Social inequalities in the occurrence of suicidal ideation among older primary care patients

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Abstract

Objectives—To examine whether there is an association between area socioeconomic status and the experience of suicidal ideation among older adults.

Design—Secondary analyses of data from a prospective study of naturalistic outcomes of depressive symptoms

Setting—Monroe County, NY

Participants—A cohort of older adults (≥65 years, N=515) attending primary care settings

Measurements—Area socioeconomic status was based on the median household incomes of the census tracts in which participants lived. At six and twelve month follow-ups, the Longitudinal Interval Follow-up Evaluation was used to assess weekly depressive symptom status over the previous 6 months, which was used to construct a measure of any suicidal ideation during the study.

Results—Residents of census tracts with median household incomes of less than $30,000/per year were more likely to experience suicidal ideation than residents of higher income census tracts (unadjusted odds ratio (OR), 4.60; 95%CI, 1.64–12.86). Adjustment for demographic and baseline clinical factors did not eliminate the association (OR, 5.44; 95%CI, 1.71–17.24). Subsequent

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models that adjusted for medical, functional, and psychosocial variables did not explain this association, either.

Conclusions—There is a robust association between lower census tract income and the occurrence over one year of suicidal ideation in a primary care cohort of older adults. These findings indicate the need for more research into how social worlds come to influence the emotional well-being of older adults, and whether social factors such as census tract income can be used to identify individuals at elevated risk for suicidal behavior.

Keywords

suicidal ideation; socioeconomic status; neighborhood effects; older adults

OBJECTIVE

An estimated 5–10% of older adults (≥65 years) experience suicidal ideation (1), with the rate rising to as high as 30% among those individuals diagnosed with major depression (2). Two factors make suicidal ideation an issue of concern in primary care. First, it is a predictor of suicide attempts in late-life. Thus, it is reasonable to assume that detecting suicidal ideation, and addressing the clinical issues that are associated with it – depression, anxiety, feelings of guilt and worthlessness, poor social support, and bereavement, history of prior suicide attempts (3–5) – will reduce suicidal behaviors in older adults (2,6). Second, most at-risk older adults come into contact with a primary care physician, but few are seen in specialty mental health services (7). Detection could facilitate appropriate referrals.

Much of the research about suicidal ideation in older adults has focused on psychopathology (2,3,6,8–10). However, for more than a century suicide has been recognized as a social phenomenon, too (11). Support for this comes from evidence demonstrating that high rates of suicide in general populations are, for example, related to low socioeconomic status (7), or associated with political violence (12) and crises in national economies (13). Evidence suggests that the same associations are true for suicidal ideation (14). For example, suicidal ideation has been found to be inversely associated with income and employment status (15), and directly associated with financial strain (16). Little is known, however, about social inequalities in suicidal ideation, independent of psychopathology, and among older adults, specifically.

The present study, which consisted of secondary analyses of data from a prospective study of naturalistic outcomes of depressive symptoms among older adults (≥65 years) (17), was conducted to examine whether there is an association between area socioeconomic status (as measured by census tract median household income and individual educational attainment) and suicidal ideation in a primary care cohort of older adults. We hypothesized that participants who lived in relatively low income neighborhoods would report more suicidal ideation than participants who lived in higher income neighborhoods and that this relationship would remain significant even when controlling for the clinical (severity of depression symptomatology at baseline, treatment for depression, and evidence of alcohol abuse) and medical (overall medical burden) characteristics of participants, as well as a range of other factors (functional status, social support, life events, and religiosity). The basis for this hypothesis derives from research that has demonstrated an association between the characteristics of neighborhoods and levels of depressive symptoms in older adults independent of individual-level risk factors (18) and that census tract median household income is associated with the occurrence of suicidal ideation in a clinical sample of older adults receiving treatment for late-life depression (19). More broadly, our hypothesis emerges from research about the association of neighborhood characteristics and the health of older adults (20).

METHODS

Participants

Participants were adults aged 65 years and over who took part in a prospective cohort study of naturalistic outcomes of depressive symptoms (17). The study attempted to recruit all patients, whether or not they were experiencing symptoms of depression, who attended primary care offices in internal or family medicine clinics in the Rochester, NY area. Of 1500 older adults approached, 749 consented and were interviewed in their homes or at the University of Rochester Medical Center. Interviews were conducted by trained research assistants. The great majority (N=694, 94%) of the sample lived in Monroe County, NY. Because we used annual income categorizations based on distributions in Monroe County, these subjects were the focus of the present analyses. Of these, 515 individuals had follow-up data on suicidal ideation and complete data on educational status, as well as baseline factors of interest for the primary analyses (gender, race/ethnicity, baseline depression symptom severity, illness burden, physical functioning). Secondary analyses to examine additional potential predictors (social support, levels of religious involvement, stressful life events, alcohol abuse/dependence diagnosis, anti-depressant treatment, impairments in instrumental activities of daily living and physical self-maintenance), employed samples ranging from N=499 to 515.

Measures

At 6 and 12 months, assessments of weekly depressive symptom status over the preceding 6-month period were conducted using the Longitudinal Interval Follow-up Evaluation (LIFE) (21). The LIFE, which has been validated for use in establishing depressive symptom course, determines "change points" in depressive symptoms over time by cross-referencing events such as holidays, birthdays, and physician visits. For each week, the level of each of the nine DSM-IV depression symptoms are judged as "absent," "subthreshold," and "threshold," based on Structured Clinical Interview for the DSM-IV (SCID) criteria (22). The suicidal ideation item was explored with probe questions: "[over the week in question] Were things so bad that you were thinking a lot about death or that you would be better off dead? What about thinking of hurting yourself?" The corresponding SCID item inquires about "recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide." Suicidal ideation was considered present if it met full threshold levels on the SCID, thus excluding more transient or less severe thoughts of death. The primary outcome was whether or not subjects experienced at least one week of threshold suicidal ideation over the follow-up year.

The addresses of participants at enrollment were geocoded using ArcGIS Version 9.2 with New York State Accident Location Information System street data (23). Ninety-nine percent (N=738 of 749) of the addresses all the participants were successfully geocoded and spatially joined to Census Tract (CT) geographies and the associated median household income data. The primary risk factor was the lowest tertile of Monroe County CT median household income (< $30,000/year), according to the 2000 US Census Bureau (http://factfinder.census.gov). The upper two tertiles were combined to form the reference group for analysis because preliminary analysis revealed that risk for suicidal ideation was markedly different between the lowest and middle tertile, but nearly identical across the middle and highest tertile..

Baseline depression status was assessed with the 24-item version of the Hamilton Depression Rating Scale (HDRS) (24), which captured symptom severity, including suicidal ideation, in the previous week.

Baseline medical illness burden, which is associated with increased risk of late-life depression (25) and suicidal ideation (5), was assessed with the Cumulative Illness Rating Scale (CIRS) (26). Scores represent the level of disease severity across major organ systems. A physician investigator (JML) completed the CIRS after reviewing primary care charts and information obtained from interviews with participants. Higher scores indicate greater illness burden.

Functional status, which is associated with depressive symptoms (27) and suicidal ideation (28) in older adults, was assessed with two interview scales and one physician-rating scale: the Instrumental Activities of Daily Living and Physical Self Maintenance Scales (IADL/PSMS) (29), which are complementary indexes of the extent of impairment in eight essential activities of daily living (e.g., cooking, shopping, and housekeeping), and in six basic physical self-maintenance activities (e.g., feeding, dressing, and grooming). Higher scores indicate worse function. The Karnofsky Performance Status Scale (KPSS) (30) was completed by a physician investigator (JML). Scores range 0–100 with 100 representing normal physical functioning, and scores of 10 or below indicating imminent death.

Baseline status of treatment for depression was captured by the Composite Antidepressant Score (31), and cross-validated by reviewing primary care charts. It was coded dichotomously as the presence or absence of a prescription for antidepressant medication. This measure does not reflect either the degree of medication adherence or whether a participant was receiving another type of intervention for depression.

Social support, which has been associated with depression (32) and suicidal ideation (33) in older adults, was assessed at baseline using the interviewer-administered 23 item Duke Social Support Index (DSSI) (34), which taps three interrelated constructs of social interaction, instrumental support, and perceived social support. Higher scores indicate greater social support.

Research suggests that higher levels of religious involvement are associated with lower levels of distress and suicidal ideation (35). In this study, religious involvement was measured at baseline using the interviewer administered 5-item Duke Religion Index (DUREL) (36), which assesses organizational, non-organizational, and intrinsic religiosity. A single composite score was used in the present analyses. Higher scores indicate greater religious involvement.

Stressful life events have been shown to have a role in the etiology of late-life depression, as well as influencing its course and outcome (37). The presence or absence of an event in the past 6 months that participants perceived as stressful was assessed at baseline using the interviewer administered Louisville Older Persons Event Schedule (LOPES) (38). As a dichotomous variable, this measure does not assess the relative severity of events.

The SCID-IV (22) was administered at baseline to assess the presence of active alcohol or substance, anxiety, and major or minor/subsyndromal depressive diagnoses according to DSM-IV criteria (39). The algorithms for determining the presence of subsyndromal depression are described elsewhere (17).

Statistical Analyses

Risks for suicidal ideation were investigated by fitting a series of logistic regression models predicting whether or not participants reported at least one week out of the follow-up year at threshold levels of SI, and included random intercepts for each census tract in order to account for the nesting of individuals within tracts (40,41). We began with a bivariate model of the unadjusted relative risk of threshold SI in older adults residing in low vs. middle or

high CT median household income neighborhoods (Model 1). Model 2 adjusted for an individual-level socioeconomic indicator, education (high school or less, some college, college or greater) and demographic factors (age, gender, and race/ethnicity). Model 3 adjusted for baseline severity of depressive symptoms, implementing an indicator for sub-threshold levels of depression or above (HDRS >10), and indicators for high medical burden (CIRS >7, i.e., above the sample mean) and low functional status (KPSS <79, i.e., below the sample mean). The HDRS, KPSS, and CIRS were dichotomized to obtain more conservative CT income estimates, as preliminary analyses revealed that treating them as continuous covariates led to OR estimates for low CT median household income roughly 35% higher, and of comparable statistical significance.

With respect to statistical inference, we were interested in testing the hypothesis that lower area SES is associated with higher odds for suicidal ideation. We also fitted extended models in which we examine whether this hypothesized association would be explained by various candidate covariates. All p-values are the result of z-statistics from Wald tests.

RESULTS

Of the 738 participants with geocodable addresses, 44 were excluded because they lived in counties neighboring Monroe county; 177 could not be followed-up at 1 year; and 2 lacked data on one or more primary covariates. Participants included in the primary analysis sample (N=515) did not differ from the other participants who resided in Monroe County, but were excluded because of missing data (N=179) with respect to age, gender, or years of education, but were less likely to be minorities (OR, 0.51; 95% CI, 0.28–0.95, z = −2.1, p = .035), and less likely to have HDRS scores of >10 (OR, 0.62; 95% CI, 0.43–0.89, z = −2.55, p = .011). The participants who comprised the primary analysis sample resided in 89 different census tracts (average 5.8 participants per tract, range of 1 to 38).

Table 1 provides descriptive statistics on a number of baseline characteristics for the sample as a whole and stratified by middle/high and low CT median household income. Participants who lived in middle and high income census tracts were better educated (higher proportion of college graduates), less likely to be a member of an ethnic minority, less likely to be living alone, and had higher levels of perceived social support and social interactions. The risk of suicidal ideation was significantly higher among individuals residing in low income census tracts (11.8%) than among individuals residing in middle and high income census tracts (2.9%). No differences between participants in the two CT median household income groups were observed in regard to age, gender, physical health and functioning (CIRS, IADL, PSMS, and KPSS), instrumental social support, degree of religious activity, SCID diagnoses for depression (major and minor/subsyndromal) and alcohol abuse or dependence, severity of depressive symptoms (HDRS), or report of receiving a prescription for antidepressant medication.

Table 2 presents the results of the models examining the association between CT median household income and the odds of at least one week at threshold level of suicidal ideation over the follow-up year. Unadjusted for other factors (Model 1), compared to residents of CTs with middle or high median household incomes, residents of CTs with low median household incomes were more than four and a half times as likely to experience threshold suicidal ideation during the 12 months of follow-up. Adjusting for sociodemographic factors (Model 2), as well as depression (Model 3) did not diminish the effect. Model 3 (Table 2) appeared to fit the data well, resulting in an Area Under the Receiver Operating Curve of .87 (95% CI = .80–.93), meaning that the model discriminated positive cases with a high degree of accuracy. Secondary analyses using depression diagnosis rather than HDRS scores also indicated a significant association between CT median household income and the occurrence

of suicidal ideation (adjusted OR=5.34, 95% CI=1.54–18.48, z=2.64, p=.008). An additional model that included baseline measures of medical burden, functional impairment, the three Duke social support scales, and whether or not the subject was living alone, did not reduce the effect of CT median household income (adjusted OR=4.65, 95% CI=1.47–14.73, z= 2.61, p .009).

CONCLUSIONS

The analyses reveal a robust association between CT median household income and the occurrence over one year of suicidal ideation in a primary care cohort of older adults. Unadjusted analysis revealed that residents of census tracts with low median household incomes were about four and a half times as likely to experience suicidal ideation during the follow-up year than those residing in census tracts of high median household income. Adjusted analyses indicated that this effect could not be explained by a number of clinical and social factors. In contrast, educational status, which is often considered a principal component of socioeconomic status, was not a predictor of suicidal ideation. This latter finding is consistent with previous research (19), and lends support to the notion that the effect of educational status may play a lesser role in determining the health and well-being of older adults (42).

Previous research suggests that depression is the major predictor of suicidal ideation among older adults (43). The analyses reported here are consistent with these findings: the severity of depression at baseline (as measured by HDRS scores) was associated with an elevated risk of threshold suicidal ideation. However, including HDRS scores in the models did not change the effect of residence in a CT with low median household income, nor did a range of other potential social and clinical factors, underscoring the likelihood that residence in low-income neighborhoods acts as an independent risk factor for suicidal ideation in older adults.

Why might older adults who lived in census tracts in which median household incomes were $30,000 or less have elevated risk of experiencing suicidal ideation during a follow-up period of 12 months? A number of factors have been cited as possibly underlying the relationship between neighborhoods and health, including levels of poverty (44), ethnic composition (45), nature of the built environment (46), and levels of violence (47). In regard to older adults, specifically, research has demonstrated that older adults who live in poor neighborhoods are at elevated risk of depression (18) and poor response to antidepressant treatment (19). Descriptive statistics of our sample (Table 1) indicate several factors vary according to census tract median household income and may account for neighborhood variation in the occurrence of suicidal ideation: race/ethnicity, perceived social support, levels of social interaction, and proportion of persons living alone. However, the effects of CT median household income remained significant in regression analyses that controlled for these factors.

The research reported here has several limitations. First, while we examined the effects of individual education, individual data on income was unavailable, and the use of census tract data on the median household income of neighborhoods individuals without adjustment for individual level income may over-attribute risk to contextual, rather than compositional economic influences. Second, while the base rate of individuals experiencing suicidal ideation is consistent with previous reports of older primary care patients, the study sample was not recruited through random sampling of all census tracts in the county. Therefore, the number of individuals with suicidal ideation in the sample was small, and the precision of our estimates of risk was low. Future research may wish to recruit larger samples in order to obtain more precise estimates of the risk of suicidal ideation conferred by low CT median

household income in non-psychiatric samples. Third, it is possible that some respondents met criteria for threshold suicidal ideation but were, in fact, experiencing recurrent thoughts of death that were not associated with thoughts of self-harm. However, we have little reason to believe that the residents of the lower income neighborhoods were disproportionately reporting death, rather than suicidal ideation. Even if this was the case, our findings are an indication of elevated levels of distress among residents of poorer neighborhoods. Thus, there remains considerable uncertainty regarding the magnitude of the association between census tract income and suicidal ideation, which ranged from relatively small to substantial. Fourth, the analyses reported here are limited by the data collected in the original study and, thus, we were not able to examine potential mediators and moderators. Fifth, the study sample included only about one-third of the potential subjects, and those in the study sample were more likely to have HDRS scores >10 compared to other subjects who lived in Monroe County. Together these factors suggest the possibility of sample bias and raise the question of whether area SES would have remained a significant predictor if data from all potential subjects had been included in the analyses. These limitations aside, the analyses reported here were intended to build on previous research (19,48) by documenting the independent effect of socioeconomic status on the occurrence of suicidal ideation among older adults, even when controlling for a wide range of clinical and sociodemographic factors.

The study was also characterized by a number of strengths, including a prospective design, coverage of a wide variety of demographic and clinical covariates, and labor-intensive, highly validated assessments of psychopathology, functional status, and quality of life, supplemented by information from official medical records. It is also, to the best of our knowledge, the first study to document an association between CT median household income and suicidal ideation over a one year follow-up period in a cohort of older adults. Thus, the study constitutes an important preliminary investigation that raises questions for future work about the association between neighborhood characteristics and suicidal ideation in older adults. Further work on the nature of this association, and the mechanisms through which it operates, appears warranted, and may lead to more effective interventions for prevention of suicidal behaviors among older adults. For example, census tract median household income may be a proxy for a range of factors, including, individual income, accumulated wealth, safety of neighborhoods, or access to health and social services, and further research is necessary to precisely determine why residents of certain neighborhoods experience higher rates of suicidal ideation than residents of other neighborhoods. More generally, the findings reported here suggest that future research on predictors of suicidal ideation in older adults must not be confined to a focus on demographic and clinical factors, but must expand the search to an examination of the processes by which social and physical worlds place older adults at elevated risk for suicidal behaviors.

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Table 1

Descriptive statistics: older adults attending primary care settings in Monroe County, NY

	Overall Sample M/N (SD/%)	Middle/High CT Income (≥$30K/year) n=447 M/N (SD/%)	Low CT Income (< $30K/year) n= 68 M/N (SD/%)	t or X^2 (df), p-value
Independent Variable				
Census Tract median income	$54,781 ($20,867)	$59,820 ($17,393)	$21 658 ($6,621)	t (513)=−17.88, p<.001
Primary Demographic Covariates				
Age (years)	75.3 (6.8)	75.3 (6.8)	74.8 (7.0)	t (513)= .61, **p= .542**
<u>Gender</u>				
Female	318 (61.7%)	278 (62.2%)	40 (58.8%)	X^2 (1)=.28, **p = .594**
Male	197 (38.3%)	169 (37.8%)	28 (41.2%)	
<u>Race</u>				
Caucasian	480 (93.2%)	432 (96.6%)	48 (70.6%)	X^2 (1)=63.26, p<.001
Minority	35 (6.8%)	15 (3.4%)	20 (29.4%)	
<u>Education</u>				
High School or Less	177 (34.4%)	136 (30.4%)	41 (60.3%)	X^2 (2)=24.77, p<.001
Some College	107 (20.8%)	95 (21.3%)	12 (17.7%)	
College	231 (44.9%)	216 (48.3%)	15 (22.1%)	
Baseline Depression, Illness Burden, and Physical Functioning				
<u>Depression Diagnosis (SCID)</u>				
Major Depression	22 (4.3%)	19 (4.3%)	3 (4.4%)	X^2 (2)=1.38, **p = .502**
Minor/Subsyndromal	184 (35.7%)	164 (36.7%)	20 (29.4%)	
No Depression	309 (60.0%)	264 (59.1%)	45 (66.2%)	
Hamilton Depression Rating Scale (HDRS)	8.4 (5.8)	8.3 (5.9)	8.6 (5.4)	t (513)=−.38, **p = .704**
Cumulative Illness Rating Scale (CIRS)	7.4 (2.9)	7.3 (2.9)	7.7 (3.4)	t (513)= −1.07, **p = .283**
Karnofsky Performance Status Scale (KPSS)	79.0 (12.5)	79.1 (12.5)	78.0 (1.5)	t (513)=.73, **p = .469**
Other Candidate Risk Factors				
Instrumental Activities of Daily Living (IADL)	1.8 (3.6)	1.7 (3.5)	2.4 (4.3)	t (511) = −1.54, **p = .124**
Physical Self Maintenance Scale (PSMS)	1.5 (2.0)	1.5 (2.0)	1.8 (2.1)	t (511)= −1.47, **p = .141**
Duke Perceived Social Support (DSSI)	19.5 (2.2)	19.6 (2.1)	18.8 (2.9)	t (501)=2.86, p=.004

	Overall Sample M/N (SD/%)	Middle/High CT Income (≥$30K/year) n=447 M/N (SD/%)	Low CT Income (< $30K/year) n= 68 M/N (SD/%)	t or X^2 (df), p-value
Duke Instrumental Social Support	15.1 (2.3)	15.1 (2.3)	15.3 (2.8)	t (497)= −.86, **p = .388**
Duke Social Interaction	8.9 (1.6)	9.0 (1.6)	8.5 (1.6)	t (502)=2.07, p = .039
Duke Religion Scale (DUREL)	18.6 (6.4)	18.6 (6.3)	18.6 (7.0)	t (503)=.01, p = .985
Stressful Event (LOPES)				
No	350 (69.3%)	309 (70.6%)	41 (61.1%)	X^2 (1)=2.39, **p = .122**
Yes	**155 (30.7%)**	129 (29.5%)	26 (38.8%)	
Alcohol Diagnosis (SCID)				
No	498 (96.7%)	432 (96.7%)	66 (97.1%)	X^2 (1)=.03, **p = .859**
Yes	17 (3.3%)	15 (3.4%)	2 (2.9%)	
Living Alone				
Yes	187 (36.3%)	149 (33.3%)	38 (55.9%)	X^2 (1)=12.98, p<.001
No	328 (64.7%)	298 (66.7%)	30 (44.1%)	
Antidepressant Treatment				
none	407 (79%)	309 (70.6%)	41 (61.2%)	X^2 (1)=.52, **p = .470**
any	108 (21%)	129 (29.4%)	26 (38.8%)	
Dependent Variable				
Suicidal Ideation Presence (LIFE)				
Not present over year	494 (96.1%)	434 (97.1%)	60 (88.2%)	X^2 (1)=11.84, p=.001
Present at least 1 week	21 (4.1%)	13 (2.9%)	8 (11.8%)	

Note: Results from independent samples t-tests and chi-square tests of independence. Degrees of freedom for each test statistic are in parentheses.

Table 2

Association between CT median income and risk of threshold suicidal ideation

	Unadjusted Model 1[1] OR; 95% CI z; p	Adjusted Model 2[2] OR; 95% CI z; p	Adjusted Model 3[3] OR; 95% CI z; p
SES			
CT median household income			
Higher	Reference	Reference	Reference
Lower	**4.60 (1.64–12.86) 2.41; .004**	**5.01 (1.51–16.60) 2.64; .008**	**5.44 (1.71–17.24) 2.95; .003**
Education			
High School or less	Reference	Reference	Reference
Some College		0.84 (0.42–2.99) −.27; .788	0.71 (0.20–2.27) −.28; .779
College or Greater		0.82 (0.27–2.51) −.351 .726	1.38 (0.44–4.42) .25, .801
Demographics			
Age (years)		.98 (0.92–1.05) −.52; .601	.98 (0.91–1.06) −.20, .838
Gender			
Male		Reference	Reference
Female		2.30 (0.76–6.96) 1.47; .141	2.37 (0.76–7.45) 1.33, .182
Race/Ethnicity			
Caucasian		Reference	Reference
Minority		.78 (.17–3.70) −.31; .759	.49 (.10–2.43) −.55, .584
Baseline Depression			
HDRS < 10			Reference
HDRS ≥10			**7.85 (2.70–23.02) 4.14, < .001**

[1] Unadjusted relative risk of threshold SI in older adults residing in low vs. middle or high CT median household income neighborhoods

[2] Model 2 included an individual-level socioeconomic indicator, education (high school or less, some college, college or greater) and demographic factors (age, gender, and race/ethnicity)

[3] Model 3 included baseline severity of depressive symptoms, implementing an indicator for sub-threshold levels of depression or above (HDRS >10), and indicators for high medical burden (CIRS >7, i.e., above the sample mean).

[4] P-values are obtained from z statistics and corresponding p-values are from Wald tests.