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Comparison of caregiver responses to English and Hebrew language versions of an abridged Zarit Burden Interview

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The provision of informal care to infirm family members is of central importance to social gerontology; concomitantly, caregiver burden is a topic of considerable research interest. To this end, psychometrically sound instruments are required to advance cross-national research. The current study builds upon previous research examining the reliability and validity of responses to a brief Hebrew language version of the Zarit Burden Interview. For this study, factorial validity of responses to this instrument is examined relative to a representative English Canadian sample of caregivers. Invariance analyses comparing English and Hebrew responses support a 2-factor model of burden (role strain, personal strain); furthermore, invariance analyses comparing responses indicate that caregivers interpret and respond to the majority of items in a consistent manner. This finding suggests reliable translation of items from English to Hebrew. Caregiver burden is discussed in the context of changing demographics and the growing prevalence of disorders affecting older adults.

Keywords: caregiver burden; informal care; linguistic invariance; test reliability; test validity

Introduction

Twenty years ago, George (1990) noted that family caregiving is among the most studied topics in social gerontology. Little has changed in the intervening period, in part, because persons over 84 years represent the fastest growing segment of populations in both Western Europe and North America (e.g., Collerton et al., 2009; Statistics Canada, 2005; US Census Bureau, 2004). Concomitantly, the prevalence of disorders afflicting older adults continues to rise (e.g., Alzheimer's Association, 2009) and the study of phenomena such as caregiver burden remains a central topic of study for the field. It is therefore important to have psychometrically sound measures of burden to enable comparative studies within and between cultures. Among available instruments, the Zarit Burden Interview (ZBI) has been used most frequently (Knight, Fox, & Chou, 2000). The current study examines the psychometric properties of a newly developed brief Hebrew version of the ZBI vis-à-vis responses by a representative Canadian sample of the dementia caregivers (in the language the ZBI was developed).

Zarit Burden Interview

First developed 30 years ago, the ZBI measures the psychological impact of providing informal care to persons with dementia (Zarit, Reever, & Bach-Peterson, 1980). The original ZBI was composed of 29 items to which responses were provided along a four-point Likert-type scale (Zarit et al., 1980). A revised ZBI was later introduced (S.H. Zarit, Orr, & J.M. Zarit, 1985) and the number of items was reduced to 22 with responses provided along a revised five-point Likert-type scale (Zarit et al., 1985).

In our previous reliability generalization study, we concluded that responses to the ZBI are generally reliable across caregiver populations (i.e., spouses/partners, parents, adult children), care-recipients (i.e., dementia, physical illness, mental illness) and most language versions (e.g., French, Spanish, and Chinese); one exception was the Hebrew version based on the original 29-item ZBI (Bachner & O'Rourke, 2007). We concluded that it would be opportune to revise this Hebrew ZBI in accord with changes to the English version of this instrument.

Even reduced to 22-items, however, some have suggested that this length may be too long for administration in clinical contexts (Bédard et al., 2001). As a result, several brief versions of the ZBI have been proposed in recent years, some psychometrically more sound than others (O'Rourke & Tuokko, 2003b). Among these, the brief ZBI proposed by Bédard et al. (2001) has received consistent support in subsequent studies (O'Rourke & Tuokko, 2003a).

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Bachner and Ayalon (2010) recently proposed a new Hebrew version of this scale based on the brief ZBI proposed by Bédard et al. (2001). Exploratory factor analyses yielded a 2-factor structure of responses identical to that previously reported (Bédard et al., 2001; O'Rourke & Tuokko, 2003b). Divergent validity of responses was found relative to caregiver well-being. Support for the concurrent validity of responses was also provided vis-à-vis caregiver distress and patient behavioral problems (Bachner & Ayalon, 2010).

The current study was undertaken to further explore the psychometric properties of responses to this new brief version of the ZBI. More precisely, Hebrew responses are compared to those by caregivers from the Canadian Study of Health and Aging (Canadian Study of Health and Aging [CSHA] Working Group, 2002). The latter served as an ideal comparative sample against which to examine any new translation because the CSHA is a national, randomly recruited and representative sample of caregivers from each Canadian province (English only).

Methods

Israeli sample

The Israeli sample for this study is comprised of family caregivers of persons over 59 years of age with physical and/or cognitive impairments ($n = 142$). All care recipients were dependent in their ability to perform activities of daily living; more than 60% had concurrent cognitive deficits. All family caregivers were Jewish Israelis proficient in Hebrew.

Prospective participants were recruited from adult day centers and Alzheimer Association chapters across Israel. Interviews lasting 30–40 min were conducted by trained research assistants, mostly in participants' homes. Participants were also asked to suggest other caregivers who might be willing to take part in this study (i.e., snowball recruitment strategy).

English Canadian sample

Older adults were initially recruited as part of a national epidemiological study of dementia prevalence in Canada. The methodology employed for this study is described elsewhere in detail (CSHA Working Group, 1994). Briefly, persons over 64 years of age were randomly identified from governmental health records in all provinces except Ontario where enumeration records were used. Community-dwelling older adults underwent clinical screening during which the Modified Mini-Mental State Examination (3MS; Teng & Chui, 1987) was administered. Those unable to complete the 3MS and persons scoring below 78/100 were invited to undergo clinical examination. Primary caregivers of persons with dementia were identified by patients and/or their families as the person most responsible for day-to-day decisions.

A follow-up study was undertaken five years later to examine patterns of change in cognition of persons with dementia as well as the health and welfare of those who provide care (CSHA Working Group, 2002). All but 33 caregivers from the initial wave of data collection were located and interviewed. For the current study, participation was restricted to English speaking caregivers of persons with dementia who continued to live in the community; caregivers of patients who had died or had since been institutionalized were excluded. Time 2 responses to this abridged ZBI were examined for the current study ($n = 199$).

Brief ZBI

The brief ZBI presents caregivers with a series of 12 questions regarding perceived strain in caring for a person with dementia (e.g., "Do you feel you should be doing more for your relative?"; "Do you feel strained when you are around your relative?"). The scale is composed of two constructs: role strain and personal strain. The degree to which caregivers endorse each item is rated along five-point Likert-type scales. Possible scores range from 0 to 48 with higher totals reflecting greater burden. For the two samples compared for the current study, internal consistency was measured as $\alpha = 0.90$ and $\alpha = 0.83$ for English and Hebrew ZBI responses, respectively; both coefficients are within ideal parameters (Clark & Watson, 1995; DeVellis, 2003).

Analytic strategy

Separate Confirmatory Factor Analytic (CFA) models were computed for Israeli and Canadian participant samples. This was done to ascertain the viability of the 2-factor pattern of responses separately for both caregiver groups. Invariance analyses were next undertaken to compare patterns of response between language groups. CFA and invariance analyses were performed with AMOS 16.0 in keeping with the procedures described by Byrne (2004).

Results

Brief ZBI scale responses of 16 or higher suggest clinically significant burden according to Bédard et al. (2001). Applying this 16+ cut-off point, 22.5% of the Israeli sample and 23.6% of Canadian caregivers reported significant burden. These percentages do not significantly differ between participant samples, $\chi^2(\mathrm{df} = 1) = 0.01$, *ns*. Total scale scores averaged 10.83 and 9.59 among Israeli and Canadian caregivers, respectively; similar to categorical comparisons, these response totals do not differ between language groups, $t(339) = 1.27$, *ns*.

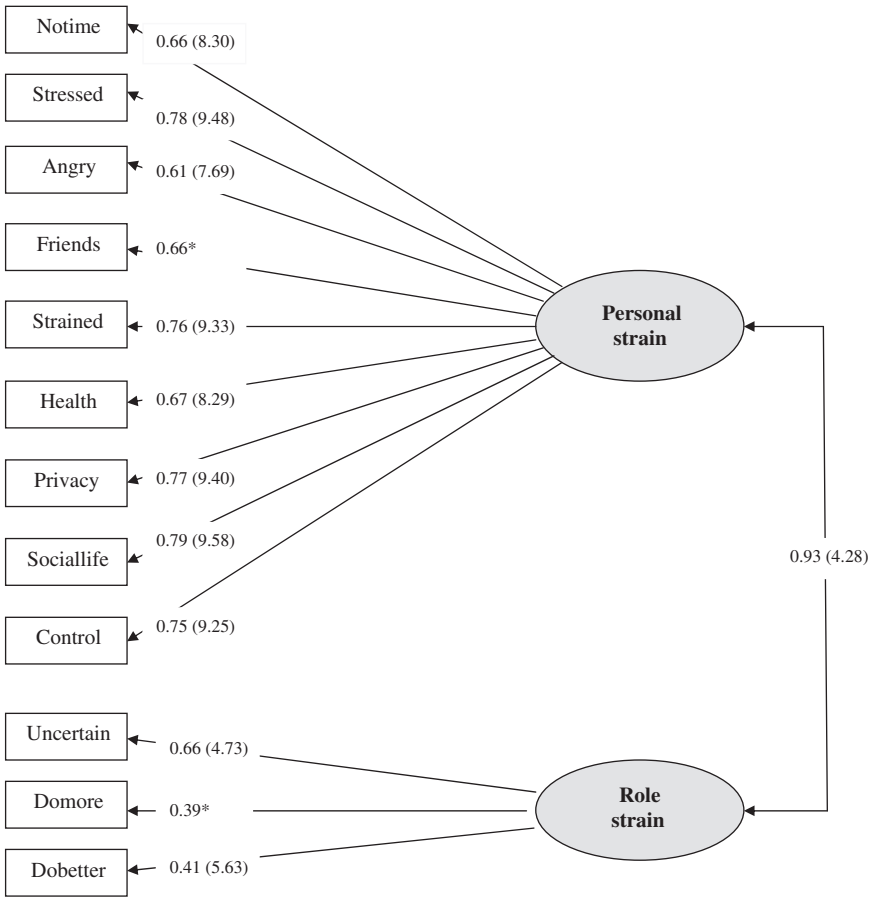

Figure 1. Confirmatory Factor Analytic model of English responses to the brief ZBI. Parameters expressed as maximum likelihood estimates (standardized solution). Asterisks denote parameters initially fixed for scaling and statistical identification; significance levels cannot be computed for these two items. Parenthetical numbers indicate significance levels for parameter estimates (statistically significant CR values $> |1.96|$).

Baseline CFA models

The 2-factor model of responses to this 12-item ZBI was first examined in separate CFA models. This model emerged as viable among Canadian caregiver sample as all items loaded significantly upon their respective factors (statistical significance evident when critical ratio [CR] values $> |1.96|$). In keeping with the procedures outlined by Byrne (1998), correction was made for correlated error between 5 of 78 possible item pairs; this CFA model indicated effective fit of data, $\chi^2(\text{df} = 48) = 67.58$, $p < 0.05$. According to the goodness-of-fit threshold values recommended by Hu and Bentler (1999), the Comparative Fit Index (CFI) for this model is within optimal parameters (i.e., CFI > 0.95; CFI $= 0.98$) as is the Standardized Root Mean Square Residual (i.e., SRMR < 0.05; SRMR $= 0.03$), and the Root Mean Square Error of Approximation (i.e., RMSEA < 0.05; RMSEA $= 0.045$); also, the 90% range of confidence limits for this RMSEA value are within acceptable parameters ($0.069 \geq$ RMSEA $\text{CL}_{90} \geq 0.014$; Figure 1).

Similar results emerged when this model was tested with Hebrew language responses ($\chi^2[\text{df} = 41] = 68.40$, $p < 0.01$). Again, all items loaded significantly upon their respective factors (i.e., CR values $> |1.96|$). The CFI for this model is within ideal parameters (i.e., CFI $= 0.96$); however, the SRMR $= 0.08$ and RMSEA $= 0.069$ are within acceptable limits only ($0.097 \geq$ RMSEA $\text{CL}_{90} \geq 0.038$; Figure 2).

Comparison of factor structures

Subsequent to establishing baseline models, Israeli and Canadian CFA models were compared to ascertain the similarity of ZBI solutions. This was done by estimating models simultaneously (i.e., the same CFA calculation), and fixing corresponding paths between models in a succession of steps. With each successive comparison, change in chi-square values is computed as well as associated change in degrees of freedom. Comparative difference between CFA models is demonstrated by statistically significant change in chi-square values. In accord with convention, we also report goodness-of-fit statistics associated with each successive pairing of path coefficients.

For these comparative analyses, statistical power was estimated at 0.97 assuming large to medium effect sizes and a standard alpha level (i.e., $\alpha = 0.05$; MacCallum, Browne, & Sugawara, 1996).

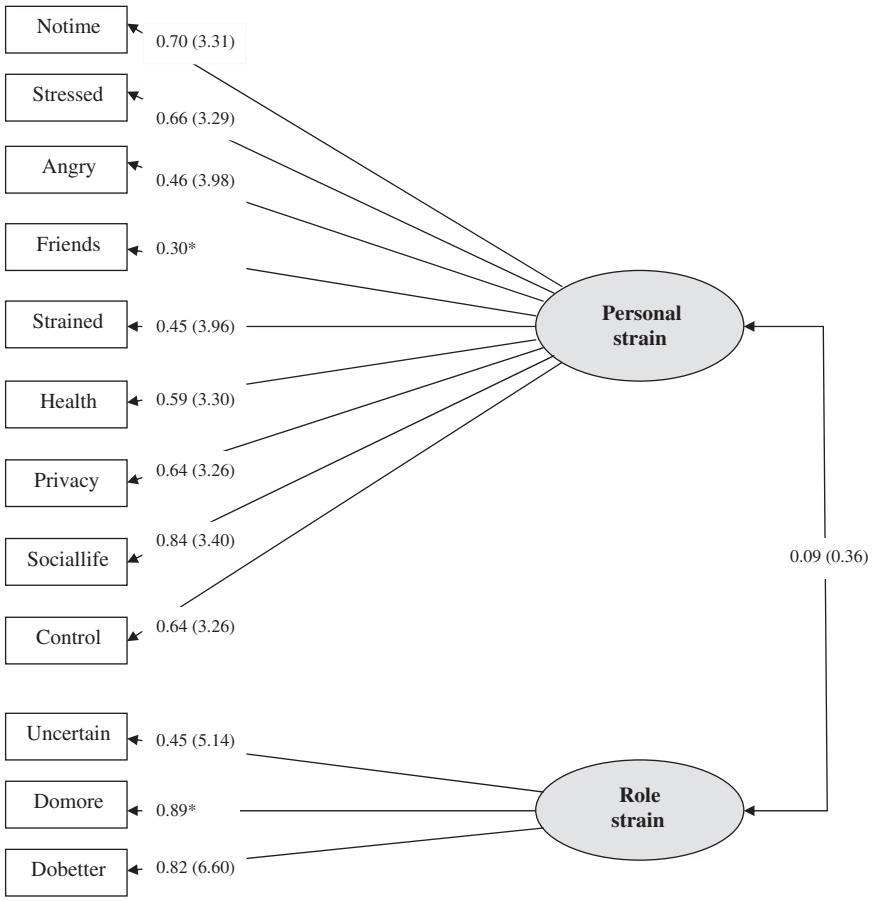

Figure 2. Confirmatory Factor Analytic model of Hebrew responses to the brief ZBI. Parameters expressed as maximum likelihood estimates (standardized solution). Asterisks denote parameters initially fixed for scaling and statistical identification; significance levels cannot be computed for these two items. Parenthetical numbers indicate significance levels for parameter estimates (statistically significant CR values > |1.96|).

Overall model structure

Models were first compared to determine if the 2-factor structure applies to both groups. This solution emerged as viable, suggesting that the structure of responses to this brief ZBI may best be measured by a 2-factor solution for both English and Hebrew ZBI responses ($\chi^2[df = 89] = 136.00$, $p < 0.01$; CFI = 0.97; SMRM = 0.08; RMSEA = 0.039; $0.052 \geq$ RMSEA $CL_{90} \geq 0.025$). Findings suggest factorial validity of responses to the Hebrew version of the ZBI relative to the original English language version of this abridged instrument.

Item invariance analyses

The relative contribution of items upon their respective factors was next examined by comparing coefficients (and variability around these coefficients) for each item in succession. This was undertaken to ascertain if caregivers interpreted and responded to translated Hebrew items similar to the Canadian sample. Chi-square difference tests indicated that responses to one personal strain item (no time; $\Delta\chi^2[\Delta df = 1] = 59.91$, $p < 0.01$; CFI = 0.97; SMRM = 0.08; RMSEA = 0.044; $0.057 \geq$ RMSEA $CL_{90} \geq 0.031$) and one role strain item significantly differed between caregiver groups (uncertain future; $\Delta\chi^2[\Delta df = 1] = 45.27$, $p < 0.01$; CFI = 0.94; SMRM = 0.09; RMSEA = 0.056; $0.067 \geq$ RMSEA $CL_{90} \geq 0.045$; Table 1). Yet, no response differences were found for the remaining eight items.[1] In other words, it appears that both Israeli and Canadian caregivers interpret and respond to the majority of brief ZBI items in a consistent manner. These findings suggest generally reliable translation from English to Hebrew.

Discussion

The results of this study suggest that general equivalence exists between responses to this newly developed brief Hebrew version of the Zarit Burden Inventory vis-à-vis a representative sample of English Canadian caregivers (original language version of the scale). An identical 2-factor model of responses was identified for the two language groups; and for both, all items loaded significantly upon their respective factors. We can place more confidence in these findings given that English speaking caregivers were randomly recruited. In other words, this Canadian sample stands as an appropriate benchmark against which to compare new language formats of the ZBI. Our

Table 1. Summary Specifications and Invariance Analyses between English and Hebrew ZBI Responses.

Successive constraints applied	χ^2	df	$\Delta\chi^2$	Δdf	CFI	RMSEA (90% CL)	SRMR
Unconstrained baseline model	136.00	89	–	–	0.97	0.039 (0.025–0.052)	0.084
Personal strain							
No time	150.03	90	14.03**	1	0.97	0.044 (0.031–0.057)	0.088
Stressed	151.63	91	1.60	1	0.97	0.044 (0.032–0.057)	0.089
Angry	151.79	92	0.16	1	0.97	0.044 (0.031–0.056)	0.089
Strained	152.91	93	1.12	1	0.96	0.044 (0.031–0.056)	0.091
Health	152.93	94	0.03	1	0.96	0.043 (0.030–0.055)	0.091
Privacy	153.80	95	0.87	1	0.96	0.043 (0.030–0.055)	0.092
Social life	157.27	96	3.47	1	0.96	0.043 (0.031–0.055)	0.091
Control	158.23	97	0.96	1	0.96	0.043 (0.031–0.055)	0.090
Role strain							
Uncertain	203.50	98	45.27**	1	0.94	0.056 (0.045–0.067)	0.090
Do better	206.46	99	2.96	1	0.94	0.057 (0.046–0.067)	0.089
Correlation between factors	216.26	100	9.80**	1	0.94	0.059 (0.048–0.069)	0.113

Notes: df, degrees of freedom; CFI, Comparative Fit Index; RMSEA, Root Mean Square Error of Approximation; CL, confidence limits; and SRMR, Standardized Root Mean Square Residual.
*$p < 0.05$; **$p < 0.01$.

findings suggest that the 2-factor structure of responses to this brief ZBI is invariant for both English and Hebrew language responses. Furthermore, caregivers appear to interpret and respond to most items in a consistent manner. The latter finding suggests that, for the most part, items for the brief Hebrew version of the ZBI were accurately translated.

Two exceptions, however, were responses to the *no time* (personal strain) and *uncertain future* (role strain) items. The (Israeli) authors next reexamined these translations. Although there appears to be complete correspondence between the Hebrew and English *no time* item, closer examination of the *uncertain future* item, however, suggests refinement may be warranted. In English, the full item reads "do you feel uncertain about what to do about your relative" and the current Hebrew wording translates to "do you feel uncertain about the care for your relative". The difference is minimal but may account for our finding of statistical significance; instead, it might better read in Hebrew: דתחפשמ וב מע תושעל המל סחיב וחטב רסוח שיגרמ התא מאה. We recommend that this substitution be made for future studies using this brief Hebrew ZBI. Psychometric research will be required to ascertain if this is a more effective translation relative to the original English version of the scale.

One primary limitation of this study is that Israeli and Canadian samples are not fully equivalent. More precisely, the CSHA sample was composed entirely of dementia caregivers whereas Israeli participants are more heterogeneous (i.e., cognitive and physical impairments). This limitation, however, would be of greater concern had between-group response differences been more pronounced. Brief ZBI response totals were indistinguishable between groups (as well as percentages falling into clinical range); furthermore, invariance analyses suggest general similarity in responses to this abridged instrument. Consistent with findings previously reported by Bachner and O'Rourke (2007), the ZBI appears appropriate for use with a range of caregivers (contrary to our initial expectation) even though originally developed for use only with dementia caregivers. As we previously described, results of this meta-analysis indicated that the prior Hebrew language format of the ZBI was significantly less reliable than other language formats (Bachner & O'Rourke, 2007). Future research is required to ascertain if this abridged Hebrew version of the brief ZBI proposed by Bachner and Ayalon (2010) redresses this limitation.

As recently reported, the number of persons with dementia is likely to double over the next 20 years in both Canada and the US (Alzheimer's Association, 2009; Alzheimer Society of Canada, 2010). In order to undertake cross-national research comparing burden levels across nations, psychometrically sound instruments are required. The results of this study suggest that the brief Hebrew version of the ZBI proposed by Bachner and Ayalon (2010) is appropriate for comparative research. We would, however, suggest that the *uncertain future* item be revised in accord with our revised translation for future studies.

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Note

1. Item invariance analyses cannot be undertaken for the two items initially fixed to 1.0 for purposes of scaling and statistical identification required for CFA models with latent variables (Byrne, 2004).

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