

Am J Geriatr Psychiatry. Author manuscript; available in PMC 2016 July 01.

Published in final edited form as:

Am J Geriatr Psychiatry. 2015 July; 23(7): 671–683. doi:10.1016/j.jagp.2014.11.003.

# **Prevalence and Predictors of Depression in Korean American Elderly: Findings from the Memory and Aging Study of Koreans** (MASK)

Miyong T. Kim<sup>1</sup>, Kim B. Kim<sup>2</sup>, Hae-Ra Han<sup>3</sup>, Boyun Huh<sup>4</sup>, Tam Nguyen<sup>5</sup>, and Hochang Benjamin Lee<sup>6</sup>

<sup>1</sup>School of Nursing, University of Texas at Austin, Austin, Texas <sup>2</sup>Korean Resource Center, Ellicott City, Maryland <sup>3</sup>School of Nursing, Johns Hopkins University, Baltimore, Maryland <sup>4</sup>School of Nursing, University of California at San Francisco, San Francisco, California <sup>5</sup>Connell School of Nursing, Boston College, Chestnut Hill, Massachusetts <sup>6</sup>School of Medicine, Yale University, New Haven, Connecticut

#### **Abstract**

**Objectives**—To estimate the prevalence and identify the predictors of depression among community-dwelling Korean American elderly (KAE).

**Design**—A cross-sectional descriptive epidemiological survey using a two-step sampling strategy to obtain a representative community sample.

Setting—We recruited study participants at religious, service, and business establishments in the KA community (26 churches, 6 senior centers, 2 medical daycare centers, 1 supermarket).

Participants—Community-dwelling first-generation KAE (n=1,118; mean age ±SD; 70.5 ±7.0 years; female: 67.2%).

**Measurements**—Trained bilingual nurses and community health workers interviewed participants face-to-face for demographic information, chronic conditions, and depression using the Korean versions of the Patient Health Questionnaire (PHQ-9K).

**Results**—30.3% of KAEs were classified as having either mild (PHO-9K score = 5 to 9; n=218, 19.5%) or clinical depression (PHQ-9K score >=10; n = 120, 10.8%), respectively. One of seven KAE (n=164, 14.7%) endorsed thoughts of death or self-injury, but only 63 (5.7%) reported utilizing mental health services. We also identified several predictors of depression, including living arrangement (living alone vs. living with family/spouse); having chronic conditions such as

The authors declare no conflict of interest.

<sup>© 2014</sup> American Association for Geriatric Psychiatry. All rights reserved.

Correspondence to: Kim B. Kim, Ph.D, <kbkim@ikorean.org>, CEO/President, Korean Resource Center, 10328 Baltimore National Pike, Ellicott City, MD 21042, (410) 203-1111.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Conflict of Interest

diabetes, arthritis, digestive disorders, or chronic bronchitis; years of education; and cognitive impairment.

**Conclusions**—Our findings reveal a high prevalence of depression among KAE and a low level of mental health service utilization. Because there are urgent needs for culturally and contextually relevant interventions, we also discuss the feasibility of community-based interventions to reduce the burden of depression, which should be incorporated into a management system for multiple chronic conditions.

## Keywords

Korean American elderly; Depression; PHQ-9K; Chronic conditions

## INTRODUCTION

Asian American and Pacific Island (AAPI) elderly individuals (age 65 and older) represent one of the fastest growing segments of the US population. Numbering more than 1.3 million individuals in 2008 (3.4% of the older US population), this group is projected to grow to more than 7.6 million (8.6% of the older population) by 2050. The demand for effective care support systems for community-dwelling elderly is ubiquitous; however, elderly Asian immigrants, including Korean American elderly (KAE), often face additional barriers to accessing culturally and contextually relevant care support systems within the community: As predominantly first-generation immigrants, they must deal with the consequences of acculturative stress, less-than-optimal health literacy, and insufficient care support infrastructures in their neighborhoods.

The Korean American (KA) community as a whole consists of about 1.7 million people. KAEs represent the fifth largest Asian subgroup in the US, and their population has increased rapidly during the last few decades. Although data on KAEs' mental health status is not readily available, several small, locally sampled studies have indicated that large numbers of KAE are at high risk of having depression (31% to 53% of KAE, 49 a level much higher than the 13.5% reported for the general American elderly population). KAE are much less likely to utilize mental health services. Several unique individual-level characteristics (such as language barriers and social stigma related to mental illness within the KA community) as well as systematic factors (e.g., a shortage of bilingual mental health care providers) have been identified as barriers to receiving adequate mental health services among KAE. A 12

KAEs' unmet mental health needs are further complicated by their high prevalence of undertreated chronic medical conditions. In particular, KAE suffer from higher levels of hypertension and type 2 diabetes mellitus, with less-than-optimal levels of control of their chronic conditions. <sup>13–15</sup> For the general US population, the important interplay between mental health problems, particularly depression, and chronic medical conditions is well documented. <sup>16–20</sup> Depression has emerged as a critical comorbidity of several chronic medical conditions and is likely to increase mortality and morbidity, although the causal mechanisms are not conclusively established. <sup>21–22</sup> Nevertheless, given the known associations between depression and chronic conditions, accurately characterizing the

prevalence and predictors of depression among KAE is vital for planning effective interventions. Therefore, the aim of this study is to move beyond small convenience samples to systematically assess the prevalence and predictors of depression among KAE.

### **METHODS**

This was an epidemiological study that used a two-step sampling process to produce a representative community sample of today's KAE. To be eligible for the study, participants had to self-identify as first-generation Korean immigrants, be 60 years old, and reside in the greater Washington-Baltimore metropolitan community (and not be institutionalized in assisted living or nursing home facilities). In the first step, we used a stratified sampling technique to randomly select 26 Korean ethnic churches according to denomination and size from a list of 150 sizeable churches in the region, because over three-quarters of KAs currently attend Korean ethnic churches.<sup>23, 24</sup> In the second step, we purposefully added several alternative recruitment sites to capture non-churchgoers (six senior centers, one ethnic grocery store, and one community research center and less mobile elderly (two medical daycare centers), resulting in a larger, more representative final sample for assessing the prevalence and predictors of depression among KAE.

## **Participants**

A total of 1,118 KAE (mean age  $\pm$ SD, 70.5  $\pm$ 7.0 years; female: 67.2%) participated in the study between September 2010 and June 2012. Trained bilingual registered nurses and community health workers were present at the sites and conducted one-on-one interviews with all participants to collect the data. The study was approved by the Johns Hopkins Medicine IRB, and all participants provided written informed consent.

#### Measurements

We collected the following individual socio-demographic information: age, place of birth, living arrangement, years of education completed, years of US residency, job, and working status. In addition, questions covered health status and chronic conditions: hypertension, diabetes, arthritis, high cholesterol, depression, dementia, osteoporosis, digestive disorders, prostate hyperplasia/urinary tract disorders, thyroid disorders, cardiovascular disease (CVD), diseases of the eyes, chronic obstructive pulmonary disease (COPD), renal/kidney problems, and cancer/others. We also collected information regarding the number and kind of currently prescribed medications, including any psychiatric medications (e.g., antidepressants, antipsychotics, mood stabilizers, antianxiolytics, or cognitive enhancers). To assess participants' cognitive impairment, we used the Mini Mental State Examination (MMSE)-Korean version with established cutoff scores for screening dementia by age and education based on Korean elderly in Korea. The cutoff scores for screening dementia ranged from 13 (for those with <3 years of education and age >80) to 24 (for those with >12 years of education and age <70).<sup>25</sup> We also collected information related to health access and utilization, such as the last time participants saw a physician, and information about primary health care and mental health providers.

Depression was measured using the Korean version of the Patient Health Questionnaire (PHQ-9K), which has been validated in a study of Korean elderly<sup>26</sup> and Korean American adults.<sup>27</sup> The instrument is composed of 9 items that evaluate the presence over the past 2 weeks of depressive symptoms from the DSM-IV classification for major depressive disorder. Items are scored from 0 (not at all) to 3 (nearly every day); totals range from 0 to 27. We set cutoff points for PHQ-9 scores at <5 for "minimal depression or normal," 5 to 9 for "mild depression," and 10 for "clinical depression," as suggested by a previous validation study of Korean elderly.<sup>26</sup> The internal consistency reliability coefficient (Cronbach's alpha) in the present study was 0.82.

In addition, each participant was asked the following questions regarding mental health service utilization for depression: (1) "Are you currently receiving any treatment for depression or any other mood-related problems?" (1a) "If yes, what is the profession of the person treating your condition?" (e.g., primary care doctor, psychiatrist, psychologist, counselor, or other); (1b) "Please describe the type of treatment" (e.g., medication, psychotherapy, counseling, or other).

In the study, bilingual nurses interviewed a total of 389 participants (34.9%), and CHWs interviewed 727 participants (65.1%). Before the data collection, systematic training for both groups was conducted to achieve high inter-rater reliability (Kappa >.95) and followed the standardized measurement protocol. The measurement fidelity assessment between nurses and CHWs was equivalent as the inter-item covariance among PHQ-9K items was 0.18 for nurses and 0.20 for CHWs, respectively, and Cronbach's alpha were identical at 0.82.

## **Data Analysis**

We used STATA 12 to analyze data from 1,116 participants, having excluded two for incomplete records. After assessing the normality of the data with a Kolmogorov–Smirnov test, we used descriptive statistics to summarize the participants' individual characteristics. A series of two-tailed t-tests with unequal variance and  $x^2$  tests or Fisher's exact tests were conducted, and analysis of variance (ANOVA) was used to compare individual characteristics by gender and depression subgroups (normal, mild, and clinical depression). In addition to describing the prevalence of depression in this sample, multivariate ordered logistic regression analysis was used to identify correlates of depression. Statistical significance was determined at p <0.05 for all tests.

# **RESULTS**

## **Sample Characteristics**

Table 1 presents the key socio-demographic and health characteristics of the subjects by gender. Of the 1,116 KAE in the valid sample, 750 (67.2%) were women and 366 (32.7%) men. The majority (n=787, 70.5%) were recruited from churches, followed by senior centers (n=220, 19.7%) and medical daycare centers (n=109, 9.8%). They averaged 70.5 ( $\pm$ 7.0) years old, and the majority had less than a high school education, with an average of 10.9 ( $\pm$ 4.5) years of education completed. The men had a higher average level of completed

education than did the women. Just over half of the women (52.4%) were widowed or separated, whereas the majority of the men (72.1%) were married. Slightly more than half of all participants (n = 597, 53.8%) were living with their spouse; one-quarter (n = 271, 24.4%) were living in a family (spouse + children), and 242 (21.8%) were living alone. Participants' mean length of stay in the US was 25.7 ( $\pm 10.6$ ) years. Overall, each participant had an average of 1.9 ( $\pm 1.3$ ) chronic conditions, ranging from 0 n = 187, 16.7%) to 7 (n = 1, 0.1%), and was taking 2.6 ( $\pm 2.3$ ) prescription drugs. More than half n = 638, 57.2%) had two or more chronic conditions. Slightly less than one-half (n = 489, 45.2%) reported that their physical health was "excellent or good," followed by "fair" (n = 411, 38.0%) and "bad" (n = 183, 16.9%). Participants reported their mental health status as "excellent or good" (n = 597, 55.1%), "fair" (n = 386, 35.6%), or "bad" (n = 100, 9.2%).

The male and female participants were similar with regard to mean age, length of residency in the US, age at the time of immigration, and the last time they had seen a doctor. Other characteristics of the men and women were statistically different, including their recruitment site, with more women participating in senior centers or medical daycare centers. The majority of male participants were living with their spouse (72.1%) or family (21.0%), and only 25 (6.8%) of them were living alone; fewer than half of the female participants were living with a spouse (44.4%); roughly one-quarter were living alone (29.7%) and one-quarter with family (25.9%).

In addition, the women reported more chronic conditions than did the men  $(2.0 \pm 1.4 \text{ vs } 1.5 \pm 1.2; t = 5.77, df = 785, p < 0.001)$ , and they took more prescription drugs  $(2.7 \pm 2.3 \text{ vs. } 2.2 \pm 2.3; t = 3.43, df = 756, p < 0.001)$ . With regard to depression, more women than men tended to experience mild (22.1% vs. 14.2%) or clinical depression (12.0% vs. 8.2%), respectively, and these differences were statistically significant. Female participants also reported their physical and mental health status less positively than did their male counterparts  $(\chi^2 = 29.89, df = 2, p < 0.001, and \chi^2 = 16.36, df = 2, p < 0.001, respectively)$ . A total of 164 (14.7%) had thoughts of killing/hurting themselves, and more women (16.3%) did so than men (11.5%), a difference that was statistically significant. In addition, about 1 out of 7 study participants (n = 159, 14.2%) was identified as cognitively impaired, but no statistically significant difference was observed between men (12.8%) and women (14.9%) (Table 1).

### **Prevalence and Demographic Correlates of Depression**

A total of 778 (69.7%) participants scored <5 on the PHQ-9K scale, but about one-fifth (n = 218, 19.5%) and about 1 of 10 (n = 120, 10.8%) were classified as having mild or clinical depression, respectively. Several factors are appeared to correlate with depression, and these relationships were statistically significant. Participants of senior centers were least depressed; i.e., their prevalence of mild (14.1%) or clinical depression (7.3%) was lowest, followed by those who were recruited from churches (19.7% and 8.8%, respectively). Depression was most prevalent among participants from medical daycare centers (29.4% and 32.1%, respectively). However, the statistical significance was attributable to differences between daycare centers and other sites. In addition, more female participants experienced mild depression (22.1% vs. 14.2%) or clinical depression (12.0% vs. 8.2%) than

did men. Age was associated with the severity of depression; the mean age of people experiencing clinical depression was higher  $(72.5\pm8.3)$  than that for those whose scores reflected no  $(70.2\pm6.5)$  or only mild depression  $(70.5\pm7.6)$ .

Those who were living alone had the highest prevalence of mild (23.1%) or clinical (17.4%) depression. In addition, the number of chronic conditions and the number of prescription drugs were highest among those with clinical depression, followed by those with mild depression, and these differences were statistically significant. Also statistically significant was the distribution of those who were cognitively impaired: About a quarter (25.8%) of the clinically depressed individuals were cognitively impaired, followed by 17.0% of those with mild depression and 11.7% of those without depressive symptoms. Similarly, more than half (n = 60, 51.3%) and one-third (n = 44, 37.6%) of those with clinical depression reported negative perceptions about their physical and mental health, respectively (Table 2).

## **Chronic Conditions and Depression**

Table 3 summarizes the relationship between self-reported chronic conditions and depression. Several chronic conditions were significantly correlated with depression, including diabetes, arthritis, digestive disorders, and chronic bronchitis. Other chronic conditions, including hypertension, hyperlipidemia, osteoporosis, prostate/urinary disorders, cardiovascular disease, and diseases in the thyroid, eye, or kidney, were not significantly correlated with depression.

## **Predictors of Depression**

To accurately identify the significant predictors of depression among KAE, several input variables that demonstrated significant bivariate correlations with depression were entered into an ordered logistic regression model using the backward stepwise option. The same model was run for males and females separately, because the two sexes were quite different in many demographic characteristics, perceived health status, the number of chronic conditions, and depression manifestation. The dependent variable was depression experience, coded as 0 for normal (PHQ-9K score <5), 1 for mild depression (PHQ-9K score = 5~9), and 2 for clinical depression (PHQ-9K score 10). Independent variables included were age (to nearest 10 years), gender, living arrangement (recoded as 0 if living with spouse/family, 1 if living alone), level of education completed (0 for no formal education, 1 for elementary school graduate, 2 for high school graduate, and 3 for college and above), years of US residency (to nearest 10 years), age at the time of immigration (to nearest 10 years), recruitment site (0 for senior center/supermarket/community research center, 1 for church, and 2 for medical daycare center), and cognitive impairment status. The models also included the number of chronic conditions (range: 0-5), chronic conditions identified as significantly correlated with depression (diabetes, arthritis, digestive disorders, and COPD) through a series of  $\chi^2$  tests (Table 2), time since participants saw a doctor, and the number of prescribed medications. Some indicators (such as perceived physical and mental status) were excluded from the model because of a high level of multicollinearity with other indicators in the model.

The analysis identified a model of depression that was statistically significant, but with a small amount of the variance explained (Table 4). Participants' age, level of education, living alone, and recruitment site were predictors of depression: Those who were younger, less educated, or living alone and not engage religious or social activities were more likely to experience depression. In addition, rheumatoid arthritis, digestive disorders, and cognitive impairment were also significant predictors. Nevertheless, the statistical models for males and females were quite different from each other. For males, only the individual's age and his age at immigration turned out to be significant predictors of depression. For females, recruitment site, along with the four chronic conditions (diabetes, rheumatoid arthritis, digestive disorders, and COPD) were significant predictors of depression (Table 4).

## DISCUSSION

The negative consequences of depression for the elderly are well established; they include decreased self-care activities and quality of life, declining functional status, <sup>28</sup> and increasing complications from chronic conditions. <sup>29</sup> Our findings suggest that the combined prevalence of mild and clinical depression among KAE (30.3%) is considerably higher than population norm in the US (13.5%) and other countries. <sup>10, 30</sup> Moreover, the prevalence rate of clinical depression (10.8%) in KAE was two times higher than that of the US elderly population in general (4.9%). <sup>31</sup>

In this study, we also identified correlates of depression common among elderly populations in general, such as the number of chronic conditions, perceived declining health status, living alone, being female, and low level of education completed. However, the effect of these mental health risk factors was amplified among KAE because they are isolated by linguistic, cultural, and environmental barriers. Studies have reported that many KAE have no meaningful social interactions with people outside of their own family or members of their own church. <sup>32, 33</sup> Although our study was not equipped to explicate precise empirical relationships between social isolation and depression, a few variables in our study that can very well be considered proxy indicators of social isolation, such as living arrangement (living alone vs. living with family), age, and recruitment site (churches, medical daycare center, senior center), were shown to be statistically significantly correlated with depression, and therefore to support the "social isolation hypothesis." <sup>34</sup>, Furthermore, the differential prevalence in depression that we saw in different recruitment sites also provides the basis for further considering systematic efforts to prevent social isolation as potential intervention strategies for vulnerable elderly groups. Although the higher prevalence of depression among medical day care center attendees was expected, the difference between church attendees and senior center attendees seems to indicate that attending church alone (for most individuals, once a week) may not provide a sufficient buffer from the negative effect of the pervasive social isolation that KAE experience because of language and cultural barriers. Although the harmful effects of social isolation, including the development of depression and early death among the elderly, have long been discussed in the literature, perhaps the most powerful empirical study of social isolation is the recent longitudinal study conducted by a group of British researchers who followed 6,500 British people over the age of 52 from 2004 until 2012.<sup>35</sup> After controlling for pertinent factors that affect mortality such as comorbid conditions, wealth, education, marital status, ethnicity, age, and sex, those

researchers found that the most socially isolated people were 26% more likely to die during the study period than those with the most active social lives. Future depression research on vulnerable elderly populations, including linguistically isolated minority groups, must address the aspect of social isolation in both descriptive and intervention research.

Another interesting finding from our study was that several chronic conditions (diabetes, arthritis, COPD, and self-reported symptoms related to digestive disorders such as heartburn) showed high correlations with depression, whereas others (high blood pressure, high cholesterol, and prostate or urinary problems) did not. This finding is consistent with previous studies of depression that have identified diabetes as the physical condition most susceptible to being associated with depression, <sup>16, 36–38</sup> along with arthritis <sup>39</sup> and certain conditions accompanied by chronic pain. <sup>40, 41</sup>

Many clinical studies have reported a strong relationship between digestive disorders (or gastrointestinal symptoms) and psychological distress (e.g., depression and anxiety). 42–46 Some argue that depression and anxiety are risk factors for developing a digestive disorder, 46 however, it is also possible that the gastrointestinal discomfort is a somatic complaint resulting from depression. Cross-cultural research has reported a greater tendency among members of certain cultural groups such as KAE to express their emotional problems or mood disorders through physical complaints than among their European counterparts, 47–50 although somatic expression of emotional distress is to some extent ubiquitous. 51–54 Our study underscores the importance of conjoint consideration of depressive symptoms and somatic or physical symptoms in identifying elderly individuals at high risk for developing depression in primary care and community settings.

## **Utilization of Health Services for Depression**

Nine out of ten KAE (92.3%) reported that they had seen doctors within the last 12 months, but only a fraction of them were receiving treatment for their depression. The rates of having treatment for depression were 2.1%, 8.3%, and 24.2% among the minimal, mild, and clinical depression groups, respectively. Of those who thought about killing/hurting themselves (n=163), only 27 (16.6%) received treatment for depression (Table 5). This discrepancy in rate between the regular clinic visits and treatment for depression in KAE highlights the importance of implementing routine mental health examinations and subsequent treatment by primary care providers for the group of patients who demonstrate historical reluctance to seek mental health treatment by psychiatrists. This phenomenon may very well be related to the stigma associated with seeking treatment from a mental health care provider, which is considered to be a sign of weakness; also, Korean culture measures one's maturity in terms of how well one keeps one's feelings to oneself, especially those feelings that are troublesome.

A close examination of Tables 2 and 5 may elucidate some, if not all, of the difference we observed in treatment frequency Table 2 indicates that the prevalence rates (including thoughts on suicide and hurting him/herself) at daycare centers were much higher than those at senior centers and churches. Although the overall rate of the treatment for depression was low (n=64, 18.9%), those at medical daycare centers received treatment at much higher rates: 15.6% of those in the mild depression group and 48.6% of those in the clinical

depression group (2.2-fold and 3.5-fold higher percentages, respectively, than at other sites). Because the adult medical daycare center for those who need medical care during the daytime is funded and regulated by Medicaid, nursing staff are in charge of case management for program participants, including scheduling clinic visits, medication, and provision of transportation and interpreter services. Most centers also provide wellness education, exercise training, and diet education as well as other social services, in partnership with social workers.

For those KAE who are not eligible for medical daycare services, it may be a daunting task to seek mental health services: First, it is hard to find mental healthcare providers in the region who are culturally and linguistically accommodating to KAE. For example, for the more than 120,000 KAs in our catchment area, most of whom are first-generation immigrants with limited English proficiency, there are only three board-certified psychiatrists at four clinics, one licensed professional counselor (LPC), and two licensed social workers. Three of these caregivers serve only adolescents and young adults, and one psychiatrist is half-retired. Of the 63 participants who received treatment, 30 identified the names of 15 doctors who were all family doctors or internists, except for one psychiatrist. Accordingly, their treatment regimens focused on prescription drugs, and only a few KAE reported that counseling was provided.

The interpretation of our study is subject to several caveats and limitations: Our two-345 stage community sampling method represented our best, most feasible effort to create a sampling pool that is truly representative of the current KAE community and included active churchgoers, non-churchgoers, and less mobile Korean elders from adult daycare centers. Our sample characteristics are similar to the national and the regional estimates with regard to age, although it appears to have oversampled the female (about 7%) and those who live alone (about 4-6%).

However, it is likely that the most vulnerable sector of the population, namely the disabled, homebound elderly, and individuals belonging to the oldest age group, was still underrepresented in our sample. In addition, difficulty in making causal inferences is inherent in any cross-sectional design, and this situation applies to the interpretation of our findings as well. Potential causal relationships identified by our multivariate analyses, such as the relationship between certain chronic conditions and depression, would benefit from a longitudinal design that would allow stronger inferences to be made.

Nevertheless, our study represents the first large-scale epidemiological study of this vulnerable group. KAE are the most understudied, linguistically isolated population in the US; they are predominantly first-generation immigrants, the majority of whom have followed their adult children to the US without adequate preparation for immigrating to a new environment. As our findings clearly illustrate, these KAE suffer from a high prevalence of depression and potential social isolation. To our knowledge, no systematic effort has yet been made to reduce the manifestation of depression in the KAE community,

<sup>&</sup>lt;sup>i</sup>Estimates from our analyses of the American Community Survey (ACS) Public Use Microdata Sample (PUMS) 2008–2012, downloaded from http://www.census.gov/acs/www/data\_documentation/pums\_data during January – August 2014.

probably because of a lack of culturally sensitive best practices, which is, in turn, a result of the scarcity of evidence-based intervention research. For example, in our review of 246 clinical trials to reduce depression manifestations through behavior modification interventions, we found only one trial targeting Asian Americans with depression (NCT01239407). It is Notwithstanding, some community-partnered interventions that have been constructed to alleviate the burdens of chronic illness management of conditions such as type 2 diabetes and hypertension, 15, 58–60 including our own studies, have been very successful because they have mobilized community resources, including community organizations and Korean-speaking healthcare providers, and especially community health workers. These studies provide a potentially successful model for depression prevention and management in the KAE community. In addition, our study strongly indicates that future depression prevention efforts targeting linguistically isolated populations such as KAE must include some strategy to reduce social isolation.

## **ACKNOWLEDGMENTS**

This study was partially supported by a grant from the American Alzheimer's Association (IIRG-08-9137) and a grant from the National Heart, Lung, and Blood Institute (R01 HL085567; Clinical Trials Registry NCT00406614). The authors are grateful for substantial editorial assistance provided by Dr. John Bellquist at the Cane Center for Nursing Research, University of Texas at Austin, and additional assistance from Dr. Deborah McClellan. The content is solely the responsibility of the authors and does not necessarily represent the official views of the American Alzheimer's Association or the National Institutes of Health.

#### REFERENCES

- Administration on Aging. [Accessed on 04/21/2014] A statistical profile of Asian older Americans aged 65+. Available at http://www.aoa.gov/Aging\_Statistics/minority\_aging/Facts-on-API-388Elderly2008-plain\_format.aspx.
- Kang SY, Domanski MD, Moon SK. Ethnic enclave resources and predictors of depression among Arizona's Korean immigrant elders. J Gerontological Social Work. 2009; 52:489–502.
- 3. Kim MT, Song HJ, Han HR, et al. Development and validation of the high blood pressure-focused health literacy scale. Patient Educ Coun. 2012; 87(2):165–170.
- 4. Lee HB, Han HR, Huh BY, et al. Mental health service utilization among Korean elders in Korean churches: preliminary findings from the Memory and Aging Study of Koreans in Maryland (MASK-MD). Aging and Mental Health. 2014; 18(1):102–109. [PubMed: 23889338]
- 5. Pew Research Center: The rise of Asian Americans. (updated: April 4, 2013). Available from http://www.pewsocialtrends.org/files/2013/04/Asian-Americans-new-full-report-04-2013.pdf.
- Jang Y, Chiriboga DA. Social activity and depressive symptoms in Korean American older adults: the conditioning role of acculturation. J Aging & Health. 2011; 23(5):767–781. [PubMed: 21273501]
- 7. Donnelly PL, Kim KS. Patient Health Questionnaire (PHQ-9K) to screen for depressive disorders among immigrant Korean American Elderly. J Cultural Diversity. 2008; 15(1):24–29.
- 8. Kang SY, Domanski MD, Moon SK. Ethnic enclave resources and predictors of depression among Arizona's Korean immigrant elders. J of Gerontological Social Work. 2009; 52:489–502.
- 9. Sin MK, Choe MA, Kim JI, et al. Depressive symptoms in community-dwelling elderly Korean immigrants and elderly Koreans. Research in Gerontological Nursing. 2010; 3(4):262–269. [PubMed: 20143752]
- 10. Beekman AT, Copeland JR, Prince MJ. Review of community prevalence of depression in later life. British J Psychiatry. 1999; 174:307–311.
- 11. Kim GY, Chiriboga DA, Jang Y, et al. Health status of older Asian Americans in California. J Am Geriatrics Soc. 2010; 58:2003–2008.

12. Lee HB, Hanner JA, Cho SJ, et al. Improving access to mental health services for Korean American immigrants: moving toward a community partnership between religious and mental health services. Psychiatry Invest. 2008; 5(1):14–20.

- 13. Kim MT, Kim KB, Juon HS, et al. Prevalence and factors associated with high blood pressure in Korean Americans. Ethn Dis. 2000; 10(3):364–374. [PubMed: 11110353]
- 14. Kang JH, Han HR, Kim KB, Kim MT. Barriers to care and control of high blood pressure in Korean-American elderly. Ethn Dis. 2006; 16(4):145–151. [PubMed: 16599363]
- 15. Kim BK, Han HR, Huh BY, et al. The effect of a community-based self-help multi-modal behavioral intervention in Korean American seniors with high blood pressure. Am J Hypert. 2014
- Alagiakrishnan K, Sclater A. Psychiatric disorders presenting in the elderly with type 2 diabetes mellitus. Am J Geriatr Psychiatry. 2012; 20:645–652. [PubMed: 21989315]
- 17. Choi NG, Kim JS, Marti M, Chen G. John. Late-life depression and cardiovascular disease burden: Examination of reciprocal relationship. Am J Geriatr Psychiatry. 2014; 22:1522–1529. [PubMed: 24856874]
- 18. Bogner HR, de Vries HF. Integration of depression and hypertension treatment: a pilot, randomized controlled trial. Anal Fam Med. 2008; 6(4):295–301.
- 19. Simon GE, Von Korff M. Medical co-morbidity and validity of DSM-IV depression criteria. Psychological Med. 2006; 36:27–36.
- Verhaak P, Heijmans M, Peters L, et al. Chronic disease and mental disorder. Social Science & Mede. 2005; 60:789–797.
- 21. Schatzberg A. Major depression: causes or effects? [Editorial]. Am J Psychiatry. 2002; 159(7): 1077–1079.
- Bailey N, Parés D. Fecal incontinence and depression: cause or effect? [Editorial]. Colorectal Disease. 2010; 12:397–398. [PubMed: 19843112]
- 23. Hurh, WM.; Kim, HC. Assimilation patterns of immigrants in the U.S.: A case study of Korean immigrants in the Chicago area. Washington, D.C.: University Press of America; 1978.
- 24. Hofstetter CR, Ayers JW, Irvin V, et al. Does Church Participation Facilitate Tobacco Control? A Report on Korean Immigrants. J Immigrant Minority Health. 2010; 12:187–197.
- 25. Han CS, Jo Ahn S, Jo I, et al. An adaptation of the Korean mini-mental state examination (K-MMSE) in elderly Koreans: demographic influence and population-based norms (the AGE study). Arch of Gerontology and Geriatrics. 2008; 47:302–310.
- Han HC, Jo SA, Kwak J, et al. Validation of the Patient Health Questionnaire-9 Korean version in the elderly population: The Ansan Geriatric Study. Comprehensive Psychiatry. 2008; 49(2):218– 223. [PubMed: 18243897]
- 27. Shin J, Park SY, Cho SH, et al. Validation of Patient Health Questionnaire-9 Korean version (PHQ-9K) scale for screening depression among Korean Americans in community settings. J Theory Construction & Testing. 2010; 14(2):45–51.
- 28. Harada N, Takeshita J, Ahmed I, Chen R, et al. Does cultural assimilation influence prevalence and presentation of depressive symptoms in older Japanese American men? The Honolulu-Asia Aging Study. Am J Geriatr Psychiatry. 2012; 20:337–345. [PubMed: 21358388]
- Fiske A, 1 Wetherell JL, Gatz M. Depression in older adults. Ann Rev Clin Psychol. 2009; 5:363–389. [PubMed: 19327033]
- 30. Djernes JK. Prevalence and predictors of depression in populations of elderly: A review. Acta Psychiatrica Scandinavica. 2006; 113(5):372–387. [PubMed: 16603029]
- 31. McGuire LC, Strine TW, Allen RS, et al. The Patient Health Questionnaire 8: current depressive symptoms among U.S. older adults, 2006 Behavioral Risk Factor Surveillance System. Am J Geriatr Psychiatry. 2009; 17:324–334. [PubMed: 19307861]
- 32. Kim JB, Lauderdale DS. The role of community context in immigrant elderly living arrangements: Korean American elderly. Res on Aging. 2002; 24:630–653.
- Lee YM, Holm K. Family relationships and depression among elderly Korean immigrants. ISRN Nursing. 2011:1–7.
- 34. Meltzer H, Bebbington P, Dennis MS, et al. Feelings of loneliness among adults with mental disorder. Soc Psychiatry and Psychiatric Epidemiol. 2013; 48:5–13.

35. Steptoe A, Shankar A, Demakakos P, et al. Social isolation, loneliness, and all-cause mortality in older men and women. Proc Natl Acad Sci U S A. 2013 Apr 9; 110(15):5797–5801. [PubMed: 23530191]

- 36. Katon WJ, Lin EHB, Von Korff M, et al. Collaborative care for patients with depression and chronic illnesses. N Engl J Med. 2010; 363(27):2611–2620. [PubMed: 21190455]
- 37. Oladeji BD, Gureje O. The comorbidity between depression and diabetes. Curr Psychiatry Rep. 2013; 15(390):1–8.
- 38. Roya T, Lloyd CE. Epidemiology of depression and diabetes: a systematic review. J Affective Disorders. 2012; 142(S1):S8–S21.
- 39. Matcham F, Rayner L, Steer S, et al. The prevalence of depression in arthritis: a systematic review and meta-analysis. Rheumatology. 2013; 52:2136–2148. [PubMed: 24003249]
- 40. Farmer C, Zaslavsky A, Reynolds CF, et al. Effect of depression treatment on chronic pain outcomes. Psychosomatic Medicine. 2010; 72:61–67. [PubMed: 19875633]
- 41. Baker TA, Buchanan NT, Small BJ, et al. Life satisfaction in older African Americans identifying the relationship between chronic pain, depression, and life satisfaction in older African Americans. Research on Aging. 2011; 33:426–443.
- 42. Mak ADP, Wu JCY, Chan Y, et al. Dyspepsia is strongly associated with major depression and generalised anxiety disorder a community study. Aliment Pharmacol Ther. 2012; 36:800–810. [PubMed: 22957985]
- 43. Wu JCY. Community-based study on psychological comorbidity in functional gastrointestinal disorder. J Gastroenterology and Hepatology. 2011; 26(Suppl. 3):23–26.
- 44. Jones MP, Sharp LK, Crowell MD. Psychosocial correlates of symptoms in functional dyspepsia. Clin Gastroenterology and Hepatology. 2005; 3:521–528.
- 45. Jackson J, O'Malley P, Tomkins G, et al. Treatment of functional gastrointestinal disorders with antidepressant medications: A meta-analysis. Am J Med. 2000; 108:65–72. [PubMed: 11059442]
- 46. Haug TT, Mykletun A, Dahl AA. Are anxiety and depression related to gastrointestinal symptoms in the general population? Scand J Gastroenterol. 2002; 37(3):294–298. [PubMed: 11916191]
- Kleinman A. Neurasthenia and depression: A study of somatization and culture in China. Culture, Medicine and Psychiatry. 1982; 6(2):117–190.
- 48. Pang KY. Understanding depression among elderly Korean immigrants through their folk illnesses. Med Anthro Quart. 1994; 8(2):209–216.
- 49. Castro-Costa, Dewey M, Stewart R, et al. Prevalence of depressive symptoms and syndromes in later life in ten European countries. BJ Psychiatry. 2007; 191:393–401.
- Probst JC, Laditka SB, Moore CG, et al. Race and Ethnicity Differences in Reporting of Depressive Symptoms. Adm Policy Ment Health. 2007; 34:519–529. [PubMed: 17849182]
- 51. Kapfhammer HP. Somatic symptoms in depression. Dialogues in Clin Neuroscience. 2006; 8(2): 227–239.
- 52. Halbreich U, Kahn LS. Atypical depression, somatic depression and anxious depression in women: are they gender-preferred phenotypes? J Affective Disorders. 2007; 102:245–258.
- 53. Simon G, VonKorff M, Picinelli M, et al. An international study of the relation between somatic symptoms and depression. New Eng. J Med. 1999; 341(18):1329–1331. [PubMed: 10536124]
- 54. Barkow K, Maier W, Üstün TB, et al. Risk factors for depression at 12-month follow-up in adult primary health care patients with major depression: an international prospective study. J Affective Disorders. 2003; 76(1–3):157–169.
- Fuentes D, Aranda M. Depression interventions among racial and ethnic minority older adults: A systematic review across 20 Years. Am J Geriatr Psychiatry. 2012; 20:915–931. [PubMed: 22828202]
- Kim MT, Han HR, Song HJ, et al. Community-based, culturally tailored behavioral intervention for Korean Americans with type 2 diabetes. Diabetes Educator. 2009; 35(6):986–994. [PubMed: 19934458]
- 57. Song YS, Song HJ, Han HR, et al. Unmet needs for social support and effects on diabetes self-care activities in Korean Americans with type 2 diabetes. Diabetes Educator. 2012; 38(1):77–85. [PubMed: 22222514]

58. Kim MT, Kim EY, Han HR, et al. Mail education is as effective as in-class education in hypertensive Korean patients. J Clin Hypertens. 2008; 10:176–184.

- Han HR, Kim JY, Kim KB, et al. Implementation and success of nurse telephone counseling in linguistically isolated Korean American patients with high blood pressure. Patient Education and Counseling. 2010; 80:130–134. [PubMed: 19945816]
- 60. Kim MT, Han HR, Hedlin H, et al. Teletransmitted monitoring of blood pressure and bilingual nurse counseling-sustained improvements in blood pressure control during 12 months in hypertensive Korean Americans. J Clin Hypertens. 2011; 13(8):605–612.
- 61. Lee HB, Hanner JA, Cho SJ, Han HR, Kim MT. Improving access to mental health services for Korean American immigrants: moving toward a community partnership between religious and mental health services. Psychiatry Invest. 2008; 5:14–20.
- 62. Han HR, Kim KB, Kim MT. Evaluation of the training of Korean community health workers for chronic disease management. Health Education Research. 2007; 22(4):513–521. [PubMed: 17032707]

**Author Manuscript** 

**Author Manuscript** 

Table 1

Sample characteristics by gender

	(n = 366, 32.8%)	$(\mathbf{n} = 750, 67.2\%)$	Statistics (df)	ď	Total (n = 1,116, 100%)
Recruitment site, n (%)			$\chi^2(2) = 29.27$	<.001	
Senior centers	54 (14.8%)	166 (22.1%)			220 (19.7%)
Churches	295 (80.6%)	492 (65.6%)			787 (70.5%)
Medical daycare centers	17 (4.6%)	92 (12.3%)			109 (9.8%)
Age, mean (SD)	70.8 (6.8)	70.4 (7.1)	t(754)=0.80	.417	70.5 (7.0)
Age, n (%)			$\chi^2(2) = 4.29$	.117	
61–69 years	178 (48.6%)	395 (52.7%)			573 (51.3%)
70–79 years	150 (41.0%)	261 (34.8%)			411 (36.8%)
80 or older	38 (10.4%)	94 (12.5%)			132 (11.8%)
Years education, mean (SD)	13.0 (3.7)	9.8 (4.5)	t(880) = 12.71	<.001	10.9 (4.5)
Level of education, n (%)			$\chi^2(3) = 106.16$	<.001	
No formal education	4 (1.1%)	43 (5.7%)			47 (4.2%)
Elementary (<=6 years)	25 (6.8%)	187 (24.9%)			212 (19.0%)
Middle/High (7–12 years)	158 (43.2%)	345 (46.0%)			503 (45.1%)
College (>12 years)	179 (48.9%)	175 (23.3%)			354 (31.7%)
Living arrangement, n (%)			$\chi^2(2) = 95.78$	<.001	
Alone	25 (6.8%)	223 (29.7%)			248 (22.2%)
With spouse	264 (72.1%)	333 (44.4%)			597 (53.5%)
With family	77 (21.0%)	194 (25.9%)			271 (24.3%)
Years in US, mean (SD)	25.83 (10.4)	24.8 (10.3)	t(719)=1.37	.171	25.1 (10.3)
Years in US, n (%)			$\chi^2(4) = 4.63$	.327	
Less than 10 years	15 (4.1%)	39 (5.2%)			54 (4.8%)
10–19 years	46 (12.6%)	85 (11.3%)			131 (11.7%)
20–29 years	85 (23.2%)	208 (27.7%)			293 (26.3%)
30–39 years	140 (38.3%)	282 (37.6%)			422 (37.8%)
40 years	80 (21.9%)	136 (18.1%)			216 (19.4%)
A of at immigration mean (SD)	45.0 (11.32)	456(125)	4792) 74	691	15 4 (12 1)

	Male (n = 366, 32.8%)	Female $(n = 750, 67.2\%)$	Statistics (df)	ď	Total (n = 1,116, 100%)
Age at immigration, n (%)			$\chi^2(5) = 13.03$	.023	
29 years old	20 (5.5%)	76 (10.1%)			96 (8.6%)
30–39 years old	105 (28.7%)	182 (24.3%)			287 (25.7%)
40-49 years old	129 (35.3%)	228 (30.4%)			357 (32.0%)
50–59 years old	70 (19.1%)	146 (19.5%)			216 (19.4%)
60–69 years old	32 (8.7%)	90 (12.0%)			122 (10.9%)
70 or older	10 (2.7%)	28 (3.7%)			38 (3.4%)
Saw doctor last time (months), mean (SD)	6.4 (15.3)	5.2 (15.6)	t (723)= 1.25	.212	5.6 (15.5)
Saw doctor last time, n (%)			$\chi^2(3) = 5.51$	.138	
Last 3 months	242 (67.4%)	526 (71.0%)			768 (69.8%)
Last 6 months	52 (11.5%)	101 (13.6%)			153 (13.9%)
Last 12 months	28 (7.8%)	(8.9%)			94 (8.6%)
More than a year	37 (10.3%)	48 (6.5%)			85 (7.7%)
Multiple chronic conditions, mean (SD)	1.5 (1.2)	2.0 (1.4)	t (785)=-5.77	<.001	1.9 (1.3)
Multiple chronic conditions, n (%)			$\chi^2(5)=33.70$	<.001	
None	84 (23.0%)	103 (13.7%)			187 (16.8%)
1 condition	110 (30.1%)	181 (24.1%)			291 (26.1%)
2 conditions	93 (25.4%)	206 (27.5%)			299 (26.8%)
3 conditions	56 (15.3%)	150 (20.0%)			206 (18.5%)
4 conditions	18 (4.9%)	82 (10.9%)			100 (9.0%)
5–7 conditions	5 (1.4%)	28 (3.7%)			33 (3.0%)
N. significant chronic conditions (range: 0-4) (see Table 3)			$\chi^2(2) = 13.88$	.001	
None	241 (65.9%)	434 (57.9%)			675 (60.5%)
1 condition	114 (31.2%)	275 (33.7%)			367 (32.9%)
2 conditions	11 (3.0%)	63 (8.4%)			74 (66.3%)
N. prescription drugs, mean (SD)	2.2 (2.2)	2.7 (2.3)	t (756)= -3.43	<.001	2.6 (2.3)
N. prescription drugs, n (%)			$\chi^2(6) = 24.64$	<.001	
None	87 (23.8%)	111 (14.8%)			198 (17.7%)
1 drug	81 (22.1%)	124 (16.5%)			205 (18.4%)
2 drugs	66 (18.0%)	172 (22.9%)			238 (21.3%)

Indicators	Male (n = 366, 32.8%)	Female (n = 750, 67.2%)	Statistics (df)	d	Total (n = 1,116, 100%)
3 drugs	47 (12.8%)	128 (17.1%)			175 (15.7%)
4 drugs	26 (7.1%)	78 (10.4%)			104 (9.3%)
5 drugs	25 (6.8%)	63 (8.4%)			88 (9.7%)
6 or more	34 (9.3%)	74 (9.9%)			108 (9.7%)
Physical health, n (%)			$\chi^2(2) = 29.89$	<.001	
Good	196 (55.4%) 293 (40.2%)	293 (40.2%)			489 (45.2%)
Fair	124 (35.0%)	287 (39.4%)			411 (38.0%
Bad	34 (9.6%)	149 (20.4%)			183 (16.9%)
Mental health, n (%)			$\chi^2(2) = 16.36$	<.001	
Good	221 (62.4%	376 (51.6%)			597 (55.1%)
Fair	115 (32.5%)	271 (37.2%)			386 (35.6%)
Bad	18 (5.1%)	82 (11.2%)			100 (9.2%)
Cognitively impaired, n (%)	47 (12.8%)	112 (14.9%)	$\chi^2(1) = 0.88$	.348	159 (14.2%)
Suicidal thoughts/injury	42 (11.5%)	42 (11.5%) 122 (16.3%)	$\chi^2(1) = 4.50$	.034	164 (14.7%)

Note: t-tests are two-tailed with unequal variance, unless noted otherwise.

**Author Manuscript** 

Table 2

Sample characteristics and depression distribution

Indicators	(n = 778, 69.7%)	(n = 218, 19.5%)	(n = 120, 10.8%)		
Recruitment site, n (%)				$\chi^2(4) = 78.42$	<.001
Senior centers <sup>+</sup>	173 (78.6%)	31 (14.1%)	16 (7.3%)		
Churches <sup>+</sup>	563 (71.5%)	155 (19.7%)	(8.8%)		
Medical daycare centers <sup>+</sup>	42 (38.5%)	32 (29.4%)	35 (32.1%)		
Sex				$\chi^2(2) = 16.07$	<.001
Male+	284 (77.6%)	52 (14.2%)	30 (8.2%)		
Female+	494 (65.9%)	166 (22.1%)	90 (12.0%)		
Age, mean (SD)	70.2 (6.5)	70.5 (7.6)	72.5 (8.3)	F(*) = 5.56	.004
Years education, mean (SD)	11.3 (4.3)	10.1 (4.8)	9.1 (4.9)	F(*) = 15.92	<.001
Level of education, n (%)				$\chi^2(6) = 35.64$	<.001
No formal education	26 (3.4%)	12 (5.5%)	9 (7.5%)		
Elementary (<=6 years)	120 (15.4%)	52 (23.9%)	40 (33.3%)		
Middle/High (7–2 years)	363 (46.7%)	95 (43.6%)	45 (37.5%)		
College (>12 years)	269 (34.6%)	59 (27.0%)	26 (21.7%)		
Living arrangement, n (%)				$\chi^2(4) = 23.91$	<.001
Alone (n=242)	147 (18.9%)	58 (26.6%)	43 (35.8%)		
Spouse (n=597)	438 (56.3%)	101 (46.3%)	58 (48.3%)		
Family (n=271)	193 (24.8%)	59 (27.1%)	19 (15.8%)		
Years in US, mean (SD)	25.5 (10.4)	24.5 (10.5)	24.3 (9.3)	F(*) = 1.26	.283
Years in US, n (%)				$\chi^2(8) = 13.61$	.093
Less than 10 years	43 (5.5%)	9 (4.1%)	2 (1.7%)		
10–19 years	82 (10.5%)	31 (14.2%)	18 (15.0%)		
20–29 years	195 (25.1%)	60 (27.5%)	38 (31.7%)		
30–39 years	296 (38.1%)	78 (35.8%)	48 (40.0%)		
40 years	162 (20.1%)	40 (18.4%)	14 (11.7%)		
Age at immigration, mean (SD)	44.8 (11.9)	46.1 (12.6)	48.2 (12.0)	F(*) = 4.66	.001
(/0)					

Indicators	Normal (n = 778, 69.7%)	$\begin{aligned} & Mild \\ & (n=218,19.5\%) \end{aligned}$	Clinical $(n = 120, 10.8\%)$	Statistics (df)	d
29 years old	73 (9.4%)	14 (6.4%)	9 (7.5%)		
30–39 years old	207 (26.6%)	61 (28.0%)	19 (15.8%)		
40-49 years old	258 (33.2%)	58 (26.6%)	41 (34.2%)		
50–59 years old	135 (17.4%)	49 (22.5%)	32 (26.7%)		
60–69 years old	81 (10.4%)	26 (11.9%)	15 (12.5%)		
70 or older	24 (3.1%)	10 (4.6%)	4 (3.3%)		
Saw doctor last time (months), mean (SD)	5.9 (16.8)	5.4 (13.0)	3.9 (9.8)	F(*)=0.81	.447
N. chronic conditions, mean (SD)	1.7 (1.3)	2.0 (1.3)	2.2 (1.3)	F(*) = 17.49	<.001
N. chronic conditions, n (%)				$\chi^2(10) = 44.96$	<.001
None	140 (18.0%)	32 (14.7%)	15 (12.5%)		
1 condition	228 (29.3%)	46 (21.1%)	17 (14.2%)		
2 conditions	205 (26.4%)	67 (30.7%)	27 (22.5%)		
3 conditions	131 (16.8%)	42 (19.3%)	33 (27.5%)		
4 conditions	59 (7.6%)	23 (10.6%)	18 (15.0%)		
5–7 conditions	15 (1.9%)	8 (3.7%)	10 (8.3%)		
N. significant chronic conditions (range: 0-4) (see Table 3)				$\chi^2(4) = 84.56$	<.001
None	515 (66.2%)	112 (51.4%)	48 (40.0%)		
1 condition	239 (30.7%)	83 (38.1%)	45 (37.5%)		
2 or more conditions	24 (3.1%)	23 (10.6%)	27 (22.5%)		
N. Prescription drugs, mean (SD)	2.3 (2.0)	2.9 (2.5)	3.6 (3.0)	F(*) = 20.84	<.001
N. prescription drugs, n (%)				$\chi^2(12) = 58.63$	<.001
None	151 (19.3%)	33 (15.4%)	14 (11.7%)		
1 drug	158 (20.2%)	34 (15.6%)	13 (10.8%)		
2 drugs	165 (21.2%)	50 (22.9%)	23 (19.2%)		
3 drugs	123 (15.8%)	36 (16.5%)	16 (13.3%)		
4 drugs	72 (9.3%)	21 (9.6%)	11 (9.2%)		
5 drugs	55 (7.1%)	9 (4.1%)	24 (20.0%)		
6 or more	54 (6.9%)	35 (16.1%)	19 (15.8%)		
Physical health, n (%)				$\chi^2(4) = 187.96$	<.001
Good	417 (55.3%)	53 (25.0%)	19 (16.2%)		
Fair	270 (35.8%)	103 (48.6%)	38 (32.5%)		

Indicators	Normal Normal (%) 69 70%	Normal Mild Clinical (n = 778 69 7%) (n = 218 19 5%) (n = 120 10 80%)	Clinical (n = 120 10 8%)	Clinical Statistics (df)	ď
	(n - 7.0, 0.5.7.6)	(II – 210, 17.5 /0)	(II – 120, 10.0 /0)		
Bad	(%6.8) 29	56 (26.4%)	60 (51.3%)		
Mental health, n (%)				$\chi^2(4) = 244.01$	<.001
Good	507 (67.2%)	73 (34.4%)	17 (14.5%)		
Fair	227 (30.1%)	103 (48.6%)	56 (47.9%)		
Bad	20 (2.7%)	36 (17.0%)	44 (37.6%)		
Cognitively impaired, n (%)	91 (11.7%)	37 (17.0%)	31 (25.8%)	$\chi^2(2) = 18.65$	<.001

+ row-wise percentage;

 $<sup>\</sup>ensuremath{^*}$  df = 2 for numerators and 1,113 for denominators

**Author Manuscript** 

Kim et al.

Table 3

Chronic conditions and depression

	Normal (n = 778, 69.7%)	$\begin{aligned} & \text{Mild} \\ & (n=218, \\ & 19.5\%) \end{aligned}$	Clinical $(n = 120, 10.8\%)$	$\chi^2$	Ь	Total (n = 1,116)
Hypertension	472 (60.7%)	140 (64.2%)	73 (60.8%)	0.92	.630	685 (61.4%)
Diabetes	181 (23.3%)	67 (30.7%)	43 (35.8%)	11.57	.003	291 (26.1%)
Arthritis	51 (6.6%)	30 (13.8%)	31 (25.8%)	46.96	<.001	112 (10.0%)
Cholesterol	275 (35.3%)	72 (33.0%)	35 (29.2%)	1.94	.380	382 (34.2%)
Osteoporosis	120 (15.4%)	32 (14.7%)	24 (20.0%)	1.88	.390	176 (15.8%)
Digestive disorders	46 (5.9%)	31 (14.2%)	19 (15.8%)	23.89	<.001	96 (8.6%)
Prostate/urinary	30 (3.9%)	3 (1.4%)	6 (5.0%)	4.01	.135	39 (3.5%)
Hyperthyroidism	48 (6.2%)	11 (5.0%)	4 (3.3%)	1.75	.416	63 (5.6%)
CVD	67 (8.6%)	26 (11.9%)	12 (10.0%)	2.25	.325	105 (9.4%)
Eye	14 (1.8%)	3 (1.4%)	1 (0.8%)	0.71	.702	18 (1.6%)
COPD	11 (1.4%)	6 (2.8%)	7 (5.8%)	10.12	900.	24 (2.2%)
Renal	11 (1.4%)	5 (2.3%)	2 (1.7%)	0.83	629.	18 (1.6%)
Cancer/other	14 (1.8%)	4 (1.8%)	5 (4.2%)	2.95	.228	23 (2.1%)

Note: Degrees of freedom (df) is 2, unless noted otherwise.

Kim et al. Page 21

Table 4

Correlates of depression using stepwise (backward) ordered logistic regression model setting the cutoff probability at p=.05

Summary Statistics	Total $(n = 1,100)$		Male $(n = 359)$		Female $(n = 741)$	
LR chi2(7)	= 131.97		= 18.61		= 99.38	
Prob > chi2	< 0.001		= 0.009		< 0.001	
Pseudo R <sup>2</sup>	= 0.074		= 0.038		= 0.077	
Variables	OR (95% CI)	d	OR (95% CI)	ъ	OR (95% CI)	Ь
Age	0.72 (0.57–0.90)	.004	0.54 (0.35–0.84)	900.		
Living alone	1.53 (1.10–2.13)	.011				
Age at immigration			1.27 (1.00–1.60)	.048		
Education level	0.80 (0.67–0.95)	.011				
Site	1.94 (1.47–2.56)	<.001			2.21 (1.65–2.98)	<.001
COPD	2.93 (1.30–6.59)	600.			2.50 (1.00–6.25)	.049
Rheumatoid	2.40 (1.60–3.61)	<.002			2.42 (1.57–3.73)	<.001
Digestive disorder	1.82 (1.18–2.81)	<.007			2.06 (1.30–3.25)	.002
Diabetes					1.51 (1.07–2.14)	.018
Cognitively impaired	1.49 (1.03–2.15)	.033	3.27 (1.69–6.33)	<.001		
/cutoff- mild	-0.94		-1.60		1.43	
/cutoff- clinical	0.50		36		2.95	

Variables removed: Number of chronic conditions; Number of prescribed medications; Saw doctor last time

Table 5

Health service utilization for depression

Indicators	Normal (n = 778, 69.7%)	$\begin{aligned} & \text{Mild} \\ & (n=218,\\ & 19.5\%) \end{aligned}$	Clinical $(n = 120, 10.8\%)$	Statistics	Ь
(a) Having seen doctor, n (%)				$\chi^2(6) = 16.22$	.013
Last 0–3 months	517 (67.6%)	517 (67.6%) 153 (70.5%)	98 (83.1%)		
Last 4–6 months	110 (14.4%)	35 (16.1%)	8 (6.8%)		
Last 7–12 months	77 (10.1%)	12 (5.5%)	5 (4.2%)		
More than year ago	61 (8.0%)	17 (7.8%)	7 (5.9%)		
(b) Having treatment for depression, n (%)	17 (2.1%)	18 (8.3%)	29 (24.2%)	$\chi^2(2) = 86.78$	<.001
(c) Thoughts of killing/hurting self, n (%)	41 (5.3%)	68 (31.2%)	72 (60.0%)	$\chi^2(2) = 273.9$	<.001
(d) Receiving treatment, n (%: d/c)	5 (12.2%)	4 (6.0%)	18 (25.0%)	$\chi^2(2) = 10.19$	900.
Receiving treatment by recruit site				$\chi^2(4)=11.94$	.018*
Senior Centers, n (%)	4 (2.3%)	5 (16.1%)	5 (31.3%)		
Churches n (%)	11 (2.0%)	8 (5.2%)	7 (10.3%)		
Medical daycare centers, n (%)	2 (4.8%)	5 (16.1%)	17 (48.6%)		

\* Fisher's exact p-value = .016