Published in final edited form as:

J Am Geriatr Soc. 2009 April ; 57(4): 627–633. doi:10.1111/j.1532-5415.2009.02183.x.

Positive Affect and Incidence of Frailty in Elderly Women Caregivers and Noncaregivers: Results of Caregiver–Study of Osteoporotic Fractures

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Abstract

OBJECTIVES—To determine whether positive affect is associated with a lower incidence of frailty over 2 years in elderly community-dwelling women and to test the stress-buffering hypothesis by evaluating whether these associations differed in caregivers and noncaregivers.

DESIGN—Prospective cohort study with three annual interviews conducted in four U.S. communities between 1999 and 2004.

SETTING—Home-based interviews.

PARTICIPANTS—Three hundred thirty-seven caregiver and 617 noncaregiver participants from the Caregiver-Study of Osteoporotic Fractures (Caregiver-SOF) who were not frail at the baseline Caregiver-SOF interview.

MEASUREMENTS—High and low positive affect and depressive symptoms were derived from the baseline 20-item Center for Epidemiologic Studies Depression Scale. Frailty was the development of three or more indicators (weight loss, exhaustion, slow walking speed, or weak grip strength) at the first or second follow-up interview.

RESULTS—Respondents' mean age was 81.2. Caregivers and noncaregivers had similar levels of positive affect (56.3% vs 58.3%) and frailty incidence (15.4% vs 15.9%) but differed in perceived stress (mean Perceived Stress Scale score 16.7 vs 14.8, $P < .001$). Frailty risk was lower in respondents with high positive affect than in those with low positive affect in the total sample

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Conflict of Interest: The editor in chief has reviewed the conflict of interest checklist provided by the authors and has determined that the authors have no financial or any other kind of personal conflicts with this paper. Funded by the National Institutes of Health, National Institute on Aging (AG18037, AG05407, T32-AG-00262), and National Institute of Arthritis and Musculoskeletal and Skin Diseases (AR35582, AG05394, AR35584, AR35583).

Author Contributions: Eunice Park-Lee conceptualized the hypotheses and study design, performed data analyses, and took the lead role in interpretation of the results and preparation of the manuscript. Lisa Fredman designed the Caregiver-SOF study on which these analyses were performed (including obtaining funding for this study), created the data set, reviewed analyses, and contributed to the interpretation of the results and preparation of the manuscript. Marc Hochberg was involved in collection of data from subjects enrolled in the Baltimore Clinical Center and critical review of the manuscript. Kimberly Faulkner reviewed analyses and contributed to the interpretation of the results and preparation of the manuscript.

(adjusted hazard ratio (HR) =0.49, 95% confidence interval (CI) =0.35–0.70), caregivers (adjusted HR =0.44, 95% CI =0.24–0.80) and noncaregivers (adjusted HR =0.50, 95% CI =0.32–0.77).

CONCLUSION—These findings add to the evidence that positive affect protects against health decline in older adults, although it had no additional stress-buffering effect on health in elderly caregivers.

Keywords

positive affect; depression; frailty; caregivers

There is mounting evidence that positive affect, defined as emotional contentment and happiness,¹ has benefits for physical and psychological health. It is associated with greater independence in activities of daily living (ADLs);^{2–4} faster walking speed;^{3,4} and lower incidence of mortality,^{3,5} stroke,⁶ and frailty⁷ in community-dwelling elderly adults. Older adults with high positive affect also have better recovery in ADLs, walking pace, and chair stand speed after hospitalization for stroke, heart attack, and hip fracture than those with low positive affect or depressive symptoms.^{2,8} With respect to psychological health, adults with high positive affect report greater psychological resilience than those with low positive affect or depressive symptoms.^{9,10} Laboratory studies suggest that positive emotions may help people endure stress and have better health outcomes.¹⁰ Because caregivers are generally under chronic stress,¹¹ studies comparing caregivers and noncaregivers can shed light on whether positive affect influences physical health differently in stressed and nonstressed adults. To the authors' knowledge, no study has addressed this question under real-life circumstances. This study evaluated whether the association between positive affect and incidence of frailty differed in caregivers and noncaregivers in a multisite sample of community-dwelling elderly women.

The stress-buffering model¹² and “broaden and build” theory¹³ propose two ways that positive affect may operate in caregivers and noncaregivers. The stress-buffering model hypothesizes that positive affect serves as a buffer against the negative effects of stress. According to this model, it would be expected that a stronger benefit of positive affect would be observed in caregivers because of their higher levels of stress. The “broaden and build” theory states that positive emotions enable individuals to broaden their behavioral repertoires and draw on a wider array of physical, psychological, intellectual, and social resources in response to stress. This theory would predict that persons with high positive affect, regardless of caregiver status, would have a lower risk of health decline than those without high positive affect.

Frailty is generally defined as a decline in homeostatic reserves in multiple physiological systems, resulting in greater vulnerability.^{14–16} Its prevalence increases from 2.5% to 4.8% in adults aged 65 to 75 to more than 30% (32–56.3%) in those aged 90 and older.^{17,18} Frail older adults have a greater risk of falls, disability, hospitalization, institutionalization, and death.^{16,19,20} Although several studies have evaluated whether depression influences the development of frailty,^{21,22} only one study has found that it was inversely associated with positive affect, and that study was conducted over a 7-year period.⁷ Thus, the short-term influence of positive affect on frailty is relatively unknown.

In the present study, the hypothesis was tested that older women with high positive affect would have a lower risk of frailty over 2 years than those with low positive affect or high depressive symptoms and that high positive affect would have a greater protective effect on caregivers than on noncaregivers. A previously developed measure of positive affect^{2,8} and a modified version of a previously developed index to measure frailty¹⁶ were used.

METHODS

Sample

The sample came from the Study of Osteoporotic Fractures (SOF).²³ The SOF sample included 9,704 white women who were aged 65 and older and were recruited between 1986 and 1988 from population-based listings in four areas of the United States: Baltimore, Maryland; Minneapolis, Minnesota; Portland, Oregon; and the Monongahela Valley, Pennsylvania. Women were excluded if they were unable to walk without assistance from another person or had a history of bilateral hip replacement. In 1997, a cohort of 662 African-American women with similar functional characteristics to the original cohort was added. Approximately every 2 years, a comprehensive clinical evaluation is conducted at each site. The Caregiver-SOF sample included members of both cohorts.

Caregiver-SOF Sample—The study sample was identified in two phases, described elsewhere.²⁴ The first phase consisted of administering a caregiver screening questionnaire to 5,952 SOF respondents who participated in the sixth biennial examination, conducted between 1997 and 1999, at their home or a SOF clinic. SOF participants were not screened if they were cognitively impaired or lived in nursing homes or other long-term care facilities. The second phase began in 1999 and consisted of readministering the screening questionnaire by telephone to all caregivers and a subset of noncaregivers had been identified by the initial screening questionnaire.

The screening questionnaire asked SOF participants if they currently helped a relative or friend with each of seven instrumental ADL tasks (IADLs) and seven ADL tasks²⁵ because that person was physically, cognitively, or psychologically unable to perform the task independently. Participants were categorized as caregivers if they helped one or more persons with at least one IADL or ADL, and as non-caregivers if they did not help anyone with these tasks.

One to two noncaregivers were matched to each caregiver on SOF site, age, race, and ZIP code. The resulting sample included 375 caregivers and 694 noncaregivers.

Data Collection

Home-based face-to-face interviews were conducted with respondents within 2 weeks of the telephone re-evaluation (Caregiver-SOF baseline interview) and at two annual follow-up interviews. The institutional review boards at each SOF site and at the Boston University Medical Center approved this study. All participants provided written informed consent.

Variables

Positive Affect—A three-category ordinal variable was created from the 20-item Center for Epidemiologic Study Depression Scale (CES-D),²⁶ based on previously developed measures.^{2,8} The CES-D was administered at the Caregiver-SOF baseline interview. Respondents reported how frequently they had experienced each item in the previous week, with responses ranging from rarely (0) to most of the time (3). A total CES-D score of 16 or higher indicates high depressive symptoms. Those whose CES-D score was less than 16 were categorized as having high or low positive affect. Respondents were classified as having high positive affect if they reported feeling all four positive affect items (“I felt that I was just as good other people,” “I felt hopeful about the future,” “I was happy,” and “I enjoyed life”) most of the time in the previous week and as having low positive affect if they reported these feelings less often. Respondents were classified as having high depressive symptoms if their overall CES-D score was 16 or more, regardless of the number of positive affect items they endorsed. Thus, although these three categories were mutually exclusive,

respondents with high depressive symptoms could also have high or low positive affect, but those with high depressive symptoms could not be included in a positive affect category.

Frailty—Frailty was measured at each of interview using a modified version of a previously developed index.¹⁶ The current study's measure included four of the five components that were in the original index because Caregiver-SOF lacked a measure of physical activity. Similar to previous measures, frailty was defined as the presence of three or more of the following components: unintentional weight loss, exhaustion, slow walking speed, and weak grip strength.

Weight loss was defined as losing 10 pounds or more. At baseline, this was based on self-report of having lost 10 or more pounds unintentionally in the past 6 months. At each follow-up interview, weight loss was based on comparing measured weight at the previous interview to that at the follow-up interview. Exhaustion was measured according to a single item on the CES-D ("I felt that everything I did was an effort"). Respondents were classified as exhausted if they reported the item occasionally or most of the time in the previous week. Previous frailty measures defined slow walking speed as taking 7 seconds or more to walk 15 feet for older women whose height was 159 cm or less and 6 seconds or more for those who were taller than 159 cm.^{16,27} In this study, walking speed was measured over a 2-, 3-, or 6-m course, depending on the space available. Slow walking speed was defined as average walking speed of 0.65 m/s or slower (4.57 m/7 s) for women whose height was no more than 159 cm or 0.76 m/s or slower (4.57 m/6 s) for those who were taller than 159 cm. Grip strength was measured twice in each hand using a handheld dynamometer, according to previously published methods.²⁸ Weak grip strength was based on the average of these four measurements, using the same criteria as previous frailty measures:¹⁶ average grip strength of 17 kg or less for women with a body mass index (BMI) of 23.0 or less, 17.3 kg or less for a BMI of 23.1 to 26.0, 18 kg or less for a BMI of 26.1 to 29.0, or 21 kg or less for a BMI greater than 29.0 kg/m². BMI was based on the respondent's measured weight at the Caregiver-SOF interview and her height at her first SOF interview.

Covariates

Sociodemographic factors were self-reported at baseline and included age, race (white or African American), marital status (currently married vs widowed, divorced, separated, or never married), education (college educated vs high school graduate or less), and caregiving status. Caregivers were defined as respondents who assisted a relative or friend with one or more ADL or IADL tasks because that person had cognitive, physical, or psychological impairments, and respondents who did not help others with these tasks were categorized as noncaregivers.

With regard to health status, respondents were classified as having a comorbid medical condition if they reported that a physician or health professional had ever diagnosed them with two or more of the following conditions: hypertension, heart disease, diabetes mellitus, cancer, stroke, or Parkinson's disease. These conditions were chosen because of their association with frailty in older adults. Respondents reported their ability to perform each of seven ADLs (feeding, dressing or undressing, grooming, walking, transferring, bathing, and using the toilet) and seven IADLs (telephone use, getting to places out of walking distance, shopping for groceries or clothes, preparing meals, doing housework, taking medications, and handling money). Separate dichotomous measures were constructed to indicate limitations in one or more ADLs and IADLs.

Perceived stress was measured using the Perceived Stress Scale.²⁹ This 14-item scale measures general stress experienced in the previous month, with higher scores indicating

more stress and possible values ranging from 0 to 56. Perceived stress was used as a continuous variable in these analyses.

Analyses

Bivariate analyses (e.g., analyses of variance, chi-square tests) were performed to determine whether sociodemographic, health, and caregiving characteristics differed for respondents in the three affect categories. Cox proportional hazards models were fitted to evaluate the effect of positive affect on time to onset of frailty in respondents who were not frail at baseline. The first report of frailty onset at follow-up was considered as the event. Respondents with no evidence of new frailty were censored at the second annual follow-up interview for those who completed the study interviews; those who died or had only one follow-up interview were censored at their date of death or the date of the first follow-up interview, whichever occurred first. The assumption of proportional hazards was assessed using log minus log plots and by testing the significance of the interaction between positive affect variables and the logarithm of time at the significance level of .05. No evidence was found in the data that the proportional hazards assumption was violated.

Crude and adjusted hazards ratios (HRs) and 95% confidence intervals (CIs) were calculated. All models included indicator variables for high positive affect (vs other) and high depressive symptoms (vs other); low positive affect was the reference group for all analyses. Individual covariates were included as potential confounders in multivariable analyses if their addition to a model containing only the positive affect variables altered the association with frailty by 10% or more. All covariates that met the criteria were then included as potential confounders in a model, and non-statistically significant variables were excluded one at a time to arrive at the most-parsimonious model. In addition, separate Cox proportional hazards models were conducted within caregiver and noncaregiver subgroups.

All analyses were performed using PC-SAS (version 9.1, SAS Institute, Inc., Cary, NC).

RESULTS

The sample included 954 women who were not frail at baseline: 337 caregivers and 617 noncaregivers. Excluded from these analyses were 115 respondents who were frail at baseline. Respondents who were excluded were significantly less likely than those who were included in these analyses to be college educated and more likely to have comorbid medical conditions, ADL and IADL limitations, and high depressive symptoms. As shown in Table 1, the mean age of the study sample was 81.2 ± 3.7 ; 87% were white, 37% were married, and 35% were caregivers. Fifty-eight percent reported high positive affect, 34% reported low positive affect, and 8% reported high depressive symptoms. Respondents with high depressive symptoms were more likely to have ADL and IADL limitations than other respondents, but no other factors differed significantly across affect categories. Caregivers made up approximately 35% of each affect group.

Forty-five (4.7%) respondents died, and 36 (3.8%) were lost to follow-up over the study period. A higher proportion of respondents with high depressive symptoms died (9.2% vs 4.3%, $P=.08$) or were lost to follow-up (6.6% vs 3.5%, $P=.20$), but these differences were not statistically significant.

As shown in Table 2, 17.2% of the sample became frail by the second follow-up interview. The cumulative proportion of respondents exhibiting each of the four frailty components ranged from 13.2% who lost weight to 75.9% who developed weak grip strength by the second follow-up interview.

The rate of developing frailty per 1,000 person-years rose from 57.1 cases in women with high positive affect to 112.5 and 148.6 cases in those with low positive affect and high depressive symptoms, respectively (Table 3). When adjusted for confounders, respondents with high positive affect were half as likely to become frail as those with low positive affect (adjusted HR =0.49, 95% CI =0.35–0.70). By contrast, the risk of frailty did not differ in respondents with high depressive symptoms from those with low positive affect when adjusting for confounders (adjusted HR =0.95, 95% CI =0.56–1.59). Caregiving status was not associated with risk of frailty, after adjusting for covariables.

Respondents with high positive affect had a lower risk of developing frailty than those with low positive affect, regardless of their caregiving status (adjusted HR =0.44 for caregivers and 0.49 for noncaregivers; Table 4), but risk of frailty was not higher in respondents with high depressive symptoms than in those with low positive affect, whether they were caregivers (adjusted HR =0.91, 95% CI =0.33–2.51) or noncaregivers (adjusted HR =1.05, 95% CI =0.56–1.95). Moreover, when interaction terms between caregiver status and high positive affect and high depressive symptoms were included in a model containing all respondents, the interaction terms were not statistically significant.

These associations were reanalyzed using positive affect as a continuous variable, and results were obtained that were similar to those reported above. The protective effect of a 1-unit increase in positive affect on incident frailty remained significant for the total sample (adjusted HR =0.92, 95% CI =0.86–0.98), caregivers (adjusted HR =0.92, 95% CI =0.86–0.98), and noncaregivers (adjusted HR =0.92, 95% CI =0.84–1.0).

Because positive affect and frailty measures include the exhaustion item of the CES-D, the analyses were reperformed excluding the exhaustion item from the positive affect variable. These results did not differ from the results of analyses that included this item. In addition, because logistic regression was also an acceptable method to test this hypothesis, the risk of frailty (yes/no) was estimated using logistic regression models. Similar results were found to those found using proportional hazards models (adjusted OR =0.50, 95% CI =0.34–0.73 for high positive affect; adjusted OR =1.12, 95% CI =0.61–2.05 for high depressive symptoms compared with the low positive affect reference group).

Analyses were also performed that included respondents who were excluded, because they died or terminated during the follow-up period, and they were coded as developing frailty. The association between high positive affect and incident frailty was somewhat attenuated (adjusted HR =0.64, 95% CI =0.48–0.86), whereas that for high depressive symptoms became stronger (adjusted HR =1.17, 95% CI =0.76–1.80). Likewise, in the caregiver and noncaregiver subsamples, respondents with high positive affect were less likely to become frail than those with low positive affect.

DISCUSSION

This study found that older women with high positive affect were half as likely to develop frailty over 2 years as women with low positive affect. Women with high depressive symptoms had greater rates of frailty than those with low positive affect in unadjusted analyses, but these rates did not differ when adjusted for race and health status. Moreover, similar associations were observed in caregivers and noncaregivers. These findings confirmed the main hypothesis that high positive affect would be associated with a lower risk of frailty, although subgroup results in caregivers and noncaregivers did not support the hypothesis of a stress-buffering effect of positive affect and appeared to support the general “broaden and build” theory instead.

These results are consistent with previous studies that found protective effects of positive affect on physical health.^{2–4,6,8,30} They corroborate and extend the results of the one other study on positive affect and frailty.⁷ That study found that positive affect was associated with a significantly lower risk of developing frailty in older Mexican-American adults over a 7-year period. As in the current study, that study used a positive affect variable that was constructed from the four positive items on the CES-D, but it was measured on a continuous scale and included no adjustment for high depressive symptoms. The categorical measure used in the current study was able to show that low positive affect had no protective effect compared with high depressive symptoms when adjusting for health factors. Furthermore, a beneficial effect of positive affect in an older sample and within a shorter follow-up period was observed that has also been found in other studies.^{2–4,8}

The few studies in the field of caregiving that have addressed positive affect have focused only on caregivers.^{31–33} Similar to results of other studies that did not distinguish caregiver status, caregivers with high positive affect reported better physical health³³ and were less likely to experience health decline than caregivers who were pessimistic.³² High positive affect appeared to mediate the effects of coping on physical symptoms over a 2-year period in caregivers of persons with acquired immunodeficiency syndrome; those who used active and social coping styles experienced an increase in positive affect, which resulted in a decrease in self-reported physical symptoms.³¹ The current study adds to this research by contrasting the effect of positive affect on a clinically relevant outcome in caregivers and noncaregivers.

Positive affect may influence the development of frailty through various behavioral, physiological, or psychological mechanisms. Older persons with high positive affect may be healthier than other adults through greater social engagement³⁴ or greater self-efficacy around maintaining physical activity.³⁵ In addition, individuals with high positive affect may employ more effective coping strategies than others, as suggested by coping theories⁹ and the “broaden and build” hypothesis.¹³

Recent studies suggest that high positive affect may influence frailty through neuroendocrine or immune mechanisms, consistent with theories of psychoneuroimmunology.³⁶ High positive affect is associated with lower levels of C-reactive protein and interleukin-6 in women aged 50 to 74 and with lower levels of salivary cortisol in men and women in that age group.³⁷ By contrast, high levels of inflammatory markers are associated with prevalence^{38,39} and incidence³⁹ of frailty in older adults. Thus, positive affect may prevent frailty by its direct effect on these systems or by an indirect effect through behavioral or lifestyle factors.

There are several possible reasons why the results of the current study did not support a stress-buffering model of positive affect on frailty. First, this theory may be more suited to psychological outcomes than physical health decline. Second, by focusing on caregiving as a stressor, other current or lifetime stressors that were not measured and that may have revealed a stress-buffering effect of positive affect may have been overlooked. Third, the sample of caregivers was heterogeneous; only 26% were caring for a relative with dementia, and 12% were performing only one IADL for their care recipient. Although the caregivers reported more perceived stress than the noncaregivers, caregivers who were minimally involved in caregiving tasks were less stressed than other caregivers and may not have been as receptive to the stress-buffering effects of positive affect. The sample was not large enough to perform subgroup analyses, but future studies should test whether positive affect has a stress-buffering effect on health decline in more-homogeneous samples of highly stressed caregivers, such as caregivers to persons with dementia. Finally, in Caregiver-SOF and other samples,⁴⁰ elderly caregivers have less physical health decline than noncaregivers;

better health status may have masked a differential effect of positive affect in caregivers and noncaregivers.

This study had several limitations. Caregiver-SOF consisted of older women, most of whom were white, so the results may not be generalizable to caregivers who are younger, minority, or male, but most caregivers in the United States are elderly women; thus these results apply to the majority of caregivers. The frailty measure did not replicate the previous measure because of the lack of information on physical activity, but modifications of this measure have been used in other studies, including the previous study of positive affect.^{7,41}

Caregiver status was measured at a single time point. Because health status influences whether elderly adults remain as caregivers⁴² and is a risk factor for frailty, there may have been confounding by change in caregiving status and health status, although we adjusted for several self-reported health variables. The sample was not large enough to conduct analyses within subgroups of caregivers, which might have given more insight into the difference in the effect of positive affect in high-stressed and less-stressed caregivers.

Finally, most respondents in Caregiver-SOF had been participating in the SOF cohort since the mid-1980s, making them a selective sample. This could have presented a selection bias if this sample had a higher prevalence of positive affect or a lower incidence of frailty than same-aged women in the general population. For example, a less-protective effect of positive affect and a less-adverse effect of high depressive symptoms on frailty incidence may have been observed than would have been observed in the general population, but if these conditions occurred, the results would have underestimated the true protective effect of positive affect on frailty.

This study also had many strengths. The sample was restricted to elderly women without frailty at baseline; thus it was possible to evaluate the association between positive affect and incident frailty. The use of low positive affect as the reference group allowed the effects of high positive affect to be distinguished from those of the absence of depressive symptoms. The Caregiver-SOF sample is a community-based sample of elderly women. All caregivers and noncaregivers came from the same source population, thereby reducing potential biases that might have resulted from recruiting caregivers from patient registries and non-caregivers from another source. In addition, the inclusion criteria required that caregivers be currently performing at least one IADL or ADL task for the care recipient, ensuring that all caregivers were actively involved in caregiving activities at baseline.

In conclusion, this study found that high positive affect was associated with a lower risk of frailty in a nonclinical sample of older women caregivers and noncaregivers. Given the projected increase in the number of caregivers in the United States, it is important to identify interventions that promote positive affect in this population. These results suggest that such interventions would not only improve caregivers' quality of life, but could also benefit their physical health, particularly by delaying the time to development of frailty and health decline and thereby lengthening the time that they could provide optimal care. Previous studies have advocated screening older caregivers (and noncaregivers) for depression. The results of this study suggest that screening older adults for low positive affect may identify persons at moderate risk of developing frailty.

Acknowledgments

Sponsor's Role: None.

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Table 1

Baseline Characteristics of 954 Caregiver–Study of Osteoporotic Fracture Respondents, According to Positive Affect Category

Characteristic	Total Sample (n =954)	High Positive Affect (n =550)	Low Positive Affect (n =328)	High Depressive Symptoms (n =76)	P-Value
Age, mean ± SD	81.2 ± 3.7	81.1 ± 3.6	81.3 ± 3.7	81.5 ± 3.5	.45
White, %	87.2	86.9	87.8	86.8	.92
Married, %	37.0	36.7	35.7	44.7	.33
Education >12 years, %	54.2	56.2	51.5	51.3	.36
Comorbid medical conditions					
Mean ± SD	1.0 ± 0.9	1.0 ± 0.9	1.0 ± 0.8	1.2 ± 1.0	.11
2, %	24.7	24.5	24.0	32.9	
1 activity of daily living disability, %	30.9	27.3	32.0	52.6	<.001
1 instrumental activity of daily living disability, %	35.9	32.0	38.1	54.0	<.001
Caregiver, %	35.3	34.6	36.9	34.2	.76
Perceived Stress Scale, mean ± SD	15.4 ± 7.0	12.9 ± 6.2	17.6 ± 5.8	24.6 ± 6.2	<.001

SD =standard deviation.

Table 2

Cumulative Frequency and Percentage of Respondents Who Developed Components of Frailty and Were Classified as Frail at First and Second Annual Follow-Up Interviews, 954 Caregiver–Study of Osteoporotic Fractures Respondents

	First Follow-Up (n =921)	Second Follow-Up (n =873)
Frailty Component	n (%)	
Weight loss	88 (9.5)	115 (13.2)
Exhaustion	124 (13.5)	222 (25.4)
Walking speed	433 (47.0)	574 (65.8)
Grip strength	590 (64.1)	663 (75.9)
Frail	85 (9.2)	150 (17.2)

Note: Of the 954 respondents, 20 died and 13 terminated before the first follow-up interview. By the second follow-up interview, a total of 45 respondents had died and 36 had terminated from the study.

Table 3

Incident Frailty over 2 Years According to Baseline Positive Affect Category in 954 Caregiver Study of Osteoporotic Fractures Respondents

Variable	Developed Frailty, %	Frailty Rate (per 1,000 Person-Years)	Hazard Ratio (95% Confidence Interval)		
			Unadjusted	Adjusted	
Affect					
High positive affect	11.3	57.1	0.48 (0.34–0.68)	0.49 (0.35–0.70)	
Low positive affect	20.7	112.5	1.00	1.00	
High depressive symptoms	26.3	148.6	1.32 (0.80–2.18)	0.95 (0.56–1.59)	
Race (white vs other)					0.61 (0.40–0.92)
Comorbid medical conditions (2 vs 1)					1.18 (0.82–1.69)
Activity of daily living limitations (1 vs 0)					1.32 (0.93–1.89)
Instrumental of daily living limitations (1 vs 0)					2.12 (1.49–3.00)
Caregiver versus noncaregiver					1.04 (0.74–1.47)

Table 4
Incident Frailty over 2 Years According to Baseline Positive Affect Category and Stratified According to Caregiving Status

Caregiver Status	Positive Affect Category	Developed Frailty, %	Frailty Rate (per 1,000 Person-Years)	Hazard Ratio (95% Confidence Interval)	
				Unadjusted	Adjusted*
Caregiver	High positive affect (n =190)	12.6	61.6	0.49 (0.27–0.87)	0.44 (0.24–0.79)
	Low positive affect (n =121)	19.0	87.8	1.00	1.00
Noncaregiver	High depressive symptoms (n =26)	19.2	101.3	0.85 (0.32–2.24)	0.91 (0.33–2.51)
	High positive affect (n =360)	10.6	53.2	0.46 (0.30–0.72)	0.49 (0.32–0.77)
	Low positive affect (n =207)	21.7	112.1	1.00	1.00
	High depressive symptoms (n =50)	30.0	175.8	1.55 (0.86–2.80)	1.05 (0.56–1.95)

* Adjusted for race, comorbid medical conditions, and activity of daily living and instrumental activity of daily living limitations.