

Refinements in the Assessment of Dementia-Related Behaviors: Factor Structure of the Memory and Behavior Problem Checklist

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This study explored the factor structure of Zarit's Memory and Behavior Problem Checklist (MBPC), a 29-item inventory that samples negative behavior changes associated with dementia (e.g., incontinence and destroying property). Family caregivers for 185 progressive-dementia patients provided information on their affected relatives. A principal-components factor analysis with an oblique (nonorthogonal) rotation produced an 8-factor solution that accounted for 62.9% of the variance. A second-order factor analysis of the first 5 factors produced a 3-factor solution that accounted for 74.7% of the variance. The 3 factors were (a) self-care and self-maintenance functions, (b) memory problems and psychiatric symptoms associated with dementia, and (c) communication problems and agitation. Correlations between MBPC frequency scores and measures of adaptive ability and level of dementia were high and positive. Potential clinical and research applications of the scale in other related populations are discussed.

The changes that occur in caregivers for demented family members have received considerable empirical attention. Disruptive behavior problems are very prevalent in dementia (Swearer, Drachman, O'Donnell, & Mitchell, 1988), and there is growing evidence that these behavior problems have significant adverse effects on caregivers (Dura, Stukenberg, & Kiecolt-Glaser, in press; Kiecolt-Glaser et al., 1987; Light & Lebowitz, 1989). In addition to the more well-known dementias, such as Dementia of the Alzheimer's Type (DAT), there are increasing numbers of demented patients with etiologies such as AIDS or head injury who receive care from family members. For caregiving research to advance, devices capable of assessing the salient aspects of both patient impairment and caregivers' experience are critical.

Adequate global measures of level of dementia are available, including the Global Deterioration Scale (GDS; Reisberg, Ferris, DeLeon, & Crook, 1982) and the Clinical Dementia Rating (Hughes, Berg, Danziger, Coben, & Martin, 1982). These measures and others provide criteria for assessing the stage of dementia. For example, the Blessed Dementia Scale (Blessed, Tomlinson, & Roth, 1968) documents the presence of personality changes secondary to dementia, as well as differentiating levels of dementia. However, only the Memory and Behavior Problem Checklist (MBPC; Zarit, Reever, & Bach-Peterson, 1980) attempts to broadly and diversely sample the frequency of dementia-related problem behaviors and, as such,

offers a unique contribution to research on caregivers. The MBPC has 29 items that include some of the problems most distressing to caregivers (e.g., the patient's inability to dress and feed himself or herself, incontinence, inability to communicate, inability to recognize familiar people, and multiple behavior problems, such as wandering, making accusations, and destroying property).

The MBPC was designed to provide three scores: a summed frequency of problem behaviors score, a summed reaction to the presence of problems score, and a score that summed the cross-product of the frequency and reaction scores of each item. Early research linked more frequent dementia-related problems to greater caregiver distress (Rabins, Mace, & Lucas, 1982). However, more recent research has not supported this relation (Haley, Levine, Brown, & Bartolucci, 1987; Quayhagen & Quayhagen, 1988). For example, Quayhagen and Quayhagen found caregiver distress was more strongly associated with the type of behavior problems rather than the sheer quantity of problems. Because the MBPC only provides summed total scores, additional research is necessary to delineate item clusters. Factor analysis is ideal for this task and was used in the present investigation.

Three item domains are visible on inspection, and thus a three-factor structure was hypothesized: memory problems, behavior problems, and need for assistance with self-care. Oblique (nonorthogonal) rotation methods were used because of the related nature of deficits in dementia.

Method

Subjects

The subjects for the present investigation were 185 caregivers for progressive dementia patients who were participating in a larger study on stress, immunity, and health in older adults. At the time of assessment, 102 demented family members lived with the caregiver, 55 resided in a

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nursing home, 16 lived with another family member, 11 lived alone, and 1 was hospitalized. To be included in the study, caregivers not sharing residence with their demented family member were required to be providing a minimum of 5 hrs of care per week at the time of data collection. Caregivers were recruited from multiple sources, including neurologists, hospital dementia evaluation units, nursing homes, dementia caregiver support groups, respite care programs, and governmental caregiver support groups. Subjects were interviewed, completed a number of self-report measures, had blood drawn for immunological assays, and were paid \$30.

The mean age for the caregiver sample was 57.43 years ($SD = 14.08$); 51 caregivers were male (48 were White, and 3 were Black), and 134 were female (124 were White, and 10 were Black). Five subjects declined to report income; 17 reported an income of less than \$10,000; 55 reported between \$10,000 and \$19,999; 37 reported between \$20,000 and \$29,999; 25 reported between \$30,000 and \$39,999; and 46 reported more than \$40,000. Thirty-five caregivers reported having completed more than 4 years of college, 32 reported completing 4 years of college, 56 reported partial college completion, 45 reported attaining a high school diploma, and 17 reported less than a high school education.

Caregivers had been providing assistance for an average of 62.32 months ($SD = 37.23$) and currently provided an average of 6.32 hr per day ($SD = 5.70$) directly or indirectly assisting their family member. Dementia patient characteristics are presented in Table 1. The levels of dementia were fairly evenly distributed.

Diagnoses of probable dementia were made after extensive evaluation at one of several local progressive dementia clinics by neurologists. All diagnoses conformed to the criteria of the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.; *DSM-III-R*; American Psychiatric Association, 1987). In the case of DAT, diagnostic procedures conformed to National Institute of Neurological and Communicative Disorders and Stroke/Alzheimer's Disease and Related Disorders Asso-

ciation work group standards (McKhann et al., 1984). Diagnoses included 137 DAT, 42 dementia not otherwise specified (32 Parkinson's disease with dementia, 9 Huntington's disease, and 1 Pick's disease), and 6 multi-infarct dementia.

Measures

Characteristics of demented family members were assessed through extensive interviews with caregivers. Family members' ratings have been shown to be a reliable source of data for this purpose; for example, in a study of 82 elderly patients, the majority of whom had DAT, there was high concordance between family and staff responses regarding demented patient functioning (Reifler, Cox, & Hanley, 1981). Additionally, the cognitive impairment concomitant with dementia prevents direct use of the affected family member as an informant in all but the earliest stage of dementia (Reifler et al., 1981).

The MBPC interview contains 29 specific items as well as an open-ended *other problem* item. Frequency of problem occurrence is scored categorically on an ordinal scale: 0 equals *does not occur*, 1 equals *has occurred, but not in the past week*, 2 equals *has occurred one or two times in the past week*, 3 equals *has occurred a few times in the past week*, 4 equals *occurs daily*. The scale then switches to a nominal scale: 5 equals *has occurred, but not in past 6 months*, and 7 equals *would occur if not supervised*. Because items with a frequency score of 0, 5, or 7 are not presently occurring, no reaction score is requested of the caregiver. For items with a frequency score of 1-4, reaction is scored *not at all, a little, moderately, very much, or extremely*. Instructions allow for total summed frequency and reaction scores, as well as a composite score generated by multiplying frequency by reaction on each item and then summing these products. Because the goal of the present investigation was to explore the factor structure of the domains sampled by the MBPC, frequency scores for current behavior (items scored at frequency 1-4) served as data. Caregivers' ratings were based on their current experience.

The BDS (Blessed et al., 1968) was developed to measure negative changes in a demented person's abilities across daily living, self-care, and personality domains. Higher scores on this 22-item scale denote greater decrements in ability, with a potential range of 0 to 28. BDS scores correlate with senile plaque count during postmortem histological examination (Blessed et al., 1968; Erkinjuntti, Hokkanen, Sulkava, & Palo, 1988). In addition, the BDS correlates with neuropsychological testing and can be used to differentiate degrees of dementia (Erkinjuntti et al., 1988). In the present study, the BDS served as an additional descriptive measure of the demented family members with ratings made by caregivers.

The GDS (Reisberg et al., 1982) was developed to provide an objective dementia rating in people who have been diagnosed with dementia by other means. In the present study, Jason R. Dura or advanced clinical psychology graduate students made this rating based on caregivers' reports of the affected family members' history and current functioning. These data were used to assess the heterogeneity of the demented family members. Reisberg et al. (1982) described seven clearly defined and ratable stages that range from *no cognitive decline* (Stage 1) to *very severe cognitive decline* (Stage 7). GDS scores correlate significantly with scores on 38 cognitive tasks, and the GDS is significantly related to two physiological measures: ventricular and sulcal enlargement, as measured by computerized tomographic scans, and glucose metabolism, as measured by positron emission tomography scans (Reisberg et al., 1982). Interrater reliability using the GDS was assessed by comparing the original ratings with ratings made by Jason R. Dura, who is a clinical psychologist with geriatric assessment experience. Unaware of the prior rating, he based his ratings on information from the caregivers' BDS and MBPC ratings of their affected relatives. Reliability was computed for 19 randomly chosen cases (10%); the Pearson product-moment cor-

Table 1
Characteristics of Affected Family Members

Subscale	<i>M</i>	<i>SD</i>
MBPC		
Frequency of problem behavior	52.79	19.26
Caregiver's reaction to presence of problem behavior	29.31	19.62
Total score	72.58	54.81
Blessed Dementia Scale		
Memory	5.69	2.12
Self-care	4.22	3.10
Personality	7.00	5.94
Total score	16.56	5.55
Global Deterioration Scale		
	<i>n</i>	%
1. No impairment	0	0
2. Forgetfulness	9	4.81
3. Early confusional	7	4.28
4. Late confusional	18	9.63
5. Early dementia	57	30.48
6. Middle dementia	55	29.95
7. Late dementia	39	20.86

Note. MBPC = Zarit's Memory and Behavior Problem Checklist (Zarit, Reever, & Bach-Peterson, 1980).

Table 2
First-Order Factor Loadings on MBPC Items

MBPC item	Factor							
	1	2	3	4	5	6	7	8
22. Incontinence	.78	-.05	-.03	-.02	-.05	-.05	-.11	.08
21. Make-up/shave	.75	.06	.02	-.17	.05	.00	.06	.00
19. Feed self	.74	.14	-.15	.02	.03	.02	.00	-.06
20. Bathe	.72	.00	.09	-.23	.03	.09	.05	-.04
18. Dress	.61	.03	.05	-.30	.02	.14	-.07	-.06
29. Stay alone	.33	.19	-.11	.33	.00	.31	-.02	.05
7. Forget day	.13	.77	.09	-.09	-.01	.01	-.02	-.07
6. Forget people	.42	.58	-.18	.15	-.03	-.04	.15	.12
5. Lose things	-.24	.47	.19	.00	-.24	-.06	.06	.01
14. Not talking	.05	.05	-.78	-.09	.00	.07	.08	.04
13. Constant talk	.07	.00	.69	-.05	-.10	.01	.31	-.06
12. Restless	.06	.16	.56	.10	.00	.24	.07	.31
5. Repeat question	-.32	.45	.47	-.07	-.16	-.05	-.05	.04
27. Shop	-.03	.14	.07	-.86	.03	-.07	-.08	.02
26. Clean house	.06	-.18	.02	-.81	-.07	-.05	-.00	-.01
28. Simple tasks	.03	-.00	-.16	-.66	.11	.20	.14	-.07
23. Prepare meals	.25	-.13	.00	-.57	-.14	-.28	.26	.04
25. Handle money	.22	.13	-.13	-.55	-.14	.09	-.00	.11
24. Use phone	.16	.14	-.12	-.49	.17	.04	-.05	.32
16. Reliving past	-.04	.00	.03	.02	-.82	-.10	.10	-.08
4. Suspicion	-.04	.02	.07	-.02	-.78	-.02	-.09	.06
17. Hallucinate	.17	-.06	.03	.00	-.64	.26	-.17	.10
3. Hide things	-.38	.31	-.16	-.13	-.42	.07	.16	-.00
11. Wake at night	.04	-.07	.03	.06	-.10	.80	.10	-.09
9. Destroy property	-.00	.02	.15	-.08	.08	-.02	.77	-.05
10. Embarrass	-.15	.06	-.00	.00	.00	.38	.54	.20
15. Dangerous behaviors	.06	-.29	.03	.04	-.10	-.10	.19	.75
1. Wandering	-.13	.19	.06	-.22	.02	.07	-.30	.70
8. Incomplete tasks	-.04	.31	-.09	.14	-.16	-.31	.18	.40

Note. MBPC = Zarit's Memory and Behavior Problem Checklist (Zarit, Reever, & Bach-Peterson, 1980).

relation between the original and comparison GDS scores was excellent, $r(19) = .84$.

Results

The data from the 29 items of the MBPC were subjected to a principal-components factor analysis with oblique (nonorthogonal) rotation, and eight factors with eigenvalues greater than 1 were produced (see Table 2), accounting for 62.9% of the variance. Factor 1 contained self-care items and accounted for 22.3% of the variance. Factor 2 included memory items and accounted for 14.0% of the variance. The primary contents of Factor 3 were communication items that accounted for 5.8% of the variance. Factor 4 contained self-maintenance items and accounted for 4.8% of the variance. Factor 5, accounting for 4.5% of the variance, consisted of psychiatric symptoms. Factor 6, a single item about keeping the caregiver awake, accounted for 4.1% of the variance. The two items in Factor 7 addressed property destruction and an embarrassing behavior, respectively, and accounted for 3.9% of the variance. Factor 8, the final factor, contained an item about potentially dangerous behavior,

an item about wandering, and an item about not completing tasks. It accounted for 3.6% of the variance.

A second-order factor analysis was undertaken to reduce the number of factors; it used the regressed factor scores of the first five factors produced by the original factor analysis. Factors 6 to 8 were not included in the secondary factor analysis because of their discordant content. The second-order factor analysis produced a three-factor solution that accounted for 74.7% of the variance. Factor 1 included the Self-Maintenance and Self-Care primary factors and accounted for 29.0% of the variance; Factor 2 contained the Memory Problems factor and the Psychiatric Symptoms primary factor, and it accounted for 25.0% of the variance. Factor 3, the final factor, was the Communication Problems and Agitation primary factor, and it accounted for 20.7% of the variance (see Table 3).

The role of level of dementia in total frequency score was explored by calculating mean MBPC frequency total scores for each GDS level. These data are plotted in Figure 1. An analysis of variance showed significant differences on mean MBPC frequency scores associated with GDS level, $F(5, 177) = 16.56$, $p < .0001$. Post hoc comparisons of mean scores using Tukey's

honestly significant difference test ($p < .05$) found significant differences hierarchically; that is, the mean at GDS Level 7 ($M = 59.13$, $SD = 21.65$) was significantly greater than the mean at GDS Levels 2 ($M = 25.33$, $SD = 12.19$), 3 ($M = 25.63$, $SD = 15.52$), and 4 ($M = 43.53$, $SD = 16.33$). The mean at GDS Level 6 ($M = 62.55$, $SD = 13.65$) was significantly higher than at GDS Levels 2, 3, 4, and 5. The mean at GDS Level 5 ($M = 49.76$, $SD = 14.45$) was greater than the mean at GDS Levels 2 and 3. Pearson product-moment correlations between the MBPC frequency score and the total scores of the GDS and BDS were calculated. The correlation between the MBPC frequency score and the GDS total score was $r(173) = .48$, $p < .0001$. The correlation between the BDS total score and the MBPC frequency score was $r(173) = .47$, $p < .0001$. Ten subjects were assessed before the BDS was added to the assessment battery, and data were missing for 2 subjects. The correlation between the GDS and BDS total scores was $r(185) = .68$, $p < .0001$.

Discussion

An inherent difficulty in designing a comprehensive measure of dementia-related problem behaviors is breadth. An eight-factor solution was produced by the initial MBPC factor analysis. A second-order factor analysis was undertaken to reduce the number of factors, and it produced a three-factor solution similar to that originally hypothesized. Each factor represented a discrete domain of demented patient problems (e.g., need for assistance with self-care, memory problems, psychiatric symptoms, and communication problems and agitation). Clearly, the MBPC covers an extensive array of problems.

The factor structure of a dementia-related impairment index may be influenced by the distribution of stages of impairment in the given sample (Zarit, 1989). To control for this potential problem, a sample was used that was distributed across stages of dementia. The distribution of dementia stages was broad and even, with roughly 19% in a prodementia confusional stage, and the remaining 81% split into 30% early, 30% middle, and 21% late dementia. These percentages, along with the size of the current sample, should do much to limit idiosyncratic sample effects.

There was a linear increase in MBPC frequency scores as the stage of dementia ascended. Thus, as the dementia progresses,

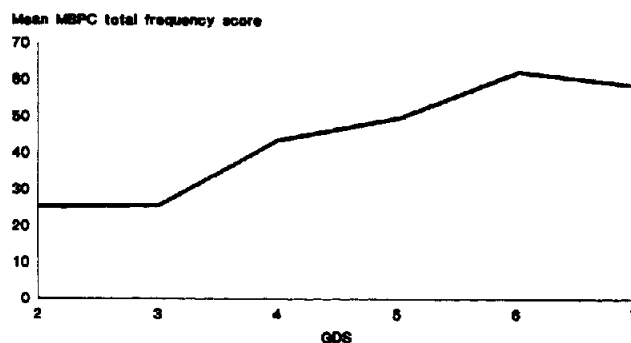


Figure 1. Mean Zarit's Memory and Behavior Problem Checklist (MBPC; Zarit, Reever, & Bach-Peterson, 1980) total frequency score by Global Dementia Scale (GDS) level.

the MBPC cumulative frequency score increases. Similarly, the MBPC was positively correlated with measures of extent of dementia and level of impairment. These data suggest that the MBPC is capable of capturing the essence of dementia as a progressive phenomenon. The higher correlation between the BDS and GDS than between either and the MBPC follows, considering their summative nature (i.e., as dementia progresses, a linear increase in BDS and GDS score is expected). In contrast, although MBPC scores would be expected to increase with dementia progression, the MBPC is not a summative measure in that new behavioral manifestations of dementia continually arise, whereas some existing manifestations would be expected to resolve.

This study suggests a number of clinical and research applications for the MBPC. For example, there is growing interest in comparing caregivers across various dementias (Dura, Haywood-Niler, & Kiecolt-Glaser, in press; Schulz, Tompkins, & Rau, 1988); use of the MBPC can provide the kind of behavioral data on the dementia patient that helps to make such comparisons possible. Similarly, MBPC data can be used to make comparisons among dementia caregivers across assessment sites and can provide more general data to evaluate impairment across studies (Dura & Kiecolt-Glaser, in press). In future longitudinal research, the factor scores could also be used to plot the progression of change.

References

- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., rev.). Washington, DC: Author.
- Blessed, B. E., Tomlinson, B. E., & Roth, M. (1968). The association between quantitative measures of dementia and of senile change in cerebral grey matter of elderly subjects. *British Journal of Psychiatry*, *114*, 797-811.
- Dura, J. R., Haywood-Niler, E., & Kiecolt-Glaser, J. K. (in press). Alzheimer's disease and Parkinson's disease caregivers: A preliminary study. *Gerontologist*.
- Dura, J. R., & Kiecolt-Glaser, J. K. (in press). Sample bias in caregiving research. *Journal of Gerontology*.
- Dura, J. R., Stukenberg, K., & Kiecolt-Glaser, J. K. (in press). Chronic strain and depressive disorders in older adults. *Journal of Abnormal Psychology*.
- Erkinjuntti, T., Hokkanen, L., Sulkava, R., & Palo, J. (1988). The

Table 3

Second-Order Factor Loadings on First-Order Factors

First-order factor	Second-order factor		
	1	2	3
MBPC 1. Self-care	.82	-.12	.28
MBPC 4. Self-maintenance	.82	.14	-.14
MBPC 2. Memory problems	.19	.83	-.17
MPBC 5. Psychiatric symptoms	-.24	.69	.32
MBPC 3. Communication	.10	.02	.94

Note. MBPC = Zarit's Memory and Behavior Problem Checklist (Zarit, Reever, & Bach-Peterson, 1980).

- Blessed Dementia Scale as a screening test for dementia. *International Journal of Geriatric Psychiatry*, 3, 267-273.
- Haley, W. E., Levine, E. G., Brown, S. L., & Bartolucci, A. A. (1987). Stress, appraisal, coping and social support as predictors of adaptational outcome among dementia caregivers. *Psychology and Aging*, 2, 323-330.
- Hughes, C. P., Berg, L., Danziger, W. L., Coben, L. A., & Martin, R. L. (1982). A new clinical scale for the staging of dementia. *British Journal of Psychiatry*, 140, 566-572.
- Kiecolt-Glaser, J. K., Glaser, R., Shuttleworth, E. C., Dyer, C. S., Ogrocki, P., & Speicher, C. E. (1987). Chronic stress and immunity in family caregivers of Alzheimer's disease victims. *Psychosomatic Medicine*, 49, 523-535.
- Light, E., & Lebowitz, B. D. (Eds.). (1989). *Alzheimer's disease treatment and family stress: Directions for research* (pp. vii-viii). Rockville, MD: National Institute of Mental Health.
- McKhann, G., Drachman, D., Folstein, M., Katzman, R., Price, D., & Stadlan, E. (1984). Clinical diagnosis of Alzheimer's disease: Report of the NINCDS-ADRDA work group. *Neurology*, 34, 939-944.
- Quayhagen, M. P., & Quayhagen, M. (1988). Alzheimer's stress: Coping with the caregiving role. *Gerontologist*, 28, 391-396.
- Rabins, P. V., Mace, H. L., & Lucas, M. S. (1982). The impact of dementia on the family. *Journal of the American Medical Association*, 248, 333-335.
- Reifler, B. V., Cox, G. B., & Hanley, R. J. (1981). Problems of mentally ill elderly as perceived by patients, families, and clinicians. *Gerontologist*, 21, 165-170.
- Reisberg, B., Ferris, S. H., DeLeon, M. J., & Crook, R. (1982). The Global Deterioration Scale for assessment of primary degenerative dementia. *American Journal of Psychiatry*, 139, 1136-1139.
- Schulz, R., Tompkins, C. A., & Rau, M. T. (1988). A longitudinal study of the psychosocial impact of stroke on primary support persons. *Psychology and Aging*, 3, 131-141.
- Swearer, J. M., Drachman, D. A., O'Donnell, B. F., & Mitchell, A. L. (1988). Troublesome and disruptive behavior in dementia: Relationships to diagnosis and disease severity. *Journal of the American Geriatrics Society*, 36, 784-790.
- Zarit, S. H. (1989). Issues and directions in family intervention research. In E. Light & B. Lebowitz (Eds.), *Alzheimer's disease treatment and family stress: Directions for research* (pp. 467-468). Rockville, MD: National Institute of Mental Health.
- Zarit, S. H., Reever, K. E., & Bach-Peterson, J. (1980). Relatives of the impaired elderly: Correlates of feelings of burden. *Gerontologist*, 20, 649-655.

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