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Lifetime Depression and Diabetes Self-management in Women with Type 2 Diabetes: A Case Control Study

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Abstract

Aims—Little is known about the association between a lifetime history of major depressive disorder (L-MDD) and diabetes self-management, particularly when depression is remitted. We examined the association between L-MDD, and diabetes self-management in women with type 2 diabetes who were not depressed at the time of assessment.

Methods—L-MDD was assessed with structured psychiatric interview. Participants completed paper-and-pencil measures of demographics, diabetes-related distress, self-care behaviors, healthcare utilization, and diabetes self-efficacy.

Results—One-hundred fifty three women participated; 41% had L-MDD. Compared to their never-depressed counterparts, women with L-MDD had more diabetes distress, reported lower overall rates of self-monitoring of blood glucose (SMBG) and greater tendency to skip SMBG, had lower diet adherence, and were less likely to have seen a primary care provider in the past year. Diabetes self-efficacy mediated the relationship between L-MDD and self-management.

Conclusions—Interventions to promote self-management for patients with L-MDD may be warranted.

Keywords

diabetes; depression; distress; health behavior; women

INTRODUCTION

Depression is twice as common among diabetic women as diabetic men [1]. Depressive symptoms are associated with poor diabetes self-management including low adherence to diet, exercise, medication, self-monitoring of blood glucose, and appointment keeping [2], as well problems such as higher diabetes distress [3] and lower self-efficacy for diabetes management [4]. Lifetime history of major depression (L-MDD) is associated with worse diabetes outcomes long after the depressive episode resolves [5,6]. This study of women with type 2 diabetes (T2DM) investigated the association between L-MDD and diabetes

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self-management after controlling for important confounders. Since self-efficacy predicts subsequent depression [7] and is linked to changes in depressive symptoms [8], and because self-efficacy is associated with diabetes self-management [9], we also examined self-efficacy as a mediator of the association between L-MDD and diabetes self-management.

PATIENTS AND METHODS

Participants and Methods

Data were combined from two separate studies that employed identical recruitment methods (advertisements, paycheck inserts, and university primary care clinics), and overlapping inclusion (female and T2DM ≥ 1 year duration) and exclusion criteria (MDD episode within prior 6 months, smoking, psychiatric disorder, substance abuse/dependence, medical illness requiring inpatient treatment, and macrovascular complications). Women with L-MDD were oversampled.

Measures

L-MDD was assessed with the Structured Clinical Interview for DSM-IV (SCID) [10]. Interrater reliability was 94% for individual SCID items (range 60%-100%), and 100% for presence/absence of L-MDD.

Diabetes self-management was assessed with the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire [11]. This measure asks about adherence over the past week yielding a total score, as well as subscales for diet, exercise, self-monitoring of blood glucose (SMBG), and foot care.

SMBG was assessed with the Measure of Invasiveness and Skipping SMBG (MISS) [12]. This 7-item measure taps into the tendency to skip SMBG due to factors such as ‘my fingers are sore after I check my blood glucose.’

Health care utilization was assessed by one item, ‘Have you seen a healthcare provider in the past year?’ Responses were ‘yes’ or ‘no.’

Diabetes-specific emotional distress was assessed with the 20-item Problem Areas in Diabetes (PAID) scale [13]. This measure taps into distress associated with 20 common diabetes problems such as ‘not having clear and concrete goals for your diabetes care.’

Diabetes self-efficacy was assessed with an 18-item measure that taps confidence in one’s ability to manage diabetes [14]. An example is, ‘I can carry out practically all of the self-care activities in my daily diabetes routine.’ In the original scale, higher scores indicate lower self-efficacy; therefore, we reverse scored the items so that higher scores indicate higher self-efficacy.

The two study samples did not differ on diabetes duration or education, but differed on age, A1c, and depressive symptoms; all *p<.05. Therefore, study was entered as a covariate in relevant analyses.

Treatment regimen was controlled in analyses investigating the association between L-MDD and health promoting behaviors because insulin users may be prescribed more intensive self-care regimens than non-insulin users.

Current depressive symptoms were measured with the Center for Epidemiological Studies – Depression (CES-D) scale [15]. Depressive symptoms were controlled in all analyses to

determine whether any observed effects of L-MDD were better accounted for by current depressive symptoms.

Neuroticism, the relatively stable tendency to experience distress, was assessed with the neuroticism subscale of the NEO personality inventory [16]. An example of one of the 12 items is 'too often, when things go wrong, I get discouraged and feel like giving up.' It was used to determine whether any observed effects of L-MDD on diabetes distress were better accounted for by personality factors conceptually related to L-MDD.

Conscientiousness, the relatively stable tendency to be self-disciplined was measured with the conscientiousness subscale of the NEO personality inventory [16]. An example of one of the 12 items is, "I work hard to accomplish my goals." It was used to determine whether any observed effects of L-MDD on self-management were better accounted for by personality factors conceptually related to self-management.

Analyses—ANOVA, ANCOVA, and chi-square were used to test differences between L-MDD and never-depressed controls. We followed guidelines by Baron and Kenny [17] and Preacher and Hayes [18] for mediation analysis.

RESULTS

See table 1.

Women with L-MDD had lower total SDSCA scores than never-depressed control subjects, $F(1,113)=6.95$, $^*p<.05$, even after controlling for study, treatment regimen, depressive symptoms, and conscientiousness, $F(5,110)=8.01$, $^*p<.05$.

Women with L-MDD had higher MISS scores than control subjects, $F(1,138)=9.49$, $^*p<.05$, even after controlling for study, treatment regimen, depressive symptoms, and conscientiousness, $F(5,128)=4.79$, $^*p<.05$.

Women with L-MDD had higher PAID scores than control subjects, $F(1,113)=22.33$, $^*p<.05$, even after controlling for study, treatment regimen, depressive symptoms, and neuroticism, $F(5,111)=7.81$, $^*p<.05$.

A chi-square test revealed that women with L-MDD were less likely than control subjects to have seen a healthcare provider in the past year, $\chi^2(1, n=153)=5.87$, $^*p<.05$.

We next tested whether self-efficacy mediated the relationship between L-MDD and self-management according to Baron and Kenny's four causal steps [17]. The SDSCA measure was the most comprehensive summary of self-management employed in this study, so we chose it as the indicator of self-management. Women with L-MDD had lower SDSCA scores, as reported above (step 1). Women with L-MDD had lower diabetes self-efficacy than control subjects $F(1,140)=5.47$, $^*p<.05$ (step 2). Self-efficacy and total SDSCA scores were significantly related, $r=0.49$, $^*p<.05$ (step 3). The association between L-MDD and SDSCA scores was reduced to a trend when self-efficacy was entered into the model, $F(2,111)=2.82$, $p=.10$, (step 4). A Sobel test [19] indicated that self-efficacy was a significant mediator of the influence of L-MDD on SDSCA scores ($z=-2.14$, standard error=1.01, $^*p<.05$). Next, because the Sobel test can be problematic with small samples [19], and because we wanted to control for covariates (study, depressive symptoms, treatment regimen, and conscientiousness), we next used bootstrapping based on 5000 resamples to test for mediation. The 95% confidence interval around the indirect effect (estimate=-2.37, standard error=1.05) did not cross zero (-4.43 to -0.31), indicating

significance. Thus, the causal steps test and the bootstrapping test agreed that self-efficacy mediated the relationship between L-MDD and SDSCA scores.

DISCUSSION

Compared with their never-depressed counterparts, women with L-MDD reported lower adherence to diet and SMBG recommendations, more diabetes-specific emotional distress, and they were less likely to have seen a healthcare provider in the past year. Our participants were not currently depressed. Thus, depression is associated with certain diabetes-related vulnerabilities even after the active depressive episode remits. We also found that diabetes self-efficacy was lower among women with L-MDD, and that self-efficacy mediated the relationship between L-MDD and diabetes self-management.

Depression in diabetes is highly recurrent and is characterized by incomplete inter-episode recovery [20,21]. Incomplete recovery may create the conditions for poor diabetes self-management. Similarly, some personality characteristics that are conceptually related to MDD and self-management may exert influence. Yet in our study, subclinical depressive symptoms and personality characteristics explained some, but not all, of the variance in diabetes self-management.

Consistent with findings suggesting a temporal precedence for depression, most of our participants (81%) reported that their first depressive episode preceded their diabetes diagnosis. Therefore, participants with L-MDD may have had worse diabetes self-management than their never-depressed peers from the outset of their diabetes diagnosis. Such a hypothesis is consistent with a larger body of literature demonstrating that MDD prior to the onset of medical illness increases risk of medical symptoms [5], less efficient use of healthcare [22], more medical distress [23,24], and modifies responses to behavioral interventions for medical symptoms [25].

Our findings may speak to the mixed results of depression treatment on diabetes self-care behaviors. The large Pathways study by Katon et al. found that depression treatment was not associated with improved diabetes self-care [26]; yet, Lustman et al. found that depression remission improved diet and exercise [27]. Differentiating currently depressed, L-MDD, and never-depressed patients may inform this area of investigation. While depression remission may improve diabetes self-management, it may still fail to produce levels of self-management observed in *never-depressed* individuals. Therefore, comparison groups should be carefully constituted. Otherwise, those who are not currently depressed, but who have a history of depression, may be misclassified into a comparison group believed to be free from the effects of depression. Doing so may obscure differences between treatment and control groups.

Contrary to past findings with non-insulin using T2DM women [5], we did not detect differences in A1c by L-MDD status. We suspect that insulin use overshadowed the relatively smaller effects of L-MDD on A1c. Furthermore, while depression is associated with worse glycemic control, there is evidence that this association is not mediated by self-management, at least in type 1 [28].

Limitations include the small sample, exclusively women, and the retrospective depression assessment which introduces two potential problems: (a) a third, unmeasured, factor may explain the findings, and (b) self-report and retrospective data are subject to some degree of unreliability. Additionally, directionality was not addressed. A putative mediator is ideally measured at a point in time between measurement of the independent variable (L-MDD) and the outcome (diabetes self-management), but we measured all three concurrently. And although our interpretation is consistent with a standard conceptualization of self-efficacy as

preceding goal-oriented behavior, it is also true that behavioral implementation can alter domain-specific self-efficacy. Furthermore, depression, self-efficacy and behavior may influence each other in a recursive fashion. Thus, prospective studies are needed to rigorously address temporal precedence of self-efficacy versus self-management.

Despite these limitations, these results suggest that depression continues to be associated with worse diabetes self-management even after remission, and that self-efficacy is one mechanism through which L-MDD exerts its effects. Patients with L-MDD – who outnumber those with current MDD by a factor of 2.5 [1] – may benefit from self-self-management and self-efficacy support.

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Table 1

	Total Sample n=153 % or Mean (SD)	No L-MDD n=90 % or Mean (SD)	Yes L-MDD n=63 % or Mean (SD)
Age (yrs)	60.1 (9.7)	61.2 (10.3)	58.5 (8.5)
Marital Status			
Single/Never married	15.0%	17.8%	11.1%
Married	47.1%	48.9%	44.4%
Divorced/Separate	30.7%	24.4%	39.7%
Widowed	7.2%	8.9%	4.8%
Education			
Less than High school	4.6%	5.6%	3.2%
High school grad/GED	19.0%	25.6%	9.5%
Some post high school	37.3%	33.3%	42.9%
College grad	17.6%	14.4%	22.2%
Post-graduate degree	21.6%	21.1%	22.2%
Annual income			
0-$10,000	9.2%	11.1%	6.3%
$11,000-$20,000	12.4%	12.2%	12.7%
$21,000-$40,000	17.0%	20.0%	12.7%
$41,000-$60,000	19.0%	18.9%	19.0%
$61,000-$80,000	17.0%	13.3%	22.2%
$81,000-$100,000	11.8%	10.0%	14.3%
over $100,000	13.1%	14.4%	11.1%
Have PCP?	100.0%	100.0%	100.0%
Have medical insurance?	96.7%	96.7%	96.8%
Race/Ethnicity			
White	69.3%	66.7%	73.0%
Black	26.8%	28.9%	23.8%
Latina	1.3%	1.1%	1.6%
A1c	6.7 (1.2)	6.6 (1.1)	6.8 (1.4)
Diabetes duration	7.7 (7.4)	8.0 (7.7)	7.4 (7.1)
Diabetes treatment, %			
Diet only	15.7%	18.9%	11.1%
Oral agents	67.3%	63.3%	73.0%
Insulin	13.7%	15.6%	11.1%
Oral agents & Insulin	3.3%	2.2%	4.8%
Age of first MDD episode (in years)	N/A	N/A	33.1 (14.9)

	Total Sample n=153 % or Mean (SD)	No L-MDD n=90 % or Mean (SD)	Yes L-MDD n=63 % or Mean (SD)
% with first MDD episode prior to DM diagnosis	N/A	N/A	81.0%