Patterns of Pain and Well-Being in Older Women: A 10-Year Longitudinal Study

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ABSTRACT. The relationships among pain, health, and psychological well-being were examined in a secondary analysis of a ten-year study of community-dwelling older women. Over time, there was an increase in the percentage of women reporting pain and a significant increase in the mean level of pain, although 24% of the women never reported pain. Subjective health declined as pain increased. Psychological well-being did not differ between women whose pain increased over time compared to women whose pain did not increase. Future research needs to examine how women maintain psychological well-being as they age in spite of increased pain. doi:10.1300/J074v19n03_03

KEYWORDS. Pain, well-being, aging, longitudinal studies

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Pain is a significant problem in older adults, with prevalence rates ranging from 21.5% to 87.5% in men and women 65 years of age and older (Brattberg, Parker, & Thorslund, 1996; Mobily, Herr, Clark, & Wallace, 1994). Older adults in pain often report reduced function, decreased mobility, sleep disruption, and increased psychological distress (American Geriatrics Society Panel, 2002). Significant research has been conducted on the prevalence and impact of pain on health and psychological distress. However, few studies have examined the potential role of pain on the psychological well-being of older adults, and none has been longitudinal. Examination of these relationships may provide valuable insights into the determinants of well-being in older adults. Because women comprise the greatest number of older adults and are more likely to experience age-related health problems that are accompanied by pain, it is important to focus on women in these investigations.

BACKGROUND

Research demonstrates a significant relationship between pain, self-rated health, and activity (Bookwala, Harralson, Parmelee, & 2003). In a large population study (Gureje, VonKorff, Simon, & Gater, 1998), pain was associated with poorer self-rated health and interference with activity across all ages. Community-dwelling older adults who frequently experienced pain were twice as likely to perceive their health status as being poor (Reyes-Gibby, Aday, & Cleeland, 2002). Pain has been identified as a significant contributor to activity restriction and functional decline in older adults (Bookwala, Harralson, & Parmelee, 2003; Thomas, Peat, Harris, Wilkie, & Croft, 2004). In a longitudinal study of community-dwelling older adults, participants reported increasing restrictions in activity, particularly mobility, with increasing pain (Mobily et al., 1994).

Pain in older adults has also been related to psychological distress. Numerous studies have found rates of depression and anxiety to be significantly higher in those with pain, particularly those with ongoing pain (Bookwala, Harralson, & Parmelee, 2003; Turk, Okifuji, & Scharff, 1995). Depression has been found to be both an antecedent and consequence of pain (Magni, Moreschi, Rigatti-Luchini, & Merskey, 1994; Reid, Williams, & Gill, 2003). However, these studies of pain and psychological distress have been mainly conducted with samples drawn from pain clinics, hospitalized patients, or institutionalized older adults where participants are more likely to experience disability and comorbid medical conditions than the typical older person (Crombie & Davies,

1998). Few studies have examined the relationship between pain and psychological distress in samples of older adults drawn from the community rather than health care settings or institutions. Such studies are necessary to understand what typically occurs as adults age and experience health changes that can be accompanied by symptoms such as pain.

Research on pain has focused largely on its relationship with psychological distress, particularly depression and anxiety. There is evidence that focusing on psychological distress neglects a key dimension of psychological adaptation, referred to as psychological well-being (Heidrich, 1996; Ryff, 1989). Ryff's (1989) model of psychological well-being provides a framework that integrates theories of positive mental health, psychological functioning, and lifespan development to articulate how individuals can thrive in the face of life's challenges, such as coping with pain in old age (Ryff & Keyes, 1995). Several cross-sectional and longitudinal studies have demonstrated a relationship between positive dimensions of psychological well-being (e.g., purpose in life and positive relations with others) and different aspects of health (Clarke, Marshall, Ryff, & Rosenthal, 2000; Heidrich, 1998; Heidrich & Ryff, 1993; Mangelli, Gribbin, Buchi, Allard, & Sensky, 2002). However, the relationship between pain and psychological well-being has received only limited attention and findings have not been consistent (Kendig, Browning, & Young, 2000; Nagyova, Stewart, Macejova, van Dijk, & van de Heuvel, 2005; Plach, Heidrich, & Waite, 2003). These studies did not take into account that many older adults experience increasing health problems as they advance in age and often health problems are accompanied by pain. It is important to examine whether these changes in health and pain over time are accompanied by a decline in psychological well-being.

In summary, research has demonstrated that pain is a significant problem in older adults and has been related to poorer self-rated health, decreased physical functioning, and greater psychological distress. However, there are several limitations to these studies: First, studies have focused almost exclusively on the impact of pain on psychological distress; the impact of pain on psychological well-being is not clear. Second, samples drawn largely from health care settings, rather than the community, limit our understanding of pain in older adults. Third, few longitudinal studies have been conducted, thus the reciprocal relationships among changes in physical health, pain, psychological well-being, and psychological distress have not been explicated.

The purpose of this investigation was to examine the longitudinal relationships among pain, physical health, psychological well-being,

and psychological distress in community-dwelling older women. Four questions were examined: What is the pattern of pain over 10 years? Does health status vary over time in relation to pain? Do psychological well-being and psychological distress vary over time in relation to pain? Does a change in pain predict a change in psychological well-being or psychological distress over time?

METHOD

Design

This study is a secondary analysis of data from a 10-year study of health and psychological well-being in older women. Data were collected at baseline, 6 years, and 10 years.

Sample

Participants were community-dwelling older women (see Table 1). The average participant age at baseline (N = 179) was 73 years (SD = 5.76; range 61-93) and at 10 years was 81 years (SD = 3.95; range 74-92). Participants were generally well educated (M = 13.5 years), widowed (54%), and lived alone (57%) at baseline. Reported income in 1989 (annual range $16,000-19,999) was somewhat higher than older women in the general population (American Association of Retired Persons, 1987).

TABLE 1. Demographic Characteristics of Community-Dwelling Older Women over Time

	Baseline	6 years	10 years
N	179	103	59
Participation (%)	100	70	57
Mean age	73.3	77.3	81
Age range	61-93	66-92	74-91
Widowed (%)	54	50	61
Live alone (%)	57	61	70
Race/ethnicity (Caucasian)	99.6%		
Mean education (years)	13.5		

Procedure

Women, aged 60 and older, were recruited from various community, church, and civic organizations. Data were collected in 1989, 1995, and 1999 using mailed self-report questionnaires. The Institutional Review Board approved this investigation.

Measures

Demographic information was collected regarding age, level of education, marital status, race/ethnicity, living arrangement, and income level.

Pain. In the original study, there were no instruments measuring pain. In this secondary analysis, we used a single item from a symptom inventory in the parent study, the Symptom Bother Scale (Heidrich & Ryff, 1993). One item on the scale was, "How much are you bothered by pain?" Pain was assessed using this single-item question. Participants responded according to a four-point scale (0 = No pain, 1 = Pain but not bothered, 2 = Some bother, 3 = Great deal of bother).

Psychological well-being. Four measures of psychological well-being were used: purpose in life, personal growth, positive relations with others, and autonomy (Ryff, 1989). Purpose in life refers to a feeling that life is meaningful. Personal growth indicates the ability to continue to develop one's self in old age. Positive relations with others emphasizes the achievement of intimacy and generativity. Autonomy taps qualities such as self-determination, self-regulation, and independence.

Each scale consists of 20 items with responses ranging from 1 (Strongly disagree) to 6 (Strongly agree). Higher scores indicate higher levels of psychological well-being. Favorable reliability and validity coefficients for these scales have been reported (Ryff & Essex, 1991). In this study, alpha coefficients were: positive relations with others, .89-.90; personal growth, .84-.89; purpose in life, .86-.91; and autonomy, .80-.89.

Psychological distress. Two measures of psychological distress were used. Depression was measured by the Center for Epidemiological Studies Depression scale (CES-D), a 20-item self-report scale designed to measure depressive symptomatology with demonstrated validity in older adults (Radloff & Teri, 1986). Respondents answer each item based on how often they felt or behaved in the past week (on a 0 to 3 scale) with higher scores indicating higher levels of depression. Internal consistency (alpha coefficient) ranged from .85-.91 in this study.

Anxiety was measured using the Jackson Personality Research Inventory (Jackson, 1979), which was developed for and tested on community samples. The subscale consists of 20 items rated on a 6-point scale (1 = Strongly disagree, 6 = Strongly agree). Higher scores indicate lower anxiety. In the original studies, the anxiety subscale demonstrated both convergent and discriminant validity as well as adequate reliability. The alpha coefficients in this study ranged from .83 to .90.

Physical health. Physical health was measured using three self-report instruments to examine different aspects of physical health: subjective health, number of health problems, and functional health. Subjective health was measured by a widely utilized, single-item question, "In general, how would you rate your health?" with responses ranging from 1 (Poor) to 5 (Excellent). Subjective health ratings are one of the best predictors of mortality and morbidity among older adults (Idler & Kasl, 1991).

The number of health problems was measured using the schedule of illnesses from the Older Americans Resources Survey (OARS) schedule of illnesses. This instrument has been widely used to assess health status in community-dwelling samples of middle-aged and older adults (Duke University, 1978). Respondents identified whether or not they experienced each illness in the recent past, and a total number of health problems was computed.

Functional health was assessed by the OARS Activity of Daily Living (ADL) scale, another measure widely used in community samples (Duke University, 1978). This scale consists of 13 items reflecting basic activities of daily living (e.g., eating, walking, dressing) and instrumental activities of daily living (e.g., preparing meals, shopping for groceries, handling money). Women rated how much difficulty they experienced in carrying out each activity on a 5-point scale (1 = No difficulty, 5 = A great deal of difficulty). The ADL scale has been shown to be reliable and related to other measures of functional status, depression, anxiety, and life satisfaction (Fillenbaum, 1985). The alpha coefficients in this study ranged from .89 to .94.

RESULTS

A total of 179 women completed surveys at baseline and agreed to participate in follow-up (see Table 1). After completion of the baseline surveys, 70% of the women (n = 103) participated in a follow-up survey

at 6 years. Ten years from baseline, 59 women completed surveys (57% of the women surveyed at 6 years). Analyses were conducted on the 59 women with data collected at all three points.

Preliminary Analysis

There was considerable dropout of participants over time. In a separate analysis, loss of participants through dropout was examined (Hengudomsub & Heidrich, 2002). To investigate whether dropout may have introduced bias into the study, completers ($n = 59$) were compared with those who were lost to follow-up ($n = 120$). There were no significant baseline differences in race, marital status, years since retirement, level of education, income, rating of financial status, pain, subjective health, number of illnesses, difficulty with activities of daily living, psychological distress (anxiety or depression), or autonomy. Completers were significantly younger ($t = -2.39$, $p > .001$) at baseline ($M = 71.36$) than dropouts ($M = 73.96$) and had significantly higher baseline scores in personal growth, positive relations with others, and purpose in life. A logistic regression was conducted to identify baseline predictors of dropout. The only significant predictor was the purpose in life score. Poorer physical health, higher depression, and higher anxiety were not associated with dropout. These results suggest that systematic bias was not a major factor influencing the results of this study.

Women averaged 2.9 ($SD = 2.43$) health problems at baseline and 4.15 ($SD = 2.37$) at 10 years. The most common health problems reported by women at baseline were arthritis (64.4%), hearing problems (28.8%), cataracts (25.4%), circulatory problems (25.4%), hypertension (23.7%), perceived depression (20.3%), osteoporosis (16.9%), and heart disease (15.3%). These are comparable with older women in the general population at the age these women were at baseline (National Center for Health Statistics, 2006).

Patterns of Pain over Time

Responses to the question "How much are you bothered by pain?" were examined at baseline, 6 years, and 10 years. Over time, the percentage of women reporting no pain decreased from 53% to 27%, the percentage of women reporting some bother from pain increased from 15% to 51%, and there was no change in the percentage of women reporting a great deal of bother from pain (15%). At 10 years, 73% of the sample reported experiencing pain.

Changes in mean pain scores over time were examined using repeated measures analysis of variance (ANOVA). There was a significant increase in pain over time $F(2,53) = 10.88$, $p < .0001$, and this trend was linear $F(1,54) = 21.64$, $p < .0001$. Pairwise comparisons were tested using the Bonferroni procedure for multiple comparisons. The only significant difference ($p < .0001$) found was between baseline ($M = .91$, $SD = .15$) and 10 years ($M = 1.58$, $SD = .141$).

Individual pain scores at each time of measurement were examined to describe different trajectories of change in pain. A change in pain was defined as a difference of one point or more from baseline to 10 years on a scale of 0 (no pain) to 3 (a great deal of bother from pain). Twenty-four percent of women ($n = 14$) were categorized as "no pain" (no pain at baseline, 6, or 10 years). Twenty-two percent ($n = 13$) were categorized as "steady pain" (the pain score at baseline did not change over time). Eight percent ($n = 5$) were categorized as "decreased pain." Forty-six percent ($n = 27$) were categorized as "increased pain."

Physical Health and Pain over Time

Participants were classified into two groups based on differences between pain scores at baseline and 10 years: (1) women whose pain rating increased over time ($n = 27$), and (2) women whose pain rating stayed the same or decreased over time ($n = 27$). A series of 2 (pain group) × 3 (time) repeated measures ANOVAs were conducted on each physical health outcome (see Table 2 for descriptive statistics).

TABLE 2. Mean Subjective Health, Number of Illnesses, and Functional Health over Time of Older Women Whose Pain Increased over Time ($n = 27$) Compared with Older Women with No Increase in Pain ($n = 27$)

	Baseline	6 years	10 years
	M(SD)	*M(SD)*	*M (SD)*
Subjective health (range 1-5)			
Decrease or no change in pain over time	3.75 (.18)	3.32 (.18)	3.29 (.16)
Increase in pain over time	4.00 (.18)	3.08 (.19)	2.89 (.17)
Number of illnesses (range 0-11)			
Decrease or no change in pain over time	3.33 (.48)	4.30 (.50)	4.41 (.47)
Increase in pain over time	2.69 (.49)	3.81 (.51)	3.96 (.48)
Functional health (ADLs) (range 1-5)			
Decrease or no change in pain over time	1.28 (.06)	1.41 (.11)	1.45 (.10)
Increase in pain over time	1.07 (06)	1.30 (.11)	1.31 (.10)

For subjective health, there was a significant pain group × time interaction $F(2,51) = 3.44$, $p < .04$. To examine the interaction, t-tests for between-group differences in subjective health were performed separately at each time. There were no significant differences. Next, changes in subjective health were examined over time within each pain group. For both groups, there were significant decreases in subjective health over time (increase in pain group: $F(2,28) = 4.05$, $p < .02$; same or decrease in pain group: $F(2,26) = .26.39$, $p < .001$), but women whose pain increased had greater declines in subjective health over time than women whose pain stayed the same or decreased over time (see Table 2).

For number of illnesses and functional health, there were significant main effects for time $F(2,51) = 9.14$, $p < .0001$ $F(2,51) = 6.64$, $p < .001$. All women demonstrated significant increases in the number of illnesses reported and decreases in functional health. There were no main effects for pain group and no significant interactions.

Psychological Well-Being and Pain Over Time

Using the same pain groups as above, a series of 2 (pain group) by 3 (time) repeated measures ANOVAs were performed on each psychological well-being measure (purpose in life, positive relations with others, autonomy, personal growth) and each psychological distress measure (anxiety and depression). There was a significant main effect for time on purpose in life, $F(2,53) = 16.59$, $p < .0001$, positive relations with others, $F(2,53) = 6.59$, $p < .002$, and personal growth, $F(2,53) = 12.43$, $p < .0001$, demonstrating decreases in these dimensions of psychological well-being over time. There was no main effect of time for autonomy, $F(2,53) = 1.93$, $p < .15$. There were significant main effects of time for depression, $F(2,50) = 3.80$, $p < .029$, and anxiety, $F(2,51) = 6.92$, $p < .002$, indicating increases in psychological distress over time. However, psychological well-being and psychological distress did not differ by pain group, and there were no significant interactions. Women whose pain increased had no more depression or anxiety and no less psychological well-being than women whose pain level was stable or improved.

To further examine the relationship of pain and psychological well-being over time, we examined whether a change in pain predicted a change in psychological well-being or psychological distress. Hierarchical multiple regression analyses were conducted to examine this question for each psychological well-being and psychological distress measure separately.

The order of entry was as follows: the baseline well-being measure, baseline pain, and pain at 10 years. After controlling for baseline depression, an increase in pain over time was a significant predictor of an increase in depressive symptoms $F(3,53) = 7.04$, $R^2 = .26$, $p < .001$ (see Table 3). However, a change in pain was not a significant predictor of any psychological well-being (purpose in life, autonomy, personal growth, positive relations with others); nor was pain a significant predictor of anxiety.

Since depression has been found to be both a consequence and an antecedent of pain, hierarchical multiple regression analysis was conducted to examine whether a change in depression scores predicted a change in pain over time. The dependent variable was 10-year pain and the entry was in the following order: baseline pain, baseline depression, and depression at 10 years. Controlling for baseline pain, an increase in depression over time ($\beta = .31$) was a significant predictor of an increase in pain over time $F(1,49) = 5.77$, $R^2 = .36$, $p < .02$.

DISCUSSION

The aim of this study was to describe the relationship among pain, physical health, psychological well-being, and psychological distress in community-dwelling older women over time. Four questions were examined: What is the pattern of pain over 10 years? Does health status

TABLE 3. Summary for Hierarchical Regression Analysis for Changes in Pain over Time Predicting Changes in Depression over Time

Variable	B	SE B	β	R^2 Δ
Step 1				
Baseline depression	.26	.13	.26	.07
Step 2				
Baseline depression	.25	.12	.25	
Baseline pain	2.74	.88	.39	.15*
Step 3				
Baseline depression	.19	.12	.19	
Baseline pain	1.54	.98	.22	
10 year pain	2.61	1.09	.34	.08**

Note. Total $R^2 = .30$.
*$p < .003$. **$p < .02$.

vary over time in relation to pain? Do psychological well-being and psychological distress vary over time in relation to pain? Does a change in pain predict a change in psychological well-being or psychological distress over time?

Overall, older women living in the community experienced increasing pain with age and reported being increasingly bothered by pain over time. Prevalence rates (73% at 10 years) in this study are consistent with the prevalence rates (72.8%) reported by Brattberg et al. (1996) in a longitudinal study of community-dwelling older adults and lower than the 87.5% reported in a cross-sectional study of the same by Mobily et al. (1994). Almost half of the women in this study reported an increase in pain over time. However, there was a reduction in the percentage of women reporting a great deal of bother from pain between 6 and 10 years. Somewhat surprisingly, not all women with pain reported being bothered by it (18% at baseline and 7% at 10 years), and 24% of women reported no pain over 10 years.

What is most striking about the findings of this study was that there were no significant differences in psychological well-being between women with and without pain over time. There was a significant reduction in several aspects of psychological well-being (purpose in life, personal growth, and positive relations) over 10 years, but changes in pain were not related to these changes in psychological well-being. How did women maintain psychological well-being in spite of increases in pain? The phenomenon of resilience may play a role (Ryff, Singer, Love, & Essex, 1998). Resilience is defined as the maintenance, recovery, or improvement in mental or physical health following challenge. In this study, pain was the challenge. Resilience results from multiple protective factors: social-relational, psychological, sociological, and biological. For example, at the social-relational level, social support has been shown to mediate the impact of pain (Evers, Kraaimaat, Geenen, Jacobs, & Bijlson, 2003). Further investigation is needed to identify protective factors that may mediate the relationship between pain and psychological well-being.

Consistent with previous findings (Turk et al., 1995), there was a positive relationship between pain and psychological distress. A change in pain over time was a significant predictor of depression, and an increase in depression over time also predicted an increase in pain.

The presence of depression along with psychological well-being may seem counterintuitive. However, both theory and empirical findings suggest that psychological well-being and psychological distress are not on a continuum but are independent dimensions of well-being

(Heidrich & Ryff, 1993, 1996). That is, one can experience both depressive symptoms and maintain a sense of purpose in life or positive relations with others. It may be that some dimensions of psychological well-being are protective and that even higher rates of depression or anxiety would be found without these protective effects, or that increases in pain over time would be greater if psychological well-being were not playing a role.

In general, physical health declined over time, but there were no significant differences in functional health and number of chronic illnesses between women with increased pain and those with decreased or no change in pain. Significant interference with daily function in older adults with pain has been reported in several studies (Mobily et al., 1994; Thomas et al., 2004), but these studies did not examine functional status in those without pain. It is possible that a variety of health conditions contribute to declines in functional health over time, pain being just one of the factors. Consistent with previous findings, women in this study with pain had significantly lower subjective health ratings than women not bothered by pain (Reyes-Gibby et al., 2002).

There were a number of limitations to this study that must be considered when interpreting the findings. It was a secondary analysis of a study of older women and psychological well-being. The measure of pain was a single item from a symptom scale, and it is not known whether women correctly interpreted the pain item on the symptom bother scale or what type of pain women experienced, that is, acute or ongoing. Whether single-item measures can be reliable and valid has been debated, although some single-item measures used in health research have been shown to be both (Idler & Kasl, 1991). A broader assessment of pain with a valid and reliable measure would strengthen future studies. The small number of subjects at 10 years reduces the generalizability of the findings. Participants who completed the study were slightly younger and had higher baseline scores in some aspects of psychological well-being than those who dropped out. However, logistic regression indicated that a systematic bias was probably not operating; baseline physical health and psychological distress did not predict dropout. No specific measures were used to evaluate cognitive status in the parent study. The evaluation of cognitive status is important in the study of older adults. However, women in the study successfully completed numerous self-report questionnaires over 10 years, and we assumed that those with cognitive impairment would not have been able to do so. Finally, this study was conducted with women only, the majority of whom were white, and the findings may not be generalized to men or to other racial/ethnic groups.

This study had several strengths. It was a 10-year longitudinal study making it possible to examine reciprocal changes in pain, health, and psychological well-being over time. The sample consisted of community-dwelling older women, expanding previous research on pain in older adults that has been conducted primarily with samples drawn from health care settings, including pain clinics. Finally, the use of multiple measures of health and psychological well-being allowed for a rich assessment of aging women.

In summary, few longitudinal studies of pain in community-dwelling older women have been conducted, and, to date, no studies have specifically examined the relationship between pain and multiple dimensions of psychological well-being. Older women experienced increasing pain with age and were increasingly bothered by pain over time. Increases in pain were accompanied by increases in depressive symptoms over time. Yet the profiles of psychological well-being of women whose pain increased over time were similar to those of women with no increases in pain. Future research needs to examine how women are able to maintain psychological well-being in spite of declines in physical health, increases in pain, and increases in psychological distress as they age.

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