

Widowhood and Other Demographic Associations of Pain in Independent Older People

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Abstract:

Objectives: To determine if psychosocial factors, as suggested by the demographic variables of widowhood and living alone, are associated with pain, particularly severe pain, in a representative sample of independent older people.

Design: One thousand older people (65+) randomly selected from independent residents living in a major city were surveyed about their health status (Health Status of Older People Study). Demographic characteristics, including age, gender, education, income, living alone, widowhood, and childlessness, were analyzed by logistic regression for their association with pain report of differing severity. Path analysis was used to confirm the association with pain severity and further define the role of mood disturbance in mediating this relationship.

Results: The prevalence of any pain report for the preceding 12 months was 56.3%. This was reduced when using more restrictive criteria, such that moderate-to-severe pain “at worst” and “at present” was found in 48.7% and 4.1% of the sample, respectively. After adjusting for type 1 error rate, the status of living alone was primarily associated with moderate-to-severe pain at worst, and being a widow(er) was associated with moderate-to-severe pain at present. The latter association had an estimated odds ratio greater than 3 and was characterized by more recent bereavement. Using path analysis, the model that severe pain was secondary to mood disturbance of widowhood, particularly recent bereavement, was tested and confirmed. The model explained 17% of the variance of pain severity in widow(er)s.

Conclusion: The mood disturbance related to spousal bereavement aggravates pain in older people. This lends support to the biopsychosocial model of pain.

Key Words: pain severity, widowhood, living alone, mood, older people

The biopsychosocial model of pain proposes that psychosocial factors can influence pain.^{1,2} There is now evidence to support the proposal that chronic stress in daily life and depression influence back pain.^{3,4} Social supports are thought to be able to relieve chronic stress and moderate pain.^{5–8} Widowhood and living alone are chronic stresses in the daily lives of many older

adults,^{9,10} and studies of small clinical populations have suggested that these sociodemographic factors are associated with severe pain report.^{11–14}

Widowhood and living alone may be associated with stresses such as loneliness, but spousal bereavement generally includes considerable grief as well, which is particularly strong in the early years of bereavement.¹⁵ This suggests a model in which widow(er)s generally have more severe pain than the unwidowed, someone with a recent spousal bereavement is more likely to suffer severely painful ailments than those with a longer widowhood. Unfortunately, there has yet to be a systematic investigation of this proposition.

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Epidemiological studies of a representative population of older adults (65+) may be able to test the role of bereavement in pain. Surveys of younger adults have found associations with the biodemographic factors, age and gender.^{16,17} Studies employing multivariate analysis, which adjusts for other associations, have also found associations between pain and socioeconomic status.^{18–21} Past surveys of older adult populations have characterized pain with respect to age and gender alone but have not employed multivariate analysis.^{22–24}

The biopsychosocial model of pain suggests that social factors may modulate pain in general, whether acute or chronic and regardless of anatomic site. The general pain criteria used in previous epidemiologic studies of older people have been diverse²⁵ but with an emphasis on chronic pain in particular anatomic locations.^{22–24} Such pain criteria, which exclude acute pain, may not be optimal in the examination of the biopsychosocial model.⁴ In addition, most previous epidemiologic research on older adults has not used comprehensive criteria of pain, including information on pain severity. Pain severity is a critical dimension of global pain report, giving greater clinical relevance to epidemiologic data²⁶ and providing a better representation of the pain experience within a biopsychosocial model.

Much of the research examining the biopsychosocial model has involved adults of working age. But with the growth of aged populations in developed countries and their disproportionate representation in many clinical groups, it is increasingly important to understand the potential psychosocial risk factors for severe pain in older people. We therefore examined global pain of high severity for associations with widowhood and living alone after adjusting for potential confounders. To investigate widowhood as a possible psychosocial influence on pain further, the role of mood disturbance associated with spousal bereavement was further analyzed using path analysis.

MATERIALS AND METHODS

Survey

A representative sample of non-institutionalized people, 65 years or older, (N = 1000) living in Melbourne (a state capital city of population 3.2 million) were asked about their health and social circumstances, behaviors and attitudes in the Health Status of Older People survey (HSOP).²⁷ This cross-sectional survey was devised and organized by the Lincoln Centre of Gerontology at La Trobe University with collaboration from the National Ageing Research Institute. Older residents of Melbourne were interviewed in person by

trained interviewers in 1994. Exclusion criteria included living in residential care, inability to speak English, cognitive impairment, or being too ill or disabled to be interviewed. The sample was randomly selected from electoral rolls (voting is compulsory in Australia). There was a 70% response rate. The survey respondents were largely representative of the older population of the state of Victoria, Australia, as described in the 1991 census, with the exception that, in having excluded those in residential care, the surveyed sample were slightly younger with a higher proportion living with their spouse.²⁷

Multivariate regression analysis

The demographic section of the HSOP included questions about age, sex, cohabitants, education, marital status, and children. Apart from age, which remained as a continuous variable, these demographic variables were dichotomized to reflect potential demographic correlates of pain in the older population (ie, women, living alone, no post-secondary education, widowhood, having no children). Other basic demographic variables in the HSOP not considered immediately relevant in the biopsychosocial model of pain, and therefore not investigated, were country of birth, and number of living siblings and grandchildren. Income and education were selected from another section of the survey as potential measures of socioeconomic status. Because many people reported the combined aged pension for a married couple, and 106 people refused to divulge or did not know their source of income, it was considered more appropriate to characterize all recipients of a government pension, which is means tested in Australia, as those being on low income.

Some descriptive data of pain report from the HSOP has already been published.²⁵ Pain report was defined by a positive response to “Have you felt pain that was persistent, or bothersome, or limits activities in the last twelve months?” This question is similar to a previous large epidemiological study in older adults.²⁴ Those who acknowledged such pain were further characterized for severity with 3 questions relating to pain intensity at worst, pain intensity at the time of interview, and the activity-limiting nature of pain, as described below. These various pain criteria were used as dependent variables in separate regression analyses:

1. Activity-limiting pain was indicated by a positive answer to the question “Do you think pain has made you cut down on any activities that you used to do?”
2. In response to “How strong is your most severe pain?”, pain intensity was rated as weak, mild, moderate, strong, or severe.²⁸

3. In response to “How strong is the pain right now?”, pain intensity was rated as none, weak, mild, moderate, strong, or severe.²⁸

To enable logistic regression analysis, responses to the latter 2 intensity questions were dichotomized to the presence or absence of moderate-to-severe pain and the presence or absence of strong-to-severe pain.

Other items in the pain section of the HSOP survey included questions regarding duration, frequency, attributed cause, anatomic location, and previous treatments. Consistent with the aim of investigating the relationship between demographic factors and global pain, these other characteristics were not examined. The involvement of acute and chronic pain in significant associations with demographic factors was determined by post hoc analysis. Acute pain was defined as less than or equal to 3 months, and chronic pain duration was greater than 3 months.²⁹ Significant associations with pain of acute or chronic duration were determined using χ^2 statistic.

Depressive symptomology was measured using the 12 question depression subscale of the Psychogeriatric Assessment Scales³⁰ which has been widely used in Australia and has been validated for use in community surveys of older populations.³¹ A score of 4 or above (range 0–12) has been designated “depressed.”³⁰ While developed as a continuous scale, significant differences in scores were determined using the Mann-Whitney *U* test because floor effects in this community sample limited the available range to 0–10.³² Widow(er)s with and without pain were described post hoc with respect to duration of bereavement (measured as <1, <5, <10, <15, <20, <25, <30, and 30+ years).

Demographic factors demonstrating a univariate association with pain ($P < 0.05$ level on χ^2 test) were entered into backward stepwise logistic regression modeling with an α level of 0.10, to estimate odds ratios of significant primary associations after adjusting for potential confounding factors.

All analyses were performed on raw data. Protection from type 1 error due to the examination of the 7 predictor demographic variables was controlled for by using multivariate analysis. Type 1 error rate due to 6 separate multivariate analyses was adjusted by Bonferroni correction of the alpha value from 0.05 to 0.05/6 or 0.0083.

Path model analysis

The 3 questions about pain severity in the survey were combined to construct a latent variable of pain severity. The resulting continuous variable was suitable for path model analysis. The latent variable of Mood Disturbance incorporated 3 measures of mood. In addition to the 12 item depression subscale of the Psychogeriatric Assess-

ment Scales,³⁰ measures of Positive Mood and Negative Mood³³ were also incorporated. Positive Mood measured responses to the questions “During the past year how often you felt –interested? energetic? content? and warmhearted?” Negative Mood measured responses to the questions “During the past year how often you felt sad? annoyed? worried? irritated? and depressed?” Responses rated on a Likert scale ranged from never, rarely, sometimes, frequently, to very frequently.

The composite variable called Spousal Bereavement was constructed by designating non-widow(er)s as 0, and widow(er)s ranging from 1 to 8 to indicate bereavement duration where 8 was a year or less duration of bereavement and 1 was more than 30 years of widowhood. Although living alone shares considerable variance with widowhood, it represents a different conceptual demographic feature. Therefore, it was not incorporated into the Spousal Bereavement variable. Additionally, given that living alone is a dichotomous variable, it is not appropriate for use within the path analytic model. While no participant of the 1000 case sample had missing demographic data, 12 cases had 1 or more missing pain severity variables and 10 cases had 1 or more missing data points on mood disturbance. This affected a total of 17 cases, but these cases were not excluded from logistic regression or path analysis.

Proposed models, based on the relationships suggested by multivariate logistic regression, were further tested by structural equation modeling (SEM) with latent variables (described above), using a maximum likelihood algorithm in AMOS. The Baron and Kenny (1986) formulation for testing mediation was also used. In the first step, the independent variable (Spousal Bereavement) was modeled as a direct predictor of Pain Severity. The second step adds a path from the proposed mediating variable (Mood Disturbance) to the outcome variable. If the magnitude of the direct path from the independent variable to the outcome variable is reduced by adding the proposed mediator, mediation has occurred. The models were evaluated for goodness of fit using Comparative Fit Index (CFI) and Root Mean Squared Error of Approximation (RMSEA). The models were also compared statistically for significant improvement in fit using the Change in χ^2 ($\Delta\chi^2$).

RESULTS

Table 1 shows the demographic profile of the HSOP population. There were more women than men and these women were generally older, more likely to be widowed and childless, to be living alone, and to have lower education and lower income. Widowhood and living alone

TABLE 1. Demographic profile of the HSOP sample population by sex

Demographic variable	Men N = 467	Women N = 533	Total N = 1000
Mean age (std. dev.)	72.6 (5.6)	74.1 (6.0)	73.4 (5.87)
% in cohort			
65–69	36.6	26.1	31.0
70–74	31.0	35.1	33.2
75–79	18.6	18.0	18.3
80+	13.7	20.8	17.5
Widow(er)s (%)	12.2	50.3	32.5
Without children (%)	6.0	9.2	7.7
Living alone (%)	15.2	49.5	33.5
Low education (%)	46.7	70.2	59.2
Low income (%)	50.0	56.9	53.6

were highly correlated ($r = 0.68$, $P < 0.01$) with over a quarter of the population sample ($n = 259$) being widow(er)s who were living alone (79.7% of widow(er)s lived alone and 77.3% of those living alone were widowed).

The overall prevalence of pain at different levels of severity is shown in Table 2. The prevalence of general pain report was 56.3%. The prevalence of people reporting moderate-to-severe pain at worst was 48.7%, and 29.8% for strong-to-severe pain. Activity limiting pain prevalence was 29.7%. The prevalence of people reporting moderate-to-severe pain at present was 4.1%, and 1.3% for strong-to-severe pain. Preliminary univariate comparisons of the demographic factors with each of the pain criteria were conducted. Female sex, low education, widowhood, and living alone were significant at $\alpha = 0.05$ for some of the pain criteria, but experiment wise Bonferroni correction of type 1 error for multiple comparisons ($P < 0.05/42$ or 0.001) left only widowhood as significant. Low income, childlessness, and age demonstrated no association at $P < 0.05$ and were therefore excluded from multivariate analysis.

Multivariate regression analyses

The primary associations between pain and demographic factors, as indicated by multivariate analyses, are

shown in Table 2. Using an α level of 0.05, living alone is primarily associated with moderate-to-severe and strong-to-severe pain at worst. Likewise, widowhood is associated with activity-limiting pain and moderate-to-severe and strong-to-severe pain currently. Indeed, the association between moderate-to-severe pain currently and widowhood was highly significant ($P = 0.001$), with widow(er)s 3 times more likely to have intense pain “now” than people of other marital status. Interactions between the various demographic variables were not significant for any criteria of pain severity. The associations of living alone and widowhood with moderate-to-severe pain at worst and at present, respectively, remained statistically significant after a Bonferroni correction of the alpha level to account for 6 a priori multivariate analyses ($0.05/6 = .0083$).

Table 3 gives an indication of the level of depressive symptomatology in various subgroups suffering from severe pain compared with those without pain of such severity. In all cases the psychologic disturbance was significantly higher for those with pain, as defined, than for the rest of that group who were without pain. Widow(er)s with moderate-to-severe pain at present tended to score the highest levels of depressive symptoms. Widow(er)s with depressive symptoms were also generally more recently bereaved than other widow(er)s, as suggested by median widowhood duration (Table 3).

Prevalence of overall pain report was 6.7% for acute pain and 49.6% for chronic pain. The nature of the pain associations was further elucidated with respect to chronicity in Table 3. After stratification with respect to acute or chronic characteristics, most associations involved only pain of a chronic nature ($P < 0.05$). The exception was the association of widow(er)s with debilitating pain which involved only acute pain states ($P < 0.05$) (Table 3).

Path model analyses

All measured variables used to construct the latent variables for Pain Severity and Mood Disturbance demonstrated a factor loading of higher than 0.3 suggesting

TABLE 2. Demographic factors independently associated with pains after multivariate analysis

Multivariate analyses of pain	Pain prevalence (%)	Significant associations*	Odds ratio (95% CI)	P
Pain report	56.3	women	1.3 (1.0–1.7)	0.053
Mod.-sev.† at worst	48.7	living alone	1.5 (1.1–1.9)	0.006
Str.-sev.‡ at worst	29.8	living alone	1.4 (1.0–1.8)	0.038
Activity limiting	29.7	widow(er)	1.5 (1.1–1.9)	0.012
Mod.-sev.† currently	4.1	widow(er)	3.1 (1.6–5.8)	0.001
Str.-sev.‡ currently	1.3	widow(er)s	3.4 (1.1–10.4)	0.034

The variables included for backward logistic regression modeling were sex, educational status, living alone, and widowhood. All these variables demonstrated $P < 0.05$ on initial χ^2 analysis.

†Moderate to severe.

‡Strong to severe.

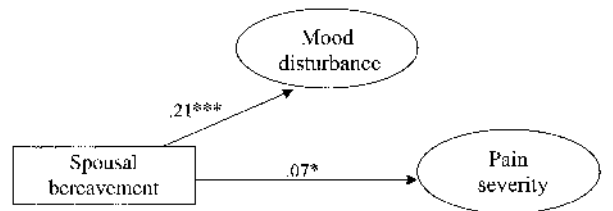
TABLE 3. Characteristics of some pain associations

Group with pain	Mean depressive symptom score (compared to group without pain)	Chronicity of pain	Median widowhood duration
General population with any pain report	1.7* (vs 0.9 in others)	—	10–14 years (same as other widow(er)s)
Those living alone with mod.-sev. pain at worst	2.2* (vs 1.4 in others living alone)	chronic	—
Widow(er)s with activity-limiting pain	2.7* (vs 1.4 in other widow(er)s)	acute	10–14 years (same as for other widow(er)s)
Widow(er)s with mod.-sev. pain currently	3.3* (vs 1.7 in other widow(er)s)	chronic	5–9 years (vs 10–14 yrs in other widow(er)s)

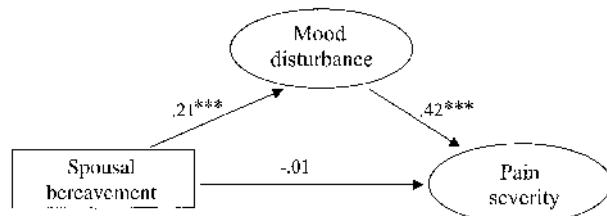
Mann Whitney test was used to demonstrate significance of elevated depressive symptom score, where * signifies $P < 0.005$.

that the observed variables are valid indicators of the underlying constructs.

The hypothesized association between the variable, Spousal Bereavement, and the latent variable of Pain Severity is supported as shown in Figure 1A, which displays a significant path coefficient of 0.07 ($P < 0.05$). While this direct model shows good fit by the CFI criterion (ie, CFI > 0.95) in Table 4, the indirect model, with mediating mood disturbance, (Fig. 1B), shows good fit by the RMSEA criterion as well (ie, RMSEA < 0.05).^{34,35} Additionally, the indirect model demonstrates a significant improvement in model fit over the direct model ($\Delta\chi^2 = 88.59$, $P < 0.001$) (Table 4). From Figure 1B, it may be observed that the direct effect of Spousal Bereavement on Pain Severity is no longer significant ($\beta = 0.01$, $P > 0.05$). The indirect effect of Spousal Bereavement on Pain Severity via Mood Disturbance is highly significant ($P < 0.001$). In summary, the direct model explained 1% of the variance in Pain Severity, whereas the indirect model accounted for 17%.



(A) Direct model (without mediation)



(B) Indirect model (with mediation)

FIGURE 1. Structural models of relationship between Spousal Bereavement and Pain Severity (A) without and (B) with mediation by Mood Disturbance. Ellipses indicate latent variables. * $P < 0.05$, *** $P < 0.001$.

DISCUSSION

Widowhood and living alone

This study of a representative sample of older people shows for the first time that widow(er)s and those living alone report more severe pain, even after controlling for age, sex, and other demographic variables. Living alone was associated with pain that was moderate-to-severe at worst, while widowhood was associated with pain that was moderate-to-severe currently. Although these associations were at only one level of severity, there is a trend for these relationships at other levels of severity (Table 2). Indeed, using a continuous measure of pain severity in path analysis (latent variable), the association with spousal bereavement was confirmed.

Severe back pain has been associated with living alone in studies of older age populations²² and among young adult sufferers of rheumatoid arthritis.¹⁴ Previous studies have also reported an association between widowhood and severe pain,^{11,36} particularly for arthritic³⁷ and chest pains.¹² However, these relationships were unadjusted for age, sex, or other potentially confounding demographic factors and the present study has controlled for these factors and confirms a strong association with severe pain.

It is notable that the relationship between widowhood and pain was apparent without need to control for other potentially stressful marital circumstances (eg, those with sick, separated, or divorced spouses).³⁸ This may reflect the strength of the widowhood/pain relationship as well as the high prevalence of widowhood in this population. Living alone and widowhood correlate strongly in this population. These sociodemographic factors also share the common attribute of the likely absence of intimate companionship.

TABLE 4. Fit statistics for spousal bereavement model

Model	χ^2/df	$\Delta\chi^2$	CFI	RMSEA
Direct	117.25/13	—	.989	.09
Indirect	28.66/12	88.59*	.998	.04

* $P < 0.001$; CFI, comparative fit index; RMSEA, root mean square error of approximation.

The association between pain and widowhood was distinguished from the pain association with living alone by several features. Widowhood was characterized by more depressive symptoms, probably because the 2 measures were temporally related (current pain and current mood measures). Secondly, the widowhood-pain association demonstrated the stronger relationship (OR = 3.1) when compared with living alone (OR = 1.5) (Table 2). Thirdly, the more recent bereavement of many of these widow(er)s suggests an apparent easing of pain with increased duration of spousal bereavement (Table 3). This characteristic enabled further analysis through the construction of the ordinal measure of widowhood duration, namely, Spousal Bereavement. This variable remains demographic in nature, rather than involving an abstract psychometric construction. For conceptual and methodological reasons, living alone could not be incorporated into the bereavement variable (although 80% of widows in this study were living alone) or the subsequent model tested by path analysis.

Spousal bereavement

There is a well-established epidemiological relationship between pain report and depression²¹ and, while it is usually argued that severe pain can aggravate mood disturbance,³⁹ the reverse may also be true (ie, depression can aggravate pain).⁴⁰ In the current study of a representative sample of independent older people, it is unlikely that the mood disturbance of individuals with severe pain influences the likelihood of mortality in their spouse. Rather, it was hypothesized that the mood disturbance of spousal bereavement is a prerequisite for increased severity of pain report, and the path analysis supports this contention (Fig. 1B). Results do not support the hypothesis that changes in mood disturbance and pain severity (possibly from physical lifestyle changes) are independent effects of widowhood (Fig. 1A).

There is a realization of the need to further examine the “role of social support...in the relationship between pain and depression”⁴¹ and the “social context of coping.”⁴² While some attention has been given to the quality of the “significant other”⁴³ or “powerful other”⁴⁴ relationship in modulating chronic pain,^{6,45,46} little attention has been given to the loss of spouse, arguably the most common and stressful social change experienced by older people.

There have been suggestions that bereavement may aggravate pain^{13,36,37,41} but, to date, there has been very little empirical evidence, or explanation of underlying mechanisms. “Powerful others,” or lack of them as in the condition of widowhood, are reported to affect endorphin activity,^{47,48} which may consequently modulate pain. Al-

ternatively, there is the proposition that psychosocial influences begin an “anxiety/muscle tension/pain” cycle.⁴⁹

In this sample population of older people, widow(er)s generally (80%) lived alone and, indeed, they are reported to be significantly more lonely and bored.⁵⁰ In addition to this lack of intimate companionship, the first 2 to 3 years of spousal bereavement are particularly associated with major mood disturbance.¹⁵ The association between duration of spousal bereavement and pain severity suggests that recently bereaved individuals generally report greater pain severity, coincident with this mood disturbance. It could therefore be suggested that some resolution of their mood disturbance, and severe pain, occurs over a longer period of time. Another interpretation is that long-time bereaved widow(er)s with severe pain are not represented in this cross-sectional study as they are more likely to die or become dependent on residential care or hospital.^{51–53} Longitudinal studies are required to clarify this issue.

Other demographic factors

Across the HSOP age range, there was no observed change in pain prevalence regardless of pain severity, in agreement with most earlier studies on older people.^{22–24} Large representative surveys of pain suggest generally high pain prevalence above the age of 45,^{16,17,23} and a peak prevalence for chronic pain above the age of 65.^{18,19} The prevalence of pain report in this 65+ year old population sample (56.3%) was somewhat less than in other studies of older populations. For example, the SWEOLD, PAQUID, and Iowa 65+ Rural surveys reported 72.8%, 71.5%, and 86.3% respectively.^{23,24,54} This may be attributable to the use of different pain criteria,²⁵ or to sample population differences. In addition to the social factors suggested in this study, socioeconomic status^{18–21} and urban/rural differences,⁵⁵ for example, may contribute to differences between studies. Indeed, compared with Australian national data on older people, this urban/suburban study sample was healthier and of higher socioeconomic status.²⁷

Most studies^{2,56} suggest that women are more likely to experience pain, but large sample surveys of people aged 65 years or above are less unanimous about the predominance of females with pain.^{22–24} In the current study, sex was not a significant risk for pain, in agreement with the Iowa 65+ Rural Study.²⁴ In the current study also, 50% of women lived alone or were widowed, in sharp contrast to only 15% and 12% of men respectively. Few of the studies of older people have adjusted for these sociodemographic factors, and it is possible that these factors may have been more sex-skewed. Relative to widowhood and living alone, age and sex demonstrated no predictive significance in the present study.

Limitations

People who are lonely and depressed, such as the widowed, are over-represented in clinical populations.^{38,57,58} There is the potential in clinical studies to conclude that these older people present with distorted pain report for secondary gain, such as companionship.⁵⁹ In the absence of any apparent therapeutic relationship in the current study, the results suggest that the severe pain reports from widow(er)s and those living alone are unlikely to reflect attention-seeking behaviors.

The present findings do not prove a causal relationship between pain and the measured sociodemographic factors, widowhood and living alone, although the results of path analysis are highly suggestive. The observed associations could be due to other unmeasured influences or cohort effects. However, a number of factors suggest these associations are not related to chance. In the logistic regression analysis, only 7 independent variables were investigated and type 1 error was minimized using multivariate analysis. Widowhood or living alone remained significant even after the significance level was adjusted to account for type 1 error of multiple comparisons. Indeed, all 5 analyses of severe pain consistently indicated the same 2 variables, in preference to all other measured demographic variables.

Prospective studies are necessary to investigate the possible changes in the perception or tolerance of pain that may result from bereavement and to identify any biologic correlates. The nature of the psychologic support provided by spouses and other live-in companions could be further examined and successful coping strategies used during longer-term bereavement could be sought in longitudinal epidemiological studies.

CONCLUSION

With a large and expanding older population, there are many people living alone or widowed¹⁰ and our data suggest that these factors may help explain some of the variation in severe pain reported by older people. The mood disturbance associated with widowhood, in particular, was strongly and significantly associated with pain severity. Awareness of the potential role of psychosocial factors in aggravating pain may be important to the patient and ultimately guide the therapeutic options of health professionals.⁶ Excessive reports of pain from those living alone or widowed may not necessarily reflect attention-seeking behavior. While older individuals are encouraged to maintain their independence, consideration may also need to be given to maximizing personal interdependence in our aging society.

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