Longitudinal Changes in Behavioral Problems in Old Age: A Study in an Adult Day Care Population

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Background. Four types of agitation have been identified: physically aggressive behaviors, physically nonaggressive behaviors, verbally aggressive behaviors, and verbally nonaggressive behaviors. These pose a major challenge to caregivers and are sometimes indicators of the emotional state of the older person. Longitudinal changes in these four subtypes of agitated behaviors were examined.

Methods. One hundred and four community-dwelling participants of five senior day care centers (mean age = 79) were followed up for 2 years. Their agitation was assessed, as was their cognitive functioning, affect, and medical functioning.

Results. Although physically nonaggressive, physically aggressive, and verbally aggressive behaviors increased significantly over 2 years, verbally nonaggressive behaviors did not show significant changes over time. These patterns can be partially explained by the relationship between the different types of agitation and cognitive functioning. Increases in physically nonaggressive behaviors from start to end of the 2 years were predicted by greater cognitive impairment at baseline and by receiving a smaller number of medications at baseline. Increases in verbally aggressive behaviors and in physically aggressive behaviors during the study period correlated significantly with a greater decline in cognitive functioning and increased depression at baseline. In addition, increases in physical aggression were correlated with greater cognitive impairment at baseline.

Conclusions. The course of change for each type of agitation was unique. The relationships between inappropriate behaviors, cognitive functioning, physical health, and depression over time are complex and vary by type of agitation.

Some of the most devastating aspects of caring for a person suffering from dementia involves the accompanying behavioral problems, or agitation. In previous reports, we have characterized the syndromes of agitation and have investigated their correlates. However, to our knowledge this is the first study to examine longitudinal changes in agitation, and to investigate predictors of such changes.

Agitation has been defined as inappropriate verbal, vocal or motor activity that is not explained by needs or confusion per se (1). Based on studies in the nursing home (2) and in community-dwelling participants of adult day care centers (3), four types of agitated behaviors have been described: (a) verbally nonaggressive behaviors — including constant requests for attention, verbal bossiness or pushiness, complaining or whining, negativism, doesn't like anything, uncooperative, related interruptions, unrelated interruptions; (b) verbally aggressive behaviors — including cursing, temper outbursts, making strange noises, screaming; (c) physically nonaggressive behaviors — including general restlessness, performing repetitious mannerisms, pacing, trying to get to a different place, handling things inappropriately, inappropriate dressing or undressing; and (d) physically aggressive behaviors — including hitting, pushing, scratching, grabbing things, grabbing people, kicking.

Correlates of these behaviors have been investigated to both clarify the meaning and the causes of the behaviors and to suggest predictors of these behaviors. These correlational investigations have been previously summarized (4–6). In the nursing home, we integrated the different findings to the following models (7): aggressive behaviors were related to cognitive impairment, male gender, negative quality of social relationships, and sleep problems; physically nonaggressive behaviors were related to cognitive impairment with moderate to high levels of activities of daily living (ADL) impairment, to relative lack of health problems (which was associated with younger age), to sleep problems, and to more life stress (such as having experienced World War II); and verbal agitation was related to depression, health problems, sleep problems, negative quality of social relations, lack of cognitive impairment in comparison to the rest of the nursing home population, and female gender.

[These models relate to only three types of agitated behaviors because verbal aggression is correlated with both verbal agitation and aggression; to clarify these relationships we decided to examine verbal aggression separately. The considerations involved are described in Cohen-Mansfield et al. (3)].

An especially strong correlate of agitated behavior is cognitive impairment. Regression analyses of cross-sectional data (8) showed that physically nonaggressive and...
verbally aggressive behaviors were related to level of cognitive impairment. Physically aggressive behaviors were manifested only at late stages of dementia. Verbally nonaggressive behaviors increased with severity of dementia up to moderate–severe levels of impairment and then diminished.

These findings, which had been obtained through path and regression analyses of cross-sectional data, formed the basis for the current study, in which we examined longitudinally the impact of these variables on the manifestation of agitated behaviors in a different setting, that of community-dwelling participants of adult day care centers. Understanding the longitudinal course of agitated behaviors is important for developing intervention, for planning of care, and for caregiver education.

The specific questions addressed by this investigation are therefore: (a) How does agitation change over time? (b) Does cognitive functioning explain the longitudinal change in agitation? (c) What are the characteristics of those persons likely to experience most agitation? Based on the cross-sectional studies described above, the following hypotheses were formed:

Aggressive agitation as well as physically nonaggressive agitation will increase with decline in cognitive functioning; verbal agitation will be related to depressed affect; and verbal agitation will be related to indicators of poor health, whereas physically nonaggressive behaviors will be related to relatively good health.

Methods

Participants

Participants were 104 community-dwelling participants of five senior day care centers in Maryland who completed five assessments by staff members in a longitudinal study of agitation in elderly persons over a 2-year period.

Seventy percent of the participants (n = 73) were female. At the time of initial assessment, the age range of the participants was 60–97 years (mean age = 79.2). Over half of the participants were widowed (60.6%), 28.8% were married, 2.9% were divorced, and 7.7% were single. The participants had been attending day care for an average of 1.5 years, with a range of less than 2 months to 13.3 years (see Table 1).

The average number of years of education each participant had received ranged from 0 to 25 (mean = 12.7, SE = .48). Most of the participants (86.5%) were Caucasian. The participants’ demographic data were similar to those of the participants in a national survey of day care users although a greater proportion of the participants in this study were Caucasian as compared to the national survey and a greater proportion was disabled in the performance of ADL (3).

The characteristics of those participants for whom 2 years of staff assessments were available (n = 104) were compared to the characteristics of those who did not complete 2 years of assessments (n = 96). No statistically significant differences were found in their demographic characteristics, medical status (i.e., number of disease, number and type of medication), and functional and cognitive status.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Males (n=31)</th>
<th>Females (n=73)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>79.2 ± .78</td>
<td>79.2 ± .78</td>
</tr>
<tr>
<td>Marital Status</td>
<td>Married* (n=30)</td>
<td>Married* (n=288)</td>
</tr>
<tr>
<td>Caucasian*</td>
<td>90 (86.5%)</td>
<td>73 (70.2%)</td>
</tr>
<tr>
<td>Education (yr)</td>
<td>12.7 ± .48</td>
<td>12.7 ± .48</td>
</tr>
<tr>
<td>Length of attendance in day care (yr)</td>
<td>1.5 ± .19</td>
<td>1.5 ± .19</td>
</tr>
<tr>
<td>Number of medical diagnoses†</td>
<td>4.8 ± .19</td>
<td>4.8 ± .19</td>
</tr>
<tr>
<td>Number of psychiatric diagnoses†</td>
<td>0.61 ± .08</td>
<td>0.61 ± .08</td>
</tr>
<tr>
<td>Dementia diagnosis* (n=42)</td>
<td>42 (41.2%)</td>
<td>42 (41.2%)</td>
</tr>
<tr>
<td>Probable Alzheimer’s</td>
<td>15 (14.7%)</td>
<td>15 (14.7%)</td>
</tr>
<tr>
<td>Multi-infarct</td>
<td>1 (1.0%)</td>
<td>1 (1.0%)</td>
</tr>
<tr>
<td>Unknown etiology</td>
<td>13 (12.7%)</td>
<td>13 (12.7%)</td>
</tr>
<tr>
<td>No diagnosis</td>
<td>31 (30.4%)</td>
<td>31 (30.4%)</td>
</tr>
<tr>
<td>ADL (no. impaired)†</td>
<td>3.3 ± .24</td>
<td>3.3 ± .24</td>
</tr>
<tr>
<td>BCRS¹</td>
<td>3.9 ± .19</td>
<td>3.9 ± .19</td>
</tr>
</tbody>
</table>

*Frequency (%), †Mean (SEM).

Of the 96 participants who did not complete 2 years of assessments by staff members, 38 died, 36 moved out of the area, for 11 the relatives refused to continue the elderly person’s participation in the study, and 10 did not complete five assessments by the end of the study. For one additional participant the first assessment by a staff member was missing. Informed consent was obtained for all participants. For those residents who were unable to provide informed consent (as judged by a member of the day care staff who was well acquainted with the participant), a close relative was contacted and asked to provide consent. Additional information concerning the informed consent procedure is available elsewhere (9).

Day Care Centers

Five senior adult day care centers in Montgomery County, MD were included in this study. All were Medicaid-certified and were staffed to provide the level of care of a skilled nursing facility or an intermediate care facility. Private fees provide less than half of the centers’ funds. Medicaid was the largest single source of funding. Funding was received from federal, state, and local governments, but the county government provided no funds for operating expenses. All of the centers included in the study provided transportation for at least some of the participants. The areas the centers served overlapped.

Procedure

Participants were assessed at 6-month intervals by the activity directors at the centers. These directors were selected to complete the information because of their close contact with the participants. A research assistant was present when the ratings were completed. Medical examinations by a geriatric physician were performed once a year.
Assessments of the participants were also continued if the participants discontinued their attendance at day care centers, entered a nursing home, or joined a group home.

For 10 of the participants who were missing one of the staff assessments (excluding the first one), scores were imputed by extrapolating from the values from the staff assessments immediately before and immediately after the assessment time.

**Instruments**

**Agitation.** — Agitation was rated using the Cohen-Mansfield Agitation Inventory for Community (CMAI-C), an expanded version of the Cohen-Mansfield Agitation Inventory (CMAI). The CMAI-C is an informant rating questionnaire that includes 36 items (3). Each item is rated on a 7-point scale of frequency, ranging from 1 (never manifests the behavior) to 7 (manifests the behavior on the average of several times an hour). Inter-rater agreement questionnaire that includes 36 items (3). Each item is rated

For the CMAI-C was assessed for 20 participants. Two day care staff members who were similarly involved with 20 participants, independently rated the participants' level of agitation. These averaged 92.1% for the 36 items. A syndrome score was computed as the mean of the individual behaviors comprising each type of agitation.

**Cognitive functioning.** — This was measured by the Brief Cognitive Rating Scale [BCRS; information on reliability, validity, and interaxes correlations of the BCRS is presented in Reisberg et al. (10) and in Cohen-Mansfield et al. (11)], which was completed by activity directors or daytime nurses in the appropriate setting (adult day care or nursing home). The BCRS is a 7-point scale ranging from 1 (normal functioning) to 7 (total cognitive impairment). Based on validated clinical syndromes, individuals usually score under 3; scores of 6 and 7 are usually symptomatic of severe dementia. The BCRS was slightly modified for our purposes by including only the four axes concerning cognitive functioning, i.e., concentration, recent memory, past memory, and orientation, and by adding some examples to clarify the scale.

In addition, the change in the participants' cognitive functioning was calculated as the change in BCRS from baseline to the last assessment.

**Measurement of dementia.** — A diagnosis of dementia was provided by the physician who performed a physical examination of the participants at their homes. A positive diagnosis of dementia followed the criteria for clinical diagnosis of Alzheimer's disease provided by NINCDS/ADRDA, and included: dementia, probable Alzheimer's disease; dementia with presence of vascular disorder; dementia with a diagnosis of Parkinson's disease; dementia, unknown etiology; and a combination of the above (see Table 1). Subsequently, this information was dichotomized for presence and absence of a dementia disorder.

**Depression.** — Because the lack of feasibility for those who are nonverbal to complete a self-reported instrument, a staff rating of depression, the Raskin Depression Scale (RDS), was used (12). The RDS is based on the average of three items that assessed expressions of depression or sadness verbally, behaviorally, or through secondary symptoms (insomnia, appetite changes, etc.). Scores range from 1 (not at all) to 5 (very much depressed). Reliability data are provided in Cohen-Mansfield and Werner (13).

**Pain.** — Day care staff members were asked to rate the severity of the participant's physical pain during the 2 weeks preceding the completion of the questionnaire. The pain item was assessed on a scale rating from 1 (no pain) to 6 (excruciating pain), based on the Short Form McGill Pain Questionnaire (14). To determine inter-rater reliability, two day care staff members who were similarly involved and well acquainted with 16 participants rated independently the participants' pain. The inter-rater Pearson correlation coefficient was $r = .85$.

**Demographic information.** — Basic demographic information on age, gender, race, marital status, and length of time in day care at initial testing was recorded from day care records.

**Medical information.** — In addition to the indices of dementia, a number of other variables were obtained from the initial physical examinations of the participants. Variables used in these analyses included the number of medical diagnoses (includes dementia diagnosis), psychiatric diagnoses (does not include dementia-related diagnoses), and number of medications currently taken (including prescribed medications, psychotropic medications, vitamins, and over-the-counter drugs).

**Recruitment and Nursing Home Placement**

Participants were recruited throughout the study. At each 6-month interval all participants of the adult day care centers who were over 60 years old were approached for participation in the study. Those who agreed were followed with an assessment every 6 months. Participants continued participation in the study even when they stopped participating in adult day care. Interviews were continued also when they moved to new facilities, such as a group home or a nursing home. In those cases, the staff member most involved in their care provided the information for the study.

**RESULTS**

**How Does Agitation Change Over Time?**

Longitudinal changes in the four syndromes of staff-rated agitation were examined: verbally nonaggressive behavior (VNAB), physically nonaggressive behavior (PNAB), verbally aggressive behavior (VAGB), and physically aggressive behavior (PAGB).

Repeated measures multivariate analyses of variances (MANOVAs) revealed a significant increase in PNAB [($F_{A120}$ = 270, $p = .03$), VAGB ($F_{A120} = 3.83$, $p < .01$), and PAGB ($F_{A120} = 4.43$, $p < .01$) over time. Changes in VNAB were not statistically significant. The changes in the different syndromes of agitation over time are presented in Figure 1.

Pearson correlations were calculated among the changes in each of the agitation scores over the 2-year period. Sta-
tistically significant relationships were found among the changes in agitation as follows: changes in VNAB were positively associated with changes in PNAB ($r = .42, p < .01$); changes in PAGB and VAGB were also positively associated ($r = .39, p < .01$), as were changes in VAGB and VNAB ($r = .32, p < .01$) and changes in PAGB and PNAB ($r = .24, p < .01$). No statistically significant relationships were found between changes in PNAB and VAGB, and between changes in VNAB and PAGB.

**Does Cognitive Functioning Explain the Longitudinal Change in Agitation?**

One likely explanation of the different time course of the different syndromes of agitation is their different relationships with cognitive decline. Previous research in the nursing home and day care populations showed a much clearer relationship of increase in agitation with cognitive decline for physically nonaggressive behaviors as well as for aggressive behaviors in comparison with verbal nonaggressive behaviors (8,11). We therefore examined the time course of each syndrome for three levels of cognitive impairment based on the baseline score of the BCRS: cognitively intact; BCRS 1–2 ($n = 27$); moderate impairment; 3–5 ($n = 43$); and severe impairment; 6–7 ($n = 34$); These are presented in Figures 2–5.

Regarding PNAB, as expected, those with moderate or severe impairment increased twice as much as those who were cognitively intact (at baseline); average increase scores were .30, .35, and .14, respectively. The most impaired group showed a slight decline at the end of the study, possibly reflecting the deterioration of the last stages of dementia. A two-way repeated measures analysis of variance (ANOVA) with Time as the within subject factor and BCRS as the between group factor was performed. The main effects for cognitive functioning and time were significant [$F_{2,89} = 15.1, p < .01$ and $F_{4,119} = 2.4, p < .05$] but the interaction term was not. For VNAB (Figure 3), all groups showed relatively constant levels over time, with the group with moderate levels of impairment manifesting consistently higher levels of VNAB. A two-way repeated

![Figure 1. Changes over time by syndromes of agitation. Data based on 104 participants with all first 2-year assessments.](image1)

![Figure 2. Changes in physically nonaggressive behavior over time by cognitive functioning.](image2)

![Figure 3. Changes in verbally nonaggressive behavior over time by cognitive functioning.](image3)

![Figure 4. Changes in physically aggressive behavior over time by cognitive functioning.](image4)
measures ANOVA with Time as the within subject factor and BCRS as the between group factor showed a significant difference by BCRS [$F_{12,305} = 3.47, p < .05$] but no significant effect for time or for the interaction term.

Both types of aggressive behaviors (Figures 4 and 5) show increases of agitation over time as reflected in a significant effect of time for both types [$F_{12,305} = 3.3, F_{4,404} = 3.4, p < .05$, respectively] for VAGB and PAGB. Neither BCRS nor the interaction term was significant for VAGB, although BCRS significant for PAGB [$F_{12,304} = 3.0, p < .05$].

What Are the Characteristics of Those Persons Likely to Experience Most Agitation?

Participants were classified as becoming more agitated if they increased by more than the standard error at the initial testing. Differences between those who became more agitated from the beginning to the end of the study and those who decreased or remained stable were examined using t-test and $\chi^2$ analyses; variables included BCRS, BCRS change, dementia presence, medical variables (number of medications), as well as demographic characteristics of the participants.

For PNAB, 37% showed an increase during the 2 years. Participants who showed an increase in agitated behaviors were more cognitively impaired on the BCRS at initial testing [mean BCRS: 4.5 vs. 3.6; $t_{97} = -2.59, p = .01$], received a smaller number of medications at baseline [means: 3.0 vs. 4.0, $t_{97} = 1.73, p < .05$], and were more likely to be diagnosed with dementia than those who did not manifest an increase in PNAB (82% of those who had an increase in agitation had a diagnosis of dementia in comparison to 58% of those who did not experience an increase in PNAB, $p_1 = 6.44, p = .01$, and were all white compared to 81.6% of those who did not change [$\chi^2_{(1)} = 6.0, p < .05$].

For PAGB, 20% increased during the 2 years of the study. Participants who exhibited an increase in PAGB over time were more cognitively impaired at baseline [BCRS mean = 4.5 vs. 3.7; $t_{(47)} = 1.79, p < .05$], had a greater decline in cognitive functioning [mean change in BCRS 1.34 vs. 0.64, $t_{(47)} = 2.29 p < .05$], were more depressed at baseline [2.0 vs 1.5, $t_{(47)} = 2.72, p < .01$], were more likely to have a diagnosis of dementia [86% of those who increase in PAGB vs. 61% of those who did not; $\chi^2_{(1)} = 4.42, p < .05$], and were all white compared to 83.1% of those who did not change [$\chi^2_{(1)} = 4.1, p < .05$].

DISCUSSION

Results from these analyses show that longitudinal changes in agitation and predictors of these changes vary by syndrome. While physically nonaggressive, physically aggressive, and verbally aggressive behaviors were found to increase significantly over 2 years, verbally nonaggressive behaviors did not show significant changes over time. This may be explained by the linear relationship found between the three former types of agitation and cognitive functioning, and the less clear pattern of possibly curvilinear relationship for VNAB that was identified in the analyses of cross-sectional data for the nursing home and for adult day care populations (8).

Physically nonaggressive behaviors appeared to show a linear relationship with cognitive impairment at baseline. In addition, over time pronounced changes are observed especially for the groups suffering from cognitive impairment; i.e., participants with moderate or severe cognitive impairment at baseline increased more rapidly than those in the relatively intact group. Future studies should examine the interaction between these variables and physical functioning to elucidate whether these changes are mediated by changes in the participants’ physical functioning or only dependent on their cognitive functioning.

Verbally nonaggressive behaviors show a different pattern. The highest levels of VNAB were manifested by those with moderate levels of cognitive impairment, supporting the previous notion that the relationship between these type of behaviors and cognitive functioning may be somewhat curvilinear rather than linear. Over time, however, VNAB remained relatively stable for the different levels of cognitive functioning. This stability is somewhat puzzling. Several reasons may explain it: (a) In the moderate impairment group some persons (in the initial stages of dementia) may manifest an increase in the behaviors and others (at later stages) may manifest a decrease in rates of these behaviors, keeping the average constant. In that case, a larger study with more partic-
Participants would be needed to well identify the changes in all substages of cognitive decline. (b) The relationships between cognitive functioning and VNAB are described over the range of cognitive impairment — a process that can take 15 or 20 years; 2 years may not be sufficient to identify these trends. (c) The relationship between cognitive impairment and VNAB is the weakest relationship observed between syndromes of agitation and cognitive function. In this case also, assessment periods longer than the 2 years covered in this study may clarify the findings.

Regarding the aggressive syndromes, PAGB and VAGB, significant increases were observed over time. Although no statistically significant interaction was found between cognitive functioning and time, visual inspection of Figures 4 and 5 show that the increases in aggressive behaviors were manifested by those who suffer from cognitive impairment. Presumably, as the dementia progressed, levels of aggressive behaviors increased. The lack of relationship between aggression and cognitive impairment at baseline is presumably an artifact of the population under study. Only actual participants in adult day care centers were recruited. Persons suffering from dementia who manifest significant levels of aggression are probably not selected to participate in adult day care, or if already participating, usually leave this setting.

Although relationships between agitation and cognitive functioning have already been shown, previous studies were limited to cross-sectional findings and to patients suffering from Alzheimer’s disease (15–18). To our knowledge our study is the first to demonstrate the longitudinal relationship between different types of agitation and cognitive functioning in a mixed population of community-dwelling elderly persons.

Associations among the different syndromes across time revealed that changes in both types of verbal behaviors, and both types of aggressive behaviors, tend to co-occur, in agreement with previous cross-sectional findings concerning these subtypes (2,3). However, changes also correlated between both types of nonaggressive behaviors.

The factors predicting changes over time were found to be similar to the correlates of agitation found in previous cross-sectional studies with nursing home residents (7). Participants who increased their levels of both syndromes of aggressive behaviors tended to have a diagnosis of dementia, to manifest decline in cognitive functioning during the study period, and to be perceived by day care staff members as more depressed than participants who did not increase those behaviors. These findings corroborate results of other researchers who examined the correlates of agitation cross-sectionally. Shah (19) also found a relationship between diagnosis of dementia and violence in psychogeriatric patients. Nasman et al. (20), in a study of 1350 patients in long-term care institutions and homes for the aged in Sweden, found that aggressive behaviors (such as resisting to be dressed, aggressive threats, hitting, and spitting drugs) were significantly related to dementia. Similar to our findings, these authors did not find a significant relationship between verbally disruptive behaviors and dementia.

The finding concerning predictors of increase in aggressive behaviors are also in accord with those found in the nursing home (7), with the exception that we did not find a relationship between depression and physical aggression in that population. This may be because the population in the nursing home had declined to such an extent that makes the determination of depression extremely difficult. Alternatively, because residents in nursing homes are generally at a more declined stage, they may have lost the awareness of their condition; this awareness is a major cause of depression in the initial stages of the disease. Finally, it is possible that the detection of depression as a predictor is possible because of the longitudinal nature of this study, so that depression was evident in the beginning of the study period when the participants were generally not aggressive. As the disease developed, they may or may not have remained depressed, and some depressive aspects may be manifested in their aggressive behaviors. Understanding the internal state of the person who suffers from dementia remains a very difficult issue.

The mechanisms responsible for the increase in verbally aggressive and physically aggressive behaviors as correlated with decline in cognitive function and increased depression in baseline is unknown. We hypothesize that agitation is the outcome of the interaction of discomfort, which is manifested in the depressed affect combined with the effects of dementia (i.e., reduced ability to find proper outlets for depression and discomfort or to express clearly the need for treatment, as well as increased disinhibition). Additional research is needed to clarify the processes involved and to elucidate the role of other factors that have not been examined in this research and which might account for the change in agitated behaviors.

Participants who experienced an increase in PNAB over time tended to be more cognitively impaired at baseline and healthier, as indicated by a smaller number of medications used, than participants who did not increase in PNAB over time. These findings support previous findings in the nursing home (7).

The similarity found between predictors of agitation in the nursing home and in the community calls for further analyses to fully understand the patterns and predictors of changes in agitated behaviors over time and within different settings. The complexity of the changes in agitation, and the large number of possible predictors of changes in agitation, require a larger longitudinal sample size than is currently available. The role of longitudinal changes in cognitive functioning on agitation, and the interaction between agitation, cognition, and nursing home placement over time, must be elucidated. Although our study explores changes of agitation and its predictors over time, we assessed our participants for a period of 2 years only. Given the length of the dementia course in elderly people, additional longitudinal analyses of the syndromes of agitation are crucial.

An additional limitation of the study relates to its generalizability. A greater proportion of participants in this study were Caucasian as compared to a national survey of adult day care centers. Although age and gender are similar to those of the national survey and data on education are not available, it is likely that this population is more educated and of better social economic status than a national cross-section of adult day care centers. Another limitation concerns the fact that only 104 participants completed both years of the study. However, the 96
who did not participate were very similar in demographic, cognitive, and functional status. Furthermore, 10 of them did not complete the assessment because the study ended for financial constraints; 47 either moved or had consent rescinded. The meaningful dropout is that of the 38 persons who died within 2 years. Therefore the generalization from the study is limited to those who survive for at least 2 years. These limitations notwithstanding, our study allows us to draw several conclusions regarding the implications of its findings for the care of elderly persons. Despite the relatively short period of time covered by our study, we were able to present several factors that predict increases in levels of agitation.

Findings concerning behavioral changes in elderly participants of adult day care centers have therapeutic and management implications. Educational programs should be developed to train professional staff members caring for elderly persons to identify those signs that may predict deterioration. Similarly, family caregivers can be educated to anticipate and accommodate agitation in persons whose cognitive functioning is declining. Facilities can adjust their predictions of service needs based on the anticipated changes in the population. Preventive measures should be created especially concerning methods for the early detection and treatment of depression.

A better understanding of the relationship between depression and dementia is important for the development of adequate treatments and interventions. As we have shown in a previous study (21), formal and informal caregivers perceive and interpret depression in elderly persons differently. Future studies should examine these perceptions further and try to elucidate their relationship to agitation. After the relationships between these factors are disentangled, we will be in a better position to develop improved methods to prepare both formal and informal caregivers for agitated behaviors, and for generating improved intervention methods which truly address the causes of agitation in elderly persons. This study provides the first step toward this understanding.

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