Assessing family caregiver’s mental health using a statistically derived cut-off score for the Zarit Burden Interview

A. S. SCHREINER1, T. MORIMOTO2, Y. ARAI3, & S. ZARIT1

1The Pennsylvania State University, Pennsylvania, USA, 2Nara Medical University, Japan, and 3National Institute for Longevity Sciences, Japan

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Abstract

Decades of research have confirmed that being a family caregiver is a stressful role. However, the point at which these stressors constitute a real risk for decreased mental health has not been established. The purpose of the present study was to determine a statistically valid cut-off score for the Zarit Burden Interview (ZBI) in order to identify family caregivers at risk for depression and in need of further assessment and intervention. The ZBI and the Geriatric Depression Scale or the CES-D were administered to three different populations of family caregivers of older adults: stroke caregivers (n = 80), chronic obstructive pulmonary disease (COPD) caregivers (n = 48), and general disability caregivers (n = 70). Using three different statistical methods, a ZBI cut-off score was determined. Next, contingency analysis was used to compare depression scale scores and ZBI cut-offs for the three groups of caregivers. Findings suggest that a cut-off score ranging from 24–26 has significant predictive validity for identifying caregivers at risk for depression. A ZBI cut-off of 24 correctly identified 72% of caregivers with probable depression. The validity of ZBI cut-off scores warrants further confirmation with larger samples. Valid cut-off scores would enable health care providers to assess family caregivers at risk and provide necessary interventions to improve their quality of life in this important role.

Introduction

Decades of international research have served to confirm that being a family caregiver is a stressful role. Family caregivers have been found to have an increased risk of depression, anxiety, and mortality (Bugge, Alexander, & Hagen, 1999; Carod-Artal et al., 1999; Hughes et al., 1999; Ory et al., 1999; Reese et al., 1998; Scholte op Reimer et al., 1998; Schulz & Beach, 1999; Schulz, Tompkins, & Rau, 1998; Vetter et al., 1999; Wu et al., 1999; Zarit, Todd, & Zarit, 1986). However, despite the magnitude of research in this field we remain uncertain as to exactly how much caregiver stress constitutes a real health risk. There are several ways to measure the stressors of care-giving. The oldest and most often used instrument is the Zarit Burden Interview (ZBI; Zarit & Zarit, 1987), which has been translated and validated in several languages allowing for international comparisons. High burden scores on the ZBI have been significantly related to a decrease in mental and physical health, as well as decreased vitality and social functioning.

The purpose of the present study was to determine a statistically valid cut-off score for the Zarit Burden Interview (ZBI) which can be used to screen caregivers at risk for depression and in need of further assessment and intervention. The need for valid cut-off scores has been advocated by researchers of family caregivers for some time (Bedard et al., 2001; Hebert et al., 2000; Zarit & Zarit, 1987). One advantage of administering the ZBI over standard depression scales is that it enables caregivers to understand the relationship between their caregiving role and their feelings of stress, as well as gain insight into the magnitude of their own stress which is a necessary prelude to any intervention attempt. In addition, while presumably more objective measures of caregiver stress such as hours of direct care or types of care-giving tasks have not been found to relate to negative caregiver outcomes, subjective measures like the ZBI are strongly related to these negative outcomes.

Methods

Subjects

Family caregivers were defined as co-resident family members who assisted with most, if not all, of the
patient’s daily care needs. Sample inclusion was limited to stroke and chronic obstructive pulmonary disease (COPD) patients and caregivers with no previous psychiatric history. However, it is estimated that 70% of care-recipients in the general disability sample had some form of dementia.

**Stroke and COPD caregivers.** Following guidelines for ethical use of human subjects, stroke \( (n=80) \) and COPD \( (n=48) \) family-caregivers were recruited from private hospitals specializing in either neurological or respiratory disorders, in five metropolitan areas in Western Japan. Seven neurological hospitals (54%) were randomly selected from a total of 13 and all facilities agreed to participate in the study (see Schreiner et al., 2003 for more information on stroke caregiver sampling and protocol). The COPD family caregivers were recruited from a convenience sample of five small hospitals that treated COPD patients on home-oxygen therapy. All co-resident family-caregivers of patients were invited to participate in the study and the participation rate at each facility was 100% for the qualifying caregivers, which reflects the high involvement of the physicians.

**General disability caregivers.** General disability caregivers were recruited as part of the Matsuyama Caregiver Study (see Arai et al., 2002 for study details). Similar to stroke and COPD caregivers these subjects were the co-residing principal caregivers of older adults who had been registered as disabled elderly \( (n=88) \) in a small city (population: 7126) in northern Japan. Disability status was determined on the basis of activities of daily living (ADL) scores and the presence of behavioural disturbances. Seventy surveys were returned for a response rate of 79%. The survey instrument included the ZBI, the Centre for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), and the revised Hasegawa Dementia Rating Scale (HDS-R; scores range from 0–30; scores less than 20 are considered indicative of a possible dementia; Hasegawa et al., 1974; Imai & Hasegawa, 1999), which is the equivalent of the Mini-Mental Exam and widely used in Japan. The mean HDS-R score in this sample was 13.8 (SD = 9.2); roughly 70% \( (n=70) \) scored as having some form of dementia.

**Measures**

Caregiver burden, was measured with the Zarit Burden Interview (ZBI; Zarit, Todd, & Zarit, 1986; Japanese version Arai et al., 1997) which consists of 22 items, 21 of which are summed to create a total burden score. Higher scores indicate greater burden. The ZBI measures subjective burden in terms of the degree (from ‘never = 0’ to ‘almost always = 4’) to which the caregiver experiences physical, psychological, emotional, social and financial problems as a result of their care-giving role.

Depressed mood among caregivers was measured with the Geriatric Depression Scale (GDS Short Form; translated by Niino, Imaizumi, & Kawakai, 1991) and the Centre for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), which was translated into Japanese and validated by Shima et al. (1985).

The GDS items were summed; higher scores indicate a greater number of depressive symptoms. A cut-off score of six has been determined for Japanese subjects (Schreiner et al., 2003). Subjects with scores >6 (coded 1) were considered to be symptomatic of depression while scores of <5 (coded 0) were considered ‘normal’.

The CES-D is a 20-item self-report scale widely used to identify individuals at risk for depression. Total scores range from 0–60. Individuals scoring 16 or more are generally considered to be at risk for clinical depression and we adopted this cut-off for the present study.

After obtaining informed consent, data from stroke and COPD caregivers was collected by interview which lasted approximately 40–60 minutes per subject. Stroke interviews were conducted in a private room at the rehabilitation clinic where care-recipients were patients. The COPD interviews were conducted at the home of the patient and caregiver. Data from the general disability caregivers was collected via mail survey.

**Statistical analysis**

The purpose of the statistical analysis was to generate a cut-off score for the ZBI which would have a predictive value for assessing the risk of depression. We compared three different statistical methods to identify a cut-off: (1) Tree-based modelling (SAS version 10), which incorporated GDS scores to classify the ZBI; (2) SPSS K-means clustering technique, which looked only at the ZBI scores; and (3) linear regression.

Cut-offs were determined using only stroke and COPD caregivers and excluding the general disability caregivers so they could later be used as an independent reference sample to validate the ZBI cut-off. Tree-based modelling assigned a basic cut-off score of 24.5 to the data from stroke and COPD caregivers. The K-means clustering determined that the value of 25 was an appropriate cut-off point for high and low burden. The regression model predicted a ZBI score of 25 when the GDS was set at the cut-off value of six \( (15.02c + (1.807b \times 6) = 25.86) \); see Table I. Thus, three unique methods confirmed a ZBI cut-off around the value of 25.

In order to examine the predictive validity of these cut-offs we grouped samples into high and low depression groups based on their depression scores. Next, \( 2 \times 2 \) contingency tables were generated
comparing high and low depression groups against high and low burden groups for each sample. We used three different burden cut-offs (24, 25, and 26), which centred around the statistically determined cut-off of 25. Next, we tested the overall validity of the cut-offs with the entire sample of caregivers combined. Finally, the specificity and sensitivity of the most significant contingency table for each subject group was analyzed to reveal how well the ‘best’ ZBI cut-off for that group compared with a gold standard (the GDS or the CES-D) in predicting caregiver depression (Table III). In our study, the calculated sensitivity describes the ZBI cut-off’s ability to correctly identify subjects grouped into probable depression by the GDS or CES-D while specificity reports the ability of the ZBI cut-off to correctly identify non-depressed subjects.

Results

Table II contains descriptive data on the entire sample and all study variables. While both stroke and general caregivers were similar in age they were each significantly younger than COPD caregivers. In terms of sex differences, stroke caregivers had a significantly higher percentage of men than did COPD caregivers. Stroke caregivers also had significantly higher ZBI and GDS scores than did COPD caregivers.

As stated above, based on the statistical analysis we used three different ZBI cut-off scores of 24, 25, and 26 to generate 2 x 2 contingency tables with the GDS or CES-D cut-off scores for each sample of caregivers (Table III). This range of scores was significant in predicting the risk of depression for all caregivers. Specifically, a cut-off of 25 was most accurate for stroke caregivers, while a cut-off of 24 was most accurate for COPD caregivers, and a cut-off of 26 was most accurate for independent reference sample of general disability caregivers. The results indicated that a ZBI cut-off of 25 correctly identified 77% of high burden stroke caregivers as having further need of assessment for depression. In addition, 72% of stroke caregivers with low risk of depression were in the low burden group. However, only 47% of high burden COPD caregivers were in the probable depression group while 79% of COPD caregivers in the low risk for depression group were also in the low burden group. A ZBI cut-off of 26 identified 64% of general disability caregivers with high burden as being in the probable depression (as measured with the CES-D) group while 59% of caregivers in the low burden group had depression scores below the cut-off. The results for the combined sample of all caregivers were significant at all cut-offs but strongest at a cut-off of 24.

Discussion

The findings suggest that a ZBI cut-off score which ranges from 24–26 would be useful in identifying caregivers in need of further assessment and intervention. A cut-off of 24 for our combined sample of three very different types of caregivers, with

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<th>Table I. Linear regression of burden scores on GDS scores.</th>
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<td><strong>Unstandardized coefficients</strong></td>
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<td>(Constant)</td>
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<td>GDS Scores</td>
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Dependent variable: ZBI total burden scores.

Note: Using the GDS cutoff score of 6 results in a burden score of 25.86 (15.02 + (1.807 x 6)) = 25.86.

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<th>Table II. Sample characteristics by caregiver group.</th>
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<td>Gender</td>
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<td>Chi-square test sig.</td>
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<td>CES-D mean (sd)</td>
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significant differences in age and sex, had a positive predictive value of 64%, which indicated that 64% of caregivers above the ZBI cut-off were also above the depression cut-off. The negative predictive value, the percentage of caregivers who were below the ZBI cut-off and below the depression cut-off, was 72%. Hence, there were 28% false negatives and 36% false positives.

It is important to note that the cut-off determined with the stroke and COPD samples did have validity with the sample of general disability caregivers although the depression scale used with this group was the CES-D and not the GDS. Therefore, despite the use of a different instrument, as well as a different method (i.e., mail survey versus interview), and in addition to significant differences in age and sex, the cut-off score obtained with stroke and COPD caregivers was significant in predicting the risk of depression in other caregivers.

These findings indicate that caregivers at risk for depression could be identified by administering the ZBI alone rather than a battery of other possibly more threatening tests. Since screening as a false negative (i.e., below the burden cut-off but depressed) was seen as a greater problem than screening as a false positive (i.e., above the burden cut-off but not depressed), we chose cut-off scores that increased the level of sensitivity at the expense of specificity.

The cut-off scores in this study warrant further investigation with larger samples and are intended to serve only as a guideline for practitioners to use to assess their family caregivers and encourage the caregivers themselves to seek supportive services. Future studies may also want to look at the relationship between ZBI scores and other negative outcomes of care-giving such as moods of anxiety or anger or physical outcomes such as decreased heath status in order to expand the relevance of cut-off scores for predicting a broader range of caregiver negative outcomes. Again, we did not look at the influence of moderating variables on burden as our purpose was to determine a cut-off score broad enough to identify risk across a variety of different types of different caregivers.

**Conclusion**

As the average lifespan continues to increase, so do disability rates from chronic illnesses. Persons with disabilities often require caregivers and family members overwhelmingly assume this role. In fact, family caregivers provide care that is estimated to exceed the combined costs of nursing home and paid home health care (Arno, Levine, & Memmott, 1999). The main reason family caregivers relinquish their role and seek institutional care is from feelings of excessive burden or exhaustion (Narayan et al., 2001). These conditions can be ameliorated with current psycho-educational interventions which focus on improving caregivers’ coping skills and their sense of mastery or self-efficacy (Bookwala & Schulz, 1998; Hebert et al., 2003; Ostwald et al., 1999; Pearlin et al., 1990; Yates, Tennstedt, & Chang, 1999). Valid cut-off scores for the ZBI would enable health care professionals to identify family caregivers in need of such interventions to improve their ability to provide quality care in this important role.
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