tr>
<tr>
<td>RS</td>
<td>48.4</td>
<td>12.45</td>
<td>48.2</td>
</tr>
<tr>
<td>NPO</td>
<td>17.0</td>
<td>8.03</td>
<td>9.2</td>
</tr>
<tr>
<td>AS</td>
<td>8.0</td>
<td>5.32</td>
<td>5.8</td>
</tr>
<tr>
<td>ICS</td>
<td>11.3</td>
<td>7.1</td>
<td>10.3</td>
</tr>
<tr>
<td>Positive Factor Score</td>
<td>0.13</td>
<td>0.92</td>
<td>−0.12</td>
</tr>
<tr>
<td>Negative Factor Score</td>
<td>0.47</td>
<td>0.99</td>
<td>−0.44</td>
</tr>
</tbody>
</table>

Note. The p values are based on independent samples t-tests for continuous variables and chi-squared tests for categorical variables. PILL = Pennebaker Inventory of Limbic Languidness, PPO = Positive Problem Orientation, RPS = Rational Problem Solving Style, NPO = Negative Problem Orientation, ICS = Impulsive/Carelessness Style, AS = Avoidant Style.

A hierarchical logistic regression was used to predict risk for depression from demographic, caregiver burden, physical health, and problem-solving variables. The cut value for classification was set at 0.48, the prevalence rate for risk of depression in the sample. Predictors were entered in three blocks. Gender, race, and age were entered in the first step. This block of demographic variables did not improve prediction over the null model, $\chi^2(4) = 3.33, p = 0.50$. At the second step, caregiver burden, physical symptoms (PILL), and length of time caregiving yielded a significant improvement of prediction of risk status, $\chi^2(3) = 21.23, p < 0.001$. Only the partial coefficient for the PILL ($B = 0.19$; odds ratio = 1.17) was statistically significant, Wald(1) = 11.8, $p < 0.01$. At the third step, the orthogonal positive and negative problem-solving factor scores were added to the prediction equation. The problem-solving factors provided significant improvement in the equation, $\chi^2(2) = 6.21, p < 0.05$. Only the negative problem-solving factor was significantly associated with risk for depression ($B = 1.17$; odds ratio = 3.23), Wald(1) = 4.68, $p < 0.05$. The final prediction equation provided an overall 81.7% accuracy of classification, with 82.8% of at-risk caregivers correctly classified and 80.6% of low caregivers correctly classified.

Table 2
Classification Matrix of Family Caregivers At Risk or Low Risk for Depression

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Low Risk</th>
<th>At Risk</th>
<th>% Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Risk</td>
<td>25</td>
<td>6</td>
<td>80.6</td>
</tr>
<tr>
<td>At Risk</td>
<td>5</td>
<td>24</td>
<td>82.8</td>
</tr>
</tbody>
</table>

Note. Total percent accuracy = 81.7%.

4. Discussion

Caregivers of persons with TBI who report more physical symptoms and who exhibit a negative problem solving style are more likely to be at risk for depression, regardless of the time they have spent in their role as...
a caregiver. These associations appear to be independent of caregiver age and level of burden. These data extend our knowledge of social problem-solving and adjustment in caregivers [20,30], and provide the first evidence of this relationship above and beyond caregiver burden. It is interesting to note that caregivers who exhibited an effective, or positive problem-solving approach were not shown to be at lower risk of experiencing symptoms of depression; in other words, the absence of negative tendencies was much more important than the presence of positive skills. These results suggest that cognitive-behavioral interventions must recognize the differential influence of caregiver negative problem-solving approaches and the reciprocal association between caregiver health and risk for depression. Evidence exists supporting the efficacy of problem solving training for caregivers. Problem solving interventions have been successfully utilized to promote physical and psychosocial well-being [9], increase use of active coping skills [33], and treat depression [34]. Delivery modalities including long-distance technologies such as telephone have also proven efficacious [21, 22].

The cross-sectional nature of this study presents limitations in assigning causality with regard to problem solving style, health complaints and depression. In addition, data on the incidence of our participants’ pre-morbid depressive symptomatology was not collected, thereby introducing the possibility that those caregivers identified as at risk for depression may have been so as a result of previous history of depression rather than problem solving style or health complaints. The CES-D is also sensitive to levels of anxiety, so it is possible that our results reflect a general distress, rather than symptoms specific to a depressive syndrome. Finally, the small sample size and the low number of minority participants further limit the generalizability or these findings.

Despite these limitations, these findings are consistent with prior research and are provocative for the continued investigation of correlates of depression. Longitudinal designs are needed to further expand our understanding of the development and maintenance of depression over time, and to refine interventions that address the needs of family caregivers of persons with TBI.

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