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Predictors of suicidal ideation in Korean American older adults: analysis of the Memory and Aging Study of Koreans (MASK)

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Abstract

Objective—Our aim is to investigate the prevalence and predictors of suicidal ideation among Korean American older adults and assess the self-rated mental health of Korean American older adults with suicidal ideation with or without depressive syndrome.

Methods—The Memory and Aging Study of Koreans is a cross-sectional, epidemiologic study of a community-representative sample of Korean American older adults ($N = 1116$) residing in the Baltimore–Washington area. Participants were interviewed using the Korean version of the Patient Health Questionnaire (PHQ-9K). In addition, demographic information, self-rated mental health, and self-rated physical health status were obtained.

Results—In this study, 14.7% of Korean American older adults reported suicidal ideation. Predictors of suicidal ideation included living alone, major or minor depressive syndrome (diagnosed by the PHQ-9K), shorter duration of residency in the USA, and poorer self-rated mental health status. Of those who reported suicidal ideation, 64% did not have minor or major depressive syndrome. However, their self-rated mental health was as poor as that of those with major or minor depressive syndrome but without suicidal ideation.

Conclusion—Suicidal ideation without depressive syndromes was common among Korean American older adults. For this group of elders with poor self-rated mental health, future studies should look to improving early detection of suicide risks and developing feasible suicide prevention interventions.

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Conflict of interest

None declared.

Keywords

Asian American; suicidal ideation; suicide in older adults; PHQ-9; self-rated mental health

Introduction

Suicide is a serious global health concern that accounted for 1.4% of all deaths worldwide with more than 800,000 suicides every year, making it the 15th leading cause of death in 2012 (World Health Organization, 2014). Advanced age is one of the strongest risk factors for suicide (Scocco and De Leo, 2002; Nock *et al.*, 2008; Van Orden and Conwell, 2011; Kiosses *et al.*, 2014); the suicide rate of older adults (age 65 years and above) has been highest among all age groups in men (Centers for Disease Control and Prevention, 2016). Suicide attempts by older adults are also more lethal than suicide attempts by those who are younger (Centers for Disease Control and Prevention, 1997; Juurlink *et al.*, 2004).

This high suicide rate among the older adults is alarming for countries such as the USA, in which the population is rapidly aging and the older adults are estimated to surmount 20% of the total population by the year 2040 (Administration on Aging, 2015). A substantial proportion of the increase in the US aging population comprises racial and ethnic minority older adults, with Asian American older adults being one of the fastest growing minority groups. The Asian American older adults are estimated to increase by 104% between 2014 and 2030, whereas the non-Hispanic white older adults are estimated to increase by 46% (Administration on Aging, 2015). The suicide rate among Asian American older women is the highest among all ethnic groups of older women (Centers for Disease Control and Prevention, 2012). Bartels *et al.* (2002) have also reported the highest rate of suicidal ideation among older Asian primary care patients in comparison with any other ethnic group.

Despite the higher prevalence of late life health conditions such as suicide and suicidal ideation among Asian American older adults (Jimenez *et al.*, 2013; Lee *et al.*, 2014), it is unknown what factors, if any, are associated with suicidal ideation in this population group. Recently, in a large, community-representative Korean American sample, the Memory and Aging Study of Koreans (MASK) revealed high prevalence (10.8%) of clinical depression (a score of 10 or above on the Patient Health Questionnaire-9 for Koreans, the PHQ-9K) and low mental health care service utilization (Lee *et al.*, 2014). These statistics are alarming because depression is associated with increased risk of suicidal attempts and suicidal deaths (Beskow, 1990; Simon *et al.*, 2013) and Korean older adults in South Korea have the highest suicide rate (116.2/100,000) among the World Health Organization's member countries (World Health Organization, 2014).

Screening high-risk groups for suicide as a suicide prevention method has been suggested (see the review by O'Connor *et al.*, 2013). However, the risk factors for suicide vary among ethnicities and cultures (Novins *et al.*, 1999), and studies that have dealt with suicide in Korean American older adults are scarce. To address this issue and identify Korean American older adults who have a high risk for suicide, we examined the predictors of

suicidal ideation among Korean American older adults and the characteristics of Korean American older adults who report suicidal ideation.

Methods

This study was approved by the Johns Hopkins Medical Institute's institutional review board. All participants were informed of the study's objectives, and all provided their consent.

Participants

We used data collected from the MASK for the current analysis. The MASK is a community-based, epidemiologic study to assess the burden of depression and cognitive impairment among Korean American older adults in the Baltimore–Washington D.C. area. Details of the study's sampling methods have been described previously (Lee *et al.*, 2014). Briefly, a community-representative sample ($N = 1116$; mean age $\pm$ SD = 70.5 $\pm$ 7.0 years; 67.2% female) were recruited at ethnic religious, service, and business establishments (26 Korean churches, 6 senior centers, 2 medical daycare centers, and 1 supermarket). Of the 1116 participants, 727 (65.1%) were interviewed by bilingual community health workers, and 389 (34.9%) were interviewed by bilingual nurses. High inter-rater reliability (> 0.95) on the PHQ-9K items was achieved through systematic data collector training of community health workers and nurses. Between nurses and community health workers, the measurement fidelity assessment was equivalent, with an inter-item covariance of the PHQ-9K items being 0.18 for nurses and 0.20 for community health workers. Cronbach's alpha coefficients were identical for the PHQ-9K in the two groups, with a value of 0.82.

Assessment

Depression: Patient Health Questionnaire-9, Korean version—The PHQ-9K is the Korean version of the PHQ-9, a self-administrative diagnostic exam for depression. The nine items in this questionnaire represent the nine diagnostic criteria of major depressive disorder in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*. The reliability and validity of the PHQ-9K has been confirmed in Korean older adults in both the USA (Phelan *et al.*, 2010) and Korea (Han *et al.*, 2008). The PHQ-9's diagnostic algorithm also allows diagnosis of major depressive syndrome and minor depressive syndrome (Gilbody *et al.*, 2007; Wittkamp *et al.*, 2007). Responses are rated on a 4-point Likert scale (0 for *not at all*, 1 for *several days*, 2 for *more than half the days*, and 3 for *nearly every day*). For a diagnosis of major depressive syndrome, the participant must have answered five out of nine items as at least “more than half the days” while responding positively to items 1 or 2, which are questions about symptoms of anhedonia and depressed mood, respectively. However, in the case of item 9, selecting “several days” of suicidal ideation also counts as a positive response. Minor depressive syndrome is suggested when the participant responds positively to items 1 or 2 and any one of items 3, 4, or 5, which are questions about sleep problems, feeling tired or having low energy, and poor appetite or overeating, respectively.

Item 9 of the PHQ-9 asks the participant, “How often have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way over the last two

weeks?” Studies have confirmed the sensitivity and specificity of item 9 of the PHQ-9 as a screening method of suicide in primary care settings (Uebelacker *et al.*, 2011), and this item has been used to measure suicidal ideation in many studies (Lossnitzer *et al.*, 2009). In a recent study, response to item 9 of the PHQ-9 was proven as a strong predictor of suicide attempt and death in a community practice setting, especially over the following 2 years of administration (Simon *et al.*, 2016). Additionally, in a study on Veterans Health Administration patients, responses of “several days,” “more than half the days,” and “nearly everyday” to item 9 of the PHQ-9 were associated with a 75%, 115%, and 185% increased risks of suicide, respectively (Louzon *et al.*, 2016). In analyzing data in the present study, the responses on this item were converted into a dichotomous variable: either having any suicidal ideation or having none at all.

Cognitive impairment: mini-mental state examination, Korean version—The mini-mental state examination (MMSE) is used globally as a screening method to examine the cognitive status of adults (Folstein *et al.*, 1975). The Korean version of the MMSE, validated previously, was used in our study (Lee *et al.*, 2002). In general, a cutoff score of 24 is used to screen for dementia (Lezak *et al.*, 2004).

Self-rated mental health

Mental health is a condition in which an individual is cognizant of his or her potential, is able to cope with the daily stresses of life, can work in a productive manner, and can make a contribution to her or his community (World Health Organization, 2014). Participants were asked to rate their overall *mental* or *emotional health* on a 4-point Likert scale as *excellent*, *good*, *fair*, or *poor*. A strong association has been demonstrated between self-rated mental health and both mental health symptom measures (Fleishman and Zubekas, 2007; Jang *et al.*, 2012) and mental disorders (Mawani and Gilmour, 2010; Kim *et al.*, 2011). The single-item measure has been validated as an efficient indicator of mental health (Mawani and Gilmour, 2010). Studies have also reported a connection between self-rated mental health and mental health service use (Katz *et al.*, 1997; Mawani and Gilmour, 2010; Kim *et al.*, 2011).

Other variables

The following sociodemographic information were obtained: sex, age, years of education, final educational level, date of immigration, duration of US residency, current living status (whether the participant lived alone or with spouse, children, or other family members), number and names of prescription drugs, last time they had seen a doctor, whether they had received treatment for depression or dementia, and number of medical conditions.

Analysis

All statistical analyses were performed in STATA14 for Windows (StataCorp., College Station, TX, USA), and statistical significance was set at $p < 0.05$ for all analyses. To compare the characteristics of Korean American older adults with and without suicidal ideation, the sample was divided into two groups based on responses to item 9 of the PHQ-9K: suicidal ideation positive versus negative. The sociodemographic variables, PHQ-9K scores, and MMSE scores were compared between the two groups by *t*-test for continuous variables and chi-squared test for categorical variables.

To identify significant predictors of suicidal ideation, multivariable analysis was performed with logistic regression, using the presence of suicidal ideation as the dichotomous dependent variable. Possible sociodemographic and clinical correlates of suicide (i.e., major or minor depression, sex, age, current living status, years of education, MMSE scores, number of medical conditions and prescription drugs, self-rated physical health, self-rated mental health, and duration of US residency) were chosen based on review of previous literature on putative risk factors for suicide among the older adults (Upadhyaya *et al.*, 1999; Cattell, 2000; Ikeda *et al.*, 2001; Waern *et al.*, 2003; Kposowa *et al.*, 2008; Shah and Bhandarkar, 2009) and availability of variables. The final regression model was built with a purposeful selection algorithm (Bursac *et al.*, 2008).

In addition, to examine the characteristics of Korean American older adults with suicidal ideation, the suicidal ideation positive and negative groups were further divided into two subgroups based on the presence of depression (meeting criteria for either major or minor depressive syndrome based on the PHQ-9K), yielding four subgroups (Figure 1): (i) suicidal ideation positive older adults, with either major or minor depressive syndrome (Depression+, Suicidal ideation+); (ii) suicidal ideation-positive older adults who did not have either major or minor depressive syndrome (Depression–, Suicidal ideation+); (iii) suicidal ideation-negative older adults with either major or minor depressive syndrome (Depression+, Suicidal ideation–); and (iv) suicidal ideation-negative older adults who did not have either major or minor depressive syndrome (Depression–, Suicidal ideation clinical–). Sociodemographic and variables were compared among the four groups using analysis of variance for continuous variables and chi-squared test for categorical variables.

Results

Overall, 14.7% of Korean American older adults in community settings reported suicidal ideation.

Characteristics of Korean American older adults with suicidal ideation

Older adults with suicidal ideation had 2 years less education than did older adults without suicidal ideation (9.2 ± 4.8 years vs. 11.2 ± 4.4 ; $p < 0.001$). Older adults with suicidal ideation also had shorter US residency by 2 years (23.8 ± 9.6 vs. 26.0 ± 10.6 ; $p = 0.014$), and more of them lived alone (32.7% vs. 19.9%; $p = 0.002$). Older adults with suicidal ideation had higher PHQ-9K scores (9.8 ± 5.7 vs. 2.8 ± 3.1 ; $p < 0.001$) and a higher proportion of major (25.6% vs. 0.9%) and minor (10.4% vs. 4.3%) depressive syndrome than did older adults without suicidal ideation ($p < 0.001$). Older adults with suicidal ideation also had lower MMSE scores (24.0 ± 4.8 vs. 26.0 ± 3.8 ; $p < 0.001$) and a significantly higher proportion of probable dementia (18.3% vs. 7.7%, $p < 0.001$). Older adults with suicidal ideation rated their mental and physical health status lower than did older adults without suicidal ideation ($p < 0.001$ for both) (Table 1).

Predictors of suicidal ideation

Table 2 represents the adjusted multivariable model. According to our purposeful selection model, only four predictors remained significant. The four predictors in the final model were

living alone, shorter residency in the USA, PHQ-9K diagnosis of minor or major depressive syndrome, and poorer self-rated mental health status. Pertinent demographic variables (age, sex, and years of education) and health-related factors (MMSE scores, number of medical conditions and prescription drugs, and self-rated physical health) were adjusted for the final model. This model explained 22.6% of the variance.

Older adults with suicidal ideation who were not depressed

Table 3 presents the clinical characteristics of the four subgroups. As Figure 1 shows, nearly two-thirds ($n = 105$; 64%) of Korean American older adults who reported suicidal ideation did not meet diagnostic criteria for minor or major depressive syndrome.

Although the mean PHQ-9K score was significantly lower in the Depression–, Suicidal ideation+ group than in the Depression+, Suicidal ideation– group (6.8 vs. 9.8), self-rated mental health was as poor as in the Depression+, Suicidal ideation– group ($p = 0.478$).

In addition, only 8.6% of the Depression–, Suicidal ideation+ group received mental health treatment, which was significantly less than the 28.8% for the Depression+, Suicidal ideation+ group ($p = 0.002$) and the 26.4% for the Depression+, Suicidal ideation– group ($p = 0.009$).

Discussion

In this study, 14.7% of a community-representative sample of Korean American older adults reported suicidal ideation. This is approximately three times higher than what has been reported in studies of older adults community populations in the USA (Barnow and Linden, 2000), Japan (Awata *et al.*, 2005), and Australia (Handley *et al.*, 2014). In fact, the prevalence of suicidal ideation in our community-residing Korean American older adults was similar to the 15.4% prevalence of suicidal ideation in a sample of Japanese older adults with depression (diagnosed by a Geriatric Depression Scale (GDS) score of 14 or higher) in Japan (Awata *et al.*, 2005). Moreover, this was higher than the 10.9% reported among the Korean older adults residing in South Korea, who are known to have the highest rate of suicide in the world (Ministry of Health and Welfare of Korea, 2014).

High prevalence of suicidal ideation among Korean American older adults is alarming because suicidal ideation is strongly predictive of suicide itself (Kuo *et al.*, 2001; Garlow *et al.*, 2008; van Spijker *et al.*, 2012; Kiosses *et al.*, 2014). Bruffaerts *et al.* (2011) have reported that most people with suicidal ideation do not receive any intervention or treatment, and Nock *et al.* (2008) demonstrated that up to 30% of people with suicidal ideation attempt suicide and 60% of suicide attempts made after suicidal ideation occur within the first year of ideation onset. Moreover, older adults frequently attempt suicide with highly lethal methods, and have the highest suicide rate among age groups (McIntosh, 1992; Van Orden and Conwell, 2011; Conwell, 2014). All in all, these studies support the importance of screening Korean American older adults for suicidal ideation in order to prevent suicide.

Immigrants who are less fluent in English and less acculturated are at higher risk for suicide (Hovey, 2000; Iliceto *et al.*, 2013), and they are less likely to utilize mental health services

(Administration on Aging, 2001; Kim *et al.*, 2014). Similarly, in the present study, Korean American older adults with shorter residency in the USA were more likely to report suicidal ideation. Previous reports have underscored the importance of social support from spouses and family members as protective factors against suicide (McIntosh, 1992; Joiner *et al.*, 2009). In the present study, living alone was a predictor of suicidal ideation, and 21.8% of Korean American older adults were living alone.

In our study, 64% of Korean American older adults who reported suicidal ideation did not meet the PHQ-9K's criteria for minor or major depression. The finding implies that targeting and treating older adults with conventional diagnosis of major or minor depression might miss a substantial portion of Korean American older adults who could be at high risk for suicide attempt. In addition, the self-rated mental health of this subgroup was as poor as the mental health of Korean American older adults with minor or major depressive syndrome who did not report suicidal ideation. These findings suggest that the PHQ-9K may not reliably detect mood symptoms among Korean American older adults. A number of researchers have questioned the validity of current depression scales in detecting mood disorder in the Asian population (Kurasaki *et al.*, 2002; Lim *et al.*, 2011). According to Lim *et al.* (2011), the social stigmatization and somatic presentation of mental disorders in the Asian population leads to both under-diagnosis of depression and low utilization of mental health services. The low correlation between depression diagnosis and self-rated mental health found in our subgroup is also consistent with the findings of Jang *et al.* (2012) in racial and ethnic minority older adults. Such discrepancy was attributed to cultural stigma regarding mental disorders within ethnic minority groups (Jang *et al.*, 2015).

The present study has several limitations. First, the cross-sectional design did not allow us to infer a causal relationship between study variables and suicidal ideation. A longitudinal study of those with suicidal ideation would further illuminate the clinical significance and predictive validity of suicidal ideation in Korean American older adults. Second, the sample in this study was drawn from one metropolitan area on the East Coast; it might be necessary to study several additional geographic areas to determine generalizability. Nevertheless, we did attempt to construct a community-representative sample by recruiting participants with different religious backgrounds from various ethnic facilities, including churches, senior centers, a supermarket, and medical daycare centers, in accordance with current demographic data for Korean American older adults (Jo *et al.*, 2010). Third, our assessment of depressive symptoms relied on a single validated screening tool (the PHQ-9K); structured in-depth diagnostic interviews might yield more reliable and valid data on depression among Korean American older adults.

This study is the first to investigate suicidal ideation in a large community sample of Korean American older adults. Despite its limitations, the study's findings of a high prevalence of suicidal ideation among Korean American older adults underscores the need for outreach to establish programs that can improve access to mental health services among Korean American older adults. In addition, the identification of predictors for suicidal ideation in this study should facilitate a more targeted intervention to screen and deliver mental health services to those who report suicidal ideation. Finally, given the high prevalence of Korean American older adults with significant mental distress and suicidal ideation who do not meet

the criteria for major or minor depressive syndrome, future studies should look to improving early detection of suicide risks and developing feasible suicide prevention interventions for this vulnerable population.

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Key points

- Suicidal ideation was common among Korean American older adults in the community.
- The predictors of suicidal ideation were major or minor depressive syndrome, poorer self-rated mental health status, living alone, and shorter duration of US residency.
- Substantial number of Korean American older adults with suicidal ideation (64.0%; $n=105$) met the standard criteria neither for minor nor for major depressive syndrome. However, based on the self-rated mental health status, the non-depressive Korean American older adults with suicidal ideation were just as distressed as the depressive Korean American older adults who did not report suicidal ideation.
- Given the high prevalence of Korean American older adults with significant mental distress and suicidal ideation not meeting the standard major or minor depressive syndrome diagnosis criteria, more robust tool for screening and clinical detection of suicidal intent among this vulnerable population is warranted.

Figure 1.
Sixty-four percent of older adults with suicidal ideation were not depressed.

Table 1

Characteristics of older adults with or without suicidal ideation

Variable	Older adults with suicidal ideation (<i>n</i> = 164, 14.7%)	Older adults without suicidal ideation (<i>n</i> = 952, 85.3%)	<i>p</i>	Total <i>N</i> = 1116
Sex, <i>n</i> (%)			0.034	
Male	42 (11.5)	324 (88.5)		366
Female	122 (16.3)	628 (83.7)		750
Age, years (mean ± SD)	71.6 ± 8.2	70.3 ± 6.7	0.066	70.5 ± 7.0
Education, years (mean ± SD)	9.2 ± 4.8	11.2 ± 4.4	0.001	10.9 ± 4.5
Education level, <i>n</i> (%)			0.001	
No formal education	12 (7.3)	30 (3.2)		42 (3.8)
Elementary	49 (29.9)	164 (17.2)		213 (19.1)
Middle/High	67 (40.9)	434 (45.6)		501 (44.9)
College	35 (21.3)	319 (33.5)		354 (31.8)
Residency in the USA, years (mean ± SD)	23.8 ± 9.6	26.0 ± 10.6	0.014	25.6 ± 10.4
Living arrangement, <i>n</i> (%)			0.002	
Alone	53 (32.7)	189 (19.9)		242 (21.8)
With spouse	69 (42.6)	528 (55.7)		597 (53.8)
With children	26 (16.0)	150 (15.8)		176 (15.9)
With others	14 (8.6)	81 (8.5)		95 (8.6)
PHQ-9K score (mean ± SD)	9.8 ± 5.7	2.8 ± 3.1	0.001	3.9 ± 4.4
Major Depressive Syndrome, <i>n</i> (%)	42 (25.6)	9 (0.9)	0.001	51 (4.6)
Minor Depressive Syndrome, <i>n</i> (%)	17 (10.4)	41 (4.3)	0.001	58 (5.2)
MMSE score (mean ± SD)	24.0 ± 4.8	26.0 ± 3.8	0.001	25.6 ± 4.0
MMSE < 24, <i>n</i> (%)	70 (42.7)	176 (18.5)	0.001	246 (22.1)
MMSE < cutoff score, * <i>n</i> (%)	30 (18.3)	73 (7.7)	0.001	103 (9.1)
Number of medical conditions (mean ± SD)	1.9 ± 1.4	1.6 ± 1.2	0.002	1.7 ± 1.2
Number of prescription drugs (mean ± SD)	3.4 ± 3.0	2.8 ± 2.4	0.016	2.9 ± 2.5
Self-rated mental health			0.001	
Excellent, <i>n</i> (%)	7 (4.4)	149 (16.1)		156 (14.4)
Good, <i>n</i> (%)	35 (22.0)	406 (43.9)		441 (40.7)
Fair, <i>n</i> (%)	65 (40.9)	321 (34.7)		386 (35.6)
Poor, <i>n</i> (%)	52 (32.7)	48 (5.2)		100 (9.2)
Self-rated physical health			0.001	
Excellent, <i>n</i> (%)	9 (5.7)	104 (11.3)		113 (10.4)
Good, <i>n</i> (%)	30 (18.9)	346 (37.4)		376 (34.7)
Fair, <i>n</i> (%)	57 (35.8)	354 (38.3)		411 (38.0)
Poor, <i>n</i> (%)	62 (39.0)	120 (13.0)		182 (16.8)

MMSE, mini-mental state examination; SD, standard deviation; PHQ-9K, Patient Health Questionnaire-9, Korean version. Chi-squared tests and *t*-tests were conducted for categorical variables and continuous variables, respectively.

* Individual MMSE cutoff scores were calculated on the basis of age and education.

Table 2

Predictors of suicidal ideation

Predictor	OR (95% CI)	<i>p</i>
Years of US residency (nearest 10 years)	0.80 (0.67–0.97)	0.020
Living alone	1.63 (1.01–2.68)	0.048
PHQ-9K diagnosis		
Minor depressive syndrome	1.97 (1.00–3.88)	0.050
Major depressive syndrome	17.70 (7.90–39.65)	0.001
Self-rated mental health		
Excellent	Ref	—
Fair	3.70 (1.30–10.51)	0.014
Poor	10.48 (3.33–32.99)	0.001

CI, confidence interval; MMSE, mini-mental state examination; OR, odds ratio; PHQ-9K, Patient Health Questionnaire-9, Korean version.

Adjusted for pertinent demographic and health factors (age, sex, education years, total MMSE scores, number of medical conditions and prescription drugs, and self-rated physical health).

Table 3

Characteristics of older adults by suicidal ideation and depression

Variable	Depression+ Suicidal ideation+ (<i>n</i> = 59, 5.3%)	Depression–Suicidal ideation+ (<i>n</i> = 105, 9.4%)	Depression+Suicidal ideation– (<i>n</i> = 53, 4.7%)	Depression–Suicidal ideation–(<i>n</i> = 899, 80.6%)
Age (mean ± SD)	72.5 ± 8.6	71.1 ± 8.1	72.5 ± 7.7	70.2 ± 6.6
Sex, <i>n</i> (%)				
Male	13 (22.0)	29 (27.6)	11 (20.8)	313 (34.8)
Female	46 (78.0)	76 (72.4)	42 (79.2)	586 (65.2)
Education	8.6 ± 5.1	9.6 ± 4.7	9.4 ± 4.7	11.3 ± 4.3
Residency in the USA	24.0 ± 9.3	23.7 ± 9.8	24.9 ± 9.2	26.0 ± 10.6
Living, <i>n</i> (%)				
Alone	21 (36.2)	32 (30.8)	15 (28.3)	174 (19.4)
With spouse	25 (43.1)	44 (42.3)	28 (52.8)	500 (55.9)
With children	6 (10.3)	20 (19.2)	6 (11.3)	144 (16.1)
MMSE score	23.4 ± 5.1	24.3 ± 4.7	23.9 ± 4.6	26.1 ± 3.7
Under 24, <i>n</i> (%)	29 (49.2)	41 (39.0)	19 (35.8)	157 (17.5)
Under cutoff, <i>n</i> (%)	11 (18.6)	19 (18.1)	8 (15.1)	65 (7.2)
Number of medical conditions	2.1 ± 1.5	1.9 ± 1.2	2.3 ± 1.3	1.6 ± 1.2
Number of medications	4.0 ± 3.4	3.1 ± 2.7	4.2 ± 2.9	2.7 ± 2.3
PHQ-9K score	15.3 ± 4.5	6.8 ± 3.7	9.8 ± 3.9	2.4 ± 2.5
Self-rated mental health				
Excellent, <i>n</i> (%)	1 (1.7)	6 (5.9)	2 (3.8)	147 (16.9)
Good, <i>n</i> (%)	9 (15.5)	26 (25.7)	9 (17.0)	397 (45.6)
Fair, <i>n</i> (%)	22 (37.9)	43 (42.6)	26 (49.1)	295 (33.9)
Poor, <i>n</i> (%)	26 (44.8)	26 (25.7)	16 (30.2)	32 (3.7)
Self-rated physical health				
Excellent, <i>n</i> (%)	2 (3.4)	7 (6.9)	0 (0.0)	104 (11.9)
Good, <i>n</i> (%)	9 (15.5)	21 (20.8)	3 (5.7)	343 (39.4)
Fair, <i>n</i> (%)	15 (25.9)	42 (41.6)	27 (50.9)	327 (37.5)
Poor, <i>n</i> (%)	32 (55.2)	31 (30.7)	23 (43.4)	97 (11.1)
Received mental health treatment, <i>n</i> (%)	17 (28.8)	9 (8.6)	14 (26.4)	20 (2.2)

MMSE, mini-mental state examination; SD, standard deviation; PHQ-9K, Patient Health Questionnaire-9, Korean version.