Dementia and Agitation in Nursing Home Residents: How Are They Related?

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The link between agitated behaviors and cognitive functioning in 408 nursing home residents was examined. Results showed that cognitively impaired residents manifested aggressive behaviors (e.g., cursing, hitting) and physically nonaggressive behaviors (e.g., pacing). The highest levels of physically nonaggressive behaviors were manifested by those residents who presented intermediate levels of impairment in their performance of activities of daily living. Cognitively intact residents exhibited verbally agitated behaviors (e.g., complaining). These findings have important implications for caregivers of agitated nursing home residents.

Agitation is a major problem for impaired elderly people, their families, and caretakers. Agitation affects the quality of their lives in the community, their likelihood of entering a long-term-care facility, and their specific needs in the facility.

Agitation has been defined as inappropriate verbal, vocal, or motor activity that is not a necessary by-product of the needs or confusion of the agitated individual (Cohen-Mansfield & Billig, 1986). Agitated behavior is always socially inappropriate and may be manifested in three ways: (a) It may be abusive or aggressive toward oneself or others; (b) it may be appropriate behavior performed with inappropriate frequency (e.g., constantly asking questions); or (c) it may be inappropriate according to social standards for the specific situation (e.g., putting on too many layers of clothes). The inappropriate nature of agitated behavior is judged from the standpoint of an observer. For example, an older person may repeat the same message because he or she is not receiving the appropriate internal or external response (or because the individual's response repertoire contains no other expressions), yet the behavior is still considered inappropriate from the point of view of accepted social norms or, more specifically, from that of the nursing home environment.

Agitation is not a diagnostic term, but rather a group of symptoms that may reflect a functional or organic psychiatric disorder (e.g., affective illnesses, schizophrenia, dementias), a medical illness (e.g., cardiovascular, pulmonary, renal, neurologic disorders), or the adverse effects of various medications. In addition, agitation may be secondary to insecurity, frustrations, fears, and misperceptions produced by impaired hearing, sight, or aphasia, usually in people who are also cognitively impaired. Although other terms, such as inappropriate behavior or disruptive behavior, are also in use, agitation was used in this study because of its wide clinical use in the nursing home.

A comprehensive discussion of the concept of agitation in the elderly and its definition was reported elsewhere (Cohen-Mansfield & Billig, 1986). Although most of the literature on agitation has been anecdotal rather than quantitative, the existing literature suggests that deficits in cognitive functioning and cerebral impairment may predispose individuals to become agitated (Chesrow, Kaplitz, Sabatini, Vetra, & Marquardt, 1965; de Ajuriaguerra, Rego, & Tissot, 1963; Fisher et al., 1983; Gerz, 1964; Granacher, 1982; Zarit & Zarit, 1982; Zimmer, Watson, & Treat, 1984).

The present study examined the nature of the relationship between dimensions of agitation (i.e., aggressive, physically nonaggressive, verbal, and hiding or boarding behaviors) and levels of cognitive decline in 408 nursing home residents. Two different types of relationships were investigated: a linear one (i.e., Does the level of agitation increase as the level of cognitive functioning declines?) and a curvilinear one (i.e., Does agitation increase, approach asymptote, and then decrease with the progression of dementia when all aspects of functioning decline?). The rationale for investigating a curvilinear relationship is based on our current understanding of the course of dementia in older persons. It is conceivable that dementia is, in essence, a debilitating disease that begins by attacking cognitive and social abilities while leaving physical functions relatively intact. As it increases in its downward trajectory, physical energy also becomes affected, thereby removing the motive power for the performance of agitated behaviors. The goal of this study was to determine the way in which agitation and cognitive impairment covary.

Method

Study Participants

A total of 408 residents of a large suburban nursing home were included in this study. Of this group, 92 were men and 316 were women. Their age range was from 70 to 99 years of age (M age = 85 years). The participants presented varying degrees of physical disabilities. Informed consent was obtained for all of the participants. For those

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residents who were unable to provide informed consent (as judged by a member of the nursing staff who was well acquainted with the resident), a close relative was contacted and asked to provide consent. A description of the protocol used for subject recruitment can be found in Cohen-Mansfield, Kerin, Pawlson, Lipson, and Holdridge (1988).

Instruments and Measures

Agitation. Agitation was measured independently by nursing staff from the day, evening, and night shifts using the Cohen-Mansfield Agitation Inventory (CMAI, Cohen-Mansfield, 1986). Because ratings were sought from many individuals, some unfamiliar not only with research but sometimes with the basics of reading and marking a response, a research assistant was present to answer questions and clarify items on the assessment. However, the research assistant did not interfere with the responses. To obtain a consistent picture of each resident's behavior, ratings on each unit were completed within a specified 2-week period.

The CMAI consists of 29 agitated behaviors, each rated on a 7-point scale of frequency, ranging from resident never manifests the behavior (1) to resident manifests behavior several times an hour (7). The results of factor analysis of these 29 behaviors revealed three factors: Aggressive Behavior, Physically Nonaggressive Behavior, and Verbally Agitated Behavior. For the day shift only, Hiding and Hoarding Behavior emerged as a fourth factor (Cohen-Mansfield, Marx, & Rosenthal, 1989). In addition, the total number of behaviors by each resident that were observed at least once a week was established as an additional global measurement of agitation. This last measure was based on a maximum value of 87 (i.e., 29 agitated behaviors that could occur on each of the three nursing shifts).

The percentage of exact agreements or 1-point discrepancies (between nursing staff) were calculated for each behavior on the CMAI and averaged .92 in one unit of 16 residents, .92 in a second unit of 23 residents, and .88 in a third unit of 31 residents (see Cohen-Mansfield et al., 1989).

Cognitive impairment. Cognitive impairment was assessed using a modified version of the Brief Cognitive Rating Scale (BCRS, Reisberg, Schneck, Ferris, Schwartz, & de Leon, 1983). This instrument contained four axes of cognitive functioning: concentration, recent memory, past memory, and orientation. Each axis uses 7 rating points that correspond to seven distinguishable stages of cognitive functioning within each axis. Daytime charge nurses and social workers independently rated the four items on a 7-point scale, with high score indicating cognitive deterioration. A research assistant was present to answer questions when the nurses completed the ratings, but was not present when the social workers completed this assessment.

Pearson correlations of the BCRS axes with independent psychometric and mental status questionnaire assessments were statistically significant and ranged from .51 to .84; interrelationships among the BCRS axes were between .83 and .94 (Reisberg, Ferris, de Leon, & Crook, 1985). To determine interrater reliability in the present study, BCRS ratings of 31 residents of one unit were obtained from two charge nurses. The percentage of exact agreements or 1-point discrepancies were calculated for each of the four axes and averaged .93. In addition, BCRS ratings of nurses versus social workers for all 408 residents were calculated for each of the four axes and averaged .92. Significant and ranged from .51 to .84; interrelationships among the BCRS ratings (as assessed by nursing staff and by social workers) were examined by calculating Pearson correlation coefficients for both raters. Similarities were seen between nursing staff and social workers in correlations of BCRS rating with the following: total number of agitated behaviors (r = .37 for nursing staff; r = .40 for social workers, p < .01), aggressive behaviors (r = .22 for nursing staff; r = .26 for social workers, p < .01), physically nonaggressive behaviors (r = .37, .40, respectively, p < .01), verbally agitated behaviors (r = −.09 for nursing staff; r = −.13 for social workers, p < .01), hiding or hoarding behaviors (r = −.05, −.06, respectively, not significant in both instances). Although all of the BCRS ratings were performed during the day shift, we did not expect to find this degree of similarity in correlation coefficients between BCRS scores and agitation measures inasmuch as nurses and social workers typically interact with residents at different times and in different situations.

The relationships of the five measures of agitation with cognitive impairment, ADL impairment, and diagnosis of dementia were examined by calculating Pearson correlation coefficients (ratings by nurses and social workers were averaged). To determine whether these relationships were linear or curvilinear, the multiple squared correlation was derived for the linear variable of each independent variable, and then the change in the multiple squared correlation, as a result of the contribution of the quadratic (i.e., x²) value of the independent variable, was calculated for each measure of agitation (Table 2).

Table 1
Means, Standard Deviations, and Correlation Coefficients of the Independent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>ADL Correlation</th>
<th>Diagnosis of dementia Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive impairment</td>
<td>4.37</td>
<td>2.04</td>
<td>.74*</td>
<td>.66*</td>
</tr>
<tr>
<td>Activities of daily living</td>
<td>2.64</td>
<td>1.03</td>
<td>.46*</td>
<td></td>
</tr>
<tr>
<td>Diagnosis of dementia*</td>
<td>0.54</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* A value of 0 = No and 1 = Yes.
* p < .01.
The total number of agitated behaviors as well as physically nonaggressive behaviors correlated positively with a diagnosis of dementia and with the linear BCRS value. The regression with ADL indicated that both measures of agitation were positively related to the linear value and negatively related to the quadratic value of ADL impairment (regression equations: Predicted total number of agitated behaviors = $-1.8 \text{ [ADL]}^2 + 11.9 \text{ [ADL]} - 7.4$; predicted physical nonaggression = $-0.49 \text{ [ADL]}^2 + 2.55 \text{ [ADL]} - 2.83$). These data indicate that a greater total number of behaviors and more physically nonaggressive agitation are manifested by residents who present a moderate to severe level of ADL impairment (i.e., ADL value is approximately 3: “Needs a lot of assistance”) and suffer from severe cognitive impairment.

**Aggressive behavior.** Aggressive behavior was negatively related to the linear value and positively related to the quadratic value of cognitive impairment. In addition, aggressive behaviors correlated positively with ADL impairment (linear term) and with a diagnosis of dementia. Aggressive behavior occurred in the most cognitively impaired residents (Regression equation: Predicted aggressive agitation = $0.04 \text{ [BCRS]}^2 - 0.20 \text{ [BCRS]} - 0.08$).

**Verbally agitated behavior.** Although statistically significant, the correlation of verbally agitated behavior with BCRS score was negative and noticeably smaller than correlation coefficients already described. Addition of the quadratic term of cognitive impairment improved the multiple squared correlation of verbally agitated behavior, yielding a positive linear term and a negative quadratic term. These data suggest that the greatest amounts of verbally agitated behaviors were manifested by residents with low levels of cognitive impairment (the peak of the curve occurred when BCRS score = 3) and decreased monotonically for higher or lower levels of cognitive impairment (Regression equation: Predicted verbal agitation = $-0.05 \text{ [BCRS]}^2 + 0.32 \text{ [BCRS]} - 0.30$).

**Hiding and hoarding.** Hiding and hoarding behavior correlated negatively with the linear term of ADL impairment, indicating that residents who manifested this type of agitation had retained more functional abilities than other residents in the nursing home.

To determine which combination of variables accounted for the variance in agitated behaviors, multiple regression equations were estimated using stepwise selection (forward regression produced identical results) for each measure of agitation on the independent variables of cognitive impairment (as assessed via the BCRS), ADL impairment, and diagnosis of dementia. The results of the stepwise regressions are presented in Table 3.

Seventeen percent of the variance of the total number of agitated behaviors manifested by these residents was explained by the quadratic term of cognitive impairment, indicating that agitation (as a global measurement) was related to a decline of cognitive functioning. The differential influence of cognitive impairment and ADL impairment on manifestations of agitation are reflected when specific syndromes of agitation are examined.

It is clear from these data that cognitive impairment and ADL impairment are key variables in our understanding of physically nonaggressive behaviors. That is, these two variables...
explained 37% of the variance of this type of behavior. Physically nonaggressive behaviors were positively related to the quadratic term of cognitive impairment and showed a curvilinear relationship with ADL impairment (negative quadratic term and positive linear term), suggesting that physically nonaggressive behaviors are manifested most often by individuals who have severe cognitive impairment and present intermediate levels of ADL impairment. The relationship among physically nonaggressive agitation, cognitive impairment, and ADL impairment is represented graphically in Figure 1. For this figure, residents with BCRS values of 1 or 2 were grouped as low cognitive impairment (n = 100), those with BCRS values from 3 to 5 were considered to present moderate cognitive impairment (n = 130), and those with BCRS scores of 6 or 7 were classified as high cognitive impairment (n = 178). Physically nonaggressive agitation was manifested most frequently by residents who were cognitively impaired but retained intermediate levels of ADL functioning. This type of agitation was manifested infrequently by cognitively intact or mildly demented residents. This type of agitation increased with increasing cognitive impairment, but much more for residents who presented middle levels of ADL impairment (i.e., ADL = 2 or 3) than in the functionally intact (ADL = 1) or the functionally deteriorated (ADL = 4) residents. The last group—those with impaired cognitive functioning and deteriorated ADL functioning—represents the last stages of dementia when complete deterioration takes place.

The variance of aggressive behaviors was explained by only one variable: Cognitive impairment—quadratic (positive quadratic term; R^2 = .07). Thus, aggressive behaviors tend to be manifested by residents who present severe cognitive impairment.

Cognitive impairment and ADL impairment explained 7% of the variance of verbally agitated behaviors (see Table 3). These data suggest that verbally agitated behaviors are manifested by residents who present mild cognitive impairment and are functionally impaired.

The variance of hiding and hoarding behaviors was best explained by a negative relationship in the quadratic term of ADL impairment (R^2 = .01), suggesting that residents who have retained the ability to accomplish daily activities are those who manifest the greatest amount of hiding and hoarding behaviors.

The diagnosis of dementia did not enter any of the regression equations. This was probably due to (a) its being a dichotomous variable (i.e., diagnosis vs. no diagnosis of dementia), and (b) the fact that cognitive impairment and ADL impairment entered all regression equations, and both variables correlated highly with diagnosis of dementia (see Table 1).

### Discussion

Agitation is indeed manifested differently among the cognitively impaired who exhibit aggressive behaviors, such as hitting or cursing, as well as physically nonaggressive behaviors in comparison to the cognitively intact who exhibit verbally agitated or hiding and hoarding behaviors. It is conceivable that the behaviors exhibited by cognitively intact residents may represent functional or dysfunctional coping mechanisms through which residents try to protect themselves and their belongings from real or imaginary aspects of their environment. Specifically, their complaining, negativism, and yet constant requests for attention may represent efforts to change (or, at least, not accept) the environmental structure, whereas hiding and hoarding serve as expressions of residents’ efforts to protect personal belongings or to protect their futures from a lack of material possessions. In contrast, the manifestations of agitation in cognitively impaired residents include a wide range of inappropriate behaviors.

Cognitive impairment and ADL impairment were strongly related to agitated behavior. In particular, the combination of these variables explained 37% of the variance for physically nonaggressive behavior. Increases of physically nonaggressive behavior accompanied increasing severity of cognitive impairment and intermediate levels of ADL impairment. Thus, it appears that residents who retain some ADL functioning are able to perform physically nonaggressive behaviors because these manifestations are possible within their level of physical functioning. This finding is in agreement with medical data (Billig, Cohen-Mansfield, Lipson, & Pawison, 1988) that showed that

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total no. of behaviors</th>
<th>Physically nonaggressive behaviors</th>
<th>Aggressive behaviors</th>
<th>Verbally agitated behaviors</th>
<th>Hiding/hoarding behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCRS</td>
<td>ΔR^2</td>
<td>F</td>
<td>ΔR^2</td>
<td>F</td>
<td>ΔR^2</td>
</tr>
<tr>
<td>Linear</td>
<td>.17</td>
<td>84.70**</td>
<td>.16</td>
<td>141.99***</td>
<td>.07</td>
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<tr>
<td>Quadratic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADL</td>
<td>Linear</td>
<td>.08</td>
<td>51.54**</td>
<td></td>
<td>.04</td>
</tr>
<tr>
<td>Quadratic</td>
<td>.13</td>
<td>80.74**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnosis of dementia</td>
<td>.17</td>
<td>.37</td>
<td>.07</td>
<td></td>
<td>.07</td>
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<tr>
<td>Total R^2</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

*p < .05.  **p < .01.

Note. BCRS = Brief Cognitive Rating Scale.
fewer physical disabilities were associated with physically nonaggressive individuals in comparison with the total nursing home population. The results of the present study demonstrate that the seemingly purposeless or confused behaviors of physically nonaggressive individuals, such as aimless pacing and inappropriate robing or disrobing, are directly related to severe cognitive impairment.

Impairment of ADL and cognitive functioning were also associated with aggressive behavior. Increases of this type of agitation were accompanied by both the loss of ADL functioning and the progression of dementia.

In contrast, verbally agitated behavior was not closely related to cognitive functioning. It occurred in elderly persons who were more cognitively intact and was not strongly related to ADL functioning. It may be self-evident that the individual needs to retain a minimal level of cognitive ability and communication skills to manifest some verbally agitated behaviors, such as complaining and negativism, although some others (e.g., constant requests for attention) may be more frequent among the cognitively impaired.

Cognitive functioning was not an important variable for explaining hiding and hoarding behavior. However, this type of behavior was associated with adequate ADL functioning. This would be partly explained in that hiding and hoarding behavior requires some degree of physical coordination.

The relationship between agitation and dementia is complex. In order to understand agitation, one must consider the individual's level of dementia as well as the types of agitated behavior. Dementia is associated with increased frequency of aggressive behaviors and of physically nonaggressive behavior. In the case of physically nonaggressive agitation, ADL impairment plays an important role: Increases of agitation accompany increasing cognitive impairment up until the point at which the individual may be classified as an intermediate level of ADL impairment; at this point, further decline in ADL functioning results in decreased physically nonaggressive behavior. Verbally agitated behavior, in contrast to the two other types of agitation, occurs primarily during early and middle stages of dementia.

Although this study was cross-sectional, the data suggest what may be the longitudinal course of agitation in persons suffering from dementia, (i.e., an increase in physical manifestations of agitation with the progression of dementia). In the final stages of dementia, the nonaggressive manifestations seem to decrease. The results of the present study may help caregivers predict the course of agitation in cognitively impaired persons and to make informed decisions concerning issues such as room changes, staffing patterns, and so forth. It is conceivable that increased physical agitation may also be used by caregivers as a signal of possible cognitive deterioration. In contrast, agitated behaviors manifested by the more cognitively intact residents may be responses to physical pain or to an environment with which they can no longer deal. Caregivers must be sensitized to the possible meaning of manifestations of verbal behaviors as well as hiding and hoarding behaviors and should plan further assessment, treatment, or intervention accordingly.

The type of medication administered and concurrent physical illness are important additional factors without which our understanding of agitation is incomplete. These issues are addressed elsewhere (Billig et al., 1988; Cohen-Mansfield, Billig, Lipson, Pawlison, & Marx, 1988).

It is noteworthy that results obtained independently by different raters revealed the same patterns of relationships among participants. For instance, cognitive impairment was rated by different methods (BCRS and diagnosis of dementia) by professionals of different disciplines (nursing staff, social workers, MDs) at different times. Moreover, within the BCRS ratings, different levels of instruction were received by nursing staff and social workers (a research assistant was present only during ratings by nurses). The fact that different raters and ratings yielded the same results strengthens our confidence in the robustness of our findings.

This article described the relationship between agitation in nursing home residents and their levels of cognitive and physical functioning. Rather than being linear or curvilinear, these relationships are complex. Dementia is very strongly associated with aggressive and physically nonaggressive manifestations of agitation, although these manifestations may decrease in the last stages of dementia when all functioning subsides. Other types of agitation, namely, verbal agitation and hiding and hoarding behavior, are not strongly associated with cognitive functioning and are somewhat more prevalent among cognitively intact residents.

References
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Publication Practices and Scientific Conduct

The recent disclosures of fraud in the conduct of research, reporting of research, or both in a number of scientific disciplines have prompted a widespread program of self-examination of publication practices and ethics.

The editor joins with APA in reminding authors of the principles of good publication practices and scientific conduct. Prospective authors are directed to the Publication Manual of the American Psychological Association (3rd ed.) and to the "Instructions to Authors" printed in this issue. The requirements of data availability, replicability, authorship credit, ethical treatment of subjects, and primary publication of data are important—they are meant to ensure responsible science and appropriate use of scarce and valuable resources.