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The association between hope and mortality in homebound elders

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Abstract

Objective—Despite high rates of mortality and depression, there is limited knowledge of how depressive symptoms, especially feeling of hopefulness, affect mortality in the homebound elderly.

Methods—We conducted a secondary analysis of data from a community sample of 1034 adults, age 60 years and older. The Center for Epidemiologic Studies Depression Scale was used to evaluate the mood symptoms and feeling of hopefulness at baseline. The death data were collected within an 8-year follow-up period. Analysis of variance and Chi-square were used to compare the clinical conditions among the groups of individuals who feel hopeful always, sometimes, and rarely. Logistic regression was used to explore the association between the hopefulness about the future and mortality as an outcome.

Results—In the 8-year follow-up period, frequency of feeling hopeful, but not other individual depressive symptoms, was associated with mortality rate. The mortality rate among those who always, sometimes, and rarely felt hopeful were 21.6%, 26.4%, and 35.7%, respectively ($P=0.002$). Logistic regression also confirmed that individuals who rarely feel hopeful had higher odds of decease within the 8-year follow-up period than those who always felt hopeful (OR = 1.74, CI = 1.14–2.65) after adjusting for age and medical conditions.

Conclusions—Baseline hopefulness predicts mortality outcome among the homebound elderly in the community. Identifying individuals who are depressed with hopelessness in the elderly and providing early intervention may improve the mortality rate.

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Conflict of interest

None declared.

Keywords

homebound elders; hope; hopelessness; mortality

Introduction

The idea that hope may be a determinant of health outcomes and even a key to survival has been proposed in some studies (Engel, 1968; Schmale and Iker, 1971; Peterson *et al.*, 1988) (Stein *et al.*, 1989) (Lown *et al.*, 1977) (Snyder *et al.*, 1991). Clinicians have often considered it vital to instill hope in patients with critical diseases or conditions (Stern *et al.*, 2001). Conversely, hopelessness, or a negative expectation of one's future and a feeling of helplessness to change it, has been associated with ill health (Everson *et al.*, 2000; Dunn *et al.*, 2006), and mortality (Everson *et al.*, 1996; Stern *et al.*, 2001). Existing literature also suggests that hopelessness is associated with lower functional status, poorer adjustment to disease, suicidal ideation, and a desire for earlier death (Van Servellen *et al.*, 1996; Chochinov *et al.*, 1998; Northouse *et al.*, 1998; Breitbart *et al.*, 2000).

The homebound elderly often live with multiple medical comorbidities and functional impairment (Bruce and McNamara, 1992; Qiu *et al.*, 2010), while they often lack of social support and have high rates of depressive symptoms (Ganguli *et al.*, 1996; Imuta *et al.*, 1998; Choi and McDougall, 2007; Cohen-Mansfield *et al.*, 2010), including hopelessness (Dunn *et al.*, 2006). Although the homebound elderly population has been growing in the United States, knowledge of psychological predictors of mortality among this population is lacking. To fill this gap, we conducted an analysis of data from a homebound elderly population of 1034 subjects enrolled in the Nutrition, Aging, and Memory in Elders (NAME) study, in order to investigate the association between hopefulness and mortality in this population. We hypothesized that elders with lower levels of hope about the future predict the odds of disease in the 8-year follow-up period and that subjects with higher levels of hope would consistently survive longer.

Methods

Study population

Participants were from the NAME study, a longitudinal study in a population of homebound seniors, aged 60 years and older (Scott *et al.*, 2006). Participants approached for inclusion in the study were receiving home care services from any of four homecare agencies in Boston and were enrolled from 2003 to 2007 at cross-sectional level. All enrolled participants gave informed consent to the study. The protocol and consent form were approved by the institutional review board at Tufts University and Boston University School of Medicine. A total of 1034 subjects with baseline data and longitudinal death data comprised the sample used for this study analysis.

Demographic and other health measurements

Study subjects completed interviews and a demographic, medical history, and health status questionnaire. Previous and current history of smoking, alcohol consumption, stroke, and

cancer were self-reported. Subjects who were diagnosed with congestive heart failure, coronary heart disease, agina pectoris, or a heart attack were classified as having cardiovascular disease (CVD). Additionally, blood pressure was measured, and hypertension (systolic pressure > 140, diastolic pressure > 90, or use of hypertension medication) and diabetes (usage of anti-diabetic medication or fasting glucose 126 mg/dl) were assessed. Body mass index (BMI) was also determined from height, weight, and waist circumference measurements.

Depressive scale and hopefulness measurements

Depressive symptoms were assessed using the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff 1997). The CES-D is a 20-item self-report questionnaire. Those scoring 16 were categorized as having clinical depression.

Hopefulness of each subject was assessed using his/her answer to an item from the CES-D questionnaire, "During the past week I felt hopeful about the future." Based on their answers to this question, study subjects were classified into three groups. Those who answered 5 to 7 days a week were classified as mostly or always hopeful, those who answered 1 to 4 days per week were classified as sometimes hopeful, and those who answered less than 1 day per week were classified as rarely or never hopeful.

Death data collection/assessment of mortality

Information was collected from the Social Security Death Master File to determine death in the original cohort of homebound seniors. The average period from the time of enrollment to the time of obtaining the death data was 6.7 years long.

Statistical analysis

All statistical analysis was performed using SAS version 9.3. The association between death and potential confounders was determined using Pearson's chi squared tests (χ^2) for categorical variables and the t-test or analysis of variance test for the continuous variables age and BMI. Backwards selection was then used to remove those variables whose level of significance dropped (i.e., α went above 0.05) when the regression analysis was repeated. Multivariate logistic regression analysis was used to assess the association between hopefulness subgroups and mortality after adjusting for confounders. Kaplan–Meier analysis was used to determine whether different levels of hopefulness were associated with increased survival rate of the study population in the 8-year follow-up period. When each subgroup was compared with the rarely hopeful multiple times, we used Bonferroni tests to compare differences between the groups, and the two-sided significance level of $p < 0.017$ was used.

Results

The mean age of this homebound elderly population ($n = 1034$) was 75.13 ± 8.52 years, and the mean BMI was 31.48 ± 8.43 at baseline. A majority of study participants were female (76.0%) and white (61.2%). A total of 260 (25.1%) study subjects died in the 8-year follow-up period. Median follow-up time was 6.7 years, while median time to death was 3.2 years.

We found that at baseline 14% of our study population was rarely or never hopeful, while 34.5% was sometimes hopeful, and only approximately half of them (51.5%) were always hopeful about future.

We compared depression rates defined by CES-D scores and each CES-D item at the baseline in addition to demographic and clinical characteristics between the elderly who decreased and those who were alive by the end of point of 8 years longitudinal follow-up (Table 1). Interestingly, the deceased subjects were significantly less likely to be hopeful about the future than those who were alive ($p = 0.006$). While 19.2% of the deceased subjects versus 11.6% of the alive subjects were rarely or never hopeful about future, 45.0% of the deceased ones versus 54.9% of the alive ones were always hopeful about the future. In contrast, the comparisons of depression rates (Table 1) and other items of CES-D test were not different between those who were alive and those who deceased (data not shown). As expected, the deceased elders were older than those who were alive (78.03 ± 9.00 vs. 74.16 ± 8.12 , $p < 0.001$). More of the deceased were white (71.5% vs. 57.8%, $p = .003$) and had a history of past smoking (54.2% vs. 45.7%, $p = 0.023$), while fewer were female (70.0% vs. 78.0%, $p = .009$). There were no significant differences between the two groups in education or alcohol consumption history. The prevalence of CVD (52.7% vs. 38.6%, $p < 0.001$) and stroke (24.9% vs. 18.6%, $p = 0.03$) were significantly higher in the deceased than in those who were alive, while cancer (32.8% vs. 26.7%, $p = 0.06$) only tended to be so. There were no significant differences between the two groups in rates of diabetes and hypertension.

In Table 2, we divided the subjects into three subgroups by how frequent they felt hopeful weekly at baseline. At the 8-year follow-up study, compared with the always or sometimes hopeful subgroups, those who were rarely or never hopeful had the highest mortality rate (21.6% vs. 26.4% vs. 35.7%, $p = .002$). Hopelessness is a symptom of depression, and the score was linked with depression rates in this population ($p < 0.001$). Interestingly, no significant difference was found between groups in demographics, status of smoking or alcohol drinking, or medical conditions. Consistently, the Kaplan–Meier survival analysis (Figure 1) showed that those who were always hopeful had a higher survival rate compared with the sometimes and rarely hopeful subgroups.

Multivariate logistic regression was conducted to explore the risk factors and outcome of decease in the 8-year follow-up period (Table 3). After adjusting for age, sex, BMI, white race, and history of CVD and of smoking, the homebound elders who were rarely or never hopeful at baseline were still 1.74 times more likely to die than those who felt mostly or always hopeful at baseline (95% CI, 1.14–2.65, $p = .026$). Baseline data of age, male sex, history of smoking, and CVD predict death in the 8-year follow-up period (Table 3). But baseline cancer and stroke were not found predicting death in the 8-year follow-up period in this population.

Discussion

There were three major findings highlighting our study. (i) The mortality rate among the homebound elderly was high. (ii) Feeling hopeful independently predicts the death outcome in a longitudinal 8-year follow-up study. (iii) While we found the death rates and depression

rates significantly differed among homebound elderly with different levels of feeling hopeful, their demographics, smoking and drinking status, and medical condition did not differ. These findings were consistent with the results of previous studies (Everson *et al.*, 1996; Stern *et al.*, 2001) that have found hopelessness to be a predictor for increased risk of all-cause mortality in other populations, including Finnish men and older Mexican and European Americans. To our best knowledge, this is the first study investigating the relationship between hopefulness and mortality in the homebound elderly. Because the NAME study participants were receiving public homecare services and are a low-income study sample, the findings of this paper may not be extrapolated to the general population.

Our study shows that many homebound elderly were not hopeful about the future, which was an independent risk factor for mortality. Homebound elderly are often ill medically and mentally (Qiu *et al.*, 2010), and our finding was consistent with other research that hopelessness is highly present in physically ill populations (Northouse *et al.*, 1995; Northouse *et al.*, 1998; Breitbart *et al.*, 2000; Everson *et al.*, 2000; Menon *et al.*, 2000; Lewis *et al.*, 2001; Watson *et al.*, 2005; Dunn *et al.*, 2006). One study conducted in an elderly population (Stern *et al.*, 2001), the Schulz *et al.* study (Schulz *et al.*, 1996), which used the life orientation test of Scheier and Carver, found that higher levels of pessimism versus optimism predicted mortality in middle-aged advanced cancer patients, but not older ones. This inconsistency could be due to the subtle distinction between optimism/pessimism and hope/hopelessness. While optimism involves a general expectation of positive outcomes, hope involves explicit thinking about ways to achieve goals and outcomes (Snyder *et al.*, 2001; Gum and Snyder, 2002). Nevertheless, optimism and hope are often associated (Snyder *et al.*, 1991).

The relationship between hopefulness and death could be multifactorial in the homebound elderly. Because after adjusting for different medical diseases those who were rarely or never hopeful still remained to be a high risk of dying (Table 3), it is unlikely that fatally ill individuals lose hope at the knowledge of their imminent death. Another explanation is that hopelessness may lead subjects to neglect health-promoting behaviors (Schulz *et al.*, 1996; Stern *et al.*, 2001), such as listening to doctors' orders or taking prescribed medication. As the homebound elderly population has high prevalence of serious diseases (Qiu *et al.*, 2010), noncompliance can lead to poor outcomes such as death. It has been reported that patients with coronary heart disease who are depressed are less likely to adhere to medical advice and more likely to quit cardiac rehabilitation programs than those who are not depressed (Blumenthal *et al.*, 1982; Ziegelstein *et al.*, 2000). Because hopelessness is a major symptom of depression, patients who are hopeless may also not follow a treatment regimen or to change their lifestyles.

It is worthy to note that a high rate (34.7%) of clinical depression was found in this homebound elderly population. Although low levels of hopefulness, but not depression, were associated with death in our study, depression has been associated with loss of hope as a symptom. Stern *et al.* (Stern *et al.*, 2001) reported that subjects with both hopelessness and depression had a significantly higher mortality rate than those with one or none of these conditions. Biologically, hopeless persons, like individuals with depression, could have biochemical and neurophysiologic abnormalities that help explain their increased mortality

risk, such as abnormal platelet function, reduced heart rate variability, decreased immune function, decreased serotonergic function, and increased activity of the noradrenergic system and hypothalamic–pituitary–adrenal axis (Carney *et al.*, 1988; Stratakis and Chrousos, 1995; Musselman *et al.*, 1996; Laghrissi-Thode *et al.*, 1997; Miller, 1998). Thus, treatment with antidepressants and psychotherapy could be effective to increase hopefulness in the homebound elderly. Treatment of depression in breast cancer patients may increase their longevity (Reich *et al.*, 2008). In addition, psychiatric treatment has been frequently suggested in the palliative care of patients with cancer (Lehto *et al.*, 2007; Nakaya *et al.*, 2008).

There are several publications on hopelessness and neuroimaging. Van Heeringen *et al.* found that hopelessness is interrelated with lower central serotonergic function and the personality trait of harm avoidance, which may increase the probability of attempted suicide (van Heeringen *et al.*, 2003). The same research group also found that levels of mental pain are significantly and positively associated with hopelessness (van Heeringen *et al.*, 2010). Depressed individuals with high levels of mental pain in this sample had increased perfusion in the right dorsolateral prefrontal cortex, occipital cortex and inferior frontal gyrus and in the left inferior temporal gyrus, and relatively decreased perfusion at the medulla. Other studies addressed the hopelessness theory of depression, which posits that individuals with negative cognitive styles are at risk for depression after experiencing negative life events. Hopefulness is probably an interaction between circumstances facing an individual and his or her complex cognitive abilities. Zhang *et al.* found that reductions in brain gray matter volume exist widely in individuals with cognitive vulnerability to depression (CVD) (Zhang *et al.*, 2012). Other neuroimaging studies suggest that CVD may be characterized by imbalance in spontaneous brain activity in orbitofrontal-insular circuits (Zhang *et al.*, 2016), and hypoactivation of the prefrontal cortex and hyperactivation of the amygdala in response to emotional stimuli (Zhong *et al.*, 2011).

It is probable to address causes of hopelessness in the care of homebound elders. Clinicians should do individualized assessments to communicate with and help patients, as tailoring approaches to individual circumstances and backgrounds could prove useful (Stern *et al.*, 2001; Gum and Snyder, 2002). For example, for individuals close to death, therapy based on life review could be effective by developing a sense of worth based on goals achieved and relationships developed in the past (Gum and Snyder, 2002). Helping patients to identify goals that can be achieved up to and beyond death and developing active ways to accomplish them could instill a sense of agency and personal control, elements of hope that have been associated with adjustment to terminal illness (Taylor *et al.*, 1984; Miller *et al.*, 1996; Gum and Snyder, 2002). For hopeless individuals who are not close to death, interventions such as cognitive-behavioral/supportive therapy, geared toward bolstering a feeling of control over one's future, could be more appropriate. Social support and physical regimens, such as a healthy diet, exercising and resting, minimizing pain and physical symptoms, could also significantly increase patients' hope levels and improve their quality of life (Gum and Snyder, 2002). An individual's unique genetic and physiological characteristics have a significant effect on response to different therapies and disease vulnerability. Further genetic research is needed to advance individualized interventions for hopeless individuals.

This study has limitations. While we extracted the hopefulness item from the CES-D questionnaire, we did not have a measure specific to evaluate hope that has been validated in scientific literature. Such measures include the Beck Hopelessness Scale (Haatainen *et al.*, 2004), the Miller Hope Scale, Herth Hope Index (Schrang *et al.*, 2011), and Snyder Hope Scale (Gum and Snyder, 2002). However, we believe that participants' responses to the statement, "I felt hopeful about the future," has valid content as a self-assessment of feeling hopeful at baseline. Our study provides strong basis for further studies of the association between hope and mortality in the homebound elderly using a validated measure of hope. Further research to evaluate the effects of different approaches to increasing hope on homebound elders' survival and quality of life could also be very useful. Further research on the causes or etiology of loss of hope could be crucial to developing the most effective methods of their care.

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Figure 1.

Kaplan–Meier survival analysis was used to study the survival function after 8-year follow-up period in the elderly who were always hopeful versus those who were sometimes hopeful versus those who were rarely hopeful. [Colour figure can be viewed at wileyonlinelibrary.com]

Table 1

Socio-demographic, clinical comparisons, and hopefulness between participants who were alive and participants who were deceased

Variable	All (n = 1034)	Deceased (n = 260)	Alive (n = 774)	p-value
Age, mean $\pm$ SD	75.13 $\pm$ 8.52	78.03 $\pm$ 9.00	74.16 $\pm$ 8.12	<0.001
BMI, mean $\pm$ SD	31.48 $\pm$ 8.43	30.32 $\pm$ 8.46	31.87 $\pm$ 8.39	0.003
Female, n (%)	786 (76.0)	182 (70.0)	604 (78.0)	0.009
White, n (%)	633 (61.2)	186 (71.5)	447 (57.8)	<0.001
Education, n (%)				0.422
0–8th grade	139 (13.4)	42 (16.2)	97 (12.5)	
9th–12th grade	561 (54.3)	144 (55.8)	417 (53.9)	
Some college or above	334 (32.3)	74 (28.5)	260 (33.6)	
Alcohol drinking, n (%)				0.595
Never	146 (14.2)	38 (14.7)	108 (14.0)	
Past	548 (53.2)	143 (55.2)	405 (52.5)	
Current	337 (32.7)	78 (30.1)	259 (33.6)	
Smoking, n (%)				0.023
Never	365 (35.3)	74 (28.6)	291 (37.6)	
Past	495 (47.9)	141 (54.2)	354 (45.7)	
Current	174 (16.8)	45 (17.3)	129 (16.7)	
Medical conditions, n (%)				
CVD	436 (42.2)	137 (52.7)	299 (38.6)	<0.001
Stroke	206 (20.2)	64 (24.9)	142 (18.6)	0.030
Cancer	290 (28.2)	85 (32.8)	205 (26.7)	0.058
Diabetes	369 (38.0)	93 (38.9)	276 (37.7)	0.739
HTN, n (%)	869 (85.3)	228 (88.4)	641 (84.2)	0.108
Depression, n (%)	356 (35.3)	96 (37.9)	260 (34.4)	0.306
Hopeful about the future, n (%)				0.006
Always	542 (52.4)	117 (45.0)	425 (54.9)	
Sometimes	352 (34.0)	93 (35.8)	259 (33.5)	
Rarely	140 (13.5)	50 (19.2)	90 (11.6)	

Mean $\pm$ SD or n/total (%) are presented. T-test was used to compare between the deceased and the alive groups, and *p*-values for the statistical significance are shown. Depression is defined by Center for Epidemiological Studies Depression (CES-D) score >16; hopefulness is defined by item 8 of CES-D.

BMI, body mass index; CVD, cardiovascular disease; HTN, hypertension.

Table 2

Socio-demographic and clinical comparisons between participants separated by level of hopefulness

Feeling hopeful about the future	Always (<i>n</i> = 542)	Sometimes (<i>n</i> = 352)	Rarely (<i>n</i> = 140)	<i>p</i> -value
Age, mean $\pm$ SD	74.74 $\pm$ 8.07	75.44 $\pm$ 9.03	75.90 $\pm$ 8.85	0.253
BMI, mean $\pm$ SD	31.58 $\pm$ 8.48	31.61 $\pm$ 8.33	30.75 $\pm$ 8.51	0.294
Female, <i>n</i> (%)	415 (76.6)	268 (76.1)	103 (73.8)	0.759
White, <i>n</i> (%)	317 (58.5)	220 (62.5)	96 (68.6)	0.077
Education, <i>n</i> (%)				0.129
0–8th grade	61 (11.3)	55 (15.6)	27 (19.3)	
9th–12th grade	296 (54.6)	191 (54.3)	71 (50.7)	
Some college or above	185 (34.1)	106 (29.3)	42 (30.0)	
Alcohol drinking, <i>n</i> (%)				0.517
Never	84 (15.6)	43 (12.2)	19 (13.6)	
Past	274 (50.8)	198 (56.3)	76 (54.3)	
Current	181 (33.6)	111 (31.5)	45 (32.1)	
Smoking, <i>n</i> (%)				0.333
Never	194 (35.8)	130 (36.9)	41 (29.3)	
Past	262 (48.3)	165 (46.9)	68 (48.6)	
Current	86 (15.9)	57 (16.2)	31 (22.1)	
Medical conditions, <i>n</i> (%)				
CVD	211 (38.9)	158 (44.9)	67 (47.9)	0.072
Stroke	102 (19.0)	69 (19.9)	35 (25.6)	0.230
Cancer	154 (28.4)	104 (30.1)	32 (23.0)	0.295
Diabetes	203 (39.3)	123 (37.5)	43 (34.1)	0.552
HTN, <i>n</i> (%)	449 (84.4)	305 (86.9)	115 (84.6)	0.573
Depression, <i>n</i> (%)	97 (18.3)	176 (51.2)	83 (61.0)	<0.001
Deceased, <i>n</i> (%)	117 (21.6)	93 (26.4)	50 (35.7)	0.002

Mean $\pm$ SD or *n*/total (%) are presented for the levels of feeling hopeful about the future. Hopefulness is defined by using item 8 of Center for Epidemiological Studies Depression (CES-D). Analysis of variance analysis was used, and *p*-values for the statistical significance are shown. Depression is defined by using CES-D score >16.

BMI, body mass index; CVD, cardiovascular disease; HTN, hypertension.

Table 3

Logistic regression analysis of the association between hopefulness about the future and mortality as an outcome at 8-year follow-up period

Mortality	Odds ratio (95% CI)	<i>p</i>-value
Age, year	1.06 (1.04, 1.08)	<0.001
Male	1.41 (1.00, 1.97)	0.050
BMI	1.00 (.98, 1.02)	0.934
White	1.54 (1.12, 2.12)	0.009
CVD	1.68 (1.25, 2.26)	<0.001
Past smoking versus no smoking	1.63 (1.16, 2.29)	0.409
Current smoking versus no smoking	2.05 (1.27, 3.30)	0.028
Sometimes hopeful versus always hopeful	1.23 (.89, 1.71)	0.674
Rarely hopeful versus always hopeful	1.74 (1.14, 2.65)	0.026

Logistic regression analysis was used to determine the relationship between hopefulness and mortality as an outcome after adjusting for confounders as listed in the table. Odds ratios and *p*-values for the variables in the model are shown.

BMI, body mass index; CVD, cardiovascular disease.