

Pain and Self-Injury Ideation in Elderly Men and Women Receiving Home Care

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OBJECTIVES: To investigate the associations between self-injury ideation and pain severity, pain control, and their combination in older adults receiving home care and to examine sex differences in the associations.

DESIGN: Secondary data analysis, mixed-model repeated-measures design.

SETTING: Two publicly funded home care programs in Michigan.

PARTICIPANTS: Elderly participants of home care programs (N = 16,700).

MEASUREMENTS: All participants received in-home assessments at baseline and every 3 months thereafter using a standardized instrument that included questions about self-injury ideation and pain experience. Assessment data collected over 1 year after baseline were used.

RESULTS: Participants' average age was 77.5; 72.2% were female, and 81.4% were white. At baseline, 1.4% of the sample (2.1% of men and 1.2% of women) had self-injury ideation. The risk of self-injury ideation in men increased with pain severity (some pain: adjusted odds ratio (AOR) = 1.88, 95% confidence interval (CI) = 1.12–3.13; severe pain: AOR = 2.36, 95% CI = 1.29–4.30) and pain control (controlled by medication: AOR = 1.81, 95% CI = 1.08–3.04; uncontrolled by medication: AOR = 3.39, 95% CI = 1.45–7.95). Men with severe and uncontrolled pain were at especially high risk (AOR = 4.10, 95% CI = 1.37–12.28). No measures of pain were significantly associated with self-injury ideation in women. Sex differences in the association between pain severity and self-injury ideation were significant at $P < .05$.

CONCLUSION: Pain in older adults receiving home care should be taken seriously and treated as one means to

reduce risk of suicide. Pain assessment should include severity and control of pain. In men, complaints about pain should prompt questioning about self-injury ideation. *J Am Geriatr Soc* 58:2160–2165, 2010.

Key words: suicidal behavior; deliberate self-harm; mental health; long-term care; frail older adults

Because older persons have among the highest suicide rates of all age groups in the United States,¹ research to identify risk factors for suicidal behaviors in older adults is greatly needed. Suicidal behaviors range from ideation to actual attempt. This study examined the associations between self-injury ideation and pain experience in older persons receiving home care—a segment of the elderly population that may be at high risk for suicide.²

Pain has some unique characteristics—intrusive, attention demanding, interrupting ongoing activities, physically unbearable, and difficult to “escape”—that are likely to invoke feelings of defeat and hopelessness, which in turn may elicit suicidal thoughts.^{3,4} Some early studies have reported that people experiencing chronic pain were about three times as likely as those who were not to have suicidal ideation and that suicide attempt was twice as frequent in people experiencing pain as in those who were pain free.⁵ These early studies tended to use small clinical samples and did not control for potential confounding variables. A few population-based studies have also reported that pain was a strong correlate of suicidal ideation and suicide attempt, even after controlling for mental disorders such as depression,^{6–8} but cross-sectional designs and measurement concerns (e.g., defining pain as a “current” condition and suicidal ideation as “lifetime” or “past-year”) limit their findings. Little relevant research has focused on the elderly population (with a few exceptions^{9,10}), despite the prevalence of pain and suicide in older people.

Pain is a personal experience that has multiple aspects, one of which is severity. Intuitively, severe or excruciating pain should be more likely to trigger suicidal thoughts than

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less-severe pain, but some studies have reported no association between pain severity and suicidal behavior.^{11,12} Another aspect of pain experience is how much it is perceived to be under control. Analgesic medication, for example, when it adequately reduces pain that would otherwise be intolerable, offers an alternative to ending one's life. Reports of pain severity and pain control are likely to be correlated, and their effects on self-injury ideation may depend on each other. A better understanding of how these two aspects of pain are related to suicidal ideation will help to guide development of interventions to prevent suicide in the context of pain.

Some prior studies have implied sex differences in the association between pain and suicidal behavior. For example, it was reported that the association between severe pain and suicide was somewhat stronger for men (odds ratio (OR) = 9.9) than women (OR = 3.3).¹³ A recent study reported that, in older adults receiving home-delivered meals, chronic pain was associated with suicidal thoughts in men but not in women.⁹ The current study used multiwave longitudinal data collected from a large sample of older adults receiving home care to investigate the associations between pain severity, pain control, and their combination with self-injury ideation. Whether the associations differ between men and women was also examined.

METHODS

Data Source and Sample

Original data for this secondary data analysis were collected from elderly participants in two publicly funded home- and community-based long-term care programs in Michigan: Medicaid Waiver and Care Management. Both programs aim to support older persons who are eligible for nursing home care to stay in their home by providing supportive services. An income limit (Medicaid eligible) applies to Waiver participants and an age limit (≥ 60) to Care Management participants. For care planning purposes, case managers (social workers or nurses) assess all program participants at baseline and approximately every 3 months thereafter using the same instrument (Minimum Data Set for Home Care (MDS-HC)). Assessments are conducted through home visits and based on all sources of information.

For this analysis, assessment data over 1 year from baseline of individuals aged 60 and older who enrolled in the Waiver or Care Management program between 1999 and 2003 were extracted. Those who had no severe cognitive impairment at baseline (scored ≤ 3 on the MDS Cognitive Performance Scale (CPS))¹⁴ were eligible. Also, only those who had been assessed at least twice (so as to estimate lag effects of pain on self-injury ideation) during the 1-year period were selected ($N = 16,700$).

The analyzed sample was significantly different in several sociodemographic and health characteristics from those who were eligible but excluded, because they had fewer than two assessments ($n = 4,837$). To assess potential sample selection bias, the analyses were repeated using the baseline cross-sectional data from all eligible participants; similar patterns of results were found as those we report below.

Variables and Measures

Self-Injury Ideation

Self-injury ideation was measured according to a single item in the MDS-HC asking participants whether they had "considered self-injurious behavior in the last 30 days," recorded as yes or no.

Pain Severity

Pain severity was based on two items in the MDS-HC. The first recorded how frequently participants complained about pain, with three response categories: no pain, pain less than daily, and pain daily. If participants reported pain, a follow-up question asked whether the pain was intense, with two response options: yes and no. Adapting an approach used in a prior study,¹⁵ these two items were used to form three levels of pain: no pain, some pain, and severe pain.

Pain Control

Another item in the MDS-HC asked participants whether medication offered control of their pain. Response categories included no pain, medication partially or fully controlled pain, and medication offered no control.

Pain Combining Severity and Control

To examine the combined effect of pain severity and control, a variable with five mutually exclusive categories was formed: no pain in severity or control, some pain controlled by medication, severe pain controlled by medication, some pain not controlled by medication, and severe pain not controlled by medication.

Health Covariates

The analysis adjusted for physical disability, cognitive function, disease burden, and cancer. Physical disability was indicated according to number of limitations in activities of daily living (ADLs) and instrumental activities of daily living (IADLs). ADLs were assessed using eight (e.g., dressing, eating, bathing) and IADLs using seven (e.g., preparing meals, managing finances, using the telephone) items. Cognitive function was measured using the MDS CPS, which has seven levels ranging from 0 (cognitively intact) to 6 (very severe cognitive impairment).¹⁴ (The analyzed sample excluded those scored 4 or higher, representing severe levels of cognitive impairment, on the CPS at baseline.) A dichotomous variable (cognitively intact vs not intact) was used to indicate cognitive function. Disease burden was indicated according to the total number of chronic illnesses, of 41, that the participant had. Cancer was represented according to a dichotomous variable indicating whether the participant had had cancer in the past 5 years.

Psychiatric Disorders

Depressive and anxiety disorders, both dichotomously coded, were included as control variables. They were based on a record of current diseases in the MDS-HC that defined disease as one that "doctor has indicated is present and affects client's status, requires treatments, or requires symptom management."

Sociodemographic Covariates

Sociodemographic covariates were age, race (white vs nonwhite; 98% of nonwhite were African American),

education (\geq high school graduate vs $<$ high school), living arrangements (living alone vs with others), and sex (female vs male).

Time and Number of Assessments

Time (in months) after enrollment and number of assessments in the 1-year period were used as covariates to account for changes in self-injury ideation due to the passage of time and the probability of being observed.

Data Analysis

Repeated-measures mixed models were used to estimate the lag effects of pain measures on self-injury ideation (i.e., pain was used as a time-varying independent variable predicting self-injury ideation in the following assessment). The models adjusted for time-varying variables (psychiatric disorders, health covariates, and time) measured at the same time as pain and sociodemographic characteristics. Because self-injury ideation was a dichotomous outcome, Bernoulli Hierarchical Generalized Linear Models were estimated using 6.04 HLM (Scientific Software International, Chicago, IL). Sixteen thousand seven hundred individuals and 49,200 person-records were included in the analysis.

Male and female samples were analyzed separately first, then sex differences were tested by including product terms of sex and pain measures in models using the total sample. Most study variables had missing data. The highest percentage missing was ADL limitations (14.9%). If conducting complete case analysis, 33% ($n = 5,511$) of the sample would have been lost. Therefore, multiple imputation was undertaken using 2.03 NORM.¹⁶ Three imputed datasets were analyzed. The final estimates and standard errors combined results from the three analyses. Significance was set at $P < .05$.

RESULTS

Descriptive Information of the Sample and Study Variables

Characteristics of the sample are presented in Table 1. At baseline, the average age of participants was 77.5; 72.2% were female, 81.4% were white, 52.5% had less than a high school education, 69% were not married, and 56.2% were living with someone. On average, they had 6.6 chronic conditions and experienced limitations in 3.4 ADLs and 5.7 IADLs; 43.4% of the sample were cognitively intact, 13.9% had cancer, 34.8% had depression, and 19.6% had anxiety disorders.

With regard to pain severity, 25.2% of the sample reported no pain, 46.0% had some pain, and 28.9% had severe pain. For pain control, 25.7% reported no pain, 71.3% said that medication controlled their pain, and 2.9% said that medication offered no control. As expected, pain severity and control were significantly correlated ($\chi^2(4) = 15,418$, $P < .001$); more severe pain was less likely to be controlled by medication.

Combining the two measures, 26.2% of the sample had no pain, defined as reporting no pain in severity or control, 43.7% had some pain controlled by medication, 27.2% had severe pain that was controlled, 1.4% had some pain that was not controlled, and 1.5% had severe pain that was not

Table 1. Characteristics of Study Participants at Baseline

Characteristic	Total Sample (N = 16,700)	Men (n = 4,643)	Women (n = 12,057)
Age, mean \pm SD	77.5 \pm 8.7	76.5 \pm 8.7	77.9 \pm 8.6
White, %	81.4	82.1	81.1
\geq High school education, %	47.5	44.6	48.7
Married, %	31.0	53.8	22.2
Living alone, %	43.8	30.3	49.0
Medicaid Waiver Program, %	51.6	49.0	52.5
Number of activity of daily living limitations, mean \pm SD	3.4 \pm 2.6	3.7 \pm 2.7	3.3 \pm 2.6
Number of instrumental activity of daily living limitations, mean \pm SD	5.7 \pm 1.3	5.9 \pm 1.3	5.7 \pm 1.3
Cognitive function intact, %	43.4	39.0	45.1
Depressed, %	34.8	31.6	36.0
Anxiety disorders, %	19.6	14.8	21.4
Cancer, %	13.9	18.8	12.0
Number of chronic diseases, mean \pm SD	6.6 \pm 3.1	6.3 \pm 3.1	6.8 \pm 3.1
Pain severity, %			
No pain	25.2	33.9	21.9
Some pain	46.0	42.0	47.5
Severe pain	28.9	24.1	30.6
Pain control, %			
No pain	25.7	34.2	22.5
Controlled by medication	71.3	62.6	74.7
Not controlled by medication	2.9	3.2	2.8
Pain combining severity and control, %			
No pain	26.2	34.8	23.0
Some pain, controlled	43.7	39.6	45.2
Severe pain, controlled	27.2	22.4	29.0
Some pain, not controlled	1.4	1.6	1.4
Severe pain, not controlled	1.5	1.6	1.5
Self-injury ideation, %	1.4	2.1	1.2

Men and women were significantly different ($P < .001$) in all characteristics except race.

SD = standard deviation.

controlled. About 1.4% of the sample had self-injury ideation at baseline. Of all person-records, 1.1% (565/49,200) were positive for self-injury ideation.

Table 1 displays sample characteristics according to sex. Male and female participants were significantly different in all sociodemographic and health characteristics except race. They also differed in pain experience, with women more likely to report some or severe pain and that medication offered control of their pain. Men (2.1%) were more likely to have self-injury ideation than women (1.2%) at baseline; 1.7% (225/13,269) of person-records in men and 0.9% (340/35,931) in women had positive self-injury ideation response.

Effects of Pain Severity on Self-Injury Ideation

Using repeated-measures mixed models, the lag effects of pain severity on self-injury ideation were estimated for each

Table 2. Estimates of Pain Severity and Covariates from Repeated-Measures Mixed Models Predicting Self-Injury Ideation

Independent Variables	Adjusted Odds Ratio (95% Confidence Interval)		
	Men	Women	Total Sample
Pain severity (no pain)	1	1	1
Some pain	1.88 (1.12–3.13) .02	0.96 (0.65–1.43) .85	1.88 (1.13–3.11) .01
Severe pain	2.36 (1.29–4.30) .005	1.02 (0.66–1.58) .92	2.34 (1.32–4.16) .004
Number of activity of daily living limitations	0.96 (0.87–1.05) .36	0.96 (0.89–1.04) .37	0.96 (0.91–1.02) .22
Number of instrumental activity of daily living limitations	1.06 (0.83–1.34) .66	1.02 (0.88–1.18) .81	1.03 (0.91–1.17) .64
Cognitive function (not intact)	1	1	1
Cognitively intact	0.56 (0.34–0.95) .031	0.91 (0.64–1.30) .62	0.78 (0.58–1.04) .10
Depression (no)	1	1	1
Yes	3.45 (2.09–5.70) <.001	4.18 (2.82–6.21) <.001	3.87 (2.83–5.28) <.001
Anxiety disorders (no)	1	1	1
Yes	2.22 (1.33–3.70) .002	1.07 (0.75–1.53) .72	1.38 (1.02–1.85) .03
Cancer (no)	1	1	1
Yes	1.16 (0.67–2.00) .60	0.76 (0.41–1.41) .38	0.92 (0.62–1.37) .68
Number of chronic diseases	0.96 (0.89–1.04) .28	0.99 (0.93–1.04) .59	0.98 (0.93–1.02) .28
Age	0.96 (0.94–0.99) .005	0.96 (0.94–0.98) <.001	0.96 (0.95–0.98) <.001
Race (nonwhite)	1	1	1
White	3.84 (1.41–10.45) .009	3.10 (1.49–6.45) .003	3.30 (1.83–5.96) <.001
Education (< high school)	1	1	1
≥High school	0.89 (0.58–1.37) .60	0.91 (0.65–1.27) .57	0.90 (0.69, 1.16) .41
Living arrangements (with others)	1	1	1
Living alone	0.93 (0.56–1.53) .77	0.98 (0.68–1.39) .89	0.95 (0.71–1.26) .71
Time (months)	0.98 (0.94–1.03) .38	0.99 (0.96–1.03) .77	0.99 (0.96–1.02) .47
Number of assessments	0.69 (0.58–0.84) <.001	0.72 (0.62–0.82) <.001	0.71 (0.63–0.79) <.001
Sex			1.06 (0.60–1.86) .84
Pain severity × sex			
Some pain × sex			0.52 (0.27–0.99) .049
Severe pain × sex			0.45 (0.22–0.90) .02

sex (Table 2). In men, pain severity significantly predicted self-injury ideation. The odds of having self-injury ideation in the subsequent assessment was 88% greater (adjusted OR (AOR) = 1.88, 95% confidence interval (CI) = 1.12–3.13) for men having some pain and more than two times as great (AOR = 2.36, 95% CI = 1.29–4.30) for men reporting severe pain than for men reporting no pain. Of the covariates, having depression and anxiety disorders and being white increased the odds of having self-injury ideation in men, whereas being cognitively intact and older and having more assessments during the 1-year period decreased the odds.

In women, the effect of pain severity on self-injury ideation was not statistically significant (some pain vs no pain: AOR = 0.96, 95% CI = 0.65–1.43; severe pain vs no pain: AOR = 1.02, 95% CI = .66–1.58; Table 2). Women with depression were more likely to have self-injury ideation, as were those who were younger, white, and had fewer assessments.

Using the total sample, it was found that the product terms of pain severity and sex were significant (some pain × sex: AOR = 0.52, 95% CI = 0.27–0.99; severe pain × sex: AOR = 0.45, 95% CI = 0.22–0.90; Table 2), which

suggests that the effect of pain severity on self-injury ideation was stronger in men than women.

Effects of Pain Control on Self-Injury Ideation

With regard to the effects of pain control (Table 3), it was found that men whose pain was controlled by medication were 81% (AOR = 1.81, 95% CI = 1.08–3.04) more likely and that those whose pain was not controlled by medication were 3.4 times (AOR = 3.39, 95% CI = 1.45–7.95) more likely than those without pain to have self-injury ideation. In women, pain control did not have significant effects on self-injury ideation. The interaction effects of pain control and sex were not statistically significant at *P* < .05, although the product term—controlled pain × gender—had a *P*-value of .07 (AOR = 0.57, 95% CI = 0.30–1.06).

Effects of Combined Pain Measure on Self-Injury Ideation

Using the measure combining pain severity and control, it was found that, in men, the risk of having self-injury ideation increased progressively with more-severe and less-controlled pain. Specifically, compared to men with no pain, the odds of self-injury ideation was 74% greater

Table 3. Estimates of Pain Control from Repeated-Measures Mixed Models Predicting Self-Injury Ideation

Independent Variables	Adjusted Odds Ratio (95% Confidence Interval) <i>P</i> -Value		
	Men	Women	Total Sample
Pain control (no pain)	1	1	1
Controlled by medication	1.81 (1.08–3.04) .02	1.01 (0.70–1.45) .97	1.81 (1.09–3.02) .02
Not controlled by medication	3.39 (1.45–7.95) .005	1.62 (0.75–3.49) .22	3.23 (1.41–7.44) .006
Sex			0.96 (0.54–1.68) .88
Pain control × sex			
Controlled × sex			0.57 (0.30–1.06) .07
Not controlled × sex			0.51 (0.17–1.58) .25

All models adjusted for health (activity of daily living and instrumental activity of daily living limitations, cognitive function, depression, anxiety disorders, cancer, number of chronic diseases) and sociodemographic (age, race, education, living arrangements) characteristics, time, and number of assessments. The estimates of the covariates are not shown in Table 3 but their estimates are similar to those shown in Table 2.

(AOR = 1.74, 95% CI = 1.00–3.03; not shown) for men reporting some pain that was controlled by medication, more than twice as great (AOR = 2.13, 95% CI = 1.51–3.93) for men with severe but controlled pain; almost three times as great (AOR = 2.85, 95% CI = 1.08–7.55) for men who had some pain that was not controlled, and four times as great (AOR = 4.10, 95% CI = 1.37–12.28) for men experiencing severe pain that was not controlled.

In women, the combined pain measure had no significant effect on self-injury ideation. The interaction effects of the combined pain measure and sex in the total sample were not statistically significant at $P < .05$, but the product term—severe and controlled pain × sex—had a P -value of .06 (AOR = 0.50, 95% CI = 0.24–1.02; not shown).

DISCUSSION

This study showed that the risk of self-injury ideation is greater with more-severe pain and that pain that is not controlled by medication poses especially high risks. For example, the odds of self-injury ideation for men with severe but controlled pain were two times as high as for men with no pain, but men with severe and uncontrolled pain were at four times the risk. The potency of uncontrolled pain may be related to a sense of helplessness and hopelessness, which have been suggested as mechanisms linking pain and suicide.⁵ Only a small percentage (2.9%) of the sample had pain that was not controlled, and a smaller percentage (1.5%) had severe pain that was not controlled, so the highest risk of self-injury ideation would apply to only a small subset of the elderly population in home care. However, even when pain is under control and not severe, older adults receiving home care with pain are more likely to have self-injury ideation than those without pain. These findings hold even after accounting for potential confounders of depression and anxiety, physical health, and functional status.

Men appear to be more likely than women to be at risk for self-injury ideation when experiencing pain. In sex-stratified analyses, the associations between self-injury ideation and pain severity, pain control, and their combination were all statistically significant in men but not in women. One reason for women's greater "resilience" may be that women have developed a wide repertoire of coping

strategies from pain experience resulting from menstruation, ovulation, pregnancy, and childbirth.¹⁷ Men, to the contrary, may have learned to ignore and tolerate pain—a feature of masculinity. When it comes to the point that the pain is not tolerable or ignorable, men may be less prepared to cope, or their masculinity may be threatened, giving rise to the use of maladaptive strategies such as pain catastrophizing.¹¹ Another explanation for the sex difference is that men and women may differ in expression of pain. Men's reports of some or severe pain may represent more-extreme pain than women's reports of comparable levels of pain.

These findings corroborate reports of another study that found suicidal thoughts to be associated with chronic pain in older men but not women receiving home-delivered meals.⁹ Recent data show that suicide rates increase with age in men but that the rate is lower in older than younger women.¹ To what extent these differential age trends are related to sex differences in pain experience in later life warrants further investigation.

Some limitations of this study should be noted. First, the sample was limited to older adults who participated in publicly funded home care programs in Michigan. Caution should be taken when generalizing the findings to other elderly populations. Second, the analysis was based on secondary data collected for care planning purposes. The main variables of pain severity and control were measured according to one or two items—not as precise as one would prefer—and the self-injury ideation item was similarly limited. Although nonsuicidal self-injury is far less common in older than younger populations,¹⁸ the degree of overlap between self-injury and suicidal ideation in later life is not yet clear. Moreover, the precise relationship between suicidal or self-injury ideation and suicide attempts or completed suicide is still ill defined. Therefore, caution should be used in translating these findings to late-life suicide prevention. Finally, the sample included older adults with cognitive impairment. The analyses was rerun excluding those with Alzheimer's disease or other types of dementia, and a similar pattern of results was found.

A strength of this study is its large sample, which is critical because self-injury ideation or suicidal behavior in general is a rare event at the population level. Furthermore, longitudinal data were used, which allowed the temporal order of pain and self-injury ideation to be made clear.

Overall, the findings of this study suggest that any levels of pain in older adults receiving home care should be taken seriously and treated as one means of reducing risk of suicide. Prior research has reported that undertreatment of pain is pervasive in older persons¹⁹ and that those who are older, minority, or cognitively impaired are more likely to receive unsatisfactory analgesia.^{20,21} Although interventions at multiple levels are needed, public policies could play a role in improving pain management.¹⁹ Many of the states' drug prescribing laws, regulations, and medical board guidelines have been criticized as outdated.²² Given the prevalence of pain in older persons (75% of the sample reported having pain) and its association with suicidal behaviors, there is an urgency to develop state policies that support the provision of evidence-based pain management practices.

Pain management is important to older individuals' quality of life. When clinicians assess pain, they should address not only severity but also effectiveness of medication in controlling pain. When patients report that medication offers no control, it is important to find alternatives to provide temporary relief. Complaints about pain, particular in men should prompt questioning for self-injury ideation.

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Author Contributions: Lydia Li conceptualized the study, conducted the statistical analysis, and drafted the manuscript. Yeates Conwell contributed his expertise during the conceptualization, planning, and implementation phases of the study and provided critical feedback on drafts of the manuscript.

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