

# Nursing Home Residents with Dementia and Very Frequent Agitation: A Particular Group

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**Objective:** *Although many nursing home residents with dementia show agitation, hardly any literature is published about very frequent agitation. The WAALBED-III study focuses on the 2-week prevalence and correlates of very frequent agitation in these residents. Design:* Cross-sectional study using combined data of four studies. **Setting:** *One hundred nineteen dementia special care units in twenty-six nursing homes in The Netherlands. Participants:* Two thousand seventy-four residents with dementia. **Measurements:** *We operationally defined very frequent agitation as having a score of 6 (several times a day) or 7 (several times an hour) on at least five items of the Cohen Mansfield Agitation Inventory (CMAI) combined with a CMAI total score above the 90th percentile. To assess the association of demographic and behavioral characteristics with very frequent agitation, we performed a multivariate multilevel logistic regression analysis. Results:* The 2-week prevalence of very frequent agitation was 7.4% (95% CI: 6.374–8.634). Correlates for very frequent agitation were age (OR: 0.967, 95% CI: 0.942–0.992), dementia severity (GDS 6 = OR: 3.636, 95% CI: 1.929–6.875; GDS 7 = OR: 2.951, 95% CI: 1.321–6.588), delusions (OR: 2.480, 95% CI: 1.555–3.956), anxiety (OR: 1.904, 95% CI: 1.259–2.881), euphoria (OR: 3.712, 95% CI: 2.171–6.337) and irritability (OR: 4.411, 95% CI: 2.854–6.816). **Conclusions:** *To our knowledge, this study is the first to report prevalence data and correlates about nursing home residents with very frequent agitation. We found several correlated factors for very frequent agitation. Still, further research is needed for a better understanding of the behavior of this group, and to identify good treatment options. (Am J Geriatr Psychiatry 2017; ■■■:■■■–■■■)*

**Key Words:** Agitation, dementia, very frequent, nursing home, residents

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**Article Highlights**

- Very frequent agitation was present in a small group of nursing home residents with dementia.
- Age, dementia severity, delusions, anxiety, euphoria and irritability were found to be associated to very frequent agitation.
- To our knowledge, this study is the first to report prevalence data and correlates about nursing home residents with very frequent agitation.

Agitation is an important reason for nursing home admission among residents with dementia.<sup>1</sup> It is one of the most prevalent neuropsychiatric symptoms,<sup>2,3</sup> with an estimated prevalence in nursing homes of 79% (range: 70% – 86%) according to the most recent review article.<sup>2</sup>

Agitation is often persistent during the nursing home stay.<sup>3</sup> It occurs in several types of dementia,<sup>4,5</sup> and habitually coexists with other neuropsychiatric symptoms.<sup>6,7</sup> Furthermore, agitation manifests particularly in middle and later stages of dementia.<sup>8</sup> Reported consequences of agitation are burden in family caregivers<sup>9</sup> and in professional caregivers,<sup>10</sup> more rapid cognitive and functional decline,<sup>11,12</sup> and impaired quality of life.<sup>13</sup> Causes of agitation may be internal (e.g., unmet needs, anatomical/physiological changes)<sup>14-16</sup> and/or external (e.g., sound level on a unit).<sup>17</sup> The multifactorial origin makes treatment of agitation complex, requiring a biopsychosocial treatment approach.

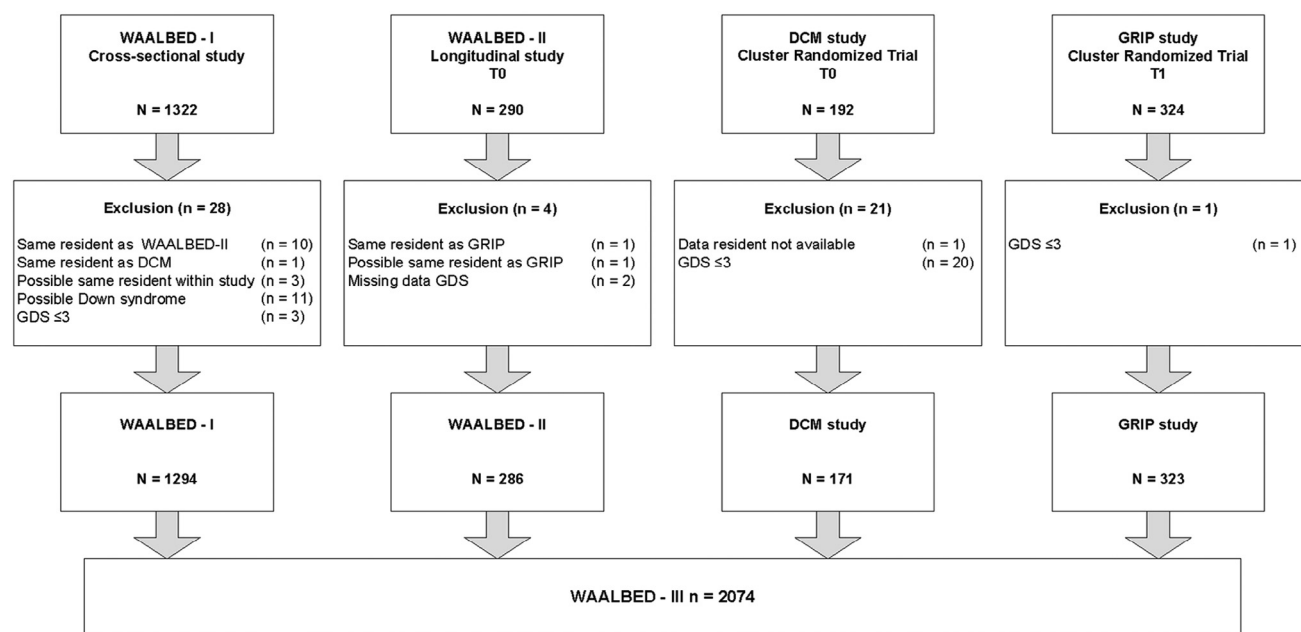
According to the most recent definition, agitation is excessive motor activity, verbal aggression, and/or physical aggression, which are consistent with emotional distress and produce excess disability on various domains.<sup>18</sup> This definition of agitation is based on expert consensus, rather than on research. Moreover, this definition does not incorporate differences in severity of agitation. We know from clinical practice that there is a small group of nursing home (NH) residents with very frequent agitation.<sup>19</sup> For example, practice reports illustrate that very frequent agitation in a NH resident frequently leads to a disruption of life on the care unit.<sup>19</sup> Despite this impact, there are no studies that report on the prevalence of very frequent agitation. Therefore, exploration of the characteristics and behavior of a group of NH residents with very frequent agitation could provide relevant clues for improving nursing home care and perhaps the quality of life of these residents. For this reason, our WAALBED (WAAL Behavior in Dementia)-III study aims to study 1) the

2-week prevalence of very frequent agitation within the population of NH residents; and 2) the factors that distinguish NH residents with very frequent agitation from those with less frequent agitation.

**METHODS****Study Design and Subjects**

We used the data of four existing studies in NH residents with dementia: the WAALBED-I study (cross-sectional study, N = 1,319),<sup>20</sup> the WAALBED-II study (longitudinal; N = 290),<sup>21</sup> the Dementia Care Mapping (DCM) study (randomized controlled trial, longitudinal; N = 434),<sup>22</sup> and GRIP on challenging behavior study (randomized controlled trial, stepped wedge design; N = 659).<sup>23</sup> The data were combined into one data set. The studies recruited residents in the following periods: WAALBED-I study: 2003, WAALBED-II study: between 2006 and 2008, DCM: between 2010 and 2012, and GRIP: between 2011 and 2012. In all four studies, residents were considered for inclusion provided they: a) met the criteria for dementia according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*;<sup>24</sup> b) had no life-threatening disease at the time of inclusion; and c) had resided in the nursing home for at least 4 weeks. Residents who participated in more than one of the studies were included only once: data of the most recent study were used. Furthermore, residents who had Down syndrome and those with a score on the Global Deterioration Scale (GDS)<sup>25</sup> of 3 or lower, or a missing GDS score, were excluded. Of all studies, the only or first measurement was used, except for the GRIP study. Here, the second measurement was used, because data on quality of life (which we examine in another part of our study) were not collected at baseline.<sup>23</sup> Further, from the GRIP study only residents who were in the control condition at the second

**FIGURE 1.** Flowchart of the included residents. DCM: Dementia Care Mapping study; GDS: Global Deterioration Scale; WAALBED: WAAL Behavior in Dementia.



measurement were included. As a result of these exclusion criteria, 54 residents were excluded from the original merged data set. In addition, one resident was excluded because the majority of data was missing. This resulted in a dataset of 2,074 residents (Figure 1) from 26 nursing homes situated throughout The Netherlands. These NH residents were living in 119 different dementia special care units.

## Data

### *Operationalization of Very Frequent Agitation*

We used the Cohen Mansfield Agitation Inventory (CMAI) to operationally define very frequent agitation.<sup>26</sup> The CMAI is the most widely used assessment scale for measuring the frequency of agitation and aggression. It consists of 29 items, each rated on a 7-point frequency scale (1 to 7) ranging from “never” to “several times an hour”. CMAI items can be summed into a total score with a possible range from 29 to 203.<sup>26</sup> In three studies the CMAI was administered by a research assistant interviewing the care staff member who was the most involved in the daily care of the resident.

In one study (DCM) an Internet application was used for administering the CMAI. In all four studies, the care staff member was asked to use the 2-week period before the assessment date as reference period for their answers. We operationally defined very frequent agitation as having a score of 6 (several times a day) or 7 (several times an hour) on at least five CMAI-items combined with a CMAI total score above the 90th percentile.

### *Demographic Characteristics*

Information about age, sex, marital status, and duration of stay was present in all four data sets and therefore included. Other characteristics were not included because they were not present in all four data sets.

### *Dementia Severity*

Information about dementia severity was assessed using the GDS.<sup>25</sup> This scale ranges from normal

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cognition (GDS stage 1) to very severe cognitive decline (GDS stage 7).

*Neuropsychiatric Symptoms*

Neuropsychiatric symptoms, other than agitation, were assessed with the Neuropsychiatric Inventory-Nursing Home version (NPI-NH). The NPI-NH was administered in the same way as the CMAI. The NPI-NH rates the frequency (F) and severity (S) of each symptom on a four-point (1–4) and three-point (1–3) Likert scale, respectively. By multiplying this frequency and severity scores, a separate score (FxS score) can be calculated, with values ranging from 0 (the symptom does not exist) to 12 for each symptom. Clinically relevant neuropsychiatric symptoms (FxS score  $\geq 4$ ) were used in the analyses.<sup>27</sup> Only the NPI items that were conceptually distinct from agitation were included. For example, the NPI item night-time behavior was excluded because of the overlap of some of its subquestions with the CMAI item wandering. As a result, we only used the following seven NPI items: delusions, hallucinations, anxiety, euphoria, apathy, irritability, and eating change.

*Psychotropic Drug Use*

Total psychotropic drug use (PDU) and the use of several PD-groups was measured according to the Anatomical Therapeutic Chemical classification<sup>28</sup> and grouped into antipsychotics, antidepressants, hypnotics, anxiolytic drugs, antiepileptics, and cholinesterase inhibitors. To quantify PDU, we used dichotomous categories of either “present” or “absent” per drug group in the analyses. Drugs that were taken as needed were discarded.

**Data Analysis**

For the analyses SPSS 22.0 (IBM, Armonk, NY) was used. For the different studies the mean, standard deviation (SD), and range of the means of the NPI and CMAI scores for the care units within each study were described. Furthermore, the intraclass correlation coefficient was calculated, assessing how much of the variance of NPI and CMAI was explained by the clustering of NH residents within care units. Descriptive statistics were used to summarize the characteristics. The 2-week prevalence of very frequent agitation and a 95% score (Wilson) confidence interval were calculated. After that, based on the severity of agitation, the data set was divided into three groups; one group of NH residents with very frequent agitation, a group of NH residents with less frequent agitation, and a group without agitation (CMAI total score of 29). Because of our focus on the factors that distinguish NH residents with very frequent agitation from those with less frequent agitation, the group without agitation was excluded from our analyses. Characteristics of NH residents with very frequent agitation and of residents with less frequent agitation were displayed. To take into account the hierarchical structure of the data (nursing home level and residents within care units), we used multilevel multivariate logistic modeling to assess the independent correlation of the characteristics with very frequent agitation.

**RESULTS****Residents**

Table 1 provides the mean and range of the mean CMAI scores and the mean NPI scores of the care units

**TABLE 1. Characteristics: Mean CMAI and NPI Scores for the Care Units from the Four Studies**

Number of residents N = 2,074

Study Name (No. of Care Units)	CMAI Total Score <sup>a</sup>	ICC	NPI Total Score <sup>a</sup>	ICC
WAALBED-I (58)	47.9 (6.6; 34.4–64.5)	0.108	22.0 (8.3; 4.0–40.9)	0.158
WAALBED-II (14)	44.5 (6.1; 36.8–58.9)	0.113	19.3 (9.0; 9.1–44.6)	0.199
DCM (33)	47.2 (8.9; 32.5–68.0)	0.082	13.7 (7.0; 1.3–32.0)	0.056
GRIP (14)	55.4 (10.5; 47.9–89.6)	0.241	26.2 (10.6; 14.1–56.1)	0.199

Notes: DCM: Dementia Care Mapping study; ICC: intraclass correlation coefficient; WAALBED: WAAL Behavior in Dementia study.

<sup>a</sup>Mean (SD; min–max).

for the four different studies, as well as the intraclass correlation coefficients of these mean scores. The mean CMAI scores of the GRIP study were higher than those of the other three studies; for the NPI, the mean scores for the WAALBED-II study and DCM study were lower. The characteristics of the NH residents in the merged data set are depicted in Table 2. The mean age was 83.0 years. The majority of the residents was female and in GDS stage 6. Antipsychotic drugs were prescribed most often. Of the NPI items, irritability had the highest prevalence. We found a 2-week prevalence of very frequent agitation of 7.4% (95% score [Wilson] CI: 6.374 – 8.634). At the CMAI-item level, the residents with very frequent agitation had the highest scores on the items general restlessness, pacing and aimless wandering, and performing repetitious mannerisms (Table 3). We elucidate the characteristics of the NH residents with very frequent agitation in Table 4. Multivariate multilevel logistic regression analysis showed that the odds for very frequent agitation were significantly lower in residents who were older and in residents with a nursing home stay of 12 to 60 months (compared with NH residents with a nursing home stay of 0 to 3 months). In contrast, the odds for very frequent agitation were significantly higher in residents with a GDS score of 6 or 7 (Table 5). Moreover, the odds for very frequent agitation were significantly higher in residents who had delusions, anxiety, euphoria, and irritability. The odds for very frequent agitation did not differ significantly from 1 for the use of the various psychotropic drugs.

## DISCUSSION

To our knowledge, this study is the first to report prevalence rates of NH residents with very frequent agitation. We found a 2-week prevalence of very frequent agitation of 7.4%. Odds for very frequent agitation were significantly lower in residents who were older and who stayed in the nursing home for more than 12 months and less than 60 months, yet were higher for residents with more severe dementia, psychotic symptoms, euphoria, or irritability.

Because studies about very frequent agitation are lacking, we can only compare our findings with figures of less frequent agitation in NH residents with dementia. On the one hand, these studies—which in

**TABLE 2. Resident Characteristics of the WAALBED-III Study**

	Total (N = 2,074)
Age at time of CMAI measurement, years <sup>a</sup>	86.0 (7.6; 36–102)
Sex, % female <sup>b</sup>	77.7% (1,611)
Marital status <sup>b,c</sup>	
Married/civil partnership/unmarried but living together/living together	21.5% (369)
Divorced/unmarried	12.4% (212)
Widow(er)	66.1% (1133)
Duration of institutionalization <sup>a,d</sup>	28.9 (27.0; 0.0–219.3)
0–3 months	8.3% (172)
3–12 months	23.2% (479)
12–60 months	55.9% (1,155)
>60 months	12.5% (259)
GDS <sup>b</sup>	
GDS 4	3.9% (80)
GDS 5	19.2% (399)
GDS 6	51.1% (1,059)
GDS 7	25.8% (536)
Psychotropic drug use <sup>b,c</sup>	
Total	63.0% (1,267)
Antipsychotic	34.6% (695)
Antidepressant	27.5% (553)
Hypnotic	13.6% (273)
Anxiolytic	15.8% (317)
Antiepileptic	5.9% (118)
Antidementia	2.8% (56)
CMAI total score <sup>a</sup>	48.0 (16.9; 29–154)
NPI-NH symptoms <sup>b,f</sup>	
Delusions <sup>d</sup>	13.8% (284)
Hallucinations <sup>g</sup>	7.5% (155)
Anxiety <sup>h</sup>	21.7% (449)
Euphoria <sup>h</sup>	7.0% (145)
Apathy <sup>i</sup>	30.0% (622)
Irritability <sup>j</sup>	31.7% (656)
Eating change <sup>k</sup>	21.8% (422)

Notes: CMAI: Cohen Mansfield Agitation Inventory; GDS: Global Deterioration Scale; NPI-NH: Neuropsychiatric Inventory Nursing Home version.

<sup>a</sup>Mean (SD; min–max).

<sup>b</sup>% (N).

<sup>c</sup>Missing data N = 360.

<sup>d</sup>Missing data N = 9.

<sup>e</sup>Missing data N = 63.

<sup>f</sup>FxS scores  $\geq 4$ .

<sup>g</sup>Missing data N = 7.

<sup>h</sup>Missing data N = 3.

<sup>i</sup>Missing data N = 1.

<sup>j</sup>Missing data N = 4.

<sup>k</sup>Missing data N = 48.

general were performed in patients with Alzheimer disease—found similar results regarding the association with psychotic symptoms.<sup>29–31</sup> Also, these studies demonstrate a relationship with severe dementia<sup>8</sup> and anxiety.<sup>32</sup> On the other hand, to our knowledge, some of the found associations have never been studied

*Nursing Home Residents with Dementia and Frequent Agitation***TABLE 3. Percentages of the Scores 6/7 of the CMAI items for NH Residents with Very Frequent Agitation**

CMAI Item	Score = 6 (several times a day) on this item	Score = 7 (several times an hour day) on this item
	% (N)	% (N)
Pacing and aimless wandering	29.2 (45)	39.0 (60)
Inappropriate dressing or disrobing	16.2 (25)	5.2 (8)
Spitting	6.5 (10)	0.0 (0)
Cursing or verbal aggression	28.6 (44)	7.1 (11)
Constant unwarranted request for attention or help	29.2 (45)	32.5 (50)
Repetitive sentences or questions	29.9 (46)	27.3 (42)
Hitting	11.7 (18)	0.6 (1)
Kicking	6.5 (10)	0.0 (0)
Grabbing onto people or things inappropriately	35.7 (55)	8.4 (13)
Pushing	10.4 (16)	0.6 (1)
Throwing things	7.1 (11)	0.0 (0)
Making strange noises	20.1 (31)	16.9 (26)
Screaming	14.9 (23)	6.5 (10)
Biting	2.6 (4)	0.0 (0)
Scratching <sup>a</sup>	8.8 (13)	3.3 (5)
Trying to get to a different place	29.2 (45)	13.0 (20)
Intentional falling	1.3 (2)	0.6 (1)
Complaining	29.9 (46)	7.8 (12)
Negativism	29.2 (45)	8.4 (13)
Eating or drinking inappropriate substances	2.6 (4)	0.6 (1)
Hurting self or other	9.7 (15)	2.6 (4)
Handling things inappropriately	28.6 (44)	7.8 (12)
Hiding things <sup>a</sup>	14.4 (22)	3.3 (5)
Hoarding things	18.8 (29)	5.8 (9)
Tearing things or destroying property	6.5 (10)	0.0 (0)
Performing repetitious mannerisms	34.4 (53)	29.2 (45)
Making verbal sexual advances	1.9 (3)	0.6 (1)
Making physical sexual advances or exposing genitals	1.9 (3)	0.6 (1)
General restlessness	42.2 (65)	46.1 (71)

Notes: CMAI: Cohen Mansfield Agitation Inventory.

<sup>a</sup>Missing data N = 1.

before, like the relationship between duration of stay and agitation.

There are several possible explanations for the association between delusions and very frequent agitation. First, frontal lobe dysfunction plays an important role in the origin of delusions<sup>33</sup> as well as of agitation.<sup>15</sup> Second, a study in patients with mild cognitive impairment and Alzheimer disease describes a significant association of neocortical atrophy with the onset of psychosis (including agitation, hallucinations, and delusions).<sup>34</sup> Finally, agitation, psychosis, and frontal disinhibition often appear together.<sup>35</sup> Concerning the association of anxiety with very frequent agitation, earlier studies have proposed some explanations. For instance, agitation has been considered the expression of underlying anxiety.<sup>36</sup> Moreover, the alterations of functional connectivity in the brain are the

same for anxiety and agitation.<sup>37</sup> In the same way, the association between irritability and very frequent agitation can be explained by an underlying biological mechanism, as poorer white matter integrity has been associated with an increased likelihood to exhibit irritability and agitation.<sup>38</sup> The role of neurological deficits in the origin of the symptoms mentioned here is supported by a review by Zwijsen et al.<sup>39</sup> They conclude that the way people with dementia recognize, interpret, and respond to the world around them might be influenced by neuropsychological functioning in dementia and they call for further research.<sup>39</sup>

The suggestion that very frequent agitation and correlated neuropsychiatric symptoms may stem from alterations in similar areas of the brain are important. As is known, very frequent agitation can be an expression of unmet needs,<sup>14</sup> but perhaps there are

TABLE 4. Characteristics of NH Residents with Very Frequent Agitation and Less Frequent Agitation (N = 1,858)

	Very Frequent Agitation (N = 154)	Less Frequent Agitation (N = 1,704)
Age at time CMAI measurement, years <sup>a</sup>	80.8 (7.3; 55-94)	83.2 (7.6; 36-102)
Sex (% female) <sup>b</sup>	77.9% (120)	77.4% (1319)
Marital status <sup>b,c</sup>		
Married/civil partnership/unmarried but Living together/living together	22.2% (26)	21.0% (294)
Divorced/unmarried	62.4% (73)	66.7% (934)
Widow(er)	15.4% (18)	12.3% (173)
Duration of institutionalization <sup>a,d</sup>	26.0 (24.2; 0.0-175.2)	28.3 (26.0; 0.0-1914.2)
0-3 months	10.4% (16)	8.0% (136)
3-12 months	24.0% (37)	23.6% (401)
12-60 months	57.8% (89)	56.4% (956)
>60 months	5.6% (12)	12.0% (203)
GDS <sup>b</sup>		
GDS 4	1.3% (2)	3.8% (65)
GDS 5	8.4% (13)	19.8% (338)
GDS 6	73.4% (113)	50.8% (865)
GDS 7	16.9% (26)	25.6% (436)
Psychotropic drug use <sup>b,e</sup>		
Total	78.1% (118)	64.5% (1061)
Antipsychotic	52.3% (79)	35.7% (588)
Antidepressant	37.7% (57)	27.6% (454)
Hypnotic	15.9% (24)	14.2% (233)
Anxiolytic	27.8% (42)	15.9% (261)
Antiepileptic	6.6% (10)	5.9% (97)
Antidementia	4.0% (6)	2.7% (44)
NPI-NH symptoms <sup>b,f</sup>		
Delusions <sup>d</sup>	41.6% (64)	12.8% (217)
Hallucinations <sup>g</sup>	19.5% (30)	7.2% (122)
Anxiety <sup>h</sup>	49.4% (76)	20.9% (355)
Euphoria <sup>h</sup>	24.7% (38)	5.9% (101)
Apathy <sup>i</sup>	39.0% (60)	29.7% (505)
Irritability <sup>j</sup>	76.0% (117)	31.4% (533)
Eating change <sup>k</sup>	33.3% (51)	21.1% (351)

Notes: GDS: Global Deterioration Scale; NPI-NH: Neuropsychiatric Inventory Nursing Home version.

<sup>a</sup>Mean (SD; min-max).

<sup>b</sup>% (N).

<sup>c</sup>Missing data N = 340.

<sup>d</sup>Missing data N = 8.

<sup>e</sup>Missing data N = 61.

<sup>f</sup>FxS scores  $\geq 4$ .

<sup>g</sup>Missing data N = 6.

<sup>h</sup>Missing data N = 3.

<sup>i</sup>Missing data N = 1.

<sup>j</sup>Missing data N = 4.

<sup>k</sup>Missing data N = 44.

cases in which it is caused by brain damage alone. Also, very frequent agitation may be an expression of another underlying neuropsychiatric symptom, like anxiety.<sup>36</sup>

Although it is questionable whether different underlying causes of very frequent agitation can be separated clinically, a combination of particular symptoms, like very frequent agitation with delusions and anxiety, may point towards a biological cause. Still, we cannot justify this assumption with existing studies.

The possible explanations of our results signify the importance of performing research into the relationships between different neuropsychiatric symptoms—including agitation—and between neuropsychiatric symptoms and neurological deficits in NH residents with dementia.

Our study has several strengths. First, we used a large sample of 2,074 NH residents. As such, it was possible to perform logistic regression analyses applying

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**TABLE 5. Correlates for Very Frequent Agitation in NH Residents with Dementia**

Number of Residents N = 1,750 (complete case analysis)	Odds Ratio	95% CI	p value
Age	0.967	0.942–0.992	0.012
Sex <sup>a</sup>	0.938	0.585–1.505	0.791
Duration of institutionalization <sup>b</sup>			
3–12 months	0.591	0.278–1.257	0.172
12–60 months	0.488	0.242–0.987	<b>0.046</b>
>60 months	0.372	0.138–1.003	0.051
GDS <sup>c</sup>			
GDS 6	3.636	1.929–6.875	<b>&lt;0.001</b>
GDS 7	2.951	1.321–6.588	<b>0.008</b>
Psychotropic drug use			
Antipsychotic <sup>d</sup>	1.419	0.942–2.137	0.094
Antidepressant <sup>d</sup>	0.968	0.631–1.484	0.881
Hypnotic <sup>d</sup>	0.948	0.549–1.636	0.848
Anxiolytic <sup>d</sup>	1.479	0.923–2.372	0.104
Antiepileptic <sup>d</sup>	0.832	0.377–1.836	0.649
Antidementia <sup>d</sup>	1.487	0.534–4.139	0.448
NPI-NH symptoms			
Delusions <sup>e</sup>	2.480	1.555–3.956	<b>&lt;0.001</b>
Hallucinations <sup>e</sup>	1.454	0.820–2.585	0.200
Anxiety <sup>e</sup>	1.904	1.259–2.881	<b>0.002</b>
Euphoria <sup>e</sup>	3.712	2.174–6.337	<b>&lt;0.001</b>
Apathy <sup>e</sup>	1.398	0.916–2.133	0.121
Irritability <sup>e</sup>	4.411	2.854–6.816	<b>&lt;0.001</b>
Eating change <sup>e</sup>	1.336	0.859–2.077	0.199

Notes: GDS: Global Deterioration Scale; NPI-NH: Neuropsychiatric Inventory Nursing Home version.

Multivariate multilevel logistic regression  $F(20,1729) = 8.130$ ,  $p \leq 0.001$ .

<sup>a</sup>Ref Female.

<sup>b</sup>Ref 0–3 months.

<sup>c</sup>Ref GDS 4 and 5.

<sup>d</sup>Ref without this type of drug.

<sup>e</sup>Ref without this NPI item.

multiple possible confounders. Second, our sample was representative, because of the participation of a large number of nursing homes from many regions of The Netherlands.

One of the limitations of this study is that PDU may have decreased the 2-week prevalence rate of very frequent agitation because of its possible effect on this symptom. This may have weakened the relationships between the correlates found and very frequent agitation. Another limitation is that we could not address dementia subtypes, because no pertaining data were available. Would that have been the case, we could have investigated, for instance, whether the relationship between delusions and very frequent agitation was stronger in NH residents with frontotemporal dementia. A third possible limitation is that marital status was

not included in the multivariate logistic regression analysis, because the GRIP study did not collect data about marital status of the NH residents. This would have resulted in many missing values in our total WAALBED-III data set, whereas we expect the importance of marital status to be limited in agitation of institutionalized residents with dementia. Fourth, because we were limited by the available data of the four studies, unfortunately we could not include other potentially interesting variables in the analysis, like pain, function, or depressive symptoms. This would be interesting for further research. Fifth, although the CMAI scores of the DCM study did not differ significantly, the NPI-NH scores in the DCM study were lower than in the other three studies. Given the difference in administration of the NPI-NH (self-assessment versus interview-based), these results may suggest that the mode of administration is a relevant aspect when interpreting these questionnaires' results. A final limitation is the operationalization of very frequent agitation. To start with, we defined very frequent agitation based on the frequency of symptoms above a certain threshold value. This operational definition may not be appropriate or restrictive enough. Although the fact that we combined two criteria (a score of 6 or 7 on at least five CMAI items combined with a CMAI total score above the 90th percentile) contributes to a refinement of the operationalization of very frequent agitation, by using the second criterion we partially determined the 2-week prevalence beforehand. It would be interesting to determine prevalence and correlates in another sample using the same cutoff criteria. Furthermore, for the operationalization of very frequent agitation, we used the CMAI. Given the use of four existing data sets that only included the CMAI and NPI for challenging behavior, we were not able to use other measures to define very frequent agitation. In our view, it is more appropriate to use the CMAI for defining agitation than the NPI, because the CMAI specifically targets agitation and is very comprehensive. It might have been more optimal to also take severity or disruptiveness into account. Nevertheless, given the findings of Cohen-Mansfield,<sup>40</sup> that frequency and disruptiveness of behavior were highly correlated, our group of residents with very frequent agitation could very well be comparable to the residents with the most disruptive behavior. To fully grasp a concept of severe or extreme agitation, however, it may not only be necessary to include other aspects of the resident's agitated



behavior into account such as whether it is directed towards other people, but also aspects of the context in which the agitation occurs. For instance, the environment of a nursing home unit or the care approach of the nursing staff may be even more important factors for explaining why agitation is considered very frequent than the demographic and behavioral characteristics of the pertaining resident. That is the reason why describing this context should be the next step in research and in understanding very frequent agitation, next to exploring the characteristics of the behavior more broadly and in depth.

In conclusion, this study of a large sample of NH residents with dementia showed a 2-week prevalence of very frequent agitation of 7.4%. These residents differ significantly from residents with less frequent agitation on several aspects, like psychotic symptoms,

euphoria, and irritability. Nevertheless, much about very frequent agitation remains unclear. Therefore, further research is needed to establish a comprehensive definition of very frequent agitation, to investigate the relationship of neurological deficits with very frequent agitation and correlated neuropsychiatric symptoms, and to explore the context of this behavior. More insight into NH residents with dementia showing very frequent agitation may lead to better treatment. Subsequently, the severity of agitation might become less frequent and the quality of life of these residents may improve.

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