

Mental Health Correlates of Aggression in Nursing Home Residents With Dementia

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Purpose: Aggression continues to challenge caregivers of persons with dementia, and identification of foci for effective interventions is needed. The purpose of this study was to examine the influence of (a) the resident characteristics of depression, communication, and cognition and (b) behavior management strategies on aggression in a group of older nursing home residents ($N = 405$) with evidence of dementia. **Design and Methods:** This cross-sectional correlational study examined the association of resident characteristics and behavior management strategies with bivariate aggression, physical aggression, and verbal aggression, using hierarchical regression. **Results:** Main findings are that impaired communication is associated with all forms of aggression, depression with physical aggression, and disorientation with verbal aggression. A 3-month prior pattern of antipsychotic drug use was consistently associated with all forms of aggression and physical restraint use with physical aggression. Most of the explained variance was attributable to antipsychotic drug use. **Implications:** The separate explanatory models for physical and verbal aggression indicate that these may be unique entities with different foci for treatment. These results provide evidence that aggression persists despite antipsychotic drug use and that further mental health interventions might be targeted at compensating for impaired communication and the treatment of depression to improve the mental health of nursing home residents with dementia.

Key Words: Long-term care, Physical restraint use, Psychoactive drug use, Communication, Cognition, Depression

An estimated four million older Americans are currently diagnosed with dementia, and as many as 86% of those may demonstrate aggression at some point in the disease progression (National Institute on Aging, 1999; Zimmer, Watson, & Treat, 1984). Such behaviors lead to caregiver frustration, burnout, and injury (Bourgeois, Schulz, & Burgio, 1996), increased potential for elder mistreatment (Coyne, Reichman, & Berbig, 1993), physical restraint use (Castle & Mor, 1998; Sullivan-Marx, Strumpf, Evans, Baumgarten, & Maislin, 1999), and institutionalization (O'Donnell et al., 1992). Aggression greatly contributes to the high cost of caring for those with Alzheimer's disease and other dementias, which can be as much as \$52,000 per year whether in the community or an institution.

Aggression is seen most often in response to personal space invasion during care activities like bathing (Hoeffler, Rader, McKenzie, Lavelle, & Stewart, 1997) and is frequently responded to by caregivers with physical restraint and psychoactive drug use (Bridges-Parlet, Knopman, & Thompson, 1994; Castle & Mor, 1998; Ryden et al., 1999). Previous studies of behavioral symptoms have often focused on global behavioral measures, yet there is a need to better understand specific behaviors in order to precisely target mental health interventions for older adults with dementia. Given that a cure for Alzheimer's disease and related dementias remains a dream at this time, we sought to identify individual characteristics and behavioral management strategies that can be targeted to improve the mental health care of persons with dementia who exhibit aggressive behaviors. This study was guided by a conceptual understanding that aggression may represent an expression of unmet needs and that identifying these unmet needs may improve the precision and efficacy of interventions (Algase et al., 1996; Talerico & Evans, 2000).

The purpose of this study was to determine if associations exist among aggression and the resident characteristics of depression, impaired communication, naming ability, attention, and orientation and the behavior management strategies of physical restraint use and antidepressant, antipsychotic, and benzodiazepine drug use in institutionalized older adults with

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dementia, using a secondary analysis of an original data set that investigated restraint reduction.

Methods

A database from a clinical trial (the parent study) containing the relevant variables of interest was used for this secondary analysis. The parent study, *Reducing Restraints in Nursing Homes: A Clinical Trial* (Grant NIH NIA AG 08324), examined the effects of three interventions in reducing the prevalence of physical restraint use in institutionalized older adults and has been reported in detail elsewhere (Evans et al., 1997; Siegler et al., 1997). Both the parent study and the current study underwent procedures for the protection of human participants and yearly review at the University of Pennsylvania Institutional Review Board. The design of this cross-sectional correlational study used hierarchical regression to examine the association of resident characteristics and behavior management strategies with bivariate aggression, physical aggression, and verbal aggression. Continuous variables were used in the regression analysis with the exception of antipsychotic and benzodiazepine drug use, which were dummy coded as factors to accurately reflect the nature of the data.

Sample and Setting

Participants were recruited for the parent study from three metropolitan nonprofit, religiously affiliated nursing homes having between 180 and 269 residents. This secondary analysis was limited to examination of data collected before any intervention and, therefore, represents baseline preintervention data.

Dementia presence, the primary inclusion criteria for the initial sample of nursing home residents ($N = 428$), was determined by a score of less than or equal to 23 (out of a possible 30) on the Mini-Mental State Exam (MMSE) for those participants with more than 8 years education (Folstein, 1983). To minimize any false-positive identification of dementia due to low educational attainment, a serious issue for this sample, an adjustment in cut-off score (MMSE score ≤ 21) was made for the 171 (42%) participants with less than or equal to 8 years of formal education and for the 54 (13%) who had missing educational data (Anthony, Leresche, Niaz, Von Korff, & Folstein, 1982). Twenty-three participants were excluded from the final analysis because of psychiatric diagnoses that could differentially affect behavior; these diagnoses included schizophrenia, bipolar mood disorder, mental retardation, alcoholism, and temporal lobe epilepsy. The participants ($N = 405$) meeting all inclusion and exclusion criteria were predominantly female (83%), 80 years old or older ($M = 84.8$, $SD = 7.19$), Caucasian (90%), and widowed (66%), with low educational attainment ($M = 9.12$ years, $SD = 7.94$); this is comparable to the U.S. nursing home population (Cowles, 1996). There was 1 Hispanic and 38 (9%) Black participants. The mean number of medical problems was 7.10 ($SD = 2.73$), ranging from 1 to

17 medical problems. There were no associations between demographic variables and aggression.

Measurement of Variables

The Psychogeriatric Dependency Rating Scale (PGDRS; Wilkinson & Graham-White, 1980), Cornell Scale for Depression in Dementia (CSDD; Alexopoulos, Abrams, Young, & Shamoian, 1988), MMSE (Folstein, 1983), and medication administration records served as the main data sources for the current study. Drug data were based on drugs that were actually administered to residents and included both scheduled and as-needed medications that were documented as having been dispensed by facility staff. The specific pharmacologic agent administered was stable for the study period for all but 2 of the participants. Interrater reliabilities for the data collection instruments were high in the parent study (0.95–0.99). Table 1 presents psychometric characteristics and descriptive data for the dependent variables and resident characteristics examined in this study. Although continuous data were used in the regression analyses, descriptive data are also presented categorically regarding presence and severity to provide a clearer picture of the sample for the reader.

Dependent Variable

Bivariate aggression was measured using the active physical aggression (Item 8) and verbal aggression (Item 10) items from the Behavior Subscale of the PGDRS. Active physical aggression captured caregiver reports of the frequency and intensity of striking, biting, scratching, strangling, or throwing at others or aggressive resistance when others attempted to help. Verbal aggression represented the frequency and intensity of abusive, threatening, or fear-inducing statements. A small number of participants ($n = 10$) had severe and frequent physical and verbal aggression. The bivariate aggression score was not significantly associated with either nursing home site ($r = -.021$, $p = .67$) or MMSE score ($r = -.094$, $p = .06$).

Independent Variables

Resident Characteristics.—The CSDD was used to measure depression, with scores higher than 5 indicating the probable presence of minor or major depression (Alexopoulos et al., 1988). This was the only scale used for this study that had limited variability; the sample range was 0–22, and the potential scale range was 0–38. The 29% incidence (Table 1) is consistent with reported rates of depression (14–48%) in institutionalized older adults (Parmelee et al., 1992; Rovner et al., 1991; Shah, Phongsathorn, George, Bielawska, & Katona, 1992).

Previous studies have provided conflicting results as to whether behavioral symptoms in persons with dementia are linearly associated with cognitive impairment (Aarsland, Cummings, Yenner, & Miller, 1996; Bridges-Parlet et al., 1994; Spector & Jackson, 1994; Swearer, Drachman, O'Donnell, & Mitchell,

Table 1. Descriptive Statistics for Dependent Variables and Resident Characteristics (N = 405)

Variables	% Present	% Severe	M (SD)	Scale Range	α
Dependent					
Bivariate aggression ^a	25	8	0.56 (1.1)	0–4	.69
Physical aggression	19	5	0.24 (0.54)	0–2	
Verbal aggression	17	5	0.22 (0.52)	0–2	
Independent—Resident characteristics					
Depression ^b	29	4	4.27 (3.9)	0–38	.73
Impaired communication ^c	20	8	0.52 (1.2)	0–4	.84
Impaired naming ability ^d	45	41	0.86 (0.97)	0–2	.95
Impaired attention ^e	94	86	4.22 (1.5)	0–5	.89
Disorientation ^f	70	47	4.40 (3.8)	0–10	.94

^aBivariate aggression (two-item dependent variable—physical aggression and verbal aggression), from Psychogeriatric Dependency Rating Scale (PGDRS), items rated 0 = never, 1 = occasional, 2 = severe and frequent. Percentage severe represents any behavior rated as severe and frequent.

^bCornell Scale for Depression in Dementia, range 0–22; scores 0–5 indicate no depression, 6–12 minor depression, 13–16 probable major depression, and >17 major depressive disorder. Percentage severe represents scores >12.

^cCommunication items (two) from PGDRS, range 0–4; higher scores are evidence of impaired communication. Items rated 0 = never, 1 = occasional, 2 = severe and frequent. Percentage severe represents scores equal to 4.

^dNaming tasks (Item 10) of Mini-Mental State Exam (MMSE), reverse coded from usual MMSE scoring, range 0–2; higher scores are evidence of impaired naming. Percentage severe represents scores equal to 2.

^eReverse serial sevens task (Item 4) of MMSE exam, reverse coded from usual MMSE scoring, range 0–5; higher scores are evidence of impaired attention. Percentage severe represents more than two questions incorrect.

^fOrientation subscale of PGDRS, range 0–10; 0 represents not disoriented, with higher scores evidence of greater disorientation. Percentage severe represents more than five questions incorrect.

1988). Use of measures that make a conceptual distinction between pragmatic communication and cognitive processes, such as disorientation, may add to an improved understanding of the relative importance of cognitive impairment versus impaired communication in aggression. Impaired communication was derived from two items regarding the frequency and severity of communication problems in the PGDRS Behavior Subscale: communication difficulties and altered speech content, with higher scores indicating more severe impairment. Several qualitative studies have noted an association between impaired language abilities and aggression, and so a positive relationship was postulated a priori (Ekman, Norberg, Viitanen, & Winblad, 1991; Lindgren, Hallberg, & Norberg, 1992).

Separate portions of the MMSE were used to examine two potentially important components of cognitive impairment: impaired naming ability and impaired attention (Table 1); these scores were reverse coded for the analysis so that higher scores were evidence of impaired function (Folstein, 1983). The 10-item Orientation Subscale of the PGDRS was used to measure orientation, with higher scores indicating greater disorientation (Wilkinson & Graham-White, 1980). The PGDRS Orientation Subscale specifically measures orientation to the nursing home environment and caregivers and is not highly dependent on intact language skills. The PGDRS Orientation Subscale may be less prone to floor effects than other cognitive measures like the MMSE, which may be important in a sample where more than 50% ($n = 210$) had a MMSE score less than or equal to 10 (Jacobs et al., 1999).

Behavior Management Strategies.—Behavior management strategies are often used with the intention of reducing the severity and frequency of aggression,

and thus warrant examination. Table 2 presents descriptive statistics for the independent variables used to measure behavior management strategies of physical restraint and psychoactive drug use. The Physical Restraint Intensity score documented the number of times each participant was observed physically restrained during 18 systematic observation rounds, so that a score of 0 meant the person was never observed restrained and a score of eighteen meant they were observed restrained at each round. This method of restraint measurement, designed for the parent study, does not suffer from the staff-report biases often present in studies with institutionalized participants (Evans et al., 1997; Sullivan-Marx et al., 1999). A pos-

Table 2. Descriptive Statistics for Independent Variables of Behavior Management Strategies (N = 405)

Behavior Management Strategies	% Present	% Low Dose	% High Dose	M (SD)
Physical restraint use ^a	49	34	15	3.5 (4.9)
Antidepressant ^b	18	18	1	0.1 (0.25)
Antipsychotic ^c	16	13	3	
Benzodiazepine ^d	26	5	21	

^aPhysical restraint use—Total observations restrained per 18 rounds, range 0–18; higher scores represent greater intensity of restraint. Low use = restrained on 1–9 rounds, high use = restrained on >9 rounds.

^bAntidepressant = Ratio of actual daily dose of antidepressant (ADDD)/World Health Organization–defined daily dose; scores greater than 1 indicate doses higher than usual dose for a healthy adult (70 kg). Low dose = doses >0 ≤ 1 ADDD; High dose = >1 ADDD.

^cHigh dose antipsychotic >2 mg haloperidol equivalents per day; low dose >0 mg <2 mg haloperidol equivalents.

^dHigh dose benzodiazepine >5 mg diazepam equivalents per day; low dose benzodiazepine >0 mg <5 mg diazepam equivalents.

itive association was hypothesized between physical restraint use and aggression on the basis of the evidence found in other studies (Cohen-Mansfield, Marx, & Werner, 1992; Horowitz, 1997; Kolanowski, Garr, Evans, & Strumpf, 1998; Werner, Cohen-Mansfield, Braun, & Marx, 1989).

Average daily doses of each type of psychoactive drug administered were computed for the 90 days before the data collection for other variables; hence, the drug data represent mean doses administered for the 3 months before the measurement of all other variables, and thus are not truly cross-sectional data. The mean administered daily dose of antidepressant was used to calculate a ratio of antidepressant drug use by dividing the average daily dose administered by the World Health Organization (WHO)-recommended defined daily dose to allow for evaluation of antidepressant drugs across therapeutic classes (WHO, 1998). For example, if a participant had an average administered daily dose of desimpramine of 50 mg, this would be divided by the WHO defined daily dose for desimpramine (100 mg) for a ratio of 0.5, which would then be used for analysis (WHO, 1998). A ratio of less than 1 indicates that the drug was administered in a lower dosage than that recommended for adults. A defined daily dose less than 1 is thought to reflect appropriate dosing for older adults given the greater risk of toxicity at usual adult dosages (Giron et al., 2001). The defined daily dose has been developed to promote uniformity and comparability in drug utilization studies and is one of the few methods available to compare antidepressant drug use, although adjustments for older adults are not available. Antipsychotic and benzodiazepine drug use were examined using equivalency data, which had the advantage over the defined daily dose of accounting for psychopharmacodynamic alterations in older adults and promotes comparison

with other studies in long-term care (Avorn, Dreyer, Connelly, & Soumerai, 1989; Siegler et al., 1997). Average daily dose of antipsychotic drug was converted to an equipotent dose of haloperidol; high doses were defined as greater than 2 mg/day haloperidol equivalents and low doses were defined as greater than 0 mg/day but less than 2 mg/day, consistent with current regulatory guidelines (American Medical Association, 1991; Siegler et al., 1997). Average daily doses of benzodiazepines were converted to an equipotent dose of diazepam; high doses were defined as greater than 5 mg/day diazepam equivalents and low doses were defined as greater than 0 mg/day but less than 5 mg/day (American Medical Association, 1991; Siegler et al., 1997). Dummy coding was used to adequately represent the antipsychotic and benzodiazepine drug data in the regression models. Thus, two dichotomous high-dose and low-dose factors were created using no drug use as the reference measure (Cohen & Cohen, 1983). Participants receiving neither of these drugs scored zero on both the antipsychotic and the benzodiazepine drug factors.

Data Analysis

Data were analyzed on a personal computer using the SAS and SPSS statistical programs (SAS Institute, 1993; SPSS, 1997). The correlation matrix for study variables is presented in Table 3. Collinearity ($r \geq .60$) was identified between naming ability and orientation, neither of which were significantly correlated with the bivariate aggression score (Cohen & Cohen, 1983). A decision was made to retain orientation but not naming ability in regression models given previous reports of correlations between measures of cognition and behavior. Owing to violation of the assumption of normality (Cohen & Cohen, 1983; Verran & Ferketich,

Table 3. Zero-Order Correlations Among Independent and Dependent Variables ($N = 405$)

Variables	Resident Characteristics					Behavior Management Strategies					
	1	2	3	4	5	6	7	8	9	10	11
Dependent											
BA	.17**	.12*	.04	.07	.05	.14*	.02	.20**	.24**	.03	.10
PA	.22**	.12*	.13*	.14**	.14**	.18**	.03	.21**	.21**	.07	.07
VA	.08	.09	-.07	-.02	-.06	.06	.01	.16**	.22**	-.04	.07
Independent											
1. Depression	—										
2. Impaired communication	-.10*	—									
3. Impaired naming ability	-.06	.31**	—								
4. Impaired attention	-.01	-.14**	.43**	—							
5. Disorientation	.06	.27**	.66**	.28**	—						
6. Physical restraint use	.13*	.16**	.33**	.17**	.49**	—					
7. Antidepressant	.16**	.01	-.08	-.05	-.07	.06	—				
8. Low dose antipsychotic	.22**	.11*	.10*	.05	.15*	.12*	.15**	—			
9. High dose antipsychotic	.09	.03	.01	.08	-.02	.08	.10	—			
10. Low dose benzodiazepine	.10	-.06	-.01	.01	-.01	-.01	.06	.02	.01	—	
11. High dose benzodiazepine	.09	.10*	-.02	-.02	-.01	.11*	.21**	.05	.15**	—	

Notes: BA = bivariate aggression, PA = physical aggression, VA = verbal aggression. Significant results are in bold.
* $p < .01$; ** $p < .001$.

1987), data analyses were run using log transformation of the dependent variables; results are presented without log transformation for ease of interpretation, as results were essentially identical to analyses using log transformations. A decision was made to use hierarchical regression entering resident characteristics on the first step followed by behavior management strategies on the second step on the basis of the theoretical underpinnings of the study and the fact that resident characteristics generally precede behavior management strategies (Cohen & Cohen, 1983; Tabachnick & Fidell, 1996). We had hypothesized positive relationships between aggression and depression, aggression and impaired communication, and aggression and physical restraint use, so one-tailed tests of significance were used to evaluate these variables. Actual power of the model for bivariate aggression was .94 ($N = 405$, $\alpha = .05$, $R^2 = .16$), demonstrating adequate ability to avoid Type II error (Cohen & Cohen, 1983).

Post hoc hierarchical regression equations were constructed for each of the aggression items that formed the bivariate aggression score to examine whether the bivariate model was more representative of either physical or verbal aggression. This appeared warranted on the basis of distribution of scores for the individual aggression items. Procedures used for examining bivariate aggression were repeated for each post hoc regression model. Actual power of the post hoc models was .96 ($N = 405$, $\alpha = .05$, $R^2 = .17$) for physical aggression and .72 ($N = 405$, $\alpha = .05$, $R^2 = .11$) for verbal aggression.

Results

Table 3 presents zero-order correlations for study variables with significant associations highlighted. We would like to discuss a few of the correlations that are most relevant for this study. Depression was negatively correlated with impaired communication. This result is understandable as most measures of depression, even the CSDD, rely to some degree on the ability to communicate emotional distress. The most frequent drug treatment in those with depression was no treatment, followed by high-dose benzodiazepine. The remaining participants with significant depression had an equal chance of being administered an antipsychotic drug alone or a combination of two or more drugs, which only rarely included antidepressant drugs ($n = 2$). This represents a nonspecific response to the presence of depression, which may explain the modest correlations noted between depression and physical restraint, antidepressant drug use, and low-dose antipsychotic drug use.

Impaired communication was correlated with impaired naming ability, impaired attention, and disorientation. Adequate communication skills are necessary to successfully answer the questions that comprised impaired naming ability and impaired attention and some of the questions for disorientation, so that overlap in skills may be present. Declines in communication skills have been documented with disease progression in dementia (Lee, 1991), which is supported

by data from this study ($r = -.33$, $p < .001$, for MMSE and impaired communication). Thus, the correlations noted between impaired communication and impaired naming ability, impaired attention, and disorientation are understandable in the context of progressive losses associated with disease progression. A moderate correlation noted was among physical restraint use and disorientation. This is consistent with reports in the literature that confusion and disorientation are primary predictors of physical restraint use (Capezuti, Evans, Strumpf, & Maislin, 1996; Castle & Mor, 1998; Sullivan-Marx et al., 1999).

Table 4 presents the results in regression coefficients and standardized beta weights of the independent variables for the regression models for bivariate aggression (second column), physical aggression (third column), and verbal aggression (fourth column). Higher levels of bivariate aggression were associated with depression, impaired communication, physical restraint use, and low- and high-dose antipsychotic drug use. Collectively, the resident characteristics accounted for a minimal proportion of explained variance in bivariate aggressions, which was improved to a modest level ($R^2 = .16$) with the addition of the behavior management strategy of antipsychotic drug use. The beta coefficients for the model suggest that a 3-month prior dose of antipsychotic drugs was the most important associate of bivariate aggression. In particular, high-dose antipsychotic drug use was by far the strongest independent variable in contributing to the explained variance in bivariate aggression. An interesting finding is that although impaired communication accounted for only 1.4% of the variance in bivariate aggression, this finding signifies that a 1-point increase in impaired communication (16.67 SDs) was associated with a 1-point increase in bivariate aggression.

Higher levels of physical aggression were associated with depression, impaired communication, physical restraint use, and low- and high-dose antipsychotic drug use. This mirrors the bivariate model, although the variance accounted for by depression increased from 1.4% in the bivariate model to 2.6% of the variance in physical aggression. There was a slight increase in the overall amount of explained variance for the physical aggression regression model over that of the bivariate model.

Higher levels of verbal aggression were associated with impaired communication, lower disorientation, and low- and high-dose antipsychotic drug use. This model is somewhat different from either the bivariate aggression or the physical aggression model. Again, a 3-month prior dose of antipsychotic drugs was the strongest associate of verbal aggression. What is different about this model as compared with the other two is that lower disorientation was a unique resident characteristic that predicted the variance in verbal aggression.

In summary, impaired communication was the only resident characteristic that was consistently associated with aggression in all three regression models. Antipsychotic drug use contributed the largest amount of variance to aggression across all three models. The results

Table 4. Final Hierarchical Regression Models of Variables Significant in Predicting Aggression (N = 405)

Correlates	Dependent Variables					
	Bivariate Aggression		Physical Aggression		Verbal Aggression	
	B	β	B	β	B	β
Step 1: Resident characteristics						
Depression	.03*	.12*	.02**	.16**	.01	.05
Impaired communication	.09*	.12*	.04*	.10*	.05*	.12*
Attention	-.02	-.03	-.03	-.08	.01	.03
Disorientation	-.02	-.08	.00	.01	-.02*	-.15*
Step 2: Behavior management						
Physical restraint use	.02*	.10*	.01*	.09*	.01	.08
Antidepressant	-.21	-.06	-.10	-.05	-.11	-.05
Low dose antipsychotic drug use	.52**	.19**	.27**	.17**	.26**	.17**
High dose antipsychotic drug use	1.4**	.26**	.70**	.23**	.68**	.23**
Low dose benzodiazepine drug use	.10	.02	.17	.07	-.08	-.03
High dose benzodiazepine drug use	.01	.01	.01	.01	-.001	-.001
R ²						
Step 1	.05		.09		.03	
Step 2	.16		.17		.11	
F (df)	7.20 (10, 394)**		7.95 (10, 394)**		4.71 (10, 394)**	

Notes: All beta weights are reported at final step. Significant results are in bold.
* $p < .05$; ** $p < .001$.

identifying somewhat different sets of predictors lend credence to the hypothesis that verbal and physical aggression may represent different phenomena and should be examined separately to increase our understanding of aggression.

Discussion

This study provides an unique analysis of aggression in nursing home residents with dementia by examining individual resident characteristics and behavior management variables that may be targeted for improved individualized mental health care. The limited amount of explained variance may reflect the complexity of aggression. Studies have found beta coefficients for variables associated with aggression in the range of .09–.35, which is consistent with this study (Beck et al., 1998; Cohen-Mansfield et al., 1992; Horowitz, 1997; Ryden et al., 1999). This study did not comprehensively examine other potentially explanatory factors for aggression, such as pain or caregiver approaches (Hoeffler et al., 1997) that may increase the explanatory ability of the models. The similarity of the sample to the nursing home population as a whole supports generalizability of these findings (Cowles, 1996). However, because there was only one Hispanic resident in this study, the results should not be generalized to that subsample of nursing home residents.

The greatest variance in aggression was consistently accounted for by antipsychotic drug use in each of the regression models. Although it is likely that aggression preceded and may have precipitated antipsychotic drug use, other studies have shown that it is possible to safely reduce antipsychotic drug use without increasing aggression as part of individualized care regimens (Bridges-Parlet, Knopman, & Steffes,

1997; Cohen-Mansfield et al., 1999; Sloane et al., 1991). The nature of the drug data (90 days pre-aggression) does provide further convincing evidence that antipsychotic drug use alone is not sufficient to effectively decrease aggression (Bridges-Parlet et al., 1994; Cummings & Knopman, 1999; Ryden et al., 1999). The modest effect of antipsychotic drug use on aggression may be due to limited range and variability of the dependent variable or to real lack of efficacy. Most reviews of antipsychotic drug use in people with dementia suggest that there are, at best, modest benefits (effect sizes = .18–.22) to their use in very circumscribed circumstances (Harrington, Tompkins, Curtis, & Grant, 1992; Schneider, Pollock, & Lyness, 1990). Some researchers have found associations of psychoses with aggression, although most have studied these two phenomena concurrently without conceptual distinction (Kunik, Yudofsky, Silver, & Hales, 1995). As measures of psychoses were not available in the data set, the role of psychosis in aggression remains untested for this sample. Given that antipsychotic drugs are known to be effective for the treatment of psychosis, a reasonable speculation is that aggression due to psychosis may explain any reduction in aggression for those participants who appear to respond to antipsychotic drugs. On the other hand, reduced aggression due to antipsychotic drug administration may initially result from behavioral suppression through sedation, which would not be expected to persist after a 3-month stable dose of a particular drug, such as was measured in this study.

Antipsychotic drugs remain a front-line treatment for aggression in older adults with dementia; these drugs were specifically targeted as problematic practices in nursing home reform due to their overuse in the past (Medicare and Medicaid, 1989). The potential

dangers of these drugs include falls, hip fractures (Thapa, Gideon, & Ray, 1995), tardive dyskinesia and other extrapyramidal symptoms (Woerner, Alvir, Kane, Sultz, & Lieberman, 1995), anticholinergic delirium (Steele, Lucas, & Tune, 1986), sedation, and cognitive decline (McShane et al., 1997). The positive association of antipsychotic drug use with greater values of aggression may represent caregivers' attempts at behavioral suppression with antipsychotic drugs rather than fulfillment of unmet needs or treatment of psychosis. Psychoactive drugs are powerful tools in the existing arsenal of treatments, yet much remains to be learned about how to use these tools in a beneficial manner and to not, unintentionally, add to the burden of those older adults suffering from dementia. The results of this study support the view that individualized mental health interventions that move beyond drug administration are needed for the humane treatment of aggression. Future studies that differentiate psychosis from aggression without psychosis are sorely needed. These studies would be strengthened by longitudinal measures sensitive to overall behavioral suppression, such as activities of daily living.

Many studies of behavior in persons with dementia have examined relationships with global cognitive impairment, accounting for limited variance (Spector & Jackson, 1994; Swearer et al., 1988; Teri, Hughes, & Larson, 1990). Alternatively, this study supports the results of those studies examining well-defined aggression that have failed to support a linear relationship to overall cognitive decline (Aarsland et al., 1996; Bridges-Parlet et al., 1994). In fact, disorientation was negatively correlated with verbal aggression. A reasonable explanation may be that those with greater cognitive skills may have used verbal aggression, rather than physical aggression, as a way to express needs. The findings of this study suggest that caregivers and researchers may need to look beyond level of cognitive impairment to understand and intervene in aggression. It may be that the measures of cognition used for this study were less than adequate. On the other hand, cognition may serve as a proxy measure for impaired communication in studies using language-dependent cognition measures. Further studies of the role of cognition, using standardized measures of cognitive processes, separate from communication, are needed to augment the findings presented in this secondary analysis.

The findings of this study demonstrated consistent predictive ability of impaired communication for each model of aggression, with a 1-point increase in impaired communication associated with a 1-point increase in bivariate aggression. Eastley and Wilcock (1997) found a significantly higher presence of receptive dysphasia in those participants with verbal and physical aggression in a British dementia clinic. A potential explanation for the role of communication in aggression is that impaired communication increases the likelihood that an older adult will have unmet needs, which may be expressed nonverbally through aggression (Algase et al., 1996; Rader & Tornquist, 1995; Talerico, 1999/2000). The limited verbal ability

of those with dementia lends support to the need to identify and anticipate unmet needs through careful attention to older adults' behaviors, as these may become their primary communication mode. Although the magnitude of these findings is not large, they lend empirical support to psychosocial caregiver interventions focused on altering communication style to decrease aggression (Allen-Burge, Stevens, & Burgio, 1999; Hoeffler et al., 1997). Future studies should continue to explore the role of impaired communication in aggression.

The current study provides clear support for the correlation between physical aggression and depression, and we conjecture that aggression may be a symptom of inadequately treated depression in this population. Detection of depression is difficult in advanced dementia when self-report is unreliable; this study had the advantage of caregiver reports of specific behaviors reliably associated with depression (Alexopoulos et al., 1988). This research supports the need for in-depth depression research to increase the understanding of its role in the evolution of aggression in persons with dementia. One may speculate whether a shared neurochemical mechanism for both physical aggression and depression is present, ascribable to disruption of the biogenic pathways in the frontal lobe (Starkstein & Robinson, 1991). There has been some conjecture that inability to inhibit aggression in dementia may be attributed to frontal lobe dysfunction, a neuroanatomical area also associated with depression (Cohen-Mansfield & Taylor, 1998; Talerico & Evans, 2001). Given the common neurotransmitter basis for both aggression and depression, basic and applied studies merit development. Future studies may benefit from an exploration of the role of frontal lobe pathology in aggression in older adults with dementia.

Antidepressant drug use was suboptimal in the study sample, at approximately one tenth the dose for an average adult of 70 kg (Table 2). Few who were depressed received any antidepressant medication, but they often received multiple other psychoactive drugs. This finding of suboptimal depression treatment in older adults is unfortunately not unique (Billig, Cohen-Mansfield, & Lipson, 1991; Office of the Surgeon General, 1999). Evidence has suggested the potential efficacy of antidepressant drugs in reducing aggression in older adults with dementia, which would be consistent with the hypothesis of a common neurochemical mechanism (Aarsland et al., 1996; Ryden et al., 1999). Given that depression had an influence on the expected value of bivariate aggression and physical aggression, appropriate antidepressant treatment may represent an untapped opportunity to improve quality of life for both older adults and their caregivers. However, concomitant with the use of pharmacologic agents, care must be taken to develop mental health interventions that address unmet basic, social, and health needs.

Anecdotal evidence has suggested that physical restraint use may lead to increased aggression due to the fear and trauma these devices often create (Rader & Tornquist, 1995; Sullivan-Marx, 1995; Talerico, 1999/2000). Aggression may represent a basic evolutionary

protective fight response when the choice of flight has been eliminated through immobilization by physical restraint. Although no data exist as to the efficacy of physical restraint use for aggression in this population, the dangers of physical restraint use are well-known and include death and disability (Castle & Mor, 1998; Miles & Irvine, 1992; Pare & Glavin, 1986). Clearly, alternative humane interventions to this type of behavior management are needed to protect nursing home residents from injury and disability associated with physical restraint use while protecting caregivers from the harm and burnout associated with aggression. The parent study for this analysis found that it is possible to reduce the use of physical restraints without increasing psychoactive drug use through the use of a gerontologic nurse specialist. It may be that there is a need to increase the availability and adequate reimbursement for specialist mental health care in nursing homes to provide alternative skillful mental health interventions for aggression.

Reliance on antipsychotic drugs and physical restraint use to manage and suppress aggression is not likely to be effective and represents considerable risk to the older adult. Interventions such as these are based on the imposition of control, which is thought to increase aggression in dementia (Rader & Tornquist, 1995; Talerico, 1999/2000). The principle of beneficence must be foremost when considering interventions that have limited known efficacy but real dangers, such as some psychoactive drug and physical restraint use. Considerable psychological distress has been associated with the use of physical restraints, without demonstrable benefits (Sullivan-Marx, 1995). Although the use of psychoactive drugs may reduce caregiver distress through behavioral suppression, the significant risks to the vulnerable older adult with dementia should be weighted more heavily in risk-benefit analyses. Furthermore, it has been suggested that economic costs associated with the use of drugs should be examined (Whitehouse et al., 1998). Considerable time and money are spent obtaining, administering, and monitoring these drugs, time that may be better spent in accurate assessment of unmet needs to facilitate implementation of more appropriate mental health treatments. Beneficence also requires that caregivers provide treatment for depressive disorders when effective treatments, such as antidepressant drugs and psychosocial interventions, are available to alleviate suffering. Psychosocial treatments focused on altering communication and treating depression, although time intensive, have limited risk and real potential to ameliorate symptoms (Hoeffler et al., 1997).

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