

Prior Depression History and Deterioration of Physical Health in Community-Dwelling Older Adults—A Prospective Cohort Study

*Hyong Jin Cho, M.D., Ph.D., Helen Lavretsky, M.D.,
Richard Olmstead, Ph.D., Myron Levin, M.D.,
Michael N. Oxman, M.D., Michael R. Irwin, M.D.*

Objective: *Depression worsens outcomes of physical illness. However, it is unknown whether this negative effect persists after depressive symptoms remit in older adults. This study examined whether prior depression history predicts deterioration of physical health in community-dwelling older adults.* **Design:** *Prospective cohort study.* **Setting:** *Three urban communities in the United States.* **Participants:** *Three hundred fifty-one adults aged 60 years or older—145 with a history of major or nonmajor depression in full remission and 206 concurrent age- and gender-matched comparison subjects with no history of mental illness.* **Measurements:** *Participants were assessed at baseline, 6 weeks, 1 year, and 2 years for physical health functioning (the Physical Component Summary of the 36-Item Short-Form Health Survey) and chronic medical burden (the Chronic Disease Score). Given the repeated nature of measurements, linear mixed model regression was performed.* **Results:** *Both physical functioning and chronic medical burden deteriorated more rapidly over time in the group with prior depression history compared with comparison subjects, and these changes were independent of the measures of mental health functioning, depressive symptoms, and sleep quality. Similar results were observed when those who developed depressive episodes during follow-up were excluded.* **Conclusion:** *A prior history of clinical depression is associated with a faster deterioration of physical health in community-dwelling older adults, which is not explained by current levels of depressive symptoms and mental health functioning or by recurrence of depressive episodes. Careful screening for a history of depression may identify those older adults at greatest risk for physical declines and chronic medical burden.* (Am J Geriatr Psychiatry 2010; 18:442–451)

Key Words: Depression, health functioning, depression history, aging

Received February 12, 2009; revised June 26, 2009; accepted June 30, 2009. From the Cousins Center for Psychoneuroimmunology, University of California, Los Angeles, Semel Institute for Neuroscience, Los Angeles, CA (HJC, HL, RO, MRI); University of Colorado Health Sciences Center, CO (ML); and San Diego Veterans Affairs Healthcare System and University of California, San Diego, CA (MNO). Send correspondence and reprint requests to: Michael Irwin, M.D., 300 UCLA Medical Plaza, Suite 3-109, Los Angeles, CA 90095-7057. email: mirwin1@ucla.edu

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Depressive conditions, including major and non-major depressive disorders, in older adults are relatively common¹ and have been consistently linked to disability and physical declines.^{2,3} Although it is generally thought that effective treatment of depression improves depressive symptoms and functional outcomes,^{4,5} sometimes even to normal levels,^{6,7} studies in younger adults have reported that prior history of depression increased the likelihood of poor health,^{8,9} metabolic syndrome,¹⁰ cardiovascular disease,^{11–14} diabetes,¹⁵ and in-hospital mortality.¹⁶ Hence, it has been hypothesized that the negative effect of depression on physical health may persist even after the depressive episode remits in younger adults.

The relationships between prior history of depression and changes in physical health in older adults have not been examined previously. Moreover, conclusions from previous studies in younger adults are limited by several issues: subjects with current depression were not excluded;^{10–13,15–17} study design was not truly prospective as prior depression history and health outcomes were assessed concurrently,^{9,12,14,15,17} health outcomes were measured at a single time point making the evaluation of progression of medical burden impossible,^{8,9,12–17} the role of mental health functioning or current depressive symptoms in the prediction of health outcomes was not taken into account;^{8,10,11,13,15} and only women were studied.^{9,10,12,14,17}

To address these limitations, this 2-year community-based longitudinal study of older adults examined the prospective relationship between prior history of depression and physical health as measured by self-reported physical functioning and objectively assessed chronic medical burden. The measures of physical functioning and chronic medical burden consisted of the Physical Component Summary (PCS) of the 36-Item Short-Form Health Survey, a widely used questionnaire of the health-related quality of life,¹⁸ and the Chronic Disease Score, a measure based on use of prescription medications, respectively, which has been shown to predict hospitalization risk and mortality.¹⁹ We hypothesized that prior depressive episodes would predict a deterioration of physical health, even after a period of maintained full remission, and that this association would be independent of concurrent measures of mental health status. To test this hypothesis, repeated measurements of health status were obtained in a sample of community-dwelling older adults. We compared

measures of physical functioning and chronic medical burden in those with a prior lifetime history of depression in full remission with similar measurements in a concurrently assessed age and gender-matched comparison group with no history of mental illness. The prospective analyses took into account mental health functioning, subclinical depressive symptoms, sleep quality, and development of depressive episodes during follow-up.

METHODS

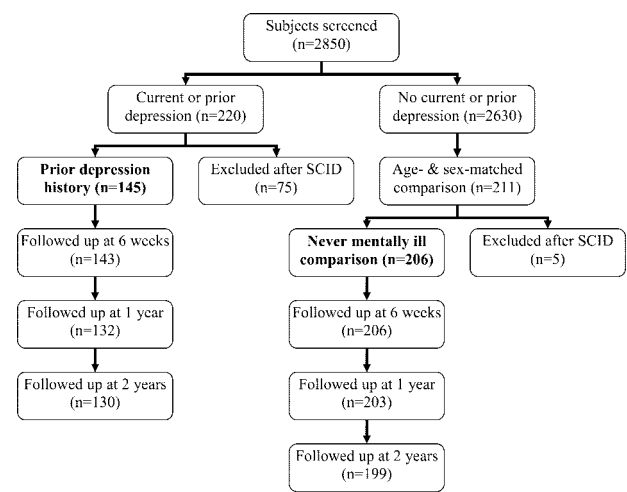
Overview

The Depression Substudy of the Veterans Affairs Cooperatives Trial no. 403, Shingles Prevention Study (SPS) provided the data presented in this article. The SPS was a randomized multicenter efficacy trial of an investigational varicella-zoster virus vaccine against herpes zoster (shingles) in community-dwelling adults aged 60 years and older.²⁰ On the basis of the results from a depression screening, subjects were enrolled in the Depression Substudy, a prospective cohort study conducted between July 2001 and June 2006. The study involved psychiatric interviews and assessment of depressive symptom severity, sleep quality, chronic medical illness, and health functioning at baseline and three follow-up visits during 2 years as described previously.^{21,22} The institutional review boards of the University of Colorado, University of California at San Diego, and University of California at Los Angeles approved all procedures.

Subjects and Procedure

Community-dwelling older adults were recruited from three urban communities (Denver, CO, and Los Angeles and San Diego, CA) as described previously.²¹ A total of 2,858 subjects entering the SPS underwent screening for entry into the Depression Substudy (Fig. 1). Depression screening included completion of an abbreviated version of the Centers for Epidemiologic Study of Depression Scale (CES-D)²³ and answering two questions about prior episodes of depression or prior treatment for depression. Persons who scored above the previously validated CES-D cutoff for de-

FIGURE 1. Flow Diagram of the Study



pression or answered affirmatively for having had depression or received treatment for depression were initially selected for a further interview (N = 220). In addition, a sample of gender- and age-matched (within ±5 years) participants who were being enrolled concurrently in the SPS and did not meet depression screening criteria were selected as comparison subjects (i.e., never been mentally ill, N = 211).

At baseline, all initially selected subjects underwent a psychiatric diagnostic interview that included administration of the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, (SCID),²⁴ with characterization of the most recent three episodes (e.g., major versus nonmajor depression, psychotropic medication used, and date of remission). Depression severity was assessed using the 24-item Hamilton Depression Rating Scale (HAM-D).²⁵ The Pittsburgh Sleep Quality Index (PSQI), a 19-item self-report measuring problematic sleep, was used to assess perceived sleep quality.²⁶

The Medical Outcome study 36-Item Short-Form Health Survey (SF-36) was used to measure health functioning.²⁷ The SF-36 is a 36-item questionnaire, which yields an eight-scale profile of scores (Physical Functioning, Role-Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role-Emotional, and Mental Health) and physical and mental health summary measures. The eight scales

are hypothesized to form two distinct higher ordered clusters in factor analysis according to the physical and mental health variance that they have in common.²⁸ Three scales (Physical Functioning, Role-Physical, and Bodily Pain) correlate most highly with the physical factor and contribute most to the scoring of the PCS measure. The mental factor correlates most highly with the Mental Health and Role-Emotional scales, which also contribute most to the scoring of the Mental Component Summary (MCS) measure. Three of the scales (Vitality, General Health, and Social Functioning) correlate with both factors.

The Chronic Disease Score (CDS) was administered as an interview by a nurse coordinator and provided an objective measure of chronic medical burden because its score is based on selected prescription medications used during a 6-month period.¹⁹ Participants were instructed to bring their medication bottles and prescriptions to the study appointment, and the nurse coordinator recorded all medications used during the last 6 months. Because the CDS does not include psychotropic or analgesic medications, this measure provides an estimate of global chronic disease status independent of psychiatric and pain-related symptoms. Hence, the CDS is less influenced by psychological distress than self-rated health status measures such as SF-36. Scores can range from 0 to 35; scores above seven are associated with a five times greater hospitalization risk and 10 times greater risk of dying within 1 year compared with a score of zero.¹⁹

Of the 220 older adults who screened positive for depression or prior depression history and underwent SCID interview, 68 were excluded due to current depressive disorders, 4 due to alcohol/substance abuse-related depression, and 3 due to breathing-related sleep disorder. Older adults with current depression were excluded because this study focused on the impact of prior rather than current depression on health functioning. The remaining 145 subjects reported a prior depression history (either major or nonmajor depressive disorder); none fulfilled diagnostic criteria for a current depressive disorder (neither major nor nonmajor) or for any other current Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, disorder (including anxiety and substance dependence disorders). Of these 145 subjects with a prior depression, 111 met criteria

for history of major depression and 34 met criteria for history of nonmajor depression (1 for dysthymia and 33 for depression not otherwise, e.g., minor depressive disorder). Nonmajor or subthreshold depression was assessed along with major depression as many elderly persons do not meet diagnostic criteria for major depression, but nonmajor depressive conditions are associated with cumulative disability similar to major depression.²⁹

Of the 211 subjects who did not reach screening criteria for a current depressive disorder or prior depression history and also underwent the SCID interview, 4 subjects were excluded due to history of an Axis I disorder (e.g., alcohol dependence) and 1 due to breathing-related sleep disorder. The remaining subjects, who comprised the comparison group (N = 206), represented a sample of older adults who had never been mentally ill were concurrently assessed along with the prior depression history group. Therefore, the final sample at baseline (N = 351) consisted of the following two groups: prior depression history (N = 145) and control (never mentally ill, N = 206).

Follow-up assessments were conducted at 6 weeks, 1 year, and 2 years from baseline. At each follow-up visit, subjects underwent the SCID with ascertainment of major- and nonmajor depressive disorders. The HAM-D, PSQI, SF-36, and CDS were also repeated. There were high response rates irrespective of group status during the 2-year follow-up. Of 351 subjects included at baseline, 349 (99.4%), 335 (95.4%), and 329 (93.7%) were assessed at 6 weeks, 1 year, and 2 years, respectively. The reasons for nonparticipation could not always be elicited, although the most commonly mentioned reasons included refusal, not being located, and death.

PCS/MCS Scoring

The two summary measures of the SF-36, used as the outcomes instead of the eight individual scales, were computed following the published guideline.²⁷ Eight individual scales were standardized using a *z* score transformation. Each *z* score was calculated by subtracting the U.S. general population mean from each respondent's scale score and dividing the difference by the corresponding scale's standard deviation of the U.S. general population. Then, *z* scores were multiplied by the subscale factor score coefficients of the U.S. general population for PCS and

MCS. Finally, *t* scores were calculated by multiplying the obtained scores by 10 and adding 50 to the product, to yield a mean of 50 and a standard deviation of 10 for the U.S. norm population. Hence, PCS and MCS scores <50 imply a functioning below the average level observed in the U.S. general population, aged 18–74 years.

Statistical Analysis

Stata Version 10.0 was used for all statistical analyses, and the significance level was set at $p \leq 0.05$. Given the longitudinal and repeated nature of measurement, to assess the temporal change of the participants' physical health according to their group status (prior depression versus comparison), linear regression analysis using mixed effects model was implemented.³⁰ Mixed effects regression models use all available data during follow-up, can properly account for correlation between repeated measurements on the same subject, have greater flexibility to model time effects, and can handle missing data more appropriately than traditional models such as repeated-measures analysis of variance.³⁰ We examined the impact of group status on the course of physical health measured by the PCS and the CDS. The initial regression model included the PCS—a subjective measure of physical health—as the dependent variable and group, time, and group-by-time interaction term as the independent variables. The final regression model also included the covariates considered as sociodemographic characteristics (age, gender, ethnicity, marital status, and education) or a priori predictors of physical health functioning (mental health functioning [MCS], depressive symptoms [HAM-D], and sleep quality [PSQI]). Note that the latter group of variables were included in the analysis in their longitudinal format, i.e., they reflected all the measurements performed during the study, to take into account not only the baseline measures but also the evolution of these variables. The regression coefficient (*B*) for “group” reflects the cross-sectional impact of group status on physical health functioning averaged across all time points. The regression coefficient for “time” reflects the temporal change in physical health functioning. The regression coefficient for “group-by-time interaction” reflects the impact of group status on the course of physical health functioning and is of our main inter-

est. We conducted the same analyses substituting the CDS—an objective measure of physical health—for the PCS. To remove the influence of depression outcome on physical health, all the analyses were repeated excluding those who developed SCID-ascertained depressive episodes during follow-up.

Finally, we tested the possibility of reverse causality between physical health and depression. Although depression typically worsens physical health as briefly reviewed in the introduction, the relationship between depression and physical health is likely to be bidirectional, and poor physical health can be a risk factor for late-life depression.³ Thus, we examined the impact of poor physical health at baseline on the change of depressive symptoms and the onset of depressive episodes during follow-up by conducting mixed effects linear regression and mixed effects logistic regression, respectively. Poor physical health was defined as PCS <50.

However, compared with the comparison group, the group with prior history of depression had younger mean age, more years of education, and a lesser proportion of married individuals. Physical health functioning (PCS), as measured by the SF-36, did not significantly differ between the two groups, but mental health functioning (MCS) was significantly worse in the prior depression group. Both groups presented lower PCS but somewhat higher MCS in comparison with the U.S. general population, aged 18–74 years, and this seems to be a consistent finding in older adults.^{31,32} Chronic medical burden as measured by CDS (an objective measure of physical health) was not significantly different between the two groups, but depressive symptom severity assessed using HAM-D (a clinician rated measure of mental health) was significantly higher in the prior depression group. Although PCS and CDS, the measures of physical health, were not significantly different when compared by simple *t* tests, they were significantly worse in the prior depression group when the comparison was adjusted for age and education using multivariable linear regression (see footnote of Table 1). As to the characteristics of prior depressive episodes, the median time since last depressive episode was nearly 10 years, indicating a period of sustained full remission for most in the prior depression group. In addition, the median duration of

RESULTS

Characteristics of Study Participants

Table 1 describes the baseline characteristics of the study participants. The groups did not differ in the composition of gender, ethnicity, and veteran status.

TABLE 1. Baseline Characteristics of Community-Dwelling Older Adults With Prior Depression History and Comparison Subjects With No History of Mental Illness

Characteristics	Prior Depression (N = 145)	Comparison (N = 206)	<i>t</i> or χ^2	<i>df</i>	<i>p</i>
Age (60–95 years), mean (SD)	67.8 (6.4)	70.0 (6.3)	3.23	349	0.001
Female, number (%)	86 (59.3)	105 (51.0)	2.39	1	0.12
Married, number (%)	81 (55.9)	139 (67.5)	4.91	1	0.03
Euro-American, number (%)	143 (98.6)	199 (96.6)	1.39	1	0.24
Education (10–18 years), mean (SD)	16.0 (2.2)	15.3 (2.3)	–2.64	349	0.009
Veteran, number (%)	50 (34.5)	81 (39.5)	0.92	1	0.34
Physical Component Summary (14.7–61.5), mean (SD)	47.2 (8.5)	48.9 (8.3)	1.77	349	0.08 ^a
Mental Component Summary (30.0–69.8), mean (SD)	54.0 (7.3)	58.6 (4.6)	7.17	349	<0.001
Chronic Disease Score (0–11), mean (SD)	2.3 (2.2)	1.9 (2.2)	–1.66	349	0.10 ^a
Hamilton Depression Rating Scale (0–16), mean (SD)	3.1 (3.5)	1.0 (1.7)	–7.25	349	<0.001
Pittsburgh Sleep Quality Index (0–16), mean (SD)	5.9 (3.7)	3.6 (2.8)	–6.58	349	<0.001
Time since full remission (1–674 months), median (IQR)	118 (45–308)	—	—	—	—
Duration of last depressive episode (1–564 months), median (IQR)	9 (4–18)	—	—	—	—
Number of prior major depressive episodes (0–5), mean (SD)	1.1 (0.9)	—	—	—	—
Current use of antidepressant, number (%)	47 (32.4)	—	—	—	—

Notes: SD: standard deviation; IQR: interquartile range.

^aWhen adjusted for age and education using multivariable linear regression, Physical Component Summary and Chronic Disease Score were significantly worse in the prior depression group compared with the comparison group (*B* = –2.34, *SE* = 0.91, *t* = –2.56, *p* = 0.01 and *B* = 0.50, *SE* = 0.24, *t* = 2.05, *p* = 0.04, respectively).

last depressive episode was 9 months, with on an average only one lifetime episode of a major depressive disorder. Nearly one-third of the prior depression group was using antidepressant medications at baseline.

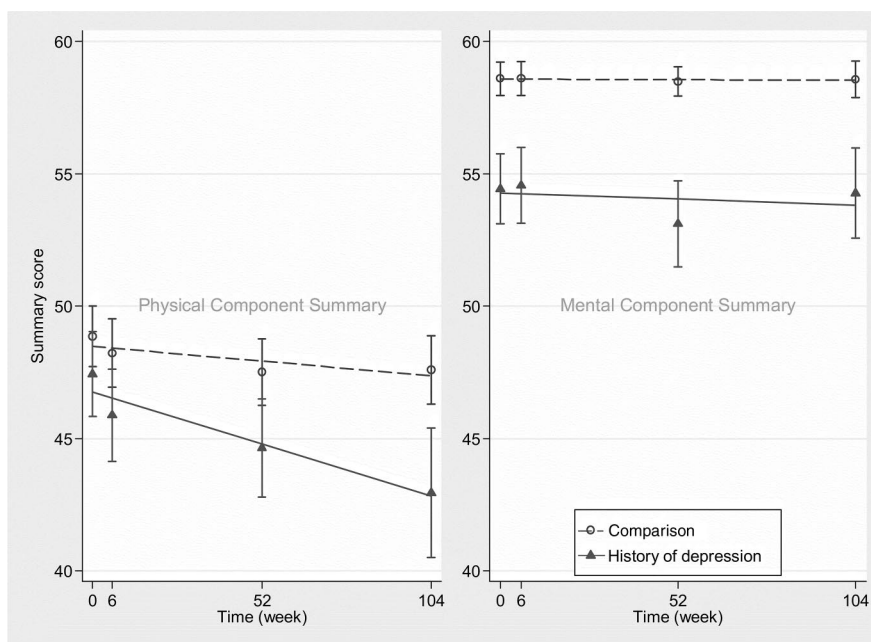
During the follow-up, only one comparison subject developed a depressive disorder. In contrast, among the prior depression group, the cumulative incidence of depressive disorders was 4.9% (95% confidence interval [CI] = 2.0%–9.8%) at 6 weeks; 12.6% (95% CI = 7.5%–19.4%) at 1 year; and 16.9% (95% CI = 11.0%–24.3%) at 2 years. Notably, 54.2% of the participants who developed a depressive disorder during the follow-up had at least one episode of nonmajor or sub-threshold depression.

Impact of Group Status on the Change of Physical Health Measured by PCS and CDS

Figure 2 describes the change of physical and mental health functioning during 2 years in each group. The mean PCS dropped >4 points in the prior depression group during the 2 years, whereas it was essentially

unchanged in those without a depression history (unadjusted B for group-by-time interaction = -0.02 , standard error [SE] = 0.008 , $z = -2.60$, $p = 0.01$). In contrast, the mean MCS remained practically unchanged in both groups throughout the study period ($B = -0.004$, SE = 0.006 , $z = -0.63$, $p = 0.53$). The individual scales followed this pattern. Scales related to the PCS declined more rapidly in the prior depression group (Physical Functioning, $B = -0.02$, SE = 0.01 , $z = -1.89$, $p = 0.06$; Role-Physical, $B = -0.08$, SE = 0.03 , $z = -2.57$, $p = 0.01$; and Bodily Pain, $B = -0.04$, SE = 0.02 , $z = -1.85$, $p = 0.07$), when compared with those without a depression history. Scales related to the MCS remained unchanged (mental health, $B = -0.01$, SE = 0.01 , $z = -1.40$, $p = 0.17$ and Role-Emotional, $B = 0.002$, SE = 0.03 , $z = 0.09$, $p = 0.93$), whereas scales related to both the PCS and MCS presented mixed results (Vitality, $B = -0.02$, SE = 0.01 , $z = -1.32$, $p = 0.19$; General Health, $B = -0.0001$, SE = 0.01 , $z = -0.01$, $p = 0.99$; and Social Functioning, $B = -0.05$, SE = 0.02 , $z = -2.82$, $p = 0.005$).

FIGURE 2. Change of SF-36 Summary Measures (Physical Component Summary and Mental Component Summary) Over Time in Community-Dwelling Older Adults With Prior Depression History and Comparison Subjects With No History of Mental Illness



Circles and triangles represent mean scores at each time point with vertical error bars corresponding to 95% confidence intervals of mean scores. Dashed and solid lines represent linear prediction based on the mean scores over time.

TABLE 2. Effect of Group (Control = 0 Versus Prior Depression = 1), Time (Weeks), and Group-by-Time Interaction on Physical Health Functioning and Chronic Medical Burden of Community-Dwelling Older Adults With Prior Depression History and Comparison Subjects With No History of Mental Illness

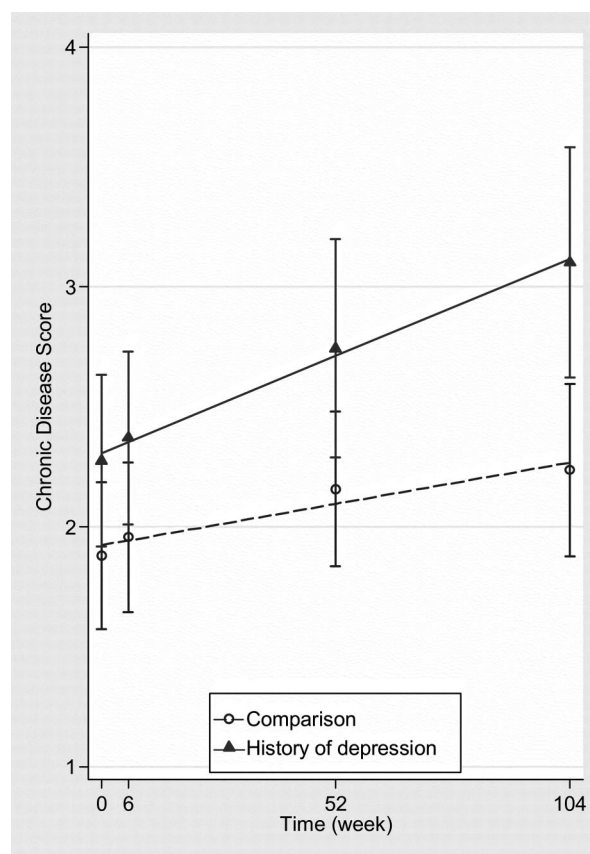
Dependent Variable	Independent Variable	Adjusted <i>B</i> ^a	SE of <i>B</i>	<i>z</i>	<i>p</i>
Physical Component Summary	Group	-1.99	0.86	-2.31	0.03
	Time	-0.01	0.004	-2.04	0.05
	Group × time	-0.02	0.007	-2.89	0.004
Chronic Disease Score	Group	0.56	0.25	2.21	0.03
	Time	0.004	0.001	4.66	<0.001
	Group × time	0.003	0.001	2.54	0.02

^aAdjusted for age, gender, ethnicity, marital status, education, mental health functioning, depressive symptoms, and sleep quality.

For PCS, unadjusted mixed model regression analysis revealed a group effect ($B = -1.88$, $SE = 0.92$, $z = -2.05$, $p = 0.05$), time effect ($B = -0.01$, $SE = 0.005$, $z = -2.60$, $p = 0.003$), and group-by-time interaction ($B = -0.02$, $SE = 0.008$, $z = -2.60$, $p = 0.01$). After adjustment for sociodemographic characteristics and MCS, HAM-D, and PSQI, the results remained significant (Table 2). The significant group-by-time interaction indicated a longitudinal decline of physical health functioning, which was more rapid over time in the prior depression group compared with the comparison group. When the multivariable analysis was repeated excluding those who developed depressive episodes during follow-up, significant group-by-time interaction was again found ($B = -0.02$, $SE = 0.007$, $z = -2.61$, $p = 0.01$). As nearly one-third of the participants with prior depression were using antidepressants at baseline, we repeated the multivariable analysis excluding these participants. There was a significant group-by-time interaction in this case as well ($B = -0.03$, $SE = 0.008$, $z = -3.36$, $p = 0.001$), indicating antidepressant use cannot explain the observed effect.

Figure 3 describes the change in chronic medical burden (CDS) in the two groups; CDS worsened at a greater rate in those with prior depression, when compared with comparison subjects. Unadjusted mixed model regression analysis for CDS showed a time effect ($B = 0.004$, $SE = 0.001$, $z = 4.96$, $p < 0.001$) and a group-by-time interaction ($B = 0.003$, $SE = 0.001$, $z = 2.67$, $p = 0.008$) but no group effect ($B = 0.38$, $SE = 0.25$, $z = 1.57$, $p = 0.12$). After adjustment for sociodemographic characteristics and MCS, HAM-D, and PSQI, the results remained significant (Table 2). The significant group-by-time interaction indicated a longitudinal increase of chronic medical burden, which was more rapid in the prior depression group compared with the

FIGURE 3. Change of Chronic Medical Burden (Chronic Disease Score) Over Time in Community-Dwelling Older Adults With Prior Depression History and Comparison Subjects With No History of Mental Illness



Circles and triangles represent mean scores at each time point with vertical error bars corresponding to 95% confidence intervals of mean scores. Dashed and solid lines represent linear prediction based on the mean scores over time.

comparison group. As above, when the multivariable analysis was repeated excluding those who developed depressive episodes during follow-up, a significant group-by-time interaction was still found ($B = 0.004$, $SE = 0.001$, $z = 2.75$, $p = 0.006$). Moreover, when the multivariable analysis was repeated without those using antidepressants at baseline, a significant group-by-time interaction was also observed ($B = 0.005$, $SE = 0.002$, $z = 3.03$, $p = 0.003$). Finally, there was a significant correlation between PCS and CDS, as assessed in their longitudinal format, which reflects all the measurements performed during the study ($r = -0.27$, $df = 349$, $p < 0.0001$).

Reverse Causality: Impact of Poor Physical Health on Depression

First, according to mixed effect linear regression analyses, there was no significant impact of baseline physical health status (poor versus good, i.e., $PCS < 50$ versus $PCS \geq 50$) on the change of depressive symptoms measured by HAM-D during follow-up (unadjusted B for group-by-time interaction = 0.0005, $SE = 0.003$, $z = 0.20$, $p = 0.85$). Multivariable adjustment for sociodemographic characteristics and sleep quality further attenuated this association (adjusted B for group-by-time interaction = 0.0002, $SE = 0.003$, $z = 0.09$, $p = 0.93$). Second, although unadjusted mixed effect logistic regression analysis revealed poor physical health to be a significant risk factor for subsequent depressive episodes (unadjusted odds ratio 5.18, 95% CI: 1.17–22.95, $z = 2.16$, $p = 0.04$), this association was no longer significant after multivariable adjustment for sociodemographic characteristics and sleep quality (adjusted odds ratio 2.78, 95% CI: 0.73–10.63, $z = 1.49$, $p = 0.14$).

DISCUSSION

This prospective study demonstrates that a lifetime history of depression, whether major or nonmajor, is associated with adverse effects on physical health of older adults, even after a long period of remission. Both subjectively and objectively measured physical health deteriorated more rapidly in older adults with a prior depression history compared with those without a prior history of mental illness. Notably, these changes were independent of the current levels of depressive

symptoms, sleep impairment and mental health functioning, the recurrence of depressive episodes, and the concomitant use of antidepressants. Furthermore, this faster deterioration occurred despite the relatively benign nature of the prior depressive episode. Contrary to the generally held idea that remission of depressive symptoms is associated with a reduced risk of adverse outcomes, we found that the negative effects of depression endured far beyond its resolution and correlated with prospective deterioration of health status in our study of older adults. The literature on the SF-36 health survey in a variety of disease states has suggested a minimal clinically meaningful difference to be 3–5 points in PCS as they reflect a magnitude of change perceptible to patients; hence the change in mean PCS score observed in the present sample (>4) can be viewed as a clinically meaningful deterioration in physical health functioning.^{33,34}

We were unable to identify any previous reports of an association between a prior depression history and physical health outcomes in older adults. In addition to its novelty, this study has unique methodologic features such as the recruitment of community-dwelling subjects, the inclusion of fully remitted subjects only, the consideration of both major and nonmajor depression histories, the longitudinal and repeated measurement of outcomes, the use of both subjective and objective health outcome measures, and the adjustment for the confounding effect of current mental health status and depressive symptoms.

The following limitations should be considered. First, because this study was a substudy of the SPS vaccine trial, the study sample had low levels of medical morbidity and, hence, not entirely representative of the community-dwelling elderly population. Moreover, because the sample was primarily white and included veterans and their family members, the findings may not be widely generalizable to the U.S. elderly population. Second, change in CDS could be partly reflecting differences in the use of healthcare services between the prior depression and comparison groups. However, this possibility is unlikely because the CDS does not include psychotropic or analgesic drugs, and there were no baseline differences of the CDS between the two groups. Third, the assessment of prior depressive episodes depended on the recollection of participants through the SCID interview. However, this method remains the gold standard for ascertainment of depression and was reported to be

reliable in assessing depression history.³⁵ Furthermore, had there been any misclassification regarding the group status (prior depression history versus comparison), the consequence should have been an underestimated difference in the deterioration of physical health as any misclassification might have made the two groups more similar. Thus, the validity of our conclusion might not be affected by such a misclassification.

Based on the theoretical explanations for the link between current depression and decline of health status,^{2,3} both physiologic and psychological mechanisms could explain the findings of this study. First, although most of the physiologic alterations observed during a depressed state may revert with remission of depressive symptoms, some alterations may persist and accumulate even after the depression resolves. Indeed, the presence of subclinical abnormalities, such as carotid atherosclerosis and endothelial dysfunction, has been associated with prior history of major depression in middle-aged women,^{12,14} and exaggerated activation of hypothalamo-pituitary-adrenal axis and sympathetic nervous system responses have been implicated as a pathway that underlies this association. Similarly, lifetime occurrence of depression is thought to increase “allostatic load,”³⁶ which is viewed as a cumulative measure of physiologic dysregulation across multiple system with impacts on future health risks.³⁷ Second, the state of depression is often associated with changes in a number of healthy life style behaviors including diet, exercise, and sleep, which may persist after the depression remits with impacts on health.³ Similarly, given the reciprocal relationship between late-life depression and executive dysfunction—impairment in cognitive domains such as planning, organizing, sequencing, and initiation/perseveration—it is possible that this dysfunction persists and compromises self-care and health of older adults.³⁸ Third, prior depression history could be a risk marker of a more distal determinant of physical health outcome such as childhood maltreatment, given that the latter strongly predicts poor psychiatric and physical health outcomes in

adulthood.³⁹ Finally, although the relationship between depression and physical health is likely to be bidirectional, our study supports the notion of depression leading to physical health decline rather than the inverse directionality in community-dwelling older adults. Although poor physical health did not predict depressive outcomes in our sample, the negative effects of depression on physical health endured far beyond its resolution. Two recent studies concur with our findings in that depression predicted physiologic outcomes directly involved with many physical illnesses—metabolic syndrome and systemic inflammation—rather than the other way around.^{10,40}

In conclusion, older adults who have had a prior depression show a faster rate of deterioration in physical health as measured by functional status and chronic medical burden in comparison with older adults who have no such lifetime history of a depression. These findings underscore the need for careful screening for current and past depression in primary and specialty medical care settings. Moreover, physicians treating older adults should bear in mind that a prior depression history may be a risk marker for physical health decline even when there has been a sustained full remission of depressive symptoms.

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