

Incident Depression in Relation to Contextual Isolation among Established Long-stay Residents of US Nursing Homes

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Abstract

BACKGROUND: The U.S. Surgeon General recently put renewed focus on loneliness and isolation as fundamental determinants of health.

OBJECTIVE: To estimate the incidence of depression among established long-stay residents in relation to contextual isolation.

DESIGN: Retrospective cohort study.

SETTING: US nursing homes.

PARTICIPANTS: 490,523 residents who lived in the same home for at least one year between 2010 and 2019.

MEASUREMENTS: Using data from the Minimum Data Set 3.0, we identified residents who were newly diagnosed with depression. We assessed contextual isolation for each resident with regard to 31 socially salient characteristics relative to their co-residents.

RESULTS: The incidence proportion of diagnosed depression from 3-12 months was 21.3% among residents not contextually isolated, 21.0% among residents contextually isolated on a single characteristic, and 22.2% among residents contextually isolated on multiple characteristics. After adjustment for several potential effect modifiers (gender, age group, race/ethnicity, use of translation services), the 3-12 month incidence proportion was 8% higher among residents experiencing contextual isolation on multiple characteristics (95% confidence interval 6% to 10%).

CONCLUSION: Contextual isolation modestly increases the risk of newly diagnosed depression among long-stay residents after they have settled into the nursing home setting. Entry to a nursing home represents an opportunity to make new connections. Helping residents make novel connections may be particularly important for residents whose background or other socially salient characteristics leave them as outsiders to the mainstream of a given nursing home.

Key words: Nursing homes, depression, social isolation, Minimum Data Set.

manifold effects. Social isolation and loneliness are prevalent in nursing homes (2, 3), and predict depression (4, 5, 6). Depression is common in the nursing home setting (4, 7). An incidence of 14% for diagnosed depression in the initial 90 days of a nursing home stay was found in a recent nationwide study (8), while prior studies of the incidence of depression have usually been limited to a single nursing home, with a range of annual incidence reported from 7% to 19% (9, 10, 11). Depression and social isolation together have a compounding adverse effect on nursing home residents' quality of life (12, 13).

In this study, we build on a novel approach to examining social isolation in nursing homes that focuses on the potential for strong ties among residents due to shared socially meaningful characteristics (or their absence). Contextual isolation is defined as having a socially salient characteristic (such as race/ethnicity) that is shared with relatively few other residents in the same nursing home (14). A modest association between contextual isolation and diagnosed depression at one year after admission has been demonstrated (15). The objective of this study was to estimate the incidence of depression among established long-stay residents after they have settled into their new environment, from their first quarter of residence to their first annual assessment, in relation to contextual isolation. By focusing on contextual isolation and its potential for leading to a higher risk for developing depression, this research will bring into focus the possibility to identify residents who may be at risk for social isolation due to being contextually isolated; to the critical phase of transition to living in a nursing home as a meaningful time to coax and encourage relationship development; and to the role for nursing home staff and culture to promote and develop relationships that bridge across implicit dividing lines between residents (16).

Introduction

The Surgeon General's recent report "Our Epidemic of Loneliness and Isolation" has put renewed focus on social isolation as a fundamental determinant of health (1), and its role as a modifiable target for reducing depression and its

Methods

Data Source

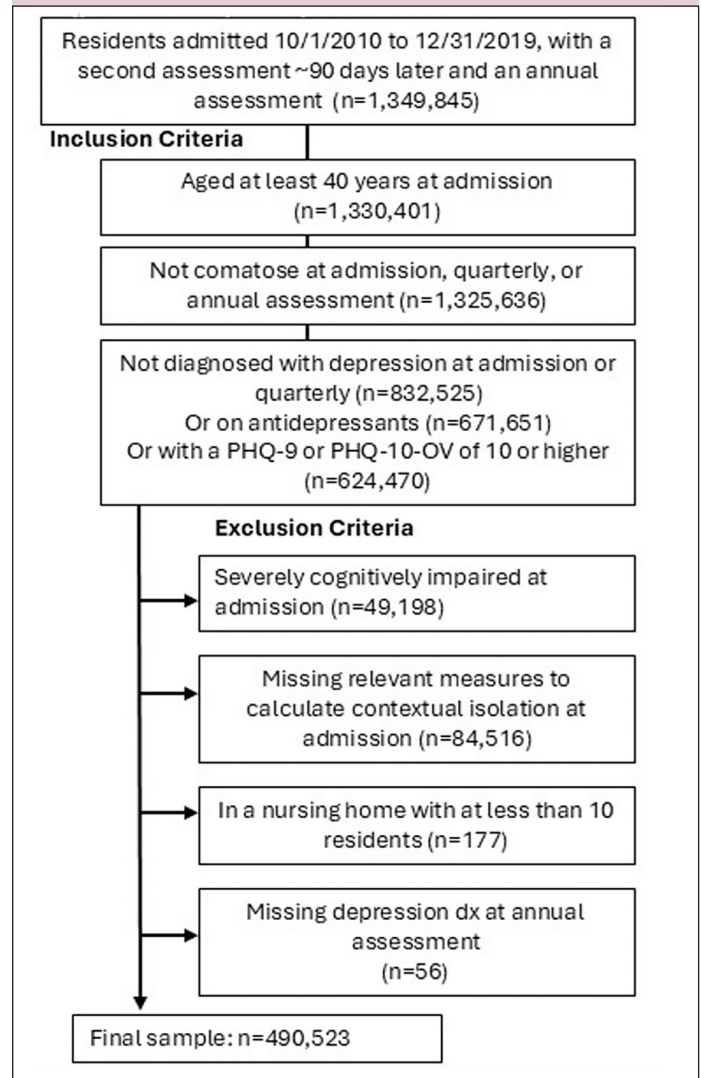
The Minimum Data Set 3.0 is a comprehensive resident assessment required of all residents in

US nursing homes eligible to receive Medicare and/or Medicaid funding (17). Assessments are completed for all residents regardless of their insurance coverage within 14 days of admission, quarterly thereafter, or when there is a significant change in status resulting in a substantive modification to the resident's care plan. At each anniversary, a full assessment of all variables is conducted, while a somewhat reduced set of items is collected at quarterly assessments. All resident characteristics (contextual isolation, incident depression, and covariates) were collected on or derived from Minimum Data Set assessments.

Study Population

To identify established long-stay residents without depression diagnosed at admission or recognized shortly after admission, we selected all 1,349,845 resident admission assessments between 10/1/2010 and 12/31/2019 matched to a second (quarterly or significant change in status) assessment 90 +/- 30 days after the admission assessment, and an annual (or significant change in status) assessment 365 days +/- 65 days after the admission assessment. (Figure 1) We restricted the sample to 624,470 residents who, at admission, were at least 40 years of age, not comatose, with no indicators of depression (depression diagnosis checkbox=no, no antidepressant medications, and PHQ-9 or PHQ-10-OV score between 0 and 9) at the admission or quarterly assessments to exclude residents admitted to the nursing home with depression that was not initially recognized. We applied this restriction due to the relatively high incidence of recognized depression in the first 3 months of a nursing home stay, in part due to the recognition of depression among residents not initially diagnosed at admission (8, 18). We hypothesized that the impact of contextual isolation on depression incidence would more likely be reflected after a resident's social and interaction patterns were more settled than in the first 3 months of a nursing home stay. Supplemental Figure 1 describes the hypothesized causal relationships that guided the decision to measure the incidence of diagnosed depression from a baseline that starts after the admission assessment. We further restricted the sample to 490,579 residents who were not severely cognitively impaired and had all measures needed to calculate contextual isolation. Of these, 490,523 had non-missing data on depression diagnosis at their annual assessment, constituting the final analytical sample.

Figure 1. Study Sample Flowchart



Contextual Isolation

We defined nursing home contextual isolation as a resident-level status that reflects living in a setting where relatively few fellow residents share highly salient social characteristics with a resident. A wide range of potential characteristics that could serve as the basis for solidarity or shared interests between residents, and/or as a core component of social identity, from three domains: demographics, habits or activity preferences, and clinical conditions, were included. The measure of contextual isolation used 31 socially salient characteristics that were both endorsed by an expert panel consensus and readily measurable on Minimum Data Set assessments. These socially salient characteristics were young resident age (younger than 65), gender (male, female, transgender), race/ethnicity (Hispanic of any race(s), not Hispanic and White only, Black only, American Indian and Alaska Native only, Asian only, Pacific Islander only, or multiracial), marital status (married, widowed, divorced/separated/never married), whether the staff needs

translation services to communicate, being large-bodied (body mass index of 30 or higher), tobacco use (yes, no), resident preference for participating in religious activities (yes, no), music (yes, no), interacting with pets/animals (yes, no), keeping up with the news (yes, no), or presence of a variety of clinical conditions: sensory impairment (hearing, vision, and/or speech clarity), visually stigmatizing condition (hemiplegia, paraplegia, quadriplegia, use of a limb prosthetic, amputation, and/or burns), stigmatized psychological condition (aphasia, cerebral palsy, multiple sclerosis, Huntington's chorea, and/or Parkinson's disease), dementia (Alzheimer's and/or another dementia), stroke, cancer, HIV, or a physician-confirmed poor life prognosis (6 months or less). In the absence of a widely accepted proportion at which a minority population develops a sense of solidarity strong enough to counter discrimination they may face (19, 20, 21), we selected a cut-point of fewer than 20% of residents sharing that characteristic to determine whether the resident was contextually isolated or not with respect to that characteristic. To determine the proportion of residents sharing a socially salient characteristic at the time of the resident's assessment, we included all residents with an assessment during the same calendar quarter as the target resident's first annual assessment, regardless of how long they stayed in the nursing home or whether they were eligible for this analysis. To minimize missing data in this denominator describing the nursing home's resident composition, we replaced missing values with the last known observation carried forward, so long as it was within 300 days (to capture the most recent full assessment-admission or annual-when available).

We further characterized contextual isolation into three mutually exclusive categories: not contextually isolated on any socially salient characteristic, contextually isolated on only one socially salient characteristic, and contextually isolated on multiple socially salient characteristics. This categorization allowed comparisons to previous research.

Incident Depression

We defined incident depression as having a diagnosis of depression indicated on the first annual assessment.

Covariates

We considered adjustment for potential effect modifiers used in construction of the contextual isolation measure: resident sex (male, female, transgender), age group (40-64, 65-74, 75-84, 85-94, or 95 years and older), race/ethnicity (Hispanic of any race(s), not Hispanic and White only, Black only, American Indian and Alaska Native only, Asian only, Pacific Islander only, or multiracial), marital status (married, widowed, divorced/separated/never married), and whether the resident wants or requests

language translation services to communicate as potential effect modifiers. We considered further adjustment for factors that might have an extraneous influence on the incidence of depression, namely cognitive function, activities of daily living, Census division, calendar year, and quarter.

Analytic Strategy

We first described the distribution of the population with respect to contextual isolation (not contextually isolated, contextually isolated on one characteristic, or contextually isolated on multiple characteristics). Then, we described the 3 to 12 month incidence proportion of residents with a diagnosis of depression at their first anniversary assessment after having no diagnosis of depression, use of antidepressant medications, or more than mild depressive symptoms at their admission assessment or first quarterly assessment. We estimated incidence proportion ratios for depression among residents who were contextually isolated on one or more characteristics relative to residents not experiencing contextual isolation, using a Poisson model with a generalized estimating equation approach, treating nursing homes as repeated elements with an exchangeable correlation matrix. We adjusted all models for potential mediators of the influence of contextual isolation on depression incidence (age group, gender, race/ethnicity, marital status, and whether the resident's care required translation services). Further adjustment for cognitive function, activities of daily living, Census division, year, or quarter of admission did not materially affect incidence proportion estimates, and were not included in the models presented. Finally, we performed nested models to estimate stratum-specific incidence proportion ratios for each gender, race/ethnicity, age group, marital status, whether the resident wanted or needed language translation services to communicate, and within cognitive function and activities of daily living strata.

Results

Of the 490,523 long-stay nursing home residents free of indicators of depression at admission and their first quarterly assessment (Figure 1), 54% were not contextually isolated on any of the socially salient characteristics we considered, 30% were contextually isolated on a single characteristic, and 15% were contextually isolated on at least two characteristics (Table 1). Male residents, the youngest residents, racial/ethnic minority residents, and residents wanting or needing language translation services to communicate with staff has higher prevalence of being contextually isolated.

The unadjusted 3 to 12 month incidence proportion of diagnosed depression was not markedly different between residents experiencing contextual isolation on

Table 1. Contextual Isolation among US Nursing Home Resident Sample, Overall and by Resident Characteristics

	% of total population (n=490,523)	Not Contextually Isolated (n=265,999)	Contextually Isolated on One Socially Salient Characteristic (n=149,548)	Contextually Isolated on Multiple Socially Salient Characteristics (n=74,976)
Total	100.0%	54.2%	30.5%	15.3%
Gender				
Male	38.1%	45.5%	33.7%	20.8%
Female	61.9%	59.6%	28.5%	11.9%
Transgender	0.0%	-*	-*	61.1%
Age Group				
40-64 years	12.1%	29.2%	35.3%	35.5%
65-74 years	13.8%	47.2%	33.8%	19.0%
75-84 years	27.9%	56.2%	30.2%	13.7%
85-94 years	38.4%	61.9%	28.1%	10.0%
95 years and older	7.8%	60.7%	30.2%	9.1%
Hispanic of any Race(s)	5.2%	28.9%	33.4%	37.6%
Not Hispanic and...				
White only	75.6%	60.0%	28.8%	11.2%
Black only	15.9%	40.9%	36.7%	22.4%
American Indian / Alaska Native only	0.5%	22.5%	43.7%	33.8%
Asian only	2.4%	30.4%	32.0%	37.6%
Pacific Islander only	0.4%	13.2%	39.7%	47.1%
Multiracial	0.1%	-*	51.8%	48.2%
Resident requested or needed translation services				
Yes	5.8%	27.9%	29.4%	42.7%
No	94.2%	55.9%	30.6%	13.6%
Marital Status †				
Married	21.0%	47.3%	33.5%	19.2%
Widowed	46.8%	64.0%	26.6%	9.5%
Separated / Divorced / Never Married	32.1%	44.6%	34.3%	21.2%
Cognitive Function				
Intact	32.5%	53.1%	31.1%	15.8%
Mild Impairment	28.1%	55.1%	30.3%	14.6%
Moderate impairment	39.3%	54.5%	30.1%	15.4%
Activities of daily living †				
Independent, limited assistance	22.3%	58.5%	29.6%	11.8%
Moderate assistance	56.9%	55.4%	30.3%	14.3%
Dependent	20.8%	46.4%	31.9%	21.8%

* Cells with a numerator of 10 or fewer residents suppressed. † 1,726 residents were missing marital status (0.4%), 135 were missing activities of daily living (0.0%).

one (21.0%) or multiple characteristics (22.2%) than from residents not experiencing contextual isolation (21.3%) (Table 2). The absolute difference between incidence proportion of depression in the most contextually isolated residents was within 5% of the cumulative incidence of depression from month 3 to 12 after nursing home admission in residents not experiencing contextual

isolation for all strata examined, with the exception of American Indian/Alaska Native residents (19.6% vs. 10.6%), and Native Hawai'ian and Pacific Islander residents (17.9% vs. 13.2%).

However, after adjustment for age group, gender, race/ethnicity, and need for translation services, the incidence proportion of diagnosed depression from 3 to 12 months

Table 2. Incidence Proportion of Depression (months 3-12 after nursing home admission) in Relation to Contextual Isolation, Overall and Stratified by Resident Characteristics

	Not Contextually Isolated	Contextually Isolated on One Socially Salient Characteristic	Contextually Isolated on Multiple Socially Salient Characteristics
	Incidence proportion		
Total	21.3	21.0	22.2
Sex			
Male	20.4	20.3	21.5
Female	21.8	21.6	23.0
Transgender	_*	_*	_*
Age Group			
40-64 years	19.3	21.5	23.2
65-74 years	22.9	22.0	23.8
75-84 years	23.7	22.6	23.2
85-94 years	20.7	20.4	20.5
95 years and older	16.0	15.0	14.6
Hispanic of any Race(s)	22.6	21.0	21.7
Not Hispanic and...			
White only	22.2	22.4	24.8
Black only	16.6	17.1	18.6
American Indian / Alaska Native only	10.6	17.6	19.6
Asian only	11.8	14.4	15.0
Pacific Islander only	13.2	17.7	17.9
Multiracial	_*	20.1	19.6
Staff needs translator to communicate			
Yes	18.5	18.5	19.4
No	21.4	21.2	22.8
Marital Status			
Married	24.2	23.2	24.1
Widowed	21.1	20.4	21.5
Separated/Divorced/ Never Married	19.9	20.3	21.6
Cognitive Function			
Intact	20.7	21.0	22.2
Mild Impairment	22.3	22.0	23.6
Moderate impairment	21.2	20.4	21.3
Activities of daily living			
Independent, limited assistance	19.5	18.7	19.1
Moderate assistance	21.8	21.6	22.3
Dependent	22.2	21.7	24.0

* Cells with a numerator of 10 or fewer residents suppressed.

Table 3. Adjusted* Incidence Proportion Ratios for Depression, in Relation to Contextual Isolation, Overall, and Stratified by Resident Characteristic

	Contextually Isolated on One Socially Salient Characteristic vs. Not Contextually Isolated	Contextually Isolated on Multiple Socially Salient Characteristics vs. Not Contextually Isolated
Total	1.01 (0.99 - 1.02)	1.08 (1.06 - 1.10)
Sex		
Male	1.00 (0.98 - 1.02)	1.07 (1.04 - 1.09)
Female	1.01 (0.99 - 1.02)	1.09 (1.06 - 1.11)
Transgender	- †	- †
Age Group		
40-64 years	1.06 (1.02 - 1.10)	1.12 (1.08 - 1.17)
65-74 years	0.99 (0.96 - 1.02)	1.10 (1.06 - 1.15)
75-84 years	1.00 (0.98 - 1.02)	1.06 (1.03 - 1.09)
85-94 years	1.02 (1.00 - 1.04)	1.07 (1.04 - 1.11)
95 years and older	0.95 (0.90 - 1.00)	0.97 (0.89 - 1.06)
Hispanic of any Race(s)	0.94 (0.89 - 0.99)	0.98 (0.92 - 1.04)
Not Hispanic and...		
White only	1.01 (0.99 - 1.02)	1.09 (1.07 - 1.11)
Black only	1.01 (0.97 - 1.05)	1.07 (1.03 - 1.12)
American Indian / Alaska Native only	1.61 (1.17 - 2.21)	1.75 (1.25 - 2.45)
Asian only	1.12 (1.00 - 1.25)	1.12 (0.99 - 1.28)
Pacific Islander only	1.36 (0.93 - 1.97)	1.37 (0.93 - 2.02)
Multiracial	- †	- †
Staff needs translator to communicate		
Yes	0.95 (0.89 - 1.01)	0.99 (0.93 - 1.06)
No	1.01 (1.00 - 1.02)	1.08 (1.07 - 1.10)
Marital Status		
Married	0.99 (0.97 - 1.02)	1.07 (1.04 - 1.10)
Widowed	1.01 (0.99 - 1.03)	1.09 (1.06 - 1.12)
Separated / Divorced / Never Married	1.01 (0.99 - 1.03)	1.07 (1.04 - 1.09)
Cognitive Function		
Intact	1.02 (1.00 - 1.04)	1.09 (1.06 - 1.12)
Mild Impairment	1.00 (0.98 - 1.03)	1.10 (1.07 - 1.13)
Moderate Impairment	1.00 (0.98 - 1.01)	1.06 (1.03 - 1.08)
Activities of Daily Living		
Independent, limited assistance	0.98 (0.96 - 1.01)	1.01 (0.97 - 1.05)
Moderate assistance	1.01 (0.99 - 1.03)	1.06 (1.03 - 1.08)
Dependent	1.00 (0.97 - 1.03)	1.11 (1.08 - 1.15)

* Adjusted for age group, gender, race/ethnicity, and need for translation services. Models included a generalized estimating equation approach to account for within-nursing home covariance. † Odds ratios based on one or more cells of 10 or fewer residents suppressed.

was 8% higher (95% confidence interval: 6% higher to 10% higher) among residents experiencing contextual isolation on multiple characteristics than among residents not experiencing contextual isolation (Table 3). In most subgroups, the incidence proportions for diagnosed depression were at least 5% higher for those experiencing contextual isolation on multiple characteristics compared to those not experiencing contextual isolation. Notable exceptions were among Hispanic residents, residents needing translation services to receive care, residents aged 95 years and older, never married residents, and residents with mild impairment of activities of daily living at admission.

Supplemental Tables A through C repeat these analyses after stratification for calendar year and quarter, and Census division. Findings within these strata were similar to those for the whole cohort. Supplemental Table D describes the 3 to 12 month incidence of depression experienced within groups of residents sharing each of the socially salient characteristics considered, and while there are stratum-specific differences, this is beyond the scope of the current analysis, and are included for the ambitious reader.

Discussion

Among newly admitted residents without diagnosed depression, or symptoms of depression, or use of antidepressants at or soon after admission, the 3 to 12 month incidence of diagnosed depression was 21.4% among all eligible residents. This 3 to 12 month incidence was 8% higher among residents experiencing contextual isolation on multiple characteristics than among residents not experiencing any contextual isolation, after adjustment for age group, gender, race/ethnicity, marital status, and need for translation services. In most demographic subgroups, the incidence was at least 5% higher in residents experiencing contextual isolation on multiple characteristics.

Overall, we found a 3 to 12 month incidence of diagnosed depression of 21.4%, and although this was over a shorter period, it was similar to the one-year incidence of depression found in a sample of 4,216 US nursing homes (21.6%) (18), but higher than the 6.4% in a single Maryland memory care nursing home (22), 14.9% in Norway (23), or 13.6% in the Netherlands (24). The incidence of newly diagnosed depression has been shown to be considerably higher in the first 3 months after admission (18), supporting our decision to restrict the observation of incident depression to the period after the first 3 months of residency. Yuan and colleagues also found a high incidence proportion (14%) of diagnosed depression in the first 3 months of a nursing home stay (8). Our findings suggest that the incidence of depression remains high regardless of contextual isolation, which indicates that other important factors contribute substantially to the onset of depression. The

high incidence of depression occurred despite the federal mandate in the United States that requires nursing homes attend to the social needs of residents. That said, we suspect that nursing homes prioritize the medical and functional aspects of care.

While the transition to a nursing home is often associated with disruption of lifelong relationships (25), it may also provide an opportunity to reduce isolation, including for individuals previously living on their own. People entering nursing homes often experience a decline in social engagement in the years leading up to admission (26). A recent study showed that entering and settling into nursing home living was associated with increased social engagement, albeit the social gains experienced varied between sociodemographic groups (27, 28). Thus, admission to a nursing home, particularly for long-term care, is an apt time to consider social isolation and prevention of its sequelae, including depression. Residents often report that friendships within the nursing home are foundational to their sense of belonging (29, 30, 31, 32, 33, 34). Interventions to reduce social isolation and loneliness in older adults include a wide variety of options, many of which involve group activities and/or counseling for individuals at risk of, or already experiencing social isolation (35, 36, 37, 38).

Limitations

Prior research has documented that incidence of depression in the first year of a nursing home stay is comprised of a mixture of both truly incident depression and pre-existing depression recognized only after admission as staff, residents, and family advocates become better acquainted with one another (18). While our decision to exclude depression first recognized in the initial quarter of a nursing home stay likely reduces this potential bias, there may be residents not identified as depressed until after their first 3 months of a nursing home stay. While depression is underdiagnosed in nursing home residents (39), this becomes a particular concern in this analysis if the underdiagnosis of depression is substantially different among contextually isolated residents. It is plausible that the recognition of depression would be lower in residents who are outside the mainstream of the typical population for a given nursing home; however, this would tend to understate the incidence of depression in contextually isolated residents and is thus unlikely to be an explanation for the observed findings.

A resident's status as contextually isolated is merely a statement about their characteristics in relation to those of their co-residents. It does not imply that all such residents feel isolated from the nursing home's social life. Many resident-level and residence-level factors are likely to mitigate or enhance the potential effect of this contextual factor. While these have yet to be identified, we hypothesize that, for example, a socially salient

characteristic shared with a roommate or neighbor may well be more of a source of solidarity than if the nearest resident sharing that characteristic lives in a different unit. Likewise, nursing home staff that cherish the variety of residents they encounter and seek to develop social connections between residents would likely mitigate the potential for adverse consequences of contextual isolation. On the other hand, there are many socially salient characteristics that are likely to be important to a given resident that are not readily measurable using MDS assessments, including such factors as political affiliation, prior work experience, having children, a passion for sports teams, interests in specific types of music, games and puzzles, or other forms of entertainment. Cognitive impairment is likely to mitigate the potential impact of contextual isolation, to the degree that cognitive impairment interferes with a resident's ability to generate and sustain social relationships. We excluded residents with severe cognitive impairment for this reason, but moderate cognitive impairment might still blunt the effect of contextual isolation.

We have no information on the contextual isolation residents may have experienced in their communities before entering the nursing homes. We also do not know what the incidence of depression would have been if they were able to remain at home. To our knowledge, data do not exist to enable future exploration of the impact of the change in exposure to contextual isolation on depression onset. We also did not conduct a mixed-method study. Qualitative data, such as individual interviews, would have helped us better understand the components of perceived contextual isolation. Such information would provide more specific guidance for targeted interventions. Future qualitative research is needed.

Our focus on resident interactions ignores another important source of resident socialization – relationships with staff. While staff interactions contribute materially to the well-being of residents (33, 40, 41), these interactions are often curtailed by demands for high resident throughput and by compensation focused on meeting residents' medical care needs over meeting their social, spiritual, and emotional needs.

Practice Implications

By identifying contextual isolation as a determinant of incident depression among established long-stay residents, who have had an opportunity to settle into the nursing home setting, we hope to provide support for some intuitive measures to improve resident care. For instance, while entry to a nursing home is often associated with significant social disruption (25), it also represents an opportunity to make new connections, especially for new residents coming from relatively isolated community settings. Helping residents make novel connections may be particularly important for residents whose background or mix of socially salient

characteristics leaves them outsiders to the typical mainstream of a given nursing home. On a related note, setting a home-wide expectation that varied experiences are to be cherished, even revered, may help offset the insularity of socially dominant groups, perhaps leading to suspicion and ostracism. By promoting a "resident-centered" approach to assessing a resident's social needs, we hope that recognition of the phenomenon of contextual isolation and its potential impacts will reduce the profound psychological and medical needs resulting from preventable depression.

Research Implications

We intentionally ended eligibility for this study in 2019 because we expect that social connection in nursing homes would be markedly different during the COVID-19 era. An analysis of contextual isolation that accounts for the impact of the COVID-19 pandemic and its aftermath would be worthy of independent investigation after setting a baseline in the pre-COVID era. Future analyses should identify the characteristics of nursing homes that best integrate contextually isolated residents into their social life, so that these approaches can be adopted by nursing homes less able to meet the social needs of these residents. Finally, examination of the construct of contextual isolation itself would be useful to identify which particular socially salient characteristics will have more influence than others. Another valuable inquiry would be to explore the influence of contextual isolation at different proportion cut-points. For instance, women in a minority of 10% or less experience little solidarity or ability to influence decisions in corporate settings, while at 30% ("critical mass"), they are able to influence agendas substantially (19). The percentages at which residents feel highly isolated vs. an integral part of a nursing home's social life remain unexplored.

Conclusions

The incidence of depression was modestly increased in residents who were contextually isolated on multiple characteristics. Nursing homes should consider identifying residents at risk for social isolation and depression due to contextual isolation at admission; foster opportunities for residents to socialize across the social boundaries of race/ethnicity, language use, and marital status; and develop a culture of mutual reverence to build solidarity and social support among residents.

Authorship / CRediT authorship contribution statement: Bill M. Jesdale, Yiyang Yuan, Natalia N. Nielsen and Kate L. Lapane each contributed to the conceptualization of the analysis, and contributed to the interpretation and writing of manuscript, including the original drafting, review, and editing. Dr. Jesdale curated the data and conducted the formal analyses. Dr. Lapane acquired funding for the analysis and is the corresponding author.

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