Title

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Gender Differences in the Relationship Between Diabetes-Specific Quality of Life and Depressive Symptoms in Middle-Aged and Older Korean Immigrants

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Abstract

This study examined age and gender differences in the relationship between diabetes specific quality of life (DQOL) and depressive symptoms among Korean immigrants with type 2 diabetes (DM). In this cross-sectional study, 160 Korean immigrants with DM aged between 40 and 80 years were assessed for depressive symptoms, DQOL, and related demographic, clinical, and psychosocial factors. The relationship between DQOL and depressive symptoms was stronger for men than women. Whereas there were no main effects of age or gender in predicting depressive symptoms, there was a significant three-way interaction between gender, age (middle-aged or older), and DQOL on depressive symptoms, with older men demonstrating the strongest positive association between DQOL and depression. Age and gender differences should be considered for DQOL and depressive symptoms in diabetic Korean immigrants. Efforts to address DQOL may be likely to have the greatest impact on decreasing depressive symptoms when targeting older male Korean immigrants.

Diabetes mellitus is a serious chronic illness that leads to disabling long-term complications and premature death when not managed properly (American Diabetes Association [ADA], 2013). It affects more than 25% of the U.S. adults aged   65 years, with type 2 diabetes (DM) being overwhelmingly the most prevalent type in this age group (Kirkman et al., 2012). With the aging of our total U.S. population, the number of cases of diagnosed DM in those aged   65 year will increase by 4.5 fold between 2005 and 2050 (compared to 3-fold in the general population) (Boyle, Thompson, Gregg, Barker, & Williamson, 2010).

The cornerstone of care for DM is self-care: the patient him or herself has to monitor blood glucose levels, eat a careful diet with recommended amount of food intake, engage in physical activities, and adhere to medication treatment to prevent complications while preserving a good quality of life (ADA, 2013). Daily tasks of these self-care activities can be complex, confusing, and often demanding. For people living with DM, the burden of disease management, co-morbidities, and complications has been documented to adversely affect quality of life (QOL), and studies have shown that the QOL in diabetic patients is substantially decreased as compared to individuals without diabetes (Grandy, Chapman, &

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Fox, 2008). Particularly, diabetic women tend to have poorer QOL (Misra & Lager, 2009; Nicolucci et al., 2009), and DM is independently associated with lower levels of health related QOL among older adults (Brown et al., 2004).

In addition to reduced QOL, depression is common in people with diabetes. Individuals with DM have a two-fold increased risk for depression, and the prevalence of comorbid depression is significantly higher in diabetic women than in diabetic men (Anderson, Freedland, Clouse, & Lustman, 2001). Furthermore, recent studies have shown that symptoms of depression, in the absence of clinical depression, are quite common among patients with diabetes, and elevated symptoms of depression are associated with worse self-care, increased risk of complications, and early mortality in older adults with DM (Black, Markides, & Ray, 2003; Gonzalez et al., 2007).

Evidence shows that diabetes, QOL, and depressive symptoms are closely interrelated. Many QOL instruments include measures of depressive symptoms, and many studies found an association between QOL and depressive symptoms among diabetic individuals (as well as among non-diabetic individuals), and the strength of the association was stronger when diabetes specific QOL measures were used compared to when generic and domain specific (health related) QOL were used (Schram, Baan, & Pouwer, 2009). However, most of these studies examined the effect of depressive symptoms on QOL, suggesting that depressive symptoms may precede decreases in QOL among both younger and older adults (Goldney, Phillips, Fisher, & Wilson, 2004). Reversed direction of the relationship (e.g., that a reduced QOL in individuals with DM contributes to the development of depressive symptoms) is less well examined (Schram et al., 2009).

Asian Americans are one of the fastest growing minority groups in the U.S. and Korean immigrants are the 4th largest among the subgroups (US Census Bureau, 2010). Among older Asian Americans, older Korean immigrants are second only to older Chinese immigrants, with the population of older Korean immigrants more than doubling between 2000 and 2010 (US Census Bureau, 2010). Korean immigrants suffer one of the highest prevalence rates of diabetes among Asian subgroups (California Health Interview Survey [CHIS], 2011). Particularly, the rate of diabetes among older Korean immigrants is significantly higher than that of other Asian and ethnic minority older adults (CHIS, 2011). Further, relative to older adults in other minorities, older Korean immigrants have higher rates of poor DM management (Choi, Rankin, Stewart, & Oka, 2008), lower self-rated health status (Kagawa-Singer, Hikoyeda, & Tanjasiri, 1997; Sohn, 2004), and higher rates of depression (Kim, Han, Shin, Kim, & Lee, 2005; Park & Bernstein, 2008). Despite the high prevalence of DM, poor QOL, and high rate of depression in Korean immigrant older adults, to date, the relationship between diabetes-specific QOL (DQOL) and depressive symptoms has not been investigated in this group. Further, whereas gender and age differences have been reported in diabetic individuals' QOL and depressive symptoms, to the best of our knowledge, no studies have examined how the relationship between DQOL and depressive symptoms may differ by age and gender in Korean immigrants. To address this gap in knowledge, this study had three aims: 1) assess the prevalence of depressive symptoms among middle-aged and older Korean immigrants with DM; 2) examine the relationship between DQOL, depressive symptoms and other demographic, clinical and psychosocial characteristics; and 3) determine whether the relationship between DQOL and depressive symptoms varies as a function of age and gender.

Conceptual Framework

A conceptual framework was developed to guide the current study and select variables for inclusion in our multivariate models (Figure 1). As illustrated, we hypothesized that DQOL

(shown on the left side of the figure) is associated with depressive symptoms (shown on the right side of the figure), and that this relationship is moderated by age and gender. As also illustrated on the lower left side of the figure, based on findings from other population-based studies with diverse racial/ethnic samples, we hypothesize that several other demographic, clinical, and psychosocial factors are also associated with DQOL and depressive symptoms, including education, duration of diabetes, number of comorbid conditions (Katon et al., 2004), social/family support (Li et al., 2009; Zhang, Chen, & Chen, 2008), and general health (Li et al., 2009).

Design and Methods

Study Design, Setting, and Participants

This study was a cross-sectional survey using a structured questionnaire. Participants were recruited from a health information center in a Korean community using flyers in both English and Korean. Eligible participants were Korean men and women who were: 1) diagnosed with type 2 diabetes for at least one year, 2) between the ages of 21–80, and 3) able to read and write in English or Korean. Interested persons contacted the bilingual research assistant or the lead researcher by phone, at which time they were screened for eligibility and obtained further information about the study. A total of 210 individuals were screened, and of those screened, 164 persons were determined to be eligible, and all eligible persons consented to study participation.

If a person met the above selection criteria, an appointment was arranged to meet with the research assistant at a community center for completion of the questionnaire. All measures were translated and back-translated between English and Korean by the bilingual lead author and health care professionals following methods suggested by Brislin (1970). Participants were given the option to complete the survey in their preferred language version (English or Korean) and all selected the Korean version. The questionnaire took approximately 30–40 minutes to complete, after which participants were compensated with a $10 gift certificate. This study protocol was approved by the university Institutional Review Board.

Power Analysis

The sample size for this study was estimated by examining power calculations; assuming a medium effect size ($r^2 = 0.09$) and power = 0.80, a minimum sample size of 82 was necessary to detect the significance of the unique contribution of any one of the ten independent variables in the multiple regression that was used to address Aim 2. This sample size was also found to provide adequate power to detect the significance of the interactions proposed in Aim 3.

Measurements

Dependent variable—Depression symptoms were measured by the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977). The CES-D consists of 20 symptom items tapping the major dimensions of depression specified in a wide range of standardized and validated indices of depression. Examples of the items on the CES-D include "I felt that I could not shake the blues, even with help with my family or friends," "I felt fearful," "I felt lonely," "I felt sad," and "I could not get going." For each symptom item, responses were scored on a 4-point Likert scale: 0 (never or rarely) to 3 (all the time or almost always). High scores (both item and total scores) indicate more depressive symptoms ($\alpha = 0.88$). A score of 16 or higher has been used extensively as the cut-off point for high depressive symptoms on this scale including a community sample of Korean immigrants in the US (Shin, Han, & Kim, 2007). The CES-D has been shown to be more reflective of general emotional and diabetes specific distress than clinical depression (Fisher et al., 2007).

Independent variables

Main variable: Quality of life was assessed by the Diabetes Quality of Life (DQOL), which was originally created for the Diabetes Control and Complication Trial (Jacobson, Barofsky, Cleary, & Rand, 1988), and items were culturally adapted for Chinese patients (Cheng, Tsui, Hanley, & Zinman, 1999). The Chinese-adapted scale incorporates Asian cultural values (e.g., deletion of items asking about one's sex life) and thus is more culturally appropriate in measuring DQOL in Korean immigrants than the original DQOL scale. The English version of the Chinese-adapted DQOL, which was translated into Korean for this study, is a multiple-choice assessment consisting of three primary scales: satisfaction, impact, and diabetes related worry with a total of 42 items combined into 1 overall DQOL score. Questions are posed from three perspectives: the impact generated by diabetes, patient satisfaction with him/herself living with diabetes, and worry about anticipated effects of diabetes. Responses to questions were coded from 1–5, with higher scores indicating a greater negative impact of diabetes on one's quality of life ($\alpha = 0.91$).

Other independent variables: Demographic and clinical indicators included patient age, gender, education (High School diploma equivalent or above versus less than a High School diploma), income, duration of diabetes, use of diabetes medication and insulin injections. Participants were also asked for other medications to create an indicator of co-morbid diagnosis of the respective disorder (i.e., high blood pressure, high cholesterol, depression; range 0–3). English language proficiency was measured by the four-item English language proficiency scale. This scale is based on the Interagency Language Roundtable (ILR) scale (Clark & Clifford, 1988), a set of descriptions of abilities to communicate in a language. Sample questions include "How well do you speak English?" and "How well do you understand spoken English?" Higher scores (range 4 – 20) on the scale indicate better English language proficiency ($\alpha = 0.98$). Family support was measured by the Diabetes Family Behavior Checklist-II (DFBC) (Glasgow & Toobert, 1988). The scale was developed to assess supportive and non-supportive family behaviors specific to diabetes on a five-point Likert-type scale in the following areas: medication compliance, glucose testing, exercise, and diet. Scores on the items were averaged to provide a single-item measure of family support, with higher scores indicating greater family support ($\alpha = 0.90$). General health was measured by the question, "In general, would you say your health is: Excellent, Very good, Good, Fair, or Poor?" This single item measure came from the Medical Outcomes Study 36-Item Short Form Survey (SF-36; Ware & Sherbourne, 1992) and has been shown to be a powerful predictor of later health outcomes by the developers. The variable was treated as a Likert scale, with responses weighted in intervals of 25, ranging from 0–100 (e.g., Poor = 0, Fair = 25) to provide more easily interpretable mean and regression coefficients. All measures have been used in previous studies with various ethnicities including Korean/Asian immigrant populations.

Data Analyses

Though participants were eligible as young as 21, the youngest participant was aged 40 years. Age was dichotomized to represent middle-aged (40–64) and older age (65–80) for all the analyses conducted in this study. Differences in the proportion of those meeting the clinical cutoff for high depressive symptoms in middle-aged (<65) and older (65–80) Korean immigrants with DM were examined with chi-square and *t*-tests respectively (Aim 1). To examine the relationship between DQOL and depressive symptoms (Aim 2), first, bivariate associations were conducted separately for both age groups. To adjust for potential confounding effects of other selected variables, we conducted a hierarchical linear regression with three levels. The first level included important demographic control characteristics (gender, age, education, English proficiency) and clinical variables (years with diabetes, comorbidities, and insulin use). At the second level, psychosocial predictors

were entered (general health, DQOL, and DFBC mean). To determine whether the relationship between DQOL and depressive symptoms varied as a function of age or gender (Aim 3), separate product-term interactions were added to the third level. In addition, to assess whether gender and age jointly influenced the relationship between DQOL and CES-D (also Aim 3), a three-way gender*age*DQOL interaction was added to the model. All continuous variables were mean-centered for interaction analyses. The significance tests were two-tailed with $\alpha = 0.05$.

Results

Sample Characteristics

In total, 160 participants completed all items of the survey ($n_{male} = 74$, $n_{female} = 86$). Overall, the majority of sample participants (66%) had low incomes, earning less than $20,000 per year. The majority of the sample (93%) was on an oral medication for diabetes and 23% were using insulin. Regarding other medications, 73% were on blood pressure medication, and 59% were on cholesterol medication. Seven participants (4%) had a prescription for an antidepressant, though this was not associated with scores on the CES-D. As can be seen in Table 1, participants on average had been diagnosed with diabetes for more than a decade. Overall, 58% of sample reported their health status as poor or fair, with middle-aged and older adults reporting similar proportions (61% and 59% respectively). The sample had fairly high levels of depressive symptoms, with 56% (middle-aged = 54%, older = 56%) of the sample above the typical clinical cutoff of 16 (Aim1). Relative to middle-aged individuals, older individuals were less likely to have a high school diploma [$t(158) = 2.59$, $p = .011$], reported lower English proficiency [$t(158) = 2.92$, $p = .004$], had lived more years with diabetes [$t(158) = -2.61$, $p = .010$], and had more comorbidities [$t(158) = -2.54$, $p = .012$]. Men and women did not differ in the degree to which diabetes impacted their quality of life [$M_{male} = 2.33$, $M_{female} = 2.37$; $t(158) = 0.58$, $p = .566$]. The only significant differences between men and women were that men reported higher English proficiency [$t(162) = -3.19$, $p = .002$] and were more likely to have a high school diploma [$t(162) = -3.92$, $p < .001$].

Correlations Between Depressive Symptoms, DQOL and other Variables

Bivariate associations between CES-D depression and the independent variables showed several significant correlations (Table 2). Among middle-aged adults, higher levels of depression were associated with worse general health and greater diabetes related impact on QOL. Among older adults, higher levels of depression were associated with not having a high school diploma, having a lower English Proficiency, more years with diabetes, the use of insulin, worse general health, greater negative impact of DM on QOL, and lower mean levels of family support as measured by Diabetes Family Behavior Checklist II (DFBC) (Aim 2).

Multiple Regression and Interactions

Models 1 and 2 in Table 3 show the results of the hierarchical linear regression predicting depression symptom levels. Model 1 shows that after adjusting for other selected variables, there was no association between depressive symptoms levels and gender, age (dichotomized: middle-aged vs. older adults), education, English proficiency, years with diabetes, number of comorbidities, or insulin use. Model 2 shows that adjusting for demographic and clinical variables, higher levels of depression were associated with lower general health, greater DQOL, and marginally lower levels of DFBC ($p = .052$). The examination of two-way interactions revealed one significant moderator: gender (Model 3). The association between DQOL and CES-D was stronger for men compared to women. Model 4 represents the full conceptual framework, explains the greatest amount of variance

(adjusted R-squared = 0.25) and illustrates a significant three-way interaction between gender, age, and DQOL (Aim 3). The interaction between gender and DQOL predicting depression is strongest among men aged 65 years and older (Figure 2).

Discussion

This study reifies the need to examine depressive symptoms among Korean immigrants with DM. Depressive symptoms are prevalent in both middle-aged and older Korean immigrants with DM and DQOL is associated with depressive symptoms in both age groups. The study also shows that the connection between DQOL and depressive symptoms is strongest among older men (65–80), relative to women or middle-aged men.

The proportion of patients with clinically significant depressive symptoms (CES-D 16 or above) in our study is notably higher than what has been found in previous studies with multiethnic middle-aged (48–55) individuals with DM (17.2%–31.6%) (Fisher, Chesla, Mullan, Skaff, & Kanter, 2001; Fisher et al., 2007) and multiethnic older adults (65–80) with DM (16%) (Bell et al., 2005). One possible reason for the high prevalence of clinically significant depressive symptoms in our sample of Korean immigrants with diabetes is that diabetes care and self-management, which is costly and complex, may place an added strain on Korean immigrants with DM. Korean immigrants (regardless of diabetes status) are already reported to have higher rates of depression than Caucasian and other Asian immigrant populations due to limited resources and socio-cultural barriers (Kim et al., 2005; Park & Bernstein, 2008; Shin et al., 2007). The limited resources and socio-cultural barriers of our sample are worth noting, with 66% earning less than $20,000/year and a low overall English language proficiency level. Consistent with previous studies of Korean immigrants (Choi et al., 2008; Kagawa-Singer et al., 1997; Sohn 2004), more than half (58%) of the current study sample indicated their general health status as poor or fair, which may have potentially contributed to the burden of diabetes care and higher rate of depressive symptoms.

Regarding the relationship between DQOL and depressive symptoms, we found that, accounting other related factors, a lower DQOL is associated with more depressive symptoms. This finding is consistent with previous studies and systematic reviews that showed a negative association between depressive symptoms and overall QOL in ethnically diverse groups of people with DM (Ali et al., 2010; Liu et al., 2012; Nicolau, Rivera, Frances, Chacartegui, & Masmiquel, 2013; Schram et al., 2009). Other factors identified in this study have also been shown to be related to depressive symptoms in multiethnic older adults with DM (Bell et al., 2005; Katon et al., 2004), and are likely to be potential risk factors for depressive symptoms in older Korean immigrants with DM as well. Particularly, English proficiency has been found to be a significant predictor of depressive symptoms in Korean immigrant adults and elders in the community (Bernstein, Park, Shin, Cho, & Park, 2011; Lee & Yoon, 2011).

In terms of moderating effects of age and gender, older men had the strongest association between DQOL and depressive symptoms, and older women had weakest association. Most previous studies that examined the moderating effects of age and gender on depressive symptoms examined each moderator separately. Until now, little information was available on the relationship between QOL and depressive symptoms by both age and gender. Previous studies have suggested that relative to older men, older women have greater DM burden, poorer health related QOL (Misra & Lager, 2009; Nicolucci et al., 2009), and higher rates of depressive symptoms (Katon et al., 2004; Szalat & Raz, 2008). Based on these previous studies, one may expect that the relationship between DQOL and depressive symptoms would be strongest among older women. However, this study found that DQOL

shows the strongest association with depressive symptoms in older men and that men and women did not differ in depressive symptoms or the amount to which diabetes affected their QOL. Our study also revealed that, within each gender, the strength of the association between DQOL and depressive symptoms varied across age. In men, the strength of the association among older men was modestly stronger than that among middle-aged men. In women, whereas the strength of the relationship among middle-aged women was similar to that in middle- aged and older men, older women appeared to have no association between DQOL and depressive symptoms.

The cultural makeup of our sample may help to explain the observed interrelationship between age, gender, and DQOL on depressive symptoms. Among older Korean immigrant women, DQOL may not be as strongly correlated with depressive symptoms because, as the traditional care provider within the family, older Korean women may feel that self-care is tied closely with normal role function and therefore the added burden of having diabetes does not feel as burdensome and lead to depression. In other words, older Korean women may be less affected by the burden of DM on their quality of life. However, as is expected in traditional Korean culture, older Korean men may have relied on their spouses or other family members for their health care when they were younger (e.g. diet management), and now they may not be adequately prepared to manage their DM in older age when men may need to be more self-reliant (i.e., their spouse or adult children may no longer be able to tend to them). Studies report that many older Korean immigrants live alone or only with their spouses (Lee & Yoon, 2011; Wong, Yoo, & Stewart, 2005). If these older men have not developed adequate self-care skills, the burden of DM may have a greater impact on their depressive symptoms. Second, QOL is a multidimensional construct and the depressive symptoms of older Korean women may be tied more directly with other domains of QOL (e.g., finance, social network) than diabetes- specific QOL. Further investigation would be needed to identify why this gender gap in the relationship between DQOL and depressive symptoms is present among older adults. Future studies should examine multiple domains of QOL (general and disease specific) in diabetic older Korean immigrants to understand which domain of QOL matters the most in each gender for depressive symptoms.

Limitations and Strengths

Our study has several limitations. First, as a cross-sectional study, we are only able to identify associations but cannot establish causality. A longitudinal study would be needed to examine the directionality of the relationship between DQOL and depressive symptoms found in this study. Second, our relatively small sample size, especially when split by age group, may have limited our ability to identify certain associations. Second, we selected primary demographic, clinical and psychosocial covariates of DQOL and depression for inclusion in this study using the conceptual model we created based on previous literature findings; however, there are multiple potential confounding variables that were not controlled for in this study (e.g., level of glucose control, level of social support, physical activity levels). Third, with mean age of 56 years, our middle-aged group may have been considered as older adults in some previous studies (Ali et al., 2010; Goldney et al, 2004). Until the results can be replicated, the novel nature of the findings necessitates caution in the interpretation of the age and gender differences in the relationship between DQOL and depressive symptoms. Fourth, older age groups are included in a single category (65–80). Although consideration was given to a greater number of groups within the (65–80) category (e.g., 'young-old' and 'old-old' groups), this was not possible due to the small sample sizes.

Our study has several strengths as well. We treated CES-D scores as a continuous variable. Therefore, the findings in this paper may generalize to diabetic Koreans with all levels of depressive symptoms, rather than only individuals in certain categories of depressive symptoms (e.g., mild, moderate, severe). Study participants came from a community setting,

increasing generalizability of the study findings within the Korean immigrant population. We also measured DQOL, which allowed us to interpret our findings in the context of diabetes and to attribute results to the impact of diabetes with more confidence. In addition, our estimation of the level of depressive symptoms in a sample of Korean immigrants with DM generated population specific knowledge for this understudied, high risk Asian subgroup. Lastly, because we examined age and gender together in this study, we were able to find the overlapping effect of the two important modifiers simultaneously in the relationship between DQOL and depressive symptoms.

Conclusion

The results of this study highlight significant age and gender differences in DQOL and depressive symptoms among Korean immigrants with DM that researchers and health care providers may need to consider in developing tailored interventions for depressive symptoms in a culturally appropriate manner for this ethnic group. Older Korean immigrant men with lower DQOL may be particularly vulnerable to depressive symptoms compared to women and middle-aged men with DM. Efforts to address DQOL may be likely to have the greatest impact decreasing depressive symptoms when targeting older male Korean immigrants.

Acknowledgments

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Independent variables:

Moderators:

Dependent variable:

Main Independent Variable:
- Diabetes related quality of life

- Age
- Gender

Covariates:
Demographic factors:
- Education
- English proficiency
Clinical factors:
- Duration of diabetes
- Co-morbidities
- Insulin use
Psychosocial factors:
- General health
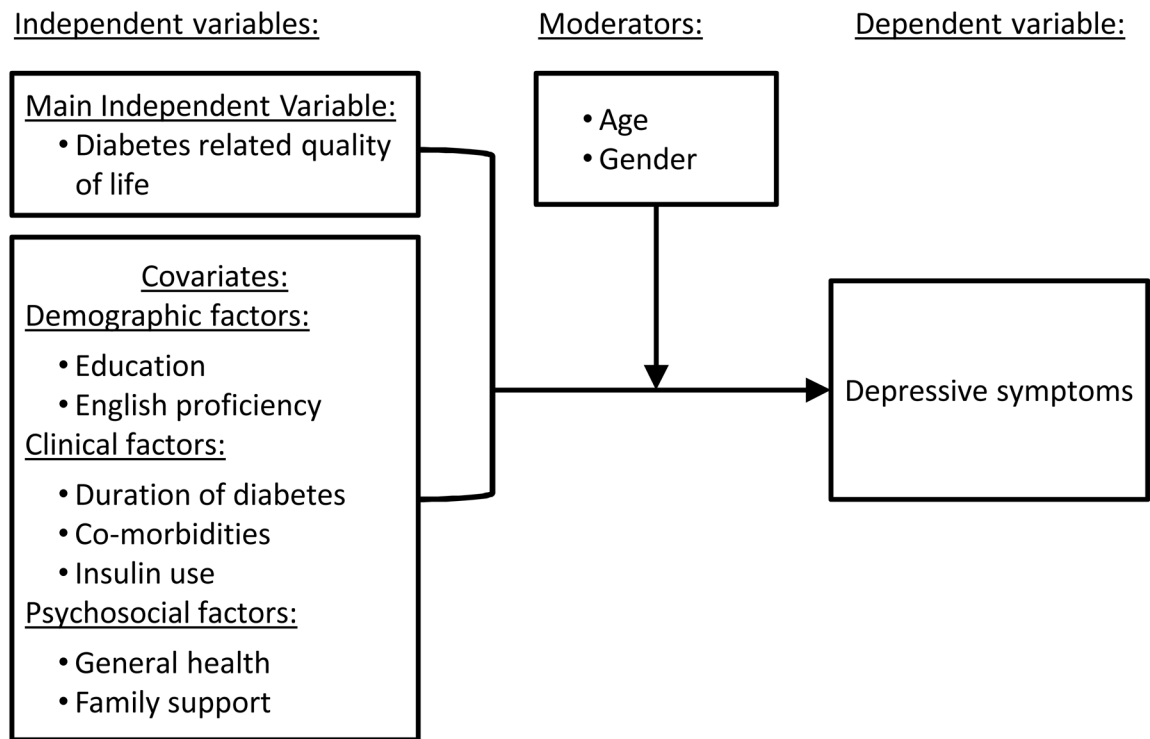- Family support

Depressive symptoms

Figure 1.
Conceptual framework illustrating hypothesized relationship between diabetes related quality of life and depressive symptoms, moderated by age and gender, and including demographic, clinical, and psychological factors.
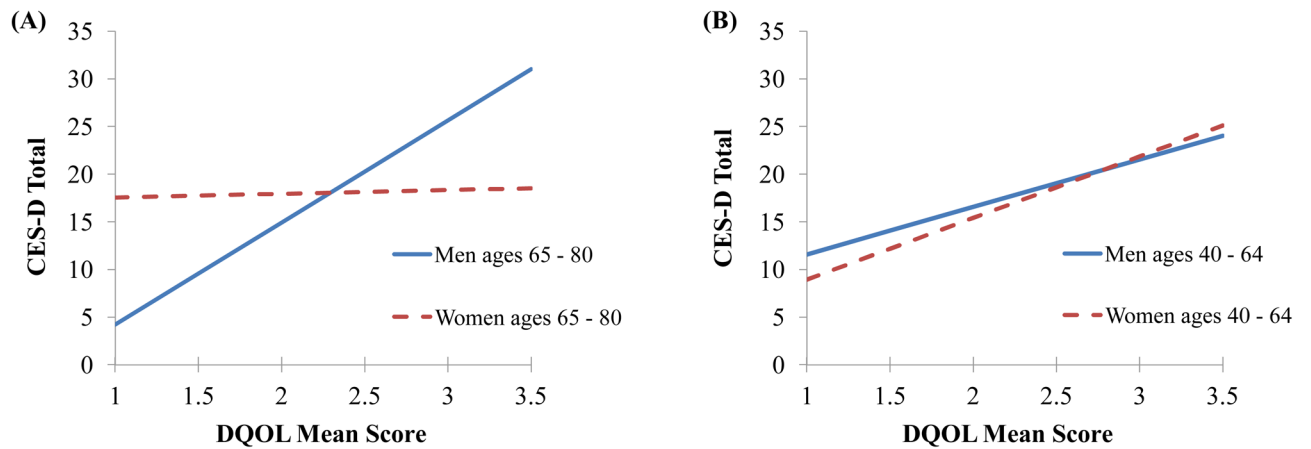
(A)

(B)

Figure 2.
Relationship between Depression and DQOL moderated by gender separately for older (age 65 – 80 years) (A) and middle-aged (40 – 64 years) (B) Korean Immigrants with Type 2 Diabetes. CES-D = Center for Epidemiologic Studies Depression Scale. DQOL = Diabetes Quality of Life. Estimates presented are adjusted for gender, age, education, English proficiency, years with diabetes, number of comorbidities, use of insulin, general health, and family support.

Table 1

Characteristics of Total Sample, Middle-Aged and Older Adults

	Overall M (SD) (n = 160)	Middle-Aged M (SD) (n = 48)	Older M (SD) (n = 112)	95% C.I.
Demographic Variables				
Male[a]	0.46 (0.50)	0.44 (0.50)	0.47 (0.50)	[−0.21, 0.14]
Age in Years	68.23 (9.34)	56.17 (5.85)	73.39 (4.55) ***	[−18.92, −15.53]
High School Diploma[a]	0.51 (0.50)	0.67 (0.48)	0.45 (0.50) *	[0.05, 0.39]
English Proficiency	8.23 (3.81)	9.54 (3.91)	7.67 (3.63) **	[0.61, 3.14]
Clinical Variables				
Years with Diabetes	10.85 (9.93)	7.77 (6.21)	12.17 (10.91) **	[−7.72, −1.07]
Comorbidities	1.17 (0.91)	0.90 (0.88)	1.29 (0.89) *	[−0.69, −0.09]
Insulin Use[a]	0.23 (0.42)	0.21 (0.41)	0.24 (0.43)	[−0.18, 0.11]
Psychosocial Variables				
General Health	35.31 (25.60)	34.90 (23.49)	35.49 (26.56)	[−9.35, 8.16]
DQOL[b]	2.35 (0.53)	2.31 (0.51)	2.37 (0.54)	[−0.24, 0.12]
DFBC mean	2.97 (0.38)	2.97 (0.28)	2.97 (0.42)	[−0.13, 0.13]
CES-D	18.55 (10.44)	17.02 (9.82)	19.21 (10.67)	[−5.74, 1.37]

Note. Significance tests represent differences between Middle-Aged (40–64) and Older (65–80) adults. Comorbidities represent the number of comorbid disorders as indicated via prescription for medication (high blood pressure, high cholesterol, or depression). General Health ranges from 0 – 100. DFBC = Diabetes Family Behavior Checklist. DQOL = Diabetes Quality of Life. CES-D = Center for Epidemiologic Studies Depression Scale. CI = Confidence interval of the mean difference.

[a]Values represent proportions.

[b]High scores denote lower diabetes quality of life.

*
 p < .05.

**
 p < .01.

***
 p < .001.

Table 2

Pairwise Correlations with CES-D: Middle-Aged and Older Korean Immigrants with Type 2 Diabetes

	Middle-Aged		Older	
	r (CES-D)	*p*-value	*r (CES-D)*	*p*-value
Demographic Variables				
Male[a]	.015	.917	−.055	.562
Age	.070	.635	.153	.108
Education[a]	.147	.319	−.225	.017
English Proficiency	.010	.948	−.249	.008
Clinical Variables				
Years with Diabetes	.052	.724	.214	.023
Comorbidities	.025	.867	.090	.345
Insulin Use[a]	.073	.623	.270	.004
Psychosocial Variables				
General Health	−.444	.002	−.381	< .001
DQOL[b]	.416	.003	.438	< .001
DFBC mean	−.014	.927	−.186	.050

Note. CES-D = Center for Epidemiologic Studies Depression Scale. Middle-Aged adults: 40–64 years old. Older adults: 65–80 years old. Education was categorized as follows: 0 = Less than a High School Diploma, 1 = High School Diploma. Comorbidities represents the number of comorbid disorders as indicated via prescription for medication (high blood pressure, high cholesterol, or depression). General Health ranges from 0 – 100. DFBC = Diabetes Family Behavior Checklist. DQOL = Diabetes Quality of Life.

[a] Dichotomous variables.

[b] High scores denote lower diabetes quality of life.

Table 3

Hierarchical Regression Models Predicting Depressive Symptoms

	Model 1 b (SE)	Model 2 b (SE)	Model 3 b (SE)	Model 4 b (SE)
Demographic Variables				
Male	0.10 (1.72)	0.60 (1.55)	0.49 (1.54)	0.71 (2.74)
Age	0.49 (1.91)	0.76 (1.73)	1.18 (1.72)	0.99 (2.29)
Education	−0.50 (2.03)	−1.35 (1.85)	−1.53 (1.83)	−2.07 (1.86)
English Proficiency	−0.33 (0.27)	−0.07 (0.25)	0.01 (0.25)	−0.02 (0.24)
Clinical Variables				
Years with Diabetes	0.12 (0.09)	0.06 (0.09)	0.04 (0.09)	0.05 (0.09)
Comorbidities	0.86 (0.92)	0.98 (0.84)	0.94 (0.83)	0.96 (0.84)
Insulin Use	3.14 (2.24)	0.85 (2.16)	1.25 (2.14)	1.66 (2.14)
Psychosocial Variables				
General Health		−0.09 (0.03) [*]	−0.08 (0.03) [*]	−0.08 (0.03) [*]
DQOL[a]		5.56 (1.72) [**]	2.89 (2.12)	8.77 (3.83) [*]
DFBC mean		−3.85 (1.96) [†]	−4.54 (1.97) [*]	−4.94 (1.96) [*]
Interactions				
Male * DQOL			5.95 (2.83) [*]	−4.32 (5.35)
Elderly * DQOL				−8.28 (4.49)
Male * Age				−0.30 (3.27)
Male * Age * DQOL				14.19 (6.29) [*]
R^2	0.08	0.27	0.29	0.32
Adjusted R^2	0.04	0.22	0.24	0.25

Note. Age was coded as: 0 = 40–64 years old, 1 = 65 – 80 years old. Education was coded as: 0 = Less than a High School Diploma, 1 = High School Diploma. Comorbidities represents the number of comorbid disorders as indicated via prescription for medication (high blood pressure, high cholesterol, or depression). General Health ranges from 0 – 100. DFBC = Diabetes Family Behavior Checklist. DQOL = Diabetes Quality of Life.

[a] High scores denote lower diabetes quality of life.

[†] $p = .052$.

[*] $p < .05$.

[**] $p < .01$.