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<thead>
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<th><strong>Title</strong></th>
<th>Depression Moderates the Frailty–Subjective Health Link among Chinese Near Centenarians and Centenarians</th>
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<tbody>
<tr>
<td><strong>Author(s)</strong></td>
<td>Lau, HP; Kwan, SKJ; Cheung, KSL; Martin, P</td>
</tr>
<tr>
<td><strong>Citation</strong></td>
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</table>
Depression Moderates the Frailty–Subjective Health Link among Chinese Near Centenarians and Centenarians

Bobo Hi-Po Lau, Ph.D., Joseph Shiu-Kwong Kwan, M.D., Karen Siu-Lan Cheung, Ph.D., Peter Martin, Ph.D.

Objective: Very old adults may be physically frail, but they do not necessarily experience poor subjective health. The authors hypothesized that the relationship between frailty and subjective health is moderated by depression for very old people. Methods: In a cross-sectional study, a survey administered was by a face-to-face interview to 129 community-dwelling older adults aged 95–108. Measurements included the five-item FRAIL scale, the Geriatric Depression Scale Short-Form (GDS), and a subjective health rating. Hierarchical multiple regressions were conducted to test the moderation effects, adjusting for age, gender, living arrangement, perceived socioeconomic status, and cognition. Results: The interaction effect between frailty and depression was significant. Inspection of the simple slopes revealed that those who were more depressed had a more negative frailty–subjective health relationship. There was no significant moderation effect for a withdrawal-apathy-vigor dimension of the GDS. Conclusion: Our findings suggest a protective psychological mechanism may enable very old adults to maintain an optimistic view of their health despite their increasing physical and functional limitations. (Am J Geriatr Psychiatry 2016; 24:753–761)

Key Words: centenarians, frailty, depression, subjective health, Chinese

INTRODUCTION

Subjective health (or self-rated health) refers to the global evaluation of health. The construct is often efficiently evaluated by a single-item question on a four- or five-point scale, yet reliably predicts important health outcomes including health complaints, treatment prognosis, healthcare utilization, and mortality, even among adults as old as nonagenarians and centenarians. However, based on the sociocultural conception of health, individuals may include multiple criteria they consider to be relevant to their health and well-being when judging their overall health. These

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Frailty–Subjective Health Link in the Oldest-Old

criteria, such as health behaviors, positive and negative emotions, fulfillment of social roles, or financial security, may not correspond directly to the conventional, biomedical definition of “health.”

When evaluating the conditions of these criteria, individuals may compare their current conditions with those of other people (e.g., same-aged peers), with their own in the past (i.e., time), or with their expectation for the near future. The inclusion of psychosocial variables and the adoption of various frames of references in the subjective evaluation of health may entail a marked discrepancy between subjective health and “objective” indicators of physical and functional health (i.e., objective health; e.g., diseases, disability, physical performance). Based on the health congruence framework of Chipperfield, people may experience congruence (i.e., realists) or incongruence in their health evaluations. Those experiencing incongruence could be regarded as health optimists (appraising subjective health as good despite poor objective health) or health pessimists (appraising subjective health as poor despite good objective health). Relative to realists with poor objective and subjective health, health optimists had been found to enjoy better psychological well-being and perceived healthcare management, to be more physically active, and to experience fewer hospitalizations. Conversely, compared with realists with good objective and subjective health, health pessimists demonstrated poorer physical and psychological health outcomes.

In other words, the discrepancy between subjective and objective health may provide important information about the well-being of older adults.

In addition to objective health indicators such as biomarkers, physical health complaints, and physical performance, psychological well-being variables such as depression and positive attitude to life are integral to one’s overall evaluation of health. The nonagenarian and centenarian populations could be an especially relevant group to study the discrepancy between subjective and objective health. On one hand, Baltes described the “fourth age” (85+) as a time of inevitable declines in biologic resources and functional capacities coupled with inefficient compensation by psychological and social resources. According to this view, “fourth-age” individuals are characterized by disability and dependency. On the other hand, studies have repeatedly documented similar levels of depression, subjective health, and subjective well-being across old, old-old, and oldest-old populations. Termed as the “paradox of aging,” studies have witnessed the diversion of the trajectory of decline of subjective and objective health with increasing age, with physical and functional health indicators (i.e., objective health) showing a much sharper decline than subjective health. This can be partly explained by adaptive coping responses older people use to deal with their health decline.

On the other hand, physical frailty is an important medical syndrome that is detectable with simple, rapid screening tests and reversible by comprehensive interventions (e.g., exercises, protein-calorie supplementation, vitamin D, and reducing polypharmacy), it has been suggested that all persons aged 70 years or with significant weight loss due to chronic disease should be screened for physical frailty.

The prevalence of physical frailty tends to increase remarkably with age, especially among nonagenarians and centenarians. Depending on the frailty assessment, the prevalence of frailty ranges from 4.0% to 59.1% among community-dwelling individuals aged 65 or above and raises from 4% among individuals aged 65–69 years to 26% for elders aged above 85. The syndrome tends to be very prevalent among the centenarian population. In the Oporto Centenarian Study, 60.0% of participants were frail, with another 36.0% being prefrail. Using the world’s largest sample...
of centenarians from the Chinese Longitudinal Healthy Longevity Survey, Gu and Feng\textsuperscript{19} reported that centenarians were significantly frailer than their younger counterparts (aged 65–79, 80–89, or 90–99). Despite the high mean cumulative deficits, the centenarian group exhibited the largest heterogeneity. In other words, advanced age does not necessarily confer physical frailty.

**Depression as a Moderator for the Physical Frailty–Subjective Health Relationship**

A depressive outlook may affect how very old adults evaluate their health beyond the effect of their actual capabilities. First, depressed individuals may be more pessimistic about the progression of their health problems, perceive less control over their objective health, and foresee a poorer prognosis of their current health complaints\textsuperscript{22,32} Second, most individuals, including older adults, tend to use lateral (compared with similar) or downward comparisons to maintain a favorable perception of their general health, especially when experiencing an increasing number of physical symptoms.\textsuperscript{14} Such favorable social comparison processes may be stifled by depression. Depression may disrupt the disregard of physical limitations in the evaluation of health, especially among very old adults who are prone to physical frailty.

Hong et al.\textsuperscript{22} found that among their samples with a mean age of 90 and poor objective health (more diseases and health complaints), health optimists reported fewer depressive symptoms than poor health realists. Kempen et al.\textsuperscript{33} also reported that the changes in subjective health and in performance-based physical functioning were more congruent among nonagenarians with worsened depression. However, Galenkamp et al.\textsuperscript{10} reported an opposite pattern based on the Vitality 90 + data, such that poor functioning tended to be more detrimental to the subjective health of those who were nondepressed. Nonetheless, the two former studies applied depression scales (the Hospital Anxiety and Depression Scale and the Center for Epidemiologic Studies Depression Scale) to assess a graded level of depression, whereas Galenkamp et al. assessed depression with a single item on self-reported diagnosis.

The investigation on the psychosocial factors moderating the objective–subjective health link remains scarce, especially in the very old (see Galenkamp et al.\textsuperscript{10} for an exception). More importantly, the effect of depression has also not been isolated from that of the withdrawal-aphathy-lack of vigor (WAV) dimension of depression.\textsuperscript{24} Gallo et al.\textsuperscript{35} concluded that a significant proportion of older adults tend to experience “depression without sadness”. Previous studies have repeatedly found that older adults are more likely to endorse WAV symptoms such as lack of hope, lack of interest, not wanting to go out, and social withdrawal than symptoms related to depressed moods including feeling sad, blue, helpless, and so on.\textsuperscript{26,34,35} Stipulated by the disengagement theory of aging,\textsuperscript{36} gerotranscendence theory,\textsuperscript{37} and socioemotional selectivity theory,\textsuperscript{38} such a tendency could be the manifestation of a normal trajectory of aging, characterized by the narrowing of the older adult’s social space and reprioritization of resources to nurturing close relationships and self-reflection. WAV symptoms are often associated with advanced age and physical frailty and could be indicative of a depletion or disengagement syndrome that prevails in very old adults rather than dysphoric mood and negative cognitions.\textsuperscript{26,34,39} To delineate the effect of WAV as a result of the normal aging trajectory from that of dysphoric moods, the current study investigated and compared the moderating effect of depression and WAV symptoms on the relationship between physical frailty and subjective health among a group of Hong Kong Chinese near centenarians (age 95–99) and centenarians (age 100 or above).

**METHODS**

**Sampling and Procedures**

The Hong Kong Centenarian Study recruited Chinese near centenarians and centenarians who were born in 1905–1915. No other exclusion criterion was imposed. Participants signed written informed consent before their in-home or center-based face-to-face interviews. At least one family member and/or registered social worker was present to ensure a reassuring environment for the interview. This study used a sample of 129 participants from the Hong Kong Centenarian Study dataset who provided valid responses on all concerned items (see supplementary appendix S1 for details on sampling method and procedure; available online).
MEASURES

Physical frailty was evaluated by the FRAIL scale, which consists of five items: fatigue, resistance, mobility (ambulation), illnesses, and loss of weight (Table 1). The FRAIL scale has a possible range of 0–5. Participants scoring 0 were considered as nonfrail. Participants who scored between 1 and 2 were prefrail, and those who scored between 3 and 5 were frail. These levels of frailty (nonfrail, prefrail, and frail) were recoded as 0, 1, and 2, respectively, in the regression models.

Depression was measured by 14 items on the Chinese version of the Geriatric Depression Scale (GDS-14) after excluding the fatigue item. To measure WAV, we constructed a two-item WAV subscale based on the findings of Adams (“Prefer to stay at home, rather than going out and doing new things,” “dropped many of your activities and interests”). The internal consistencies of GDS-14, WAV and GDS-12 are good (GDS-14: α = 0.79; WAV: α = 0.84; GDS-12: α = 0.81). Subjective health was measured by one item, “How do you rate your current health?” using a five-point scale, ranging from 1 = very poor to 5 = very good. Control variables included gender (0 = female, 1 = male), age, living arrangement, cognition, and perceived socioeconomic status (see supplementary appendix S2 for details of the measures; available online).

RESULTS

Sample Characteristics

Of the 129 participants included in the current analysis, 96 (74.4%) were women, with an age range of 95–108 (mean: 97.6; standard deviation: 2.2). Most participants were living in the community, with 67 (51.9%) living with family and/or friends and 41 (31.8%) living alone. For frailty, 29 participants (22.5%) were nonfrail, 72 (55.8%) were prefrail, and 28 (21.7%) were frail. The mean GDS-14 score was 2.40 (standard deviation: 3.30). Fifty-two participants (40.3%) scored 0, whereas 51 (39.5%) scored between 1.00 and 4.00. The mean score of subjective health was 3.26 (standard deviation: 0.93), with 52 participants (40.3%) reporting their health as “good” or “very good” and 54 (41.9%) reporting “average” health.

Table 2 provides the sample characteristics, and Table 3 presents the frequencies of levels of frailty.

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**Table 1. Items on the FRAIL Scale**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td>Answering ‘no’ to ‘Feel full of energy’ from the Chinese version of the GDS</td>
</tr>
<tr>
<td>Low resistance</td>
<td>Having difficulty or not being able to perform “crouch-and-stand” three times</td>
</tr>
<tr>
<td>Low mobility</td>
<td>Having difficulty or not being able to walk for 400 m</td>
</tr>
<tr>
<td>Illnesses</td>
<td>Suffering from more than five diseases on a list of 30 chronic diseases (i.e., stroke, coronary heart disease, hypertension, parkinsonism, cancer, arthritis, multiple sclerosis, chronic obstructive pulmonary disease, diabetes mellitus, etc.)</td>
</tr>
<tr>
<td>Loss of weight</td>
<td>Weight loss of more than 3 kg or more in the past 6 months</td>
</tr>
</tbody>
</table>

Notes: A score of 1 was assigned to each item if the deficit was present. The FRAIL scale has a possible range of 0–5.

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**Table 2. Sample Characteristics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of Cases (N = 129)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female gender</td>
<td>96</td>
<td>74.4</td>
</tr>
<tr>
<td>Mean age, yr</td>
<td>97.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Living arrangement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alone</td>
<td>41</td>
<td>31.8</td>
</tr>
<tr>
<td>With family and/or friends</td>
<td>67</td>
<td>51.9</td>
</tr>
<tr>
<td>In institutions</td>
<td>21</td>
<td>16.3</td>
</tr>
<tr>
<td>Mean MMSE score</td>
<td>24.3</td>
<td>4.6*</td>
</tr>
<tr>
<td>Perceived SES as “better off”</td>
<td>44</td>
<td>34.1</td>
</tr>
<tr>
<td>Frailty phenotype</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonfrail (code 0)</td>
<td>29</td>
<td>22.5</td>
</tr>
<tr>
<td>Prefrail (code 1)</td>
<td>72</td>
<td>55.8</td>
</tr>
<tr>
<td>Frail (code 2)</td>
<td>28</td>
<td>21.7</td>
</tr>
<tr>
<td>Frailty items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>30</td>
<td>23.3</td>
</tr>
<tr>
<td>Low resistance</td>
<td>86</td>
<td>66.7</td>
</tr>
<tr>
<td>Low mobility</td>
<td>48</td>
<td>37.2</td>
</tr>
<tr>
<td>Illnesses &gt; 5</td>
<td>12</td>
<td>9.3</td>
</tr>
<tr>
<td>Weight loss ≥ 3 kg in 6 months</td>
<td>27</td>
<td>20.9</td>
</tr>
<tr>
<td>Mean GDS-14 score</td>
<td>2.40</td>
<td>3.30*</td>
</tr>
<tr>
<td>Score 0</td>
<td>52</td>
<td>40.3</td>
</tr>
<tr>
<td>Score 1–4</td>
<td>51</td>
<td>39.5</td>
</tr>
<tr>
<td>Score &gt; 4</td>
<td>26</td>
<td>20.2</td>
</tr>
<tr>
<td>Mean subjective health</td>
<td>3.26</td>
<td>0.93*</td>
</tr>
<tr>
<td>Very good</td>
<td>10</td>
<td>7.8</td>
</tr>
<tr>
<td>Good</td>
<td>42</td>
<td>32.6</td>
</tr>
<tr>
<td>Average</td>
<td>54</td>
<td>41.9</td>
</tr>
<tr>
<td>Poor</td>
<td>18</td>
<td>14.0</td>
</tr>
<tr>
<td>Very poor</td>
<td>5</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Notes: SES: socioeconomic status.
*Value is standard deviation.
The percentages of participants reporting good subjective health were 55.2% (16/29), 44.4% (32/72), and 14.3% (4/28), respectively, for the nonfrail, prefrail, and frail groups.

**Table 3. Distribution of Frailty Phenotypes in Good Versus Poor Subjective Health**

<table>
<thead>
<tr>
<th></th>
<th>Nonfrail</th>
<th>Prefrail</th>
<th>Frail</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor subjective health (very poor/poor/average)</td>
<td>13 (10.1)</td>
<td>40 (31.0)</td>
<td>24 (18.6)</td>
<td>77</td>
</tr>
<tr>
<td>Good subjective health (very good/good)</td>
<td>16 (12.4)</td>
<td>32 (24.8)</td>
<td>4 (3.1)</td>
<td>52</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>72</td>
<td>28</td>
<td>129</td>
</tr>
</tbody>
</table>

*Notes: Values in parentheses are percents.*

(nonfrail, prefrail, and frail) across two aggregated levels of subjective health (very good/good = good subjective health; very poor/poor/average = poor subjective health). The percentages of participants reporting good subjective health were 55.2% (16/29), 44.4% (32/72), and 14.3% (4/28), respectively, for the nonfrail, prefrail, and frail groups.

**Moderating Effect of Depression**

The moderating effects were tested by hierarchical multiple regression. We first tested the effects of control variables on subjective health in Step 1. In Model 1, physical frailty and GDS-14 were centered and entered in Step 2 to test if depression and physical frailty predict subjective health above and beyond the effects of control variables. Finally, an interaction variable indicating the physical frailty x depression effect was entered into Step 3 to test for the moderation effect above and beyond the main effects. In Models 2 and 3, WAV subscale score and GDS-12 subscale score, respectively, replaced the GDS-14. The direction of significant moderation effect was examined using slope analysis.

**Table 4** presents the regression results with GDS-14 as the predictor. Controlling for the effects of age, gender, living arrangement, cognition, and perceived socioeconomic status, the level of physical frailty and depression provided significant incremental explanatory power to subjective health, $\Delta F(2, 120) = 14.88$, $\Delta R^2 = 0.17$, $p < 0.001$. Participants who had a higher GDS-14 score ($B = -0.42$, standard error $[SE] = 0.12$, $t = -3.42$, $df = 120$, $p = 0.001$) tended to have worse subjective health. Results also show that the interaction effect was significant ($B = -0.08$, $SE = 0.04$, $\Delta F(1, 119) = 5.31$, $\Delta R^2 = 0.03$, $p = 0.023$). Figure 1 shows the direction of the moderating effect. Participants with higher scores on the GDS-14 possessed a more negative relationship between physical frailty and subjective health. In other words, physical frailty tended to have a more negative impact on subjective health among centenarians who were more depressed.

We repeated the moderation analysis twice (See supplementary appendix S3 for detailed results; available online). First, we substituted GDS-14 with the two-item WAV subscale. The interaction effect between physical frailty and WAV was not significant ($B = -0.24$, $SE = 0.15$, $\Delta F(1, 118) = 2.60$, $\Delta R^2 = 0.02$, $p = 0.109$). Next, we replaced the WAV subscale with GDS-12. The interaction effect was significant ($B = -0.13$, $SE = 0.05$, $\Delta F(1, 119) = 7.38$, $\Delta R^2 = 0.04$, $p = 0.008$). The direction of the moderating effect by these 12 items was the same as that by GDS-14, such that participants with a higher GDS-12 score showed a more negative physical frailty–subjective health relationship.

**DISCUSSION**

Centenarians fulfill the basic criteria for longevity: age. However, their pathways to good health tend to be different from those of their younger counterparts. In the light of the popular use of subjective health as a proxy for an individual’s health in gerontology research and the widening discrepancy between subjective and objective health at advanced age, this study examined how depression moderated the relationship between physical frailty and subjective health among a group of Hong Kong Chinese near centenarians and centenarians. Results show that physical frailty tends to be more detrimental to the subjective health of individuals with a higher level of depression. The WAV dimension alone, however, did not moderate the physical frailty–subjective health relationship. In other words, WAV, which may reflect normal aging trajectories, does not tend to predispose...
physically frail elderly to poor self-evaluation of health. However, depressed moods and negative cognitions, such as feelings of sadness, helplessness, and feeling blue, may aggravate poor health perceptions among physically frail elderly.

The current findings help reveal the inner structure of subjective health and the cognitive process of aggregating information of distinct health domains, namely physical frailty and depression, to arrive at a coherent evaluation of total health. For very old adults, the notion of health tends to encompass components beyond the scope of the biomedical model, such as psychological well-being. In the light of the “paradox of aging,” psychosocial underpinnings of subjective health may act as a buffer for the adverse effects of physical and functional deteriorations on overall health and well-being. Hence, very old adults are able to preserve favorable appraisals of their health despite increasing functional limitations and physical decline. Based on the health congruence model, the current findings underscore the role of depression in modulating the congruence between subjective and objective health among very old adults.

### TABLE 4. Results of the Hierarchical Multiple Regression with GDS-14

<table>
<thead>
<tr>
<th></th>
<th>Step 1</th>
<th></th>
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<th>Step 2</th>
<th></th>
<th></th>
<th>Step 3</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE)</td>
<td>95% CI</td>
<td>B (SE)</td>
<td>95% CI</td>
<td>B (SE)</td>
<td>95% CI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>3.61 (0.17)</td>
<td>3.28, 3.94</td>
<td>3.52 (0.15)</td>
<td>3.22, 3.82</td>
<td>3.64 (0.16)</td>
<td>3.32, 3.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.00 (0.19)</td>
<td>-0.38, 0.38</td>
<td>-0.14 (0.18)</td>
<td>-0.48, 0.21</td>
<td>-0.10 (0.17)</td>
<td>-0.44, 0.25</td>
<td></td>
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<tr>
<td>(reference class: female)</td>
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<td></td>
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<tr>
<td>Age</td>
<td>0.02 (0.04)</td>
<td>-0.05, 0.10</td>
<td>0.02 (0.03)</td>
<td>-0.04, 0.09</td>
<td>0.02 (0.03)</td>
<td>-0.05, 0.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognition</td>
<td>0.01 (0.02)</td>
<td>-0.03, 0.04</td>
<td>0.00 (0.02)</td>
<td>-0.03, 0.04</td>
<td>0.00 (0.02)</td>
<td>-0.03, 0.05</td>
<td></td>
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<tr>
<td>Perceived SES</td>
<td>-0.39 (0.17)</td>
<td>-0.73, -0.05</td>
<td>-0.31 (0.16)</td>
<td>-0.62, 0.00</td>
<td>-0.35 (0.16)</td>
<td>-0.66, -0.04</td>
<td></td>
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<tr>
<td>(reference class: average/relatively worse off/worse off)</td>
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<td></td>
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<td>Living arrangement</td>
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<tr>
<td>Living alone</td>
<td>-0.41 (0.18)</td>
<td>-0.77, -0.05</td>
<td>-0.31 (0.17)</td>
<td>-0.64, 0.03</td>
<td>-0.36 (0.17)</td>
<td>-0.70, -0.03</td>
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<tr>
<td>Living in institution</td>
<td>0.27 (0.23)</td>
<td>-0.20, 0.73</td>
<td>0.37 (0.21)</td>
<td>-0.05, 0.79</td>
<td>0.34 (0.21)</td>
<td>-0.08, 0.76</td>
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<tr>
<td>GDS-14</td>
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<tr>
<td>Physical frailty level</td>
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<tr>
<td>Interaction (GDS-14 × physical frailty level)</td>
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<td>△F</td>
<td>2.85a</td>
<td></td>
<td>14.88b</td>
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<td>Degrees of freedom</td>
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<td>1, 119</td>
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<td>△R²</td>
<td>.12</td>
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<td>.17</td>
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<td>.03</td>
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<td>Adjusted R²</td>
<td>.08</td>
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<td>.25</td>
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<td>.28</td>
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<tr>
<td>p</td>
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<td>&lt;.001</td>
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<td>&lt;.023</td>
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Notes: Hierarchical multiple regression was conducted. N = 129. SE: standard error; CI: confidence interval; SES: socioeconomic status. Probability values are from t statistics with df = 120.

*p <.05.

*p <.01.

*p <.001.

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**FIGURE 1. Moderation by GDS-14 on the frailty–subjective health relationship.**
Depression may moderate
14,32
The social comparison theory postu-
a top-down process was also
2
In the light of the interactive nature of
In our interviews,
ltation was
and socioemotional selectivity theory.
In our pre-
38
we found that maintaining good
Another recent trial of a healthy
Such observations are in line with frame-
9,14,32
Thus, analysis with longitudinal
Ac-
47x41
Am J Geriatr Psychiatry 24:9, September 2016
[47x77]as nonagenarians and centenarians. These exceptional
facilitating successful aging among very old adults, such
jective health judgments is particularly important for
practice related to individuals of advanced age.
pressed moods and cognitions in research and clinical
provide support to distinguishing WAV from de-
and is distinguishable from depressed moods and cog-
nitions. Our findings underscore this distinction, such
that depressed mood but not WAV influenced the in-
tegration of physical frailty information to the self-
evaluation of health. The current findings therefore
provide support to distinguishing WAV from depressed moods and cognitions in research and clinical
practice related to individuals of advanced age.
Understanding the cognitive mechanisms behind sub-
jective health judgments is particularly important for
facilitating successful aging among very old adults, such
as nonagenarians and centenarians. These exceptional
survivors are likely to experience various degrees of
physical disabilities and comorbidities. As a result, the
conventional definition of “health,” which depends
heavily on intact physical and functional capacities, may
be less realistic and applicable to them as to their
younger counterparts. To facilitate their overall well-
being, instead of confronting very old adults head-on
with their unbearable physical and functional de-
clines, it may be more profitable to capitalize on their
psychosocial well-being. In other words, instead of “adding years
to life,” “adding life to years” may be more relevant
to the well-being of these very old adults.
Notwithstanding their physical limitations, studies
have found that oldest-old adults apply various coping
strategies to maintain a peace of mind.43,44 In our pre-
vious qualitative study with six healthy Hong Kong
Chinese centenarians,45 we found that maintaining good
relationships with family and friends, having a collec-
tion of fond memories of early life, possessing peace
of mind, and being content with what one has were
considered the keys to happiness in the 10th decade
of life. These elements of happiness are also anti-
dotes to depressive symptoms, which the current study
has found to regulate the subjective–objective health
relationship.46 In the light of the interactive nature of
subjective (e.g., depressive mood) and objective (e.g.,
physical frailty) components of health, an interdisci-
niplinary approach that facilitates active aging and quality
of life could be particularly relevant to individuals of
advanced age. A multifactorial interdisciplinary inter-
vention that combined comprehensive geriatric
assessment with case management, exercises, mental
health counseling, and nutritional consultation was
found to be useful in facilitating physical perform-
ance of elderly.47 Another recent trial of a healthy
aging intervention combining physical and social ac-
tivity demonstrated effectiveness in enhancing health,
social function, and engagement among community-
dwelling older adults.48
The analyses of the current study relied on a cross-
sectional dataset. Although currently we assumed that
a bottom-up process was involved in people’s evalu-
ation of their health,2 a top-down process was also
possible. Better subjective health could be conducive
to greater physical activity and in turn slow down the
frailty trajectory.2,30 Thus, analysis with longitudinal
data is needed to clarify the temporal order of changes.
Next, the current dataset was homogenous in terms of
age group. With multiple distinctive age groups (e.g., sexagenarians, octogenarians), future studies may examine whether the magnitude of the moderating effect of depression changes across age groups, as the findings of some other studies have postulated. Third, cognition was not used as a screening criterion but a control variable. Our sample included participants who provided valid answers on all items. Hence, our sample may be healthier and more cognitively fit than the general population of similar age. Similar issues have been highlighted by Poon et al. as common methodologic difficulties in conducting centenarian studies. Fourth, the standard deviation of the GDS-14 score for the current sample was relatively large compared with the mean scale score. This implies a large interpersonal variability in depression, which may in turn result in increased difficulties in achieving consistent results for this population.

The current results revealed that depression, but not WAV, is associated with a more negative relationship between physical frailty and subjective health. This finding underscores the psychological protective mechanism for very old adults to cope with the declines in physical performance.

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APPENDIX: SUPPLEMENTARY MATERIAL

Supplementary data to this article can be found online at doi:10.1016/j.jagp.2016.05.014.

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