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The Comorbid Influence of High Depressive Symptoms and Diabetes on Mortality and Disability in Mexican Americans Aged 75 and Above

Brian Downer, PhD[1], Sunshine Rote, PhD[2], Kyriakos S. Markides, PhD[1], and Soham Al Snih, MD, PhD[1]

Abstract

Objective: To examine the individual and combined effects of depression and diabetes on mortality and disability over 6 years among Mexican Americans aged ≥75. **Method:** The final sample included 1,785 participants from the Hispanic Established Population for the Epidemiological Study of the Elderly. Cox proportional hazards regression models were used to estimate the hazard ratios for incidence for mortality and disability according to diabetes and depressive symptoms. **Results:** Diabetics were more likely to become activities of daily living (ADL) disabled Hazard Ratio (HR) = 1.44, 95% confidence interval [CI] = [1.18, 1.77]) and deceased (HR = 1.47, 95% CI = [1.24, 1.74]) compared with non-diabetics. Diabetics reporting high depressive symptomatology were more than two times as likely to become ADL disabled and deceased compared with diabetics not reporting high depressive symptoms. Participants with high depressive symptoms and taking insulin alone or both oral medications and insulin were at the greatest risk of disability (HR = 3.83, 95% CI = [1.66, 8.81]). **Conclusion:** Diabetes increases the risk of disability and mortality, especially among Mexican Americans with high depressive symptoms or who are taking insulin alone or both oral medications and insulin. Interventions that are able to reduce the prevalence of depression and diabetes are needed to limit the future burden of disability and mortality in this population.

Keywords
diabetes, disability, mortality, mental health

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Introduction

Research in community and clinical settings has shown that people with diabetes are more likely than people without diabetes to experience high depressive symptomatology and high rates of clinical depression (Chau et al., 2011; Nouwen et al., 2010). Factors that may contribute to the observed association between diabetes and depression include lack of social support (Oddone, Hybels, McQuoid, & Steffens, 2011), physical inactivity (Mammen & Faulkner, 2013), and certain inflammatory factors (Baune et al., 2012). Moreover, older adults with comorbid depression and diabetes are at high risk of disability and premature mortality (Katon et al., 2008; Park, Katon, & Wolf, 2013). Depression can contribute to poor management of diabetes in terms of medication adherence, glycemic control, and dietary restrictions (Egede, 2005; Katon et al., 2009; Pouwer, Nefs, & Nouwen, 2013). This leads to higher risk of complications from diabetes including disability (Williams et al., 2010), blindness (Lin et al., 2010), and limb amputations (Williams et al., 2011). The result is often higher mortality among diabetics with comorbid depression from heart disease (Egede, Nietert, & Zheng, 2005; Skala, Freedland, & Carney, 2006; van Dooren et al., 2013).

Previous research has shown that people of Mexican origin are at high risk of depression (Dunlop, Song, Lyons, Manheim, & Chang, 2003; Kim, Chiriboga, & Jang, 2009) and diabetes (Centers for Disease Control and Prevention, 2014). It also appears that the already high rates of diabetes and disability in older Mexican Americans at age 75 and above have increased in recent years (Beard, AlGhatrif, Samper-Ternent, Gerst, & Markides, 2009; Markides & Gerst, 2011). We have

[1]University of Texas Medical Branch, Galveston,TX, USA
[2]University of Louisville, KY, USA

Corresponding Author:
Brian Downer, Division of Rehabilitation Sciences, School of Health Professions, University of Texas Medical Branch. 301 University Blvd., Galveston TX 77555-0177, USA.
Email: brdowner@utmb.edu

shown synergistic effects of diabetes and depressive symptomatology on both disability and mortality in Mexican Americans aged 65 and above using data from the Hispanic Established Population for the Epidemiological Study of the Elderly (EPESE; Black, Markides, & Ray, 2003). In the present study, we revisit this hypothesis with Mexican Americans aged 75 and above because of the rising life expectancy among Mexican Americans in recent years (Arias, 2010).

We have also shown that there has been a significant increase in the prevalence of both diabetes and functional disability in Mexican Americans aged 75 and above from the baseline Wave of the Hispanic EPESE in 1993-1994 to 2004-2005 when a new cohort of participants aged 75 and above was added (Beard et al., 2009; Markides & Gerst, 2011). Therefore, we revisit the hypothesis that depression and diabetes contribute to increased risk of disability and mortality and focus on Mexican Americans aged 75 and above. In addition, diabetes severity and treatment are also considered to understand whether the effects of diabetes and depression on disability and mortality are strongest for those who have lived with diabetes for the longest amount of time or with the most severe symptoms. Given the substantial increase in the prevalence of diabetes in recent years among older Mexican Americans aged 75 and above from approximately 20% to 37% (Beard et al., 2009), it is important to revisit the influence of high depressive symptomatology on health outcomes of diabetes during a 6-year period from 2004-2005 to 2010-2011. In the present study, we examined the independent as well as the potential comorbid effects of high depressive symptomatology and diabetes, as well as the effects of diabetes duration and treatment on all cause mortality and functional disability.

Method

Selection and Description of Participants

Data used are from the Hispanic EPESE, which is an ongoing epidemiological study of older Mexican Americans residing in five southwestern states: Texas, New Mexico, Colorado, Arizona, and California. A representative sample of 3,050 Mexican Americans aged 65 and above were interviewed in 1993-1994. By Wave 5 in 2004-2005 (hereafter referred to as baseline), there were 1,167 surviving participants from the original cohort who were then aged 75 and above. A new cohort of 902 participants aged 75 and above was drawn from the same region using similar sampling procedures yielding a combined cohort of 2,069 participants (see more details in Beard et al., 2009). The combined cohort was followed up in 2007 approximately 2.5 years later and again 6 years later in 2010-2011. The Hispanic EPESE has received ethical approval by the University of Texas Medical Branch Institutional Review Board.

Participants with complete data for gender, educational attainment, diabetes, depressive symptoms, hypertension, cancer, arthritis, heart attack, stroke, hip fracture, Mini Mental State Examination (MMSE), activities of daily living (ADLs), smoking, and marital status were used in the analysis. The final analytic sample consisted of 1,785 participants. The 282 participants who were excluded from the final sample were significantly older, reported having completed fewer years of education, had lower cognitive functioning, were less likely to have been born in the United States, to have hypertension, and were more likely to have experienced a stroke and to have had a hip fracture compared with participants included in the final analytic sample (all ps $< .05$).

Measures

Diabetes was assessed by asking the respondent whether a doctor had ever told them that they had diabetes. Participants who reported having been diagnosed with diabetes were also asked their age at the time of diagnosis and whether they were following a specific diet, were taking any oral medications, or were using insulin to treat their diabetes. Depressive symptoms were measured by the Center for Epidemiologic Studies Depression (CES-D) scale (Radloff, 1977). This measure consists of 20 items asking how often a respondent experienced specific symptoms during the past week. Potential scores on the CES-D range from 0 to 60 with a higher score reflecting greater depressive symptoms. A score of 16 or higher was used to indicate a clinically significant level of depressive symptomatology. Disability was assessed with seven ADLs from the modified Katz scale (Branch, Katz, Kniepmann, & Papsidero, 1984; Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963): walking across a small room, transferring from a bed to a chair, bathing, grooming, dressing, eating, and using the toilet. Participants were asked whether they needed help or were unable to perform each task. Participants needing help or unable to perform one or more tasks were considered ADL disabled.

Comorbid conditions were assessed by a series of questions asking respondents whether a doctor had ever told them they had arthritis, hypertension, a heart attack, stroke, hip fracture, or cancer. Hypertension was assessed both by self-report and by actual measurement. Participants were considered hypertensive if they met one or more of the following criteria (Al Ghatrif et al., 2011; Cutler et al., 2008): (a) They reported that they had been told by a doctor they had hypertension or high blood pressure, (b) were taking antihypertensive medications based on inspection of the medications they were taking during the 2 weeks prior to the interview, or (c) had an average measured systolic blood pressure of 140 mmHg or higher or had an average measured diastolic blood pressure of 90 mmHg or higher. Cognitive functioning was assessed using the MMSE (Folstein, Folstein, & McHugh, 1975). Scores on the MMSE range

Table 1. Baseline Characteristics of Older Mexican American Adults According to Mortality Status at the Third Observation (n = 1,785).

Characteristics	Mortality status			
	Remained non-disabled (n = 417)	Became disabled (n = 512)	Dead (n = 608)	Lost to follow-up (n = 248)
Age, *M* (*SD*)**	79.5 (3.3)	81.4 (4.3)	83.3 (5.5)	81.2 (5.2)
Education, *M* (*SD*)**	5.8 (4.2)	4.4 (3.8)	5.0 (3.9)	4.9 (4.3)
Female, *n* (%)**	238 (21.8)	366 (33.5)	339 (31.0)	149 (13.6)
U.S. born, *n* (%)*	238 (23.4)	273 (26.9)	372 (36.7)	132 (13.0)
Marital status, *n* (%)*				
Married	218 (28.2)	215 (22.1)	253 (32.7)	88 (11.4)
Not married	34 (18.3)	56 (30.1)	68 (36.6)	28 (15.1)
Widowed	165 (20.0)	241 (29.2)	287 (34.8)	132 (16.0)
Diabetes**	116 (19.5)	168 (28.3)	240 (40.4)	70 (11.8)
Depression**	43 (12.9)	100 (29.9)	147 (44.0)	44 (13.2)
Arthritis**	215 (20.1)	351 (32.8)	376 (35.2)	127 (11.9)
Hypertension	295 (23.5)	360 (28.6)	424 (33.7)	178 (14.2)
Heart attack**	21 (13.8)	39 (25.7)	72 (47.4)	20 (13.2)
Stroke**	29 (12.8)	66 (29.1)	109 (48.0)	23 (10.1)
Hip fracture	16 (14.0)	32 (28.1)	47 (41.2)	19 (16.7)
Cancer	25 (19.7)	32 (25.2)	52 (40.9)	18 (14.2)
MMSE score, mean (*SD*)**	24.1 (4.6)	22.0 (5.7)	19.4 (7.1)	22.0 (5.8)

Note. Percentages represent row totals. MMSE = Mini Mental State Examination.
*p < .05. **p < .01.

from 0 to 30, with higher scores indicating better cognitive ability.

Sociodemographic covariates included in the analysis were age (in years), years of education, gender, marital status (married, not married, widowed), and nativity (U.S. born or Mexican born).

Statistical Analysis

Chi-square and analysis of variance were used to examine the distribution of covariates and health conditions for participants based on disability, mortality, and loss to follow-up status. In our multivariate models, we used Cox proportional hazard regression to estimate the hazard ratio of incidence of disability and mortality as a function of depressive symptoms and diabetes. Model 1 shows the direct effects of depressive symptoms and diabetes separately for disability and mortality. In Model 2, we add interactions of diabetes and depressive symptoms. The analysis predicting the incidence of ADL disability included persons who were non-disabled at baseline (n = 1,269). All analyses controlled for age, years of education, gender, marital status, nativity, arthritis, hypertension, a heart attack, stroke, hip fracture, and cancer. In addition, we controlled for ADL disability status in the mortality analyses.

Results

Table 1 presents the descriptive baseline characteristics of the sample by follow-up status 6 years later. The final sample included 1,785 participants, the majority of which were female (n = 1,092). A total of 608 participants were deceased during the study period, followed by those who became ADL disabled (n = 512), remained non-disabled (n = 417), and those who were lost to follow-up or refused to be interviewed (n = 248). Participants who became ADL disabled or who died during the follow-up period were significantly older and had fewer years of formal education compared with participants who did not become ADL disabled (p < .05). In addition, participants who became ADL disabled were more likely to be female, and to have high depressive symptoms compared with participants who did not become ADL disabled (p < .05). Participants who became ADL disabled or who died were more likely to have diabetes, to be depressed, to have arthritis, to have experienced a stroke, to be unmarried, and to have lower average MMSE scores compared with participants who remained non-disabled. Participants who died were also more likely to have experienced a stroke.

Table 2 shows the Cox proportional models predicting the hazard ratios for disability and mortality as a function of diabetes and depressive symptoms, holding constant the covariates (age, education, sex, marital status, and nativity) and other health conditions (arthritis, hypertension, heart attack, stroke, hip fracture, and cancer). Model 1 for disability indicates that the hazard for becoming ADL disabled is higher for diabetic older adults than those without diabetes. Similarly, older adults with diabetes were more likely to die over time than those without diabetes (Model 1 mortality). Depressive symptoms were not significantly related to increased risk of ADL disability (Model 1 disability) or

Table 2. Cox Proportional Hazard Models Predicting Disability and Mortality as a Function of Diabetes and Depression Status.

	Disability (n = 1,269)		Mortality (n = 1,785)	
	Model 1	Model 2	Model 1	Model 2
	Hazard ratio (95% CI)		Hazard ratio (95% CI)	
Diabetes	*1.44 [1.18, 1.77]	*1.28 [1.03, 1.60]	*1.47 [1.24, 1.74]	*1.23 [1.01, 1.50]
Depression	1.10 [0.83, 1.45]	0.80 [0.55, 1.16]	1.19 [0.98, 1.45]	0.87 [0.67, 1.14]
Diabetes and depression	—	*2.26 [1.31, 3.90]	—	*2.06 [1.40, 3.01]
Age	*1.07 [1.04, 1.09]	*1.07 [1.04, 1.09]	*1.08 [1.06, 1.09]	*1.08 [1.06, 1.10]
Education	*0.97 [0.94, 0.99]	*0.97 [0.94, 0.99]	*1.05 [1.03, 1.07]	*1.05 [1.03, 1.08]
Female	*1.40 [1.13, 1.73]	*1.41 [1.13, 1.75]	*0.61 [0.51, 0.74]	0.62 [0.51, 0.74]
Married	0.88 [0.63, 1.21]	0.90 [0.65, 1.25]	*0.76 [0.57, 0.99]	*0.75 [0.57, 0.99]
Widowed	0.85 [0.61, 1.17]	0.86 [0.62, 1.19]	0.83 [0.63, 1.08]	0.82 [0.63, 1.07]
U.S. born	1.13 [0.93, 1.38]	1.12 [0.92, 1.37]	*1.36 [1.13, 1.61]	*1.33 [1.12, 1.58]
Arthritis	*1.46 [1.20, 1.78]	*1.47 [1.20, 1.79]	0.98 [0.83, 1.17]	0.99 [0.84, 1.18]
Hypertension	0.90 [0.73, 1.11]	0.91 [0.73, 1.12]	0.98 [0.82, 1.17]	1.00 [0.83, 1.19]
Heart attack	1.06 [0.74, 1.52]	1.05 [0.73, 1.52]	1.24 [0.96, 1.61]	1.26 [0.98, 1.63]
Stroke	1.26 [0.94, 1.70]	1.26 [0.94, 1.69]	*1.29 [1.04, 1.61]	*1.27 [1.02, 1.58]
Hip fracture	1.49 [1.00, 2.22]	*1.53 [1.03, 2.29]	1.01 [0.75, 1.37]	0.98 [0.73, 1.33]
Cancer	1.28 [0.88, 1.88]	1.26 [0.86, 1.85]	1.11 [0.84, 1.48]	1.08 [0.81, 1.44]
MMSE score	*0.97 [0.95, 0.99]	*0.97 [0.95, 0.99]	*0.95 [0.94, 0.96]	*0.95 [0.94, 0.96]
Disability	—	—	*1.84 [1.54, 2.21]	*1.89 [1.57, 2.26]

Note. Model 1 included all covariates in table. Model 2 included an interaction term between diabetes and depression. Models for disability excluded participants who were unable to independently perform one or more ADLs at baseline. CI = confidence interval; MMSE = Mini Mental State Examination; ADL = activities of daily living.
*$p < .05$.

mortality (Model 1 mortality). Compared with male participants, females were significantly more likely to become ADL disabled but were at a decreased risk of death. We did not detect a significant interaction between gender and diabetes or between gender and high depressive symptoms on the risk of ADL disability and death.

We included an interaction term of high depressive symptomatology and diabetes in the analysis to examine whether there was a synergistic effect of the two conditions on disability and mortality (Model 2). Table 2 shows that with all the main effects in the equation the interaction term was a significant predictor of both disability and mortality. We find that having co-occurring diabetes and high depressive symptoms is significantly associated with a greater risk of becoming ADL disabled than not having both conditions. For the mortality analysis, our results suggest that diabetics reporting high depressive symptomatology were more than twice as likely to die than diabetics not reporting high depressive symptomatology controlling for all other covariates. The findings also indicate that ADL disability is more likely to occur with advancing age, among females, those with arthritis, hip fracture, and having lower MMSE scores. Other significant predictors of mortality include being older, having fewer years of education, being male, not being married, being born in the United States, having experienced a stroke, having lower MMSE scores, and ADL disability.

Cox proportional models were also used to examine the effect that the duration of diabetes and diabetes treatment had on the risk of ADL disability and mortality (Table 3). The risk of ADL disability (Model 1 disability) and mortality (Model 1 mortality) did not increase according to the number of years since diabetes diagnosis (<10 years or ≥10 years) compared with participants who did not have diabetes. The risk of ADL disability was greatest for participants with high depressive symptoms and who had been living with diabetes for less than 10 years (Model 2 disability), but this was not significantly greater compared with participants with high depressive symptoms and who had been living with diabetes with 10 years or more. Moreover, there were no substantial differences in the risk of mortality between participants with high depressive symptoms and diabetes for less than 10 years compared with those who had high depressive symptoms and diabetes for 10 years or more.

The findings from the Cox proportional models that examined the effect of diabetes treatment on ADL disability and mortality revealed that the risk of ADL disability and mortality varied according to diabetes treatment (Table 4). Compared with non-diabetic participants, those diagnosed with diabetes were significantly more likely to become ADL disabled regardless of diabetes treatment (Model 1 disability). More importantly, participants who were taking insulin alone or both oral medications and insulin to treat their diabetes were at significantly greater risk of ADL disability compared with those who were not treating their diabetes and compared with those who were treating their diabetes with oral medications or diet only. Results from

Table 3. Cox Proportional Hazard Models Predicting Disability and Mortality as a Function of Depression and Number of Years Living With Diabetes.

	Disability (*n* = 1,269)		Mortality (*n* = 1,785)	
	Model 1	Model 2	Model 1	Model 2
	Hazard ratio (95% CI)		Hazard ratio (95% CI)	
Depressed (ref. = not depressed)	1.09 [0.82, 1.45]	0.80 [0.55, 1.17]	1.16 [0.95, 1.41]	0.87 [0.66, 1.14]
Years living with diabetes				
Non-diabetic (ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Diabetic <10 years	*1.41 [1.06, 1.89]	1.21 [0.88, 1.66]	*1.41 [1.10, 1.82]	*1.21 [0.91, 1.63]
Diabetic ≥10 years	*1.40 [1.09, 1.80]	1.27 [0.97, 1.67]	*1.52 [1.25, 1.85]	*1.28 [1.01, 1.61]
Depressed by years living with diabetes				
Not depressed or diabetic (ref.)	—	(ref.)	—	(ref.)
Depressed diabetic <10 years	—	*3.27 [1.53, 7.01]	—	*1.92 [1.09, 3.38]
Depressed diabetic ≥10 years	—	1.88 [0.99, 3.61]	—	*2.00 [1.30, 3.08]

Note. Model 1 included all covariates in table. Model 2 included an interaction term between diabetes duration and depression. Models for disability excluded participants who were unable to independently perform one or more ADLs at baseline. All model adjusted for age, education, marital status, gender, nativity, hypertension, heart attack, stroke, hip fracture, cognition, and cancer. CI = confidence interval; ADL = activities of daily living.
*$p < .05$.

Table 4. Cox Proportional Hazard Models Predicting Disability and Mortality as a Function of Depression and Diabetes Treatment.

	Disability (*n* = 1,269)		Mortality (*n* = 1,785)	
	Model 1	Model 2	Model 1	Model 2
	Hazard ratio (95% CI)		Hazard ratio (95% CI)	
Depressed (ref. = not depressed)	1.10 [0.84, 1.47]	0.80 [0.55, 1.17]	1.36* [1.17, 1.60]	1.30* [1.07, 1.59]
Diabetes treatment				
Non-diabetic (ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Untreated diabetes	1.91* [1.09, 3.35]	1.82 [0.99, 3.36]	1.49 [0.98, 2.26]	1.54 [0.96, 2.47]
Diabetic and oral medications or dietary treatment	1.26* [1.00, 1.58]	1.15 [0.90, 1.47]	1.27* [1.09, 1.48]	1.23* [1.04, 1.48]
Diabetic and taking insulin alone or both oral and insulin for diabetes	2.35* [1.62, 3.42]	1.83* [1.19, 2.83]	2.21* [1.78, 2.76]	2.10* [1.61, 2.74]
Depression by diabetes treatment				
Not depressed and non-diabetic (ref.)	—	(ref.)	—	(ref.)
Depressed and untreated diabetes	—	1.44 [0.30, 6.85]	—	0.86 [0.31, 2.38]
Depressed and oral/dietary treatment for diabetes	—	1.93* [1.03, 3.63]	—	1.12 [0.78, 1.62]
Depressed and taking insulin alone or both oral and insulin for diabetes	—	3.83* [1.66, 8.81]	—	1.18 [0.75, 1.86]

Note. Model 1 included all covariates in table. Model 2 included an interaction term between diabetes duration and depression. Models for disability excluded participants who were unable to independently perform one or more ADLs at baseline. All model adjusted for age, education, marital status, gender, nativity, hypertension, heart attack, stroke, hip fracture, cognition, and cancer. CI = confidence interval; ADL = activities of daily living.
*$p < .05$.

Model 1 for mortality showed that participants who were taking any oral medications or following a specific diet and those who were taking insulin alone or both oral medications and insulin were more likely to die compared with those who were non-diabetic, whereas the risk of mortality among participants with untreated diabetes was only marginally significant. Finally, a significant interaction between diabetes treatment and high depressive symptoms was detected for ADL disability (Model 2 disability), but not for mortality (Model 2 mortality). We find that participants with high depressive symptoms and taking insulin alone or both oral medications and insulin for their diabetes are at the greatest risk of ADL disability followed by participants with high depressive symptoms and taking oral medications or following a specific diet only.

Discussion

The results of this study provide evidence that Mexican Americans aged 75 and above who are diabetic are at significantly greater risk of ADL disability and mortality compared with older Mexican Americans who have not been diagnosed with diabetes. These findings are consistent with previous studies using data from non-Hispanic White populations (Katon et al., 2008; van Dooren et al., 2013) and in Mexican American adults aged 65 and above (Black et al., 2003). Compared with older Mexican Americans who were not diabetic, those with diabetes were 1.44 times more likely to become ADL disabled and were 1.47 times more likely to become deceased over a 6-year period. We also observed that participants who were taking insulin alone or both oral medications and insulin for their diabetes were at significantly greater risk of ADL disability and mortality compared with participants who were not treating their diabetes and compared with participants who were treating their diabetes by taking oral medications or following a specific diet only. Previous studies have used the type of method to treat diabetes as a measure of diabetes severity with diabetics requiring the use of insulin being classified as having more severe diabetes (Dolan et al., 2002; Nahin, Byrd-Clark, Stussman, & Kalyanaraman, 2012). Therefore, the increased risk of ADL disability and mortality among Mexican American older adults with diabetes and taking insulin is likely due to greater severity of diabetes.

Comorbid diabetes and high depressive symptoms have been observed to increase the risk of ADL disability (Egede, 2004; Schmitz, Wang, Malla, & Lesage, 2007) and mortality (Hofmann, Kohler, Leichsenring, & Kruse, 2013; Park et al., 2013) in non-Hispanic White populations. Consistent with these findings, we observed that older Mexican Americans with comorbid depressive symptoms and diabetes were over twice as likely to become ADL disabled and or deceased over a 6-year period compared with older Mexican Americans with neither of these conditions. This provides evidence for a synergistic effect of comorbid diabetes and depressive symptoms on ADL disability and mortality. While a diagnosis of diabetes may be distressing and thus contribute to the onset of depression or increase in depressive symptomology, the latter can also lead to diabetic complications by hindering adherence to exercise and medication and diet regiments resulting in poor diabetes control (Pouwer et al., 2013) and complications from diabetes (Lin et al., 2010; Williams et al., 2010). In addition, diabetes and depression are both risk factors for mild cognitive impairment (Cheng, Huang, Deng, & Wang, 2012; Panza et al., 2010), which may contribute to an increased risk of ADL disability and mortality. Future research should study the role of cognitive impairment in the relationship between depressive symptoms, diabetes, and the risk of ADL disability and mortality.

In the present study, the risk of ADL disability was greatest for older Mexican Americans with high depressive symptoms and who had been living with diabetes for fewer than 10 years, but this risk was not significantly greater compared with those with high depressive symptoms and who had been living with diabetes for 10 years or more (Table 3, Model 2 disability). This finding may suggest that the greatest risk of ADL disability among older Mexican Americans is during the years immediately following a diagnosis of diabetes and that the risk of ADL disability is not as high if a person is able to survive with diabetes past 10 years. This finding needs to be replicated in other studies before more definitive conclusions about the comorbid effects of high depressive symptoms and diabetes duration on the risk of disability can be made.

The evidence for a synergistic relationship between diabetes and depression on ADL disability and mortality identified in the present study has significant clinical implications. Mexican Americans are more likely to become diabetic compared with other ethnic groups (Centers for Disease Control and Prevention, 2014). Physicians and other medical professionals who provide treatment to older Mexican Americans need to carefully monitor the mental health of their patients in an effort to prevent diabetic patients from developing high depressive symptoms or depression. The American Diabetes Association recommends that a stepwise and collaborative care approach should be used to manage depressive symptoms of patients with diabetes (American Diabetes Association, 2015). Furthermore, interventions designed to promote mental health awareness and decrease the negative stigma toward seeking treatment for mental illnesses in the Hispanic community are needed. Such interventions may lead to a decrease in the prevalence of comorbid diabetes and depression among older Mexican Americans.

In summary, diabetes increases the risk of ADL disability and mortality among Mexican Americans aged 75 and above. Older Mexican Americans with comorbid depressive symptoms and diabetes are at particularly high risk of ADL disability and mortality. Interventions designed to address the increasing prevalence of comorbid depression and diabetes are needed to limit the future burden of mortality and ADL disability among older Mexican Americans.

Declaration of Conflicting Interests

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