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Authors

Lee, David R
Romero, Tahmineh
Serrano, Katherine
et al.

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Demographics, Symptoms, Psychotropic Use, and Caregiver Distress in Patients With Early vs Late Onset Dementia

David R. Lee, M.D., M.B.A., Tahmineh Romero, M.S., Katherine Sy Serrano, M.P.H., Michelle Panlilio, D.N.P., G.N.P., Abel Rojas-Parra, M.D., Lauren Matsuno, M.D., Mario F. Mendez, M.D., Ph.D., Christine Willinger, M.D., M.P.H., David B. Reuben, M.D.

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ABSTRACT

Background: *Understanding experiences and challenges faced by persons living with Early-Onset Dementia (EOD) compared to individuals diagnosed with Late-Onset Dementia (LOD) is important for the development of targeted interventions.* ***Objective:*** *Describe differences in sociodemographic, neuropsychiatric behavioral symptoms, caregiver characteristics, and psychotropic use.* ***Design, Setting, Participants:*** *Cross-sectional, retrospective study including 908 UCLA Alzheimer's Dementia Care Program participants (177 with EOD and 731 with LOD).* ***Measurements:*** *Onset of dementia was determined using age at program enrollment, with EOD defined as age <65 years and LOD defined as age >80 years. Sociodemographic and clinical characteristics were measured once at enrollment. Behavioral symptoms were measured using the Neuropsychiatric Inventory Questionnaire (NPI-Q) severity score and caregiver distress was measured using the NPI-Q distress score. Medications included antipsychotic, antidepressant, benzodiazepines and other hypnotics, antiepileptics, and dementia medications.* ***Results:*** *EOD compared to LOD participants were more likely men, college graduates, married, live alone, and have fewer comorbidities. EOD caregivers were more often spouses (56% vs 26%, p <0.01),*

From the Multicampus Program in Geriatric Medicine and Gerontology, Division of Geriatrics, David Geffen School of Medicine at UCLA, University of California (DRL, KS, DBR), Los Angeles, CA; Department of Medicine Statistics Core (TR), David Geffen School of Medicine, University of California, Los Angeles, CA; Department of Medicine (MP, LM, CW), David Geffen School of Medicine, University of California, Los Angeles, CA; Department of Geriatric Medicine (ARP), Clinica Sierra Vista, Bakersfield, CA; and the Department of Neurology, Department of Psychiatry and Behavioral Sciences (MFM), David Geffen School of Medicine, University of California Los Angeles (UCLA), Neurology Service, Neurobehavior Unit, V.A. Greater Los Angeles Healthcare System, Los Angeles, CA. Send correspondence and reprint requests to David R. Lee, M.D., M.B.A., Division of Geriatrics, 10945 Le Conte Ave., Suite 2339, Los Angeles, CA 90095. e-mail: drlee@mednet.ucla.edu

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whereas LOD caregivers were more often children (57% vs 10%, p <0.01). EOD was associated with lower odds of being above the median (worse) NPI-Q severity (adjusted odds ratio [aOR], 0.58; 95% CI 0.35−0.96) and NPI-Q distress scores (aOR, 0.53; 95% CI 0.31−0.88). Psychotropic use did not differ between groups though symptoms were greater for LOD compared to EOD. ***Conclusion:*** *Persons with EOD compared to LOD had sociodemographic differences, less health conditions, and fewer neuropsychiatric symptoms. Future policies could prioritize counseling for EOD patients and families, along with programs to support spousal caregivers of persons with EOD.* (Am J Geriatr Psychiatry 2024; ■■:■■−■■)

Highlights

- **What is the primary question addressed by this study?**
  How do persons with early onset dementia (EOD) differ compared to persons with late onset dementia (LOD)?
- **What is the main finding of this study?**
  Compared to their LOD counterparts, persons with EOD are more likely to be men, college graduates, married, live alone, and have spouse caregivers. They are also likely to have fewer comorbidities and lower severity of neuropsychiatric symptoms and caregiver distress.
- **What is the meaning of the finding?**
  Understanding the differences in patient and caregiver characteristics for persons with EOD can guide clinicians in shaping care plans and targeted interventions to better meet their needs.

INTRODUCTION

An estimated 6.7 million Americans have Alzheimer's disease and this number is expected to rise to 13.8 million by 2060.[1] Although the incidence of Alzheimer's disease increases with age,[2] some persons develop Alzheimer's disease and related dementias (ADRD) at ages less than 65 years, which is referred to as Early-Onset Dementia (EOD).[3,4] The onset of dementia differs from the usual patient with ADRD who develops dementia sometime after age 65, referred to as late onset dementia (LOD). The prevalence of EOD among Alzheimer's disease is approximately 5%−6%,[5,6] with the expectation this number will rise with improved screening techniques, increased awareness,[7] and new treatment options for mild Alzheimer's disease.[8]

EOD is often overlooked or misdiagnosed, delaying diagnosis from 4.4 to 5.5 years from symptom onset.[9,10] Once diagnosed, EOD patients face potentially devastating challenges including loss of employment, financial problems, disruption to family dynamics, and social stigmas that are often underappreciated.[7,11,12] Healthcare systems often lack resources to handle medical and social complexities faced by EOD patients and their caregivers and families, who are in different stages of their lives than the prototypical person living with dementia, and usually in different states of health compared to their peers. For example, traditional dementia support groups may not focus on issues of persons with EOD, including coping strategies for spousal caregivers who must manage their partner's dementia while working and raising young children, and thus, may benefit from their own dedicated groups. Additionally, given EOD composes a small fraction of those with dementia, health systems may not perceive this group a priority to devote resources specifically to them and the generalists who are more likely to care for these people, are often less experienced at treating dementia.

These challenges may be further exacerbated by current challenges in dementia care management. As dementia progresses, managing neuropsychiatric symptoms (NPS) including agitation, depression, and

psychosis, may be challenging, especially when the person with dementia still retains significant physical strength. NPS have shown to be predictors for adverse outcomes including institutionalization and mortality,[13] and are often treated with psychotropic medications that have limited evidence of efficacy and adverse side effects.[14] Understanding how NPS differ for persons with EOD, who may have sufficient physical strength to be more dangerous, can further change how clinicians approach the management of these NPS.

This study differs from others as it uses a diverse and larger cohort of community dwelling persons with EOD to further characterize sociodemographic characteristics, neuropsychiatric behavioral symptom severity, caregiver distress, and psychotropic medication use compared to those diagnosed with ADRD later in life. Characterizing these differences could help improve medical and social interventions specific to persons with EOD and potentially shape future health policy initiatives.

METHODS

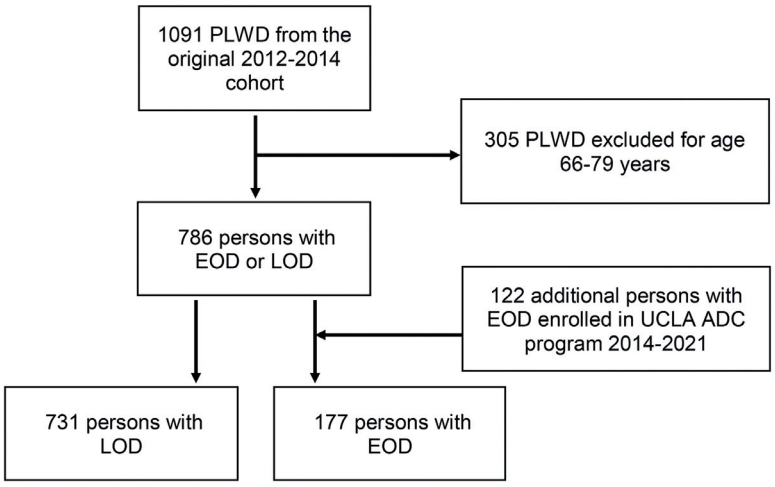
Setting and Participants

This is a cross-sectional, retrospective cohort study examining sociodemographic and NPS of participants and subsequent caregiver distress and strain among UCLA Alzheimer's Dementia Care (ADC) Program participants stratified by age of dementia onset. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline. The UCLA ADC Program is a co-management model of care for persons living with dementia (PLWD) staffed by nurse practitioners who serve as Dementia Care Specialists (DCS) providing care and guidance for patients, caregivers, and physicians to manage psychosocial, behavioral, and medical challenges.[15]

Figure 1 describes the composition of the study cohort. Participants with EOD (N = 177) were enrolled in the program at 65 years and younger, whereas participants with LOD (N = 731) were enrolled at 80 years and older. To ensure consistency in characterizing participants, age at enrollment was used because there was often lack of precision in age at diagnosis or onset of symptoms. Although ADC participants between the ages of 66–79 at time of enrollment were excluded from these analyses due to uncertainty regarding age of disease onset, the LOD participants still likely represent the prototypical dementia patient as the highest prevalence and incidence of dementia occurs after age 80.[2,16]

The original sample cohort included 55 EOD and 731 LOD individuals who joined the program from 2012 to 2014 and were part of the initial UCLA ADC

FIGURE 1. Flowsheet of study participants.



Program evaluation study.[17] To permit more robust analysis, the EOD sample was augmented with an additional 122 patients who joined the program from 2014 to 2021; data for these additional participants were collected through chart review by six abstractors (DRL, DBR, LM, MP, ARP, and CW). The study was approved by the UCLA Institutional Review Board (IRB), which waived the requirement for informed consent.

Variables

Variables were collected at ADC Program enrollment. The main outcome measure was the baseline Neuropsychiatric Inventory Questionnaire (NPI-Q),[18] which includes 12 domains of NPS (delusions, hallucinations, agitation, depression, anxiety, elation/euphoria, apathy, disinhibition, irritability, aberrant motor behaviors, sleep disturbances, and changes in appetite) and captures patient severity and distress of these to the caregiver. Caregivers were asked a screening question (yes or no) for each item of the NPI-Q domains. If they answered yes, they rated the severity of symptoms from 1 to 3 with 3 being the most severe. Caregivers were also asked how distressing the symptom was to them on a scale ranging from 0 to 5 with 5 being the most distressing. Composite scores were calculated for NPI-Q severity and NPI-Q distress with higher scores meaning worse symptoms. Scores above versus below the overall median for severity and distress scores were used as the outcome in the regression analysis to facilitate interpretation of the results.

Additionally, dichotomous outcome measures of (1) any antipsychotic use (both atypical and typical antipsychotics); (2) any antidepressant use including Selective Serotonin Reuptake Inhibitors (SSRI), Serotonin Norepinephrine Reuptake Inhibitors (SNRI), Tricyclic antidepressants (TCA), bupropion, and mirtazapine; (3) either antipsychotic or antidepressant use; and (4) concurrent antipsychotic and antidepressant use were evaluated. Additional measures of benzodiazepines and other hypnotics, antiepileptics, and dementia medications (including donepezil, rivastigmine, galantamine, and memantine) use were also evaluated. The complete list of medications by class are in Supplemental Table 1.

The primary predictor was age of onset, early versus late, of dementia. Covariates used in the regression analysis included both patient and caregiver characteristics. Patient characteristics included sex, self-reported race and ethnicity, education, marital status, living situation, dementia type and Mini-mental State Examination (MMSE) score.[19] Dementia type was determined from chart review of DCS notes who likely obtained diagnosis from primary care physician, neurology, geriatrician, or neuropsychologist notes. Caregiver characteristics included relationship status and caregiver sex.[18] Additional patient and caregiver characteristics collected but not adjusted for in the regression analyses (Table 1), included median age at ADC entry, median follow-up time, presence of comorbidities, a 13-item validated modified caregiver strain index (MCSI),[20] and caregiver Patient Health Questionnaire-9 (PHQ-9), a 9-item validated tool for measuring depressive symptoms.[21]

Data Sources

Sociodemographic and clinical data from participants and caregivers were collected by the DCS during initial and annual visits and patient previsit questionnaires, and entered into the electronic medical record on program enrollment. Data for the LOD group and the first 55 patients in the EOD group were collected through a Center for Medicare and Medicaid Innovation grant that helped establish the UCLA ADC Program from 2012 to 2014. Additional medical record data for patients in the EOD group from 2014 to 2021 were abstracted using a tool developed, piloted, and revised by the authors. Training sessions were performed with chart abstractors (DRL, DBR, LM, MP, ARP, and CW) and data were entered into Research Electronic Data Capture (REDCap, Version 12.4.19).[22,23] General disagreements regarding coding rules were resolved through discussion. Additionally, 49 charts were double-abstracted and a Cohen's kappa coefficient was calculated to measure interrater reliability across seven variables (employment, living location, living alone, caregiver relationship, paid caregiving, total medications prescribed, and number of comorbidities). The kappa coefficient showed moderate to near-perfect agreement[24] across these variables among the six data abstractors (scores ranged from 0.55 to 1 across the seven variables).

TABLE 1. Demographic and Social Characteristics of PLWD and Caregiver by Dementia Onset Group

	EOD (n = 177) No. (%)	LOD (n = 731) No. (%)	p-value
Patient characteristics			
Median age at ADC entry (IQR)	61 (57–63)	87 (83–90)	
Female	84 (48)	501 (69)	<0.001
Median follow-up time in years (IQR)	2 (1–4)	2 (2–3)	0.017
Race and ethnicity[a]			0.05
Hispanic	20 (11)	84 (13)	
Non-Hispanic Black	16 (9)	51 (8)	
Non-Hispanic White	103 (58)	448 (67)	
Other[b]	38 (22)	90 (13)	
Education Level[a]			0.003
Less than HS graduate	16 (9)	115 (17)	
HS graduate and some college	59 (34)	290 (42)	
College graduate or higher	97 (56)	292 (42)	
Married[a]	118 (67)	262 (37)	<0.001
Lives alone[a]	17 (10)	7 (1)	<0.001
One or more comorbidities[a,c]	79 (45)	557 (77)	<0.001
Dementia type[a]			<0.001
Alzheimer's	102 (58)	255 (35)	
Vascular	0 (0)	36 (5)	
Lewy body	8 (5)	14 (2)	
Frontotemporal	24 (14)	3 (0.4)	
Parkinson's	2 (1)	9 (1)	
Mixed	5 (3)	63 (9)	
Dementia NOS	34 (19)	344 (48)	
Median MMSE score (IQR)	19 (12–23)	17 (12–22)	0.6
Median NPI-Q severity (IQR)	7 (3–13)	9 (5–15)	0.002
Caregiver characteristics			
Female caregiver	119 (67)	510 (70)	0.47
Relationship to patient [a]			<0.001
Spouse	97 (56)	190 (26)	
Child	18 (10)	417 (57)	
Other	58 (34)	121 (17)	
Median NPI-Q distress (IQR)	8 (3–17)	11 (5–19)	0.006
Median caregiver PHQ9 (IQR)	4 (1–7)	3 (1–7)	0.45
Median caregiver MCSI (IQR)	10 (6–16)	10 (5–15)	0.85

[a] Numbers vary across different variables because of missing data, which did not exceed 6% for any variable.
[b] Other race and ethnicity category refers to non-Hispanic Asian, non-Hispanic Pacific Islander, and non-Hispanic American Indian or Alaskan Native.
[c] Comorbidities include diabetes, heart failure, hypertension, atrial fibrillation, stroke, Parkinson's disease, hyperthyroidism, or hypothyroidism.

Statistical Methods

To compare patient characteristics, bivariate descriptive analysis was performed using Fisher's exact and Wilcoxon rank-sum test for categorical and continuous variables, respectively. Multivariable logistic regression analyses with LOD as the reference group were performed modeling the following outcomes: above median NPI-Q severity score, above median NPI-Q distress score, use of any antipsychotic, use of any antidepressant, use of either antipsychotic or antidepressant, and concurrent use of antipsychotic and antidepressant as binary outcome measures. Multivariable logistic regression models were adjusted for patient characteristics (sex, ethnicity, education, marital status, mini-mental status examination score, living situation, dementia type) and caregiver characteristics (caregiver relationship and caregiver sex). To examine possible cohort effects between the two time periods, EOD patients from 2012–2014 and 2014–2021 were compared. Additionally, to examine effects of dementia subtype, a sensitivity analysis using an interaction term of dementia subtype (Alzheimer's versus other) and early-onset versus late-onset dementia (primary exposure) was performed. All tests were two sided and significance

level of 0.05 was used for all analyses. Statistical analyses were performed using R statistical software (v4.1.3).

RESULTS

Participants and Descriptive Data

Of the 908 participants, 177 had EOD and 731 had LOD with patient and caregiver demographic and clinical data provided in Table 1. The median age in years (Interquartile Range, IQR) for persons with EOD was 61 (57−63) and 87 (84−90) for persons with LOD. Compared to LOD, persons living with EOD were more often men, college graduates, married, living alone, and had fewer comorbidities. There was a higher proportion of non-Hispanic white adults among the LOD compared to the EOD group (67% vs 58%, p = 0.05 for comparison of race and ethnicity). There was a greater proportion of Alzheimer's disease (58% vs 35%) and Frontotemporal dementia (14% vs 0.4%) among EOD participants compared to LOD, whereas there was a greater proportion of dementia diagnosis that was not otherwise specified (NOS) among LOD participants compared to EOD (48% vs 19%) (p <0.001 for comparison of dementia type). Caregivers for persons with EOD were most often spouses (56% in EOD group vs 26% in the LOD group), whereas caregivers were most often children for persons living with LOD (57% in LOD group vs 10% in the EOD group) (p <0.001 for comparison of relationships). The proportion of female caregivers, median caregiver PHQ-9 score, and median caregiver MSCI were similar between the two groups. Additional stratification of patient and caregiver characteristics and psychotropic use by dementia subtype and onset of dementia are presented in Supplemental Table 2. There was no difference in demographic and social characteristics, and medication use among EOD participants from 2012−2014 and 2014−2021 (Supplemental Table 3).

Prevalence of Psychotropic Medication Use

Table 2 describes the unadjusted prevalence of antipsychotic, antidepressant, benzodiazepine or other hypnotic, antiepileptic, and dementia medication use by dementia onset group. About half of the EOD and LOD groups were on an antidepressant and/or dementia medication. There was a higher prevalence of antidepressant use among persons with EOD compared to LOD (53% vs 44%, p = 0.03), but this was not significant in adjusted analyses. We did not find any difference in the use of psychotropic treatments for the remaining medications between the two age groups (all p >0.05).

TABLE 2. Unadjusted Prevalence of Psychotropic Drug Use at Enrollment into the UCLA ADC Program by Dementia Onset Group

	EOD (n = 177) No. (%)	LOD (n = 731) No. (%)	p-value
Antipsychotics[a]	26 (15)	127 (18)	0.43
Antidepressants[a]	94 (53)	317 (44)	0.03
Benzodiazepines or other hypnotics[a]	30 (17)	84 (12)	0.06
Antiepileptics[a]	29 (16)	85 (12)	0.10
Dementia medication[a]	110 (62)	409 (57)	0.18

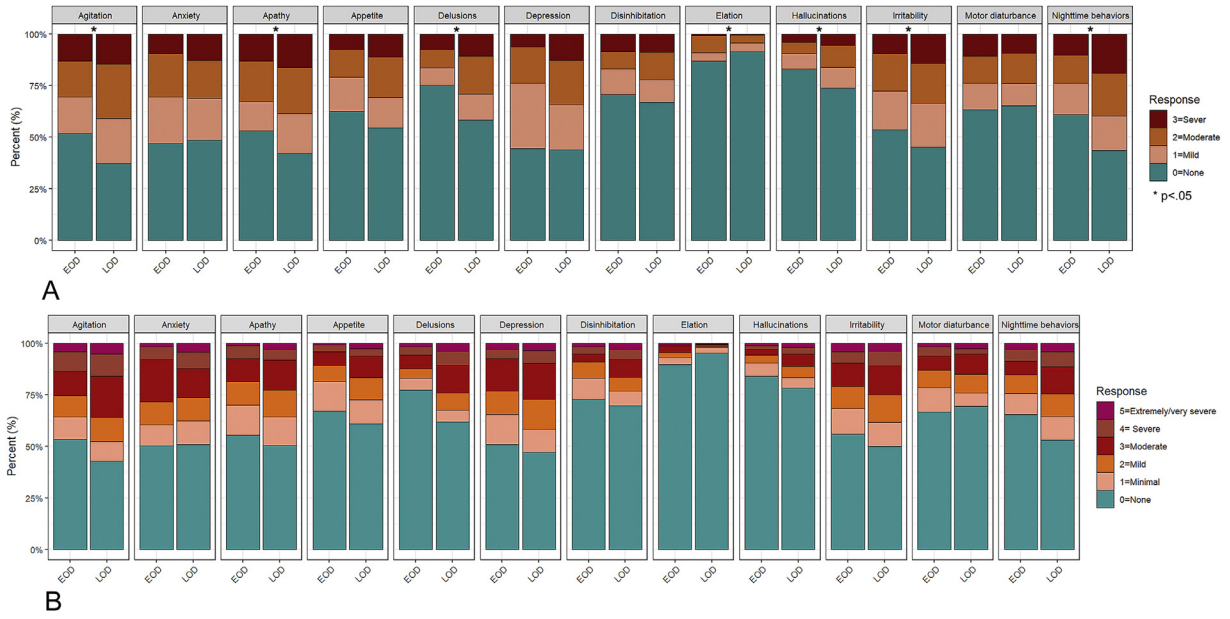
[a] Missing data were less than 1% for all variables.

Dementia Onset and Outcomes

Figure 2 compares the distribution of the NPI-Q severity and distress scores for each NPI-Q domain by dementia onset group. The EOD group reported more elation/euphoria (p = 0.04) and less agitation, apathy, delusions, hallucinations, irritability, and nighttime behaviors (all p <0.05). Reports of anxiety, appetite changes, depression, disinhibition, and motor symptoms did not differ by dementia onset age group.

Table 3 shows the adjusted odds ratios (aOR) and 95% confidence intervals (CI) of the multivariable regression analyses. After adjusting for patient and caregiver characteristics, EOD was associated with lower odds of having an above the median NPI-Q severity score (aOR 0.58; 95% CI, 0.35−0.96) and NPI-Q distress score (aOR 0.53; 95% CI, 0.31−0.88). In sensitivity analysis, the interaction term of onset of dementia and dementia type (Alzheimer's versus other) was significant (p = 0.008). The stratified analysis of early-onset versus late-onset Alzheimer's disease showed that among those with Alzheimer diagnosis, the EOD group was associated with lower NPI-Q scores, consistent with the main study results; similar findings were seen where the stratified analysis was repeated for above median NPI-Q severity

FIGURE 2. [A] Distribution of NPI-Q severity scores for each domain by onset of dementia group. [B] Distribution of NPI-Q distress scores for each domain by onset of dementia group.



and distress scores. The association of EOD was not significant for antipsychotic use or antidepressant use and concurrent antipsychotic and antidepressant use after adjusting for patient and caregiver characteristics.

TABLE 3. Adjusted Associations of Early Onset Dementia and Outcome Measures

Outcomes[a]	aOR[b] (95% CI[c])	p-value
Above median NPI-Q severity score	0.58 (0.35−0.96)	0.04
Above median NPI-Q distress score	0.53 (0.31−0.88)	0.02
Antipsychotic use	0.86 (0.42−1.69)	0.67
Antidepressant use	1.59 (0.97−2.59)	0.07
Either antidepressant or antipsychotic use	1.33 (0.82−2.17)	0.25
Concurrent antidepressant and antipsychotic use	1.34 (0.58−2.97)	0.48

[a] Models were adjusted for patient characteristics: sex, ethnicity, education, marital status, mini-mental status examination score, living situation, and dementia type; Caregiver characteristics: relationship status and sex.

[b] aOR = Adjusted Odds Ratio. Referent group is Late Onset Dementia.

[c] CI = Confidence Interval.

DISCUSSION

Compared to persons with LOD, those with EOD had fewer comorbidities and had a predominance of Alzheimer's disease and frontotemporal dementia, whereas dementia NOS was more common in the LOD group. Although cognitive scores were similar between the two groups potentially suggesting similar staging, neuropsychiatric behavioral symptoms were less severe for patients and less distressing to caregivers for persons with EOD compared to persons with LOD. This difference in the NPI-Q scores was driven by more agitation, apathy, delusions, hallucinations, irritability, and nighttime behaviors in the LOD group. This is one of the few studies to evaluate these factors in a larger and diverse cohort of people living with early onset dementia.

The finding of fewer comorbidities in EOD is consistent with prior literature[25] and is important because multimorbidity has previously been shown to be a predictor for more rapid cognitive and functional decline.[26,27] Additionally, comorbidities likely contributed to the difficulty in accurately diagnosing

the type of dementia in the LOD group as hypertension and diabetes prevalence increases with age[28] and are risk factors for vascular dementia, contributing to a mixed presentation that makes diagnosing the type of dementia more challenging. Conversely, the EOD group had fewer Dementia NOS diagnoses, likely representing a greater proportion of LOD persons having mixed dementia and more extensive evaluation and workup for those with EOD.

The NPS findings from this study are consistent with prior studies conducted outside the United States that have shown similar or lower NPI scores for persons with EOD,[29–32] and are in contrast with another study showing higher NPI-Q scores among early-onset Alzheimer's dementia patients, particularly for anxiety and motor disturbances (neither were significant in this study) and nighttime behaviors (greater among LOD group in this study).[33] This study also found a higher prevalence of elation/euphoria among the EOD group. This could be attributed to a higher prevalence of frontotemporal dementia in the EOD group, as prior studies have shown an association of frontotemporal dementia and positive emotions and euphoria.[34] Additionally, other studies have shown variability in symptom prevalence across the 12 NPI-Q domains.[29,30,32,33] These differences can be due to the heterogeneity of participants as many of the prior studies were performed in Asian and European countries, included participants living in residential facilities, and focused on a specific type of dementia or at a particular stage.[6,14,32,33,35,36] Differences could also come from how studies operationalized EOD and comparison groups, such as different age cut points.[32,33]

NPI-Q distress scores for caregivers were also worse for persons with LOD than persons with EOD. This contrasts with a prior systematic review showing high burden, stress, and depression among caregivers of persons with EOD; however, whether these symptoms were different from caregivers of LOD was inconclusive.[37] Nonetheless, the mechanism for worsening caregiver distress is often mediated by patient behavioral symptoms, highlighting the importance of evaluating and managing NPS early to reduce depression and other mental health concerns for caregivers.[38] Additionally, differences in life responsibilities and caregiver characteristics, such as caregiver's relationship (spouse versus child), may impact how distressing caregivers perceive the NPS of patients.

This study did not find a difference in antipsychotic, hypnotic, or antiepileptic use between the groups even though NPI-Q severity scores were higher in the LOD compared to the EOD group, perhaps indicating a lower threshold for prescribing psychotropic medications in EOD. Alternatively, psychotropic medications may have been prescribed less frequently for the LOD group because of the ADC program's approach of using behavioral treatments first, the modest efficacy of psychotropic drugs in treating NPS, their adverse side effect profiles, and the black box warning for antipsychotics.[39] More studies are needed on the use of these medications among community-dwelling persons living with EOD especially focusing on adverse side effects.

A strength of this study is it includes a relatively large and diverse sample of persons with EOD as prior studies had fewer than 100 participants.[29,30,32,36,40] While small in magnitude, the race and ethnic differences noted in this study likely reflect socioeconomic and cultural factors and warrant further study. This study is also one of the few studies to evaluate psychotropic use among community-dwelling persons with EOD. Limitations of this study include participants being included based on ADC program enrollment rather than at diagnosis or first symptom onset; we attempted to overcome the possibility of misclassification by excluding those aged 66–79 especially given the long delays in diagnosis among EOD participants.[9,10] The exclusion of this age group could raise concerns about the representativeness of the LOD group. However, given the prevalence and incidence of dementia is greatest after age 80,[2,16] the LOD group is likely still representative of the typical dementia patient. Second, this study was performed at a single academic medical center and among participants entering a comprehensive dementia care program, which could limit generalizability and introduce selection bias. Third, there were potential phenotypic differences between dementia subtypes and thus, in the main analyses, we adjusted for dementia subtype and provided dementia subgroup stratified analysis in Supplemental Table 2. Full subgroup analyses by onset of dementia were not meaningful due to limited sample sizes for dementia subgroups. Additionally, since this is a cross-sectional

study, we are unable to determine symptoms or triggers for psychotropic medication initiation. For example, we are unable to assess whether depressive symptoms or antidepressant pre-dated dementia diagnosis. Future clinical trials could evaluate symptom chronicity, initiation patterns and effects of medications, and dosages of medications. Last, this study does not include the major psychosocial and economic implications of EOD (for example, losing their jobs, moving into assisted living facilities, or becoming estranged from their families and friends). Future research could be performed to evaluate these important health and social consequences, especially considering the important demographic differences such as EOD participants being more educated, more likely to live alone, and be cared for by their spouses who may also be of working age. Future studies could also evaluate more medication utilization differences, including anticholinergic burden.

CONCLUSION

Persons with EOD are different than persons with LOD in terms of demographic characteristics, comorbidities, cause of dementia, and neuropsychiatric symptoms for patients and caregivers. Acknowledging and understanding these differences between persons with EOD compared to the prototypical dementia patients is important to create patient-centered care plans to meet the unique needs for EOD patients. These plans can include different approaches to advanced care planning and medication management as persons with EOD typically have fewer health-related conditions and different types of social complications, financial planning, and living situations. Additionally, future health policies could focus on providing additional support groups and counseling specific to EOD for patients and families, more innovative and age-appropriate activities such as vocational support to allow working if desired and possible, and financial assistance programs especially for spousal caregivers of persons with EOD who may have a single household income because of their spouse's dementia.

AUTHOR CONTRIBUTIONS

Lee, Romero, Serrano, Panlilio, Mendez, and Rueben contributed to the conceptualization and design of the study; all authors were part of the acquisition, analysis and interpretation of the data; Lee, Romero, and Rueben drafted the manuscript and all authors made critical revisions to the manuscript; Romero performed the statistical analysis. All authors provided final approval of the version to be published.

DATA STATEMENT

Preliminary findings were presented in part at the 2022 American Geriatrics Society Annual meeting in Orlando, Florida, and virtually at the 2022 Alzheimer's Association International Conference.

DISCLOSURES

The authors report no conflicts with any product mentioned or concept in this article.

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SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.jagp.2024.03.009.

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