



Assessing Alzheimer's disease patients with the Cohen-Mansfield Agitation Inventory: scoring and clinical implications

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Abstract

We explored the applicability of the standard scoring of the Cohen-Mansfield Agitation Inventory (CMAI), a widely used nursing-home derived instrument, to community-dwelling persons with Alzheimer's disease (AD). Item responses to the CMAI were gathered from participants in two large clinical studies, one of which specifically included patients with behavioral disturbances. Confirmatory factor analysis in these two groups of well-characterized AD patients suggested that conventional CMAI subscores did not adequately describe the responses of these two groups. Exploratory factor analysis indicated that the four CMAI subscores, based on a verbal-physical and aggressive-non-aggressive conceptualization of behavioral disturbance, did not fit community dwelling persons with AD. Based on cross-sectional and longitudinal analyses, there was suggestive evidence for three behavioral clusters, but these clusters did not achieve statistical significance. Overall, the CMAI seemed best suited to describe the overall level rather than the specific subtypes of behavioral dyscontrol in community-dwelling persons with AD. © 2002 Elsevier Science Ltd. All rights reserved.

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1. Introduction

The identification and quantification of behavioral symptoms in persons with dementing illnesses has become an important area of study due to the high prevalence of Alzheimer's disease (AD) and other dementing illnesses and the rapidly increasing number of elders. Instruments for identifying and quantifying these behaviors in AD patients are needed to help elucidate the clinical course of AD, to assist caregivers in managing patients, and to evaluate the outcome of therapeutic interventions (Cohen-Mansfield et al., 1989).

One of the most widely used instruments for assessing these behaviors is the Cohen-Mansfield Agitation Inventory (CMAI) (Cohen-Mansfield et al., 1989). This instrument was based on observations of a general nursing home population without regard for cognitive status or the presence of dementing illness (Cohen-

Mansfield, 1986; Cohen-Mansfield and Billig, 1986; Cohen-Mansfield et al., 1989, 1995). The reliability of the instrument has been established for community dwelling persons with AD (Koss et al., 1997). The CMAI quantifies observable disturbances of vocal or motor behavior such as screaming or kicking. Frequency ratings describe the symptoms in the previous 2 weeks. The instrument does not include psychosis, mood disturbance, negative symptoms such as loss of initiative, vegetative symptoms such as sleep/wake disturbances, changes in eating patterns or appetite, or incontinence.

In attempts to understand the interrelationships of behavioral symptoms, a number of factor-analytic studies of the CMAI have been performed. The instrument was conceptualized as measuring agitation in two dimensions, verbal and physical, each of which has two poles, aggressive or non-aggressive. Studies based on this conceptualization found behavioral abnormalities of elderly subjects to be comprised of three main factors; verbally aggressive behavior, verbally non-aggressive behavior, and physically non-aggressive

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behavior (Cohen-Mansfield, 1986; Cohen-Mansfield et al., 1989, 1995). A fourth factor, physically aggressive behavior, was added because of its importance in patient care, rather than its frequency of occurrence (Cohen-Mansfield, 1995; Cohen-Mansfield et al., 1995). Samples of the symptoms included in each factor based on community populations are (Cohen-Mansfield, 1991; Cohen-Mansfield et al., 1995) *Physically Nonaggressive*: restlessness, repetitious mannerisms, and pacing; *Physically Aggressive*: hitting, pushing others, scratching others; *Verbally Nonaggressive*: negativism/uncooperativeness, unwarranted requests for attention; *Verbally Aggressive*: screaming/shouting, cursing, and temper outbursts (see the Appendix for a complete listing of CMAI items).

In the course of conducting several large studies using the CMAI with community-dwelling AD patients, it was our impression that the behaviors we observed did not cluster in the above four CMAI categories. As a result, we began a formal evaluation of our CMAI data to determine the clustering of behavioral symptoms in our specific patient population.

2. Materials and methods

To determine the makeup, reliability, and robustness of CMAI subscores in AD over time and across AD populations, we reviewed CMAI data from two large-scale studies of community-dwelling persons diagnosed with possible or probable AD (McKhann et al., 1984). The studies were conducted by the Alzheimer's Disease Cooperative Study (ADCS), an NIA-sponsored clinical trials consortium (Thal, 1997). The Instrument Evaluation Study evaluated an array of cognitive and behavioral instruments. The Agitation Study was a randomized, controlled clinical trial of interventions for agitated behaviors (Teri et al., 2000).

To determine the extent to which the four subscores identified by Cohen-Mansfield and her colleagues were reflected in community-dwelling patients with AD, we used confirmatory factor analyses in each group separately to examine the fit of the four CMAI subscores. We then used exploratory factor analyses to identify what was common between four-factor analytic solutions, derived independently from these two groups when assessed at baseline. Finally, we assessed the robustness of symptom clusters by examining the reproducibility of four-factor solutions over 1 year in one of the groups.

2.1. Subjects

2.1.1. Instrument Evaluation Study (IS)

Subjects were 242 community-dwelling persons with probable AD and without severe behavior disturbance who were recruited to a multi-site study of assessment

instruments for research in AD (Ferris et al., 1997). Of these 242, the responses of the seven who had also participated in the Agitation Study were excluded from those of the IS group. One subject did not provide CMAI responses at baseline. There were 234 subjects with baseline responses; and 187 subjects in this population had CMAI responses at each of three visits during this 1-year study.

2.1.2. Agitation Study (AS)

Subjects were 148 community-dwelling persons with probable AD recruited to a multi-site study of treatments for agitation in AD (Teri et al., 2000). All had at least a 2-week history of two or more agitated behaviors. Subjects from both groups are described in the Appendix.

Mann-Whitney *U* tests indicated that the groups did not differ in Mini-Mental State Exam (MMSE) (Folstein et al., 1975), scores or years of education; chi square tests indicated no differences in gender. Age was slightly but significantly higher for the AS group ($z = -2.37$, $P < 0.05$). As expected, overall baseline level of behavioral disturbance was significantly higher as measured by total score on the CERAD Behavior Rating Scale for Dementia (BRSD) (Tariot et al., 1995) in the AS group than in the IS group ($z = 7.60$, $P < 0.001$).

2.2. Materials

The Community version of the CMAI (CMAI-C) contains 35 specific symptoms, plus two items that address time of day of behavior (item 37) and frequency of "other" behaviors (item 38). The CMAI-C is thus a 37-item scale by which behaviors are assessed for frequency by a caregiver on a seven-point scale. The ADCS version of this instrument includes a 38th item, "exhibits strange movements". Frequency ratings describe the symptoms in the previous 2 weeks, and range from "never" (0) to "several times an hour" (6), or "not applicable" (Koss et al., 1997). The ADCS version of the CMAI was used in these studies, but the two questions that do not represent specific behavior were excluded from all analyses.

2.3. Design and procedure

Reports by Ferris et al. (1997) and Teri et al. (2000) describe how data were collected. In this study, we took the individual CMAI item responses at the specified time points for AD patients in each group and entered them into factor analyses.

2.4. Statistical methods

All statistical analyses were carried out with SPLUS 4.0 and SPSS 8.0 for Windows 98, or SAS for Unix.

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