

Determinants of Recovery 12 Months after Hip Fracture: The Importance of Psychosocial Factors

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Abstract: The independent contributions to recovery from hip fracture of psychosocial factors including depression, personality, social connectedness, and self-rated health were studied in 219 women age 59 and older (mean age 78.5) who were community dwelling prior to fracture. Initial assessments were conducted shortly after surgery and follow up assessments 2, 6, and 12 months later. By 12 months, 15 patients had died and 15 had entered a nursing home. Substantial declines in physical functioning though not psychosocial status were observed. Only 21 per cent (compared to 81 per cent prefracture) reported walking independently; fewer than 30 per cent had regained reported prefracture levels of physical function. The proportion with elevated depression scores at 12 months was 20 per cent, down from 51 per cent following surgery; 64 per cent rated their

health excellent or good at 12 months, up from 43 per cent after surgery.

Poor cognitive status and post-surgical self-rated health were predictive of mortality. Among survivors, age, prefracture physical functioning, and cognitive status were associated with recovery in physical function but not psychosocial status. High post-surgery depression scores, but not the other psychosocial factors, were associated with poorer recovery in both functional and psychosocial status. These findings demonstrate the importance of depressive symptoms as one determinant of recovery from hip fracture and support the need to attend to the affective status of hip fracture patients following surgery. (*Am J Public Health* 1989; 79:279-286.)

Introduction

Fracture of the hip represents a public health problem of increasing magnitude. Annual incidence in the United States is estimated to be approximately 98 fractures per 100,000 population.¹⁻³ The majority of hip fractures (70-80 per cent) occur in females over 60 years of age, with the population at highest risk being White females 85 years or older.⁴ While there are sophisticated surgical procedures for hip fracture repair, full recovery has been elusive. Only 12 to 23 per cent return to prefracture ambulatory status and/or functional independence.^{5,6} Mortality rates in the first 12 months following fracture are 12 to 20 per cent higher than in comparable age/sex groups in the general population,^{3,7-9} and rates of institutional placement during the immediate post-hospital period are high and remain higher than average as the individual grows older.^{10,11}

Case series data^{6,9-11} consistently have shown prefracture physical and cognitive function and age to account for a substantial amount of the variance in hip fracture recovery. While there is evidence suggesting that psychological, social, and environmental factors influence recovery as well,^{6,12} evaluation of the contribution of a broad range of factors has been rare. Information regarding both physical functioning and psychosocial status, measured either before or after fracture, usually has not been available. Moreover, most studies have included both seriously debilitated, older individuals with limited potential for any recovery, and "healthier" elderly with a more positive prognosis. Consequently, even when psychosocial variables have been studied, there has been limited ability to evaluate the independent importance of these factors for recovery over and above the effects of the individual's health status.

We undertook a study designed to specifically investigate the role of psychosocial factors measured after surgery in the recovery of the "healthier" hip fracture patient. In this paper, we characterize their recovery status 12 months following surgery. We also present the findings of analyses to evaluate the independent contribution to recovery of four psychosocial factors measured during the initial, post-surgery assessments: self-rated health, depressive symptomatology, personality, and social supports. There is considerable evidence supporting the prognostic significance of these factors for the clinical course and/or recovery associated with diverse illnesses. The reader is referred to the excellent review by Kasl¹³ for a critical appraisal of this literature.

Methods

Study Sample

Subjects were recruited from among community dwelling, ambulatory White females over 59 years of age who were treated surgically for a fractured hip in one of 17 hospitals in the greater Philadelphia area between August 1, 1984 and January 15, 1986. Initial structured interviews were completed as soon after surgery as possible (usually the 7th-20th day). Follow-up interviews were obtained two and six months later and a final telephone interview was conducted 12 months after surgery. Clinical assessments of walking ability and neuromuscular status two and six months postsurgery were also made, and the patient's hospital record was systematically reviewed.

Seven hundred and thirty individuals meeting the above age, sex, race, and residence criteria were identified at the time of surgery; they represent an almost complete ascertainment of the patients treated during the surveillance period in each hospital. Additional study criteria included: ability prior to fracture to walk across a room with no greater assistance than a straight cane, absence of post-surgical cognitive impairment that would preclude completion of study assessments and absence of cancer or other health problems likely to cause a pathological fracture or to result in death during the year following hip fracture. Three hundred and sixty-two patients met these criteria and were asked to participate in the study; 219 of these consented.

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The sample for this analysis, consists of the 211 individuals (96 per cent of those enrolled in the study) for whom complete post-surgical and follow-up data or documentation of death were available. Mean age of these individuals was 78.5 (s.d. 7.6). Prior to hip fracture, 55 per cent lived alone, 21 per cent lived with their spouse, and 24 per cent with friends or other relatives. Forty-eight per cent were of British or Irish ethnic origin; 25 per cent reported German descent, and 15 per cent and 11 per cent, respectively, were from Eastern Europe or were listed as other. Mean level of education was 11.6 years (s.d. = 3.4). Forty-three per cent of the study subjects sustained a fracture of the trochanteric or intertrochanteric region of the femur. An intercapsular fracture was reported for 36 per cent and a fracture of the subtrochanteric or femoral neck region was recorded for the remaining 21 per cent. For 65 per cent of subjects, hip fracture repair involved fracture reduction and fixation; for 35 per cent a partial or complete prosthesis was used.

Some information obtained during study enrollment was available for both the 211 patients in this analysis and those who refused the initial interview (n = 143) or who were excluded because of missing data (n = 8). In addition, survival status at 12 months was known for 94 per cent of the 143 refusers and 103 (72 per cent) completed the 12-month interview. Comparisons of study participants and non-participants revealed no differences ($p < 0.05$) between the groups in terms of: age, prefracture living arrangement, prefracture independence in ambulation, history of recent fracture, prefracture pain or observed physical or sensory impairments. At 12 months, there were no differences between participants and non-participants in terms of survival or any other recovery indice.

Study Variables

In addition to information on sociodemographic variables such as age, marital status, and education, variables pertinent to this report include:

- *Prefracture Health Status:* The number of health problems experienced in the preceding year was assessed during the initial post-surgical interview using a modified version of the health problems scale in the Multi Level Assessment Instrument (MAI).¹⁴ Two additional questions were included to assess the presence and constancy of pain prior to hip fracture. Information abstracted from the patient's hospital record included the number of hospitalizations in the two years preceding the hip fracture and the number and type of different diagnoses reported on the admission history. Data on the type of diagnoses were used to classify individuals according to the number of serious diagnoses reported.
- *Prefracture Functional Status:* Ability to perform self-care activities of daily living (ADL) such as bathing, and dressing, and instrumental activities of daily living (IADL) such as shopping and doing housework prior to hip fracture were assessed retrospectively during the initial post-surgical interview. An adaptation of the Multi-level Assessment Instrument was used.¹⁴ ADL and IADL scores were computed as the number of activities that the individual reported doing without any assistance. Difficulty in performing activities such as pushing, pulling, and carrying objects was measured with three items adapted from disability scales developed by Nagi.¹⁵ The presence and kind of assistance required in walking or traveling distances were also determined.
- *Cognitive Function:* The Short Portable Mental Status Questionnaire (SPMSQ)¹⁶ was administered during the initial interview to assess post-fracture cognitive function in terms of orientation, memory and abstraction ability. Of the 10 SPMSQ items, eight were asked; the questions on year of birth and age were omitted.
- *Psychosocial Variables:* Two subjective measures of global health status based on responses to the question, "How do you rate your health: excellent, good, fair or poor?", were obtained during the initial post-surgical interview. For one, individuals were asked to rate their health as they remembered it to be "just prior" to their hip fracture; for the other, a rating was obtained for current health status "today". The presence of depressive symptomatology experienced the week preceding the post-surgery interview was assessed with the Center for Epidemiological Studies Depression Scale (CES-D).^{17,18} Recent evaluation of this 20-item scale confirms its validity as a measure of depressive symptomatology with older individuals, even those who are physically ill or disabled.¹⁹ Scores range from 0 to 60 with a score of 16 or higher distinguishing those with a high probability of clinical depression.
- *Personality dimensions of neuroticism and extraversion* were measured by the Eysenck Personality Inventory.²⁰ This instrument contains 52 "yes/no" questions of which 24 are markers for each personality trait. The Eysenck Inventory has been extensively used in personality research. Recent reviews confirm the validity of the neuroticism scale and, to a lesser extent, the extraversion scale in older populations.^{21,22}
- *Social support*, defined in terms of the availability and usual frequency of contact with children, close relatives, close friends and a "special person" with whom intimacies are shared was assessed using questions adapted from the National Institute on Aging project "The Establishment of Populations for Epidemiologic Studies of the Elderly" (EPESE).²³
- *Treatment-Related Variables:* Fracture site (e.g., trochanteric, subcapital, intertrochanteric), repair type (pin or prosthesis), pre- or post-surgical medical events (e.g., fever, wound infection, pneumonia, congestive heart failure, decreased hemoglobin), number of days in hospital and discharge location (e.g. rehabilitation hospital, nursing home, home) were obtained from the patient's hospital record.
- *Recovery Parameters:* Recovery at 12 months was characterized in terms of survival status, physical functioning, self-rated health, presence of pain in the involved limb, extent of depressive symptomatology and return to prefracture level of physical functioning. Scales in the initial post-surgery interview to assess prefracture walking ability, ADL, IADL and physical

performance were readministered at 12 months with slight modifications to accommodate the telephone interview format. Again a principal component analysis was done to summarize the physical function scales. As before, a single factor emerged, and the associated factor weights were used in computing the 12-month physical function factor score. The global self-health rating referenced to "today", the pain questions and the CES-D were also readministered at 12 months. To accommodate the telephone format, a dichotomous response option, (never = 0; sometimes to always = 1) was used with the 20 CES-D items.

An additional recovery variable was constructed as a count of the number of seven different functional parameters on which the individual had returned to, or surpassed, prefracture levels. The criteria variables included return to prefracture: 1) residence location, 2) use of ambulatory aids, 3) ambulation in the home, 4) ambulation outside the home, 5) performance of self-care, 6) instrumental activities of daily living, and 7) participation in social and recreational activities.

Results

● **Prefracture Health and Functioning:** Although "healthier" hip fracture patients were enrolled, the study sample was not free of pre-existing medical conditions. Patients reported 3.5 (s.d. 2.2) health problems with a greater number of pre-existing medical conditions ($x = 6.3$, s.d. 3.1) recorded in the hospital record. Prevalent conditions noted in the hospital record included, coronary heart disease (60 per cent), hypertension (53 per cent), osteoporosis (51 per cent), and arthritis (46 per cent).

Most patients, however, reported independence in physical function prior to fracture. Only 19 per cent of the subjects reported requiring any assistance with ambulation. Most sample members (89 per cent) reported they were completely

independent in ADL activities and 65 per cent indicated they completed all IADL activities without assistance.

● **Initial Psychosocial Status:** As seen in Table 1, a large proportion of study subjects (57.6 per cent) rated their health on the interview day as fair or poor. This is substantially in excess of that reported in large samples of community dwelling elders.^{24,25} The retrospective ratings of health status (just prior to fracture) were much more likely to be positive. Over 50 per cent of the study sample scored 16 or above on the CES-D. Compared to most samples of community dwelling elderly, this proportion is extremely high. For example Berkman, *et al*,¹⁹ report 15 per cent of women 65-74 years of age and 18 per cent of women ages 75+ enrolled in the EPESE study to have CES-D scores of 16 or greater. It is even in excess of the 28 per cent prevalence reported by Billig, *et al*,²⁶ for the post-surgical hip fracture patients in their case series and the 20-38 per cent prevalence reported for older persons hospitalized for a medical problem.^{27,28}

● **Recovery at 12 Months:** Fifteen patients (7.8 per cent) died prior to the 12-month interview. One death occurred during the acute hospital stay and seven others before the six-month interview. This mortality experience is substantially lower than that reported previously,^{5,7-9,11,29} even by studies which used restrictive selection criteria similar to ours. For example, Cobey, *et al*,⁶ and Jensen, *et al*,³⁰ report six-month, not 12-month, mortality in comparable samples to be 7.4 per cent, and 5.8 per cent, respectively.

Descriptive statistics for the remaining recovery parameters are displayed in Table 2. Even in this selectively "healthy" sample, most individuals continued to experience a sustained decline in physical function 12 months after fracture. Fifteen individuals were permanent nursing home residents. Another 18.6 per cent were reported to be dependent on a caregiver for assistance in most activities of daily living. Indeed, while approximately 74 per cent indicated at 12 months they walked outside their home, only 21 per cent

TABLE 1—Descriptive Statistics for Selected Psychosocial Variables Measured during the Initial Post-Surgery Interview

	Excellent	Good	Fair	Poor
Global Self-Rating of Health				
% Today, day of interview	7.7	35.6	34.6	22.1
% Just before hip fracture	23.7	42.7	22.7	11.4
Personality				
Neuroticism scores:	mean 9.39	s.d. 5.3		
	standardized coefficient alpha	.96		
Extraversion scores:	mean 10.04	s.d. 3.5		
	standardized coefficient alpha	.92		
Depression CES-D:				
	less than 16	48.8%		
	16 or greater	51.2%		
	mean 16.41	s.d. 8.1		
	standardized coefficient alpha	.82		
Social Connectedness:				
Frequency of contact with "special persbn":				%
	daily			54.8
	2-3 times a week			20.1
	once a week			7.3
	less than once a week			9.2
	no special person			8.7
Number of children, other relatives and friends reported being close to:				
	none			1.4
	1-2			10.9
	3-4			21.1
	5-6			25.7
	7 or more			40.8

TABLE 2—Descriptive Statistics for Parameters of Recovery 12 Months Following Hip Fracture Surgery among Surviving Patients

		%
<i>Residence:</i>	Private home: independent	62.7
	dependent	18.6
	Retirement Community	9.8
	Nursing Home	8.8
<i>Degree of return to prefracture functional status:</i>		
Number indicators at prefracture levels or better:	none	4.1
	1-3	27.5
	4-5	40.3
	6-7	28.1
	<i>Walking ability:</i>	not ambulatory
housebound	15.3	
walks in and outside home	9.7	
uses walker	14.2	
uses quad cane	29.1	
uses straight cane	20.9	
independent, no aid		
<i>Number of self-care activities for which no assistance was received:</i>	3	69.9
	2	14.3
	1	8.1
	none	7.7
	<i>Number of instrumental activities for which no assistance was received:</i>	3
2		16.3
1		10.7
none		40.8
<i>Self rated health:</i>		excellent
	good	51.5
	fair	27.6
	poor	8.2
<i>Pain in involved hip:</i>	none	45.9
	intermittent	44.7
	constant	9.4
<i>Depression score (CESD):</i>	less than eight	80.0
	eight or more	20.0
Mean	4.14	s.d. 4.3

reported they could do so without an ambulatory aid. This compares to 81 per cent who walked outside unassisted prior to hip fracture. Moreover, only 28.1 per cent had returned to their prefracture functional status in at least six of the seven functional indicators. Twenty-three per cent had failed to regain prefracture function in at least four criteria.

In contrast to physical functioning at 12 months, the distributions on self-rated health and the CES-D indicate considerable "recovery" in these areas. The proportion rating their health as excellent or good was almost identical to those rating their health status "just before fracture" in this manner. At 12 months only 20 per cent of the sample had elevated scores, ≥ 8 , on the modified CES-D scale. (Comparison of post-surgery scores on a dichotomized version of the CES-D with those on the full CES-D showed 93 per cent agreement in classification when cutpoints of ≥ 8 , and ≥ 16 , respectively, were used.) This proportion is similar to that reported in the total older female sample in the EPESE study¹⁹ and substantially less than that for women in the poorest health status strata.

Predictors of Mortality

The limited number of deaths precluded an extensive investigation of the predictors of mortality. Univariate analyses involved the examination of contingency tables, and the comparison of mean values between survivors and non-survivors on continuous variables using ANOVA proce-

TABLE 3—Adjusted Odds Ratios for Mortality in the 12 Months following Hip Fracture and 95% Confidence Intervals Computed from the Logistic Coefficients (B) and Their Standard Errors

Independent Variable	12-Month Mortality	
	AOR	95% CI
<i>Cognitive function</i>		
8	1	—
7	2.09	1.35, 3.25
5	9.15	2.44, 34.36
<i>Self-rated health</i>		
1	1	—
2	2.26	1.09, 4.68
3	5.09	1.19, 21.80
4	11.49	1.02, 101.79
<i>Age in years</i>		
60	1	—
70	.68	.32, 1.46
80	.47	.10, 2.31
<i>Years education</i>		
1	1	—
8	.93	.47, 1.83
12	.89	.40, 1.12
<i>Number days in hospital</i>		
14	1	—
21	2.54	.01, 588.16
28	6.44	.53, 3493.80

dures. An increased risk of dying was observed for individuals whose cognitive status score was 3 or less, for persons rating their health, referenced to "today", as fair or poor and for those who reported having completed high school or college. There were no mean differences ($p < 0.05$) between survivors and decedents in terms of age, prefracture physical functioning, number of recorded pre-existing health problems, number of diagnoses classified as serious, number of post-surgical medical complications, fracture site, type of fracture repair, or the psychosocial variables.* Individuals who died, however, did have significantly longer lengths of stay in the acute care hospital.

Multivariate analyses used the logistic model. Variables identified as risk factors during univariate analyses were included, along with age, as predictor variables. Adjusted odds ratios (with 95 per cent confidence limits) for each variable in the model tested are shown in Table 3. Only cognitive function following surgery and self-rated health are associated with risk of death. The importance of cognitive function measured after hip fracture for risk of post-fracture mortality has been well documented, even in studies including a similar selectively healthy population.^{6,8} Although not with hip fracture patients, other studies have demonstrated an association between self-rated health and mortality.^{24,25}

● *Predictors of Recovery among Survivors:* A two-stage analysis limited to study survivors was conducted for five recovery indices: 1) overall 12-month physical function; 2) degree of return to prefracture functional status; 3) self-rated health; 4) pain; and 5) level of depressive symptoms. In the first stage, univariate analyses between measures obtained during the post-surgery period and the recovery indices were conducted. Selected correlation coefficients are presented in Table 4. As expected, age was strongly related to all the physical function indices with recovery more limited as age increased. Predictably, as well, initial measures of health and physical functioning were strongly associated with the com-

*Data available from author on request.

TABLE 4—Correlation Coefficients between Ordinal or Continuous Variables Measured during the Initial Post-Surgery Interview Determined from the Hospital Record and Recovery Parameters at 12 Months among the Surviving Hip Fracture Patients

	Recovery Parameters				
	12 Month Physical Function	Degree of Return to Prefracture Functional Status	Self-Rated Health	Pain	Depressive Symptoms
Age	-.38**	-.28**	.09	.08	.08
Years education	.15*	.02	-.11	-.10	-.08
Years employed	.15	.04	-.13	-.11	-.12
Number self reported medical conditions	-.31**	-.25**	.26**	.07	.21**
Walking ability	.35**	-.15*	-.08	-.02	-.14
ADL	.30**	-.05	-.05	.07	.002
IADL	.45**	.22**	-.06	-.06	-.001
Physical performance	.54**	.32**	-.29**	.02	-.31**
Physical function factor score	.56**	.25**	-.20**	.03	-.19
Mental Status	.27**	.32**	-.12	-.02	-.10
Number pre-existing medical diagnoses	-.29**	.20**	.22**	.08	.11
Number medical diagnoses considered serious	-.16*	-.08	.19**	.01	.01
Number post-surgical complications	-.18**	-.19**	.11	.04	.08
Self-rated health (before fracture)	-.30**	.28**	.47**	.09	.34**
Self-rated health (now)	-.32**	.38**	.45**	.20**	.35**
CES-D score	-.24**	.26**	.39**	.29**	.47**
Neuroticism score	-.10	-.15*	.19**	.25**	.41**
Extraversion score	.11	.06	-.19**	.08	.08
Contact "special person"	-.09	-.07	.06	.14	.02
Number close children, friends and relatives	.01	.06	-.09	-.02	-.11

*p < .05 > .01

**p < .01

parable recovery parameters. To a lesser degree these variables were related to psychosocial functioning at 12 months. With the exception of scores on the extraversion scale and the measures of social connectedness, psychosocial variables measured shortly after surgery were consistently associated with both physical functioning and psychosocial functioning at 12 months. Univariate associations between the recovery indices and treating hospital, length of hospital stay, fracture site, type of fracture repair, number of post-surgical complications, discharge location, ethnic background, prefracture living arrangement and prefracture pain were also examined. Most of these associations were not of importance.*

Multivariate analyses using OLS regression procedures were conducted. Variables shown to be related to a recovery parameter or thought to be a potential confounding variable were entered into the regression equations first; included were: age, years of education, years of employment, number of self-reported conditions, number of medical conditions reported in the hospital record, number of post surgical complications, prefracture physical function score, cognitive status score, days in the acute care hospital, and pain prior to hip fracture. Dummy variables for type of fracture repair, prefracture living arrangement, the presence of pulmonary disease and cancer, and discharge location were also entered. Each psychosocial variable was entered on a second step yielding 35 separate regression equations. Analyses were also conducted in which a best fitting model containing only statistically significant ($p < 0.05$) terms obtained using backward elimination procedures³¹ was entered prior to the

psychosocial variable. The results of the two analyses were identical; the former are included here. Tables 5 and 6 present the beta coefficients and standard errors for the equations evaluating the importance of post-surgical depressive symptomatology for 12-month physical function and psychosocial status respectively. Data in Table 5 confirm the previously observed importance of age, cognitive status and prefracture physical function for recovery of physical function following hip fracture. As seen in Table 6, except for pre-fracture physical function, these factors are unrelated to psychosocial status at 12 months. The data also replicate previous studies in which pre-existing medical conditions unrelated to cognitive impairments were of limited importance to recovery.^{7,11} The type of hip fracture repair and post-surgical complications were also unassociated with recovery at 12 months.

In contrast, the associations between level of depressive symptoms and both the physical functioning and the psychosocial recovery indices stand out. In each case as level of depressive symptomatology following hip fracture surgery increases, outcomes 12 months later are less positive.

Comparable analyses not shown** here revealed the importance of the remaining psychosocial variables to be minimal. Specifically, the two measures of social connectedness and the measure of extraversion were unrelated to any of the recovery parameters. Self-rated health for the reference "just before you fractured your hip" and neuroticism were associated only with the psychosocial outcomes. While

**Findings from these analyses are available on request from the first author.

TABLE 5—Multiple Regression Analyses Showing the Relation between 12-month Physical Function Recovery Parameters and Selected Covariates and Depressive Symptoms (CES-D scores) Measured during the Initial Post-surgery Assessments among the Survivors at 12 Months

Independent Variables	Overall 12-Month Physical Function Beta (s.e.)	Degree Return to Prefracture Functional Status Beta (s.e.)
Age	-.034 (.008)***	-.071 (.017)***
Years educated	.030 (.017)	.063 (.037)
Years employed	.078 (.058)	.118 (.123)
Prefracture residence		
A (1 = lives alone)	.036 (.138)	-.344 (.294)
B (1 = lives with spouse)	.049 (.163)	-.198 (.349)
Type hip repair (1 = prosthesis)	.075 (.114)	.162 (.242)
Number self report conditions	-.042 (.030)	-.131 (.064)*
Number medical record reported conditions	-.015 (.022)	-.027 (.047)
Number post-surgical complication	-.063 (.087)	-.078 (.095)
Number recent hospitalizations	-.021 (.069)	-.083 (.148)
History of cancer (1 = yes)	-.074 (.139)	-.067 (.296)
History of pulmonary disease (1 = yes)	.269 (.140)	.609 (.299)*
Cognitive status	.097 (.048)*	.152 (.102)
Prefracture physical functioning	.465 (.062)***	.353 (.131)**
Depressive symptoms (CES-D score)	-.019 (.007)**	-.042 (.015)**
Constant	2.32 (.714)	10.764 (1.522)***
R	.72	.60
Adjusted R ²	.48	.31

*p < .05 > .01

**p < .01 > .001

***p < .001

there were associations between self-rated health for "today" and all five recovery indices, the associations between this health rating and all the recovery parameters except depressive symptomatology disappeared when the CES-D scores were added to the model.

The preceding assumes the presence of linear associations between post-surgery psychosocial variables and the recovery parameters and the absence of interaction effects. These assumptions were systematically evaluated. Analyses of residuals revealed no apparent non-linear associations. As well, none of the tested quadratic terms were statistically significant. Of the more than 100 separate analyses to evaluate the presence of interaction effects, only five achieved a p value < 0.05. Given the number of hypotheses tested, these associations may be due to chance.

Discussion

This study of the "healthier" hip fracture patient demonstrates again that older individuals who are frail have diminished reserves and are thus less able to regain losses in function following hip fracture. Impaired cognitive function as a risk factor for death or incomplete recovery of physical function is especially noteworthy. During study enrollment an experienced nurse researcher had evaluated all individuals as cognitively intact. The observed importance of cognitive status therefore reflects more subtle decrements identified by the inability to correctly respond to specific tasks on the SPMSQ such as naming the past president or subtracting from 20 by threes. Apart from the well known biomedical risk

factors, this study demonstrates for the first time the importance of level of depressive symptoms as a determinant of both functional and psychosocial recovery from hip fracture.

Several methodological features of this study make it unlikely that these observed findings simply reflect study artifacts. As noted by Kasl,¹³ serious methodological weaknesses of most previous studies of illness course include the inability to identify cohorts at the time of disease onset and to control for pre-existing, prognostically important aspects of health status. These problems have been minimized in this study. Hip fracture is an acute onset injury. Virtually all cases receive immediate medical attention and undergo a surgical repair. Although the initial interviews were conducted following the hip fracture and patient's responses may be affected by her convalescent status, correlations between self-rated health "just before hip fracture" and other retrospective measures such as ADL, IADL and the number of pre-existing medical conditions were substantially greater than those between these variables and self-rated health "today". Conversely, ratings of health today were more strongly correlated with other measures such as CES-D scores or cognitive status that had a post-surgery time reference. Moreover, a substantial amount of information concerning the individuals prefracture medical status was derived from her hospital record and reflected more objective assessments by the physician. Last, inclusion in the multivariate analyses of measures of pre-existing medical status, prefracture physical functioning and cognitive function minimized the possibility that the observed associations between depressive symptoms and the recovery indices simply reflect cross-sectional correlations between these prognostically important variables and depression.

The findings related to depression are in general agreement with those reported by Aneshensel, *et al.*³² Using longitudinal data from a community dwelling adult sample, they observed illness levels to be temporally related to increased levels of psychological distress and depression to have a smaller lagged effect on subsequent illness levels. They differ, however, from those reported by Casselith, *et al.*³³ who found no effect on differential survival or time to relapse among cancer patients due to any psychosocial factors studied including a measure of hopelessness. Casselith's study, however, was limited to individuals with advanced cancers where the inherent biology of the disease may override the influence of any other nonmedical factors. The results observed here were obtained in a patient cohort selected so that the individual's medical status was not likely to overshadow the effects of social or psychological factors.

While confirming the importance of level of depressive symptomatology, the study fails to demonstrate consistent associations between self-ratings of health and personality and achieved recovery. The apparent indirect pathways through depressive symptomatology for health ratings and neuroticism may reflect overlap in these psychosocial factors. Correlation coefficients between initial CES-D scores and neuroticism and health ratings "today" were .626 and .523 respectively. Although introduction of CES-D scores substantially modified the associations between these factors and the recovery parameters, the reverse did not occur. This suggests an importance of depressive symptomatology over and above that shared with either neuroticism or self-rated health. The absence of a detectable effect due to social supports may reflect inadequacies in the measurement of these variables. Only 1.4 per cent of study subjects indicated they had no person they felt very close to; thus most may

TABLE 6—Multiple Regression Analyses Showing the Relations between 12-month Psychosocial Recovery Parameters and Selected Covariates and Depressive Symptoms (CES-D scores) Measured during the Initial Post-surgery Assessments among the 196 Survivors

Independent Variables	Self-Rated Health	Depressive Symptoms	Hip Pain
	Beta (s.e.)	Beta (s.e.)	Beta (s.e.)
Age	.002 (.008)	.007 (.045)	-.007 (.007)
Years educated	-.009 (.017)	-.094 (.101)	-.018 (.017)
Years employed	-.019 (.058)	.004 (.319)	-.012 (.053)
Prefracture residence			
A (1 = lives alone)	-.151 (.137)	.686 (.801)	-.137 (.129)
B (1 = lives with spouse)	.005 (.163)	1.721 (.909)	.228 (.151)
Type hip repair			
(1 = prosthesis)	.149 (.114)	-1.012 (.637)	.039 (.105)
Number self report conditions	.031 (.030)	-.080 (.164)	-.019 (.028)
Number post-surgical complications	-.027 (.029)	-.029 (.034)	-.008 (.006)
Number medical record reported conditions	.019 (.022)	-.060 (.123)	.017 (.021)
Number recent hospitalizations	.049 (.069)	.436 (.371)	.010 (.062)
History of cancer (1 = yes)	-.074 (.139)	1.209 (.787)	.075 (.129)
History of pulmonary disease (1 = yes)	-.047 (.141)	-1.939 (.760)	-.168 (.126)
Cognitive status	.072 (.048)	-.2011 (.265)	.028 (.044)
Prefracture physical functioning	-.069 (.062)	-.899 (.407)*	-.002 (.067)
Depressive symptoms (CES-D score)	.036 (.007)***	.256 (.040)***	.029 (.007)***
Constant	1.749 (.714)*	1.721 (3.932)	1.810 (.658)
R	.49	.59	.44
Adjusted R ²	.24	.28	.19

*p < .05 > .01

**p < .01 > .001

***p < .001

have exceeded a threshold distinguishing social isolates from those who are socially connected.

While the analyses reported here provide insight regarding variables that affect subsequent recovery, factors associated with the incidence of depressive symptomatology or the specific process by which recovery is affected have not been addressed. For example, we do not know if elevated post-surgery depressive symptomatology represents deterioration in affective state following hip fracture or an extension of a chronic state of depression. Likewise, we do not know if the importance of post-fracture level of depressive symptomatology is mediated through its effect on participation in a rehabilitation program, on one's ability to mobilize supportive resources or on associated biological factors that affect the capacity for recovery. Analyses of data obtained from informants and at the two- and six-month examinations are in progress and will permit further evaluation of some of these important issues.

Despite unanswered questions, the study findings emphasize the clinical relevance of routine evaluation of depression following surgery in hip fracture patients. Systematic assessment by staff nurses using one of the standard self report measures such as the CES-D or a staff rating scale such as the Raskin Scale³⁴ would require little time and could substantially reduce undetected depressive symptomatology. Psychiatric referral, when indicated, would permit evaluation and initiation of appropriate treatment. Although further research is required to determine the specific effect on recovery of treatment, reduction of depressive symptomatology alone is beneficial to the individual and is likely to have positive effects on those providing support and caregiving

assistance as well. In light of the relatively frequent occurrence of hip fracture and the high prevalence of post-fracture elevated levels of depressive symptomatology, these benefits could be substantial.

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Delta Omega Society Announces Essay Contest: Open to Public Health Students

Delta Omega, the honorary society in public health, has announced a national essay contest on the topic of "Public Health as Social Justice." Any student currently enrolled in an accredited School of Public Health in the United States is eligible to enter. The deadline for entering contest is *April 15, 1989*.

Within the concept of "public health as social justice," the student may write about any aspect of public health in the United States or anywhere in the world. The essay may be based on empirical research, or literature review or interpretation, or on any other thoughtful approach to the subject selected. Essay length should not exceed 15 pages of text, typed double-space on 8½ × 11 inch paper. References, tables, and figures may occupy any additional five pages.

Winners will receive cash prizes and certificates from Delta Omega attesting to their awards. First prize is \$1500; second prize, \$1000; third prize, \$500. All three winners will be invited to present their papers during the 117th annual meeting of the American Public Health Association in Chicago, Illinois, October 22-26, 1989. Delta Omega will also contribute to the travel expenses of essay winners.

Selection of the winning essays will be made by a Delta Omega Committee of faculty members from at least three accredited Schools of Public Health. Send all essays by first class mail to:

Professor Henrik Blum
Chair, Delta Omega Essay Contest
School of Public Health
University of California
Berkeley, CA 94720