



The relationship of diabetes-related distress and depressive symptoms with physical activity and dietary behaviors in adults with type 2 diabetes: A cross-sectional study



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ABSTRACT

Aims: Diabetes-related distress (DD) and depressive symptoms (DS) may influence self-management behaviors in people living with type 2 diabetes (T2D). We examined the association of DD and DS with physical activity (PA) and adherence to recommended dietary behaviors in adults with T2D.

Methods: Using baseline data from 2040 adults with T2D in the Alberta's Caring for Diabetes (ABCD) cohort study, DD, DS, PA and adherence to dietary behaviors were assessed. A composite variable for presence of DD and DS was computed for analyses. ANOVA and logistic regression tested independent associations of DS and DD with PA and adherence to diet.

Results: Participants were 64 ± 10.6 years, 45% female, 76% with annual household income \leq \$80,000, and 86% with high school education or more. Those with DD alone were 1.8 times (95% CI 1.1, 2.9) and those with DD and DS combined were 2.0 times (95% CI 1.1, 3.7) more likely not to meet PA guidelines compared to those without DD or DS. The presence of DS alone was not significantly associated with meeting PA guidelines (OR 1.4; 95% CI 0.7, 3.0). Compared to those without DD or DS, patients with DD alone (OR 1.5; 95% CI 1.4, 3.4), DS alone (OR 5.2; 95% CI 2.7, 9.7), or DD and DS combined (OR 2.5; 95% CI 1.6, 3.8) were more likely to have poor adherence to recommended dietary behaviors.

Conclusions: Greater distress or depressive symptoms were associated with worse self-management behaviors in adults with T2D. Attention to mental health status may improve participation in PA and adherence to diet recommendations in these patients.

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1. Introduction

Managing type 2 diabetes (T2D) is complicated and may lead to measurable stress and anxiety (Gonzalez, Fisher, & Polonsky, 2011). It has been well documented that adults with T2D have difficulty meeting the recommended guidelines for physical activity (PA) and diet (Morrato et al., 2007; Nelson, Reiber, & Boyko, 2002). Determining what factors are associated with meeting self-management recommendations is important for those who support individuals with T2D.

Depression and diabetes have been linked to poor self-management (Gonzalez et al., 2011); although the measurement of

depressive symptoms in relation to self-care has yielded confusing and contradictory results (Fisher, Gonzalez, & Polonsky, 2014). Therefore we examined the association of diabetes-related distress (DD) and depressive symptoms (DS) with PA and adherence to recommended dietary behaviors in adults with T2D.

2. Methods

2.1. Research design

Data from the Alberta's Caring for Diabetes Project (ABCD) were used in this study. The ABCD study is an ongoing prospective population-based cohort of adults with type 2 diabetes in the province of Alberta, Canada (Al Sayah et al., 2015). Those eligible were over 18 years of age and able to communicate in English. Recruitment was completed over December 2011 to December 2013 through various approaches including advertising in the community. Those expressing interest via telephone and willing to participate received

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a study package that included a self-administered survey via the mail. The ABCD cohort has been reported to be a representative of Albertans and Canadians with diabetes (Al Sayah et al., 2015). The ABCD project was approved by the University of Alberta Research Ethics Board.

2.1.1. Diabetes-related distress

Problem Areas in Diabetes Scale 5 items (PAID5) questionnaire (McGuire et al., 2010) was used to assess DD. PAID5 includes 5 items, each scored from 0 (not a problem) to 4 (serious problem), with higher scores indicating more DD. A total score was computed as the sum of the 5 items (range 0–20), and categorized into two severity levels: (1) Any DD (PAID5 \geq 5) vs. no DD (PAID5 < 5); (2) Moderate–severe DD (PAID5 \geq 10) vs. absent DD (PAID5 < 10).

2.1.2. Depressive symptoms

The Patient Health Questionnaire 8 items (PHQ-8) (Kroenke, Spitzer, & Williams, 2001) was used to assess DS. PHQ-8 includes 8 items, each scored from 0 (not at all) to 3 (nearly everyday), with higher scores indicating more DS. A total score was computed as the sum of the scores of the 8 items (range 0–24), and was categorized into two severity levels: (1) Any DS (PHQ-8 \geq 10) vs. no DS (PHQ-8 < 10) Moderate–severe DS (PHQ-8 \geq 15) vs. absent DS (PHQ-8 < 15).

2.1.3. Physical activity

Weekly moderate-to-vigorous physical activity (MVPA) was assessed using the Godin Leisure-Time Exercise Questionnaire (GLTEQ). Participants reported the average number of times per week and average duration, in the past month, they engaged in vigorous, moderate and mild intensity PA for at least 10 min per session (Godin & Shephard, 1985). An independent evaluation of this measure found its degree of reliability and validity to compare favorably to nine other self-report measures of PA based on various indices (Toobert, Hampson, & Glasgow, 2000). A score \geq 150 min per week for MVPA was considered meeting current guidelines (Sigal et al., 2013).

2.1.4. Diet behaviors

Adherence to dietary behaviors was assessed using 4 items from the Summary of Diabetes Self Care Activities (SDSCA) questionnaire (Toobert et al., 2000). Each of the items was scored from 0 to 7 days with higher scores indicating better adherence to dietary recommendations, with the total score being the average of these 4 items, which was then dichotomized at the mean to indicate good (or poor) adherence to dietary recommendations.

2.1.5. Other measures

Data on age, sex, ethnicity, educational level, annual household income, smoking status, diabetes duration, and number of comorbidities were also collected.

2.2. Statistical analysis

A composite dummy variable for DD and DS was computed and used in all analyses: both DD and DS absent, only DD present, only DS present, both DD and DS present. Descriptive statistics were computed for the overall sample and by the composite variable categories. Differences in characteristics between the groups were examined using chi-square test or ANOVA as appropriate. The independent associations between DD and DS with PA and adherence to diet were examined using logistic regression models with either PA or adherence to dietary behaviors as the outcome, and the composite dummy variable of DS and DD as the main explanatory variable. Models were adjusted for age, sex, educational level, income, smoking status, diabetes duration, and number of comorbidities.

3. Results

3.1. General characteristics of participants

The average age of participants was 64 ± 10.6 years, 45% were female, 76% had income \leq \$80,000, and 86% had at least high school education (Table 1). These participants lived with diabetes for an average of 12 ± 8.8 years, and the majority (82%) reported two or more chronic conditions in addition to diabetes. On average, participants reported to be adherent to dietary behaviors 4.4 days/week, whereby 42% were considered to have good adherence to dietary behaviors, while 79% did not achieve guidelines of 150 min of weekly MVPA (Sigal et al., 2013). Compared to those without DD or DS, those who had both symptoms were younger, had lower income and lower education, were more likely to be smokers, with longer diabetes duration, and reported more comorbid conditions (Table 1). Further, those with DD and DS combined were less adherent to dietary behaviors and were less physically active compared to those without DD or DS.

3.2. DD, DS and physical activity

In adjusted analysis, compared to those without DD or DS, any levels of DD or DS were not associated with meeting guidelines for PA after adjusting for covariates (DD: OR = 1.2; 95% CI 0.9, 1.5; DS: OR = 1.4; 95% CI 0.7, 2.7) (Table 2), while patients with any level of DD and DS combined were 1.7 times (95% CI 1.2, 2.5) more likely not to meet guidelines for PA. However, those with moderate–severe DD were 1.8 times (95% CI 1.1, 2.9) and those with moderate–severe DD and DS combined were 2.0 times (95% CI 1.1, 3.7) more likely not to meet PA guidelines compared to those without DD or DS (Table 2). The presence of moderate–severe DS alone was not significantly associated with meeting PA guidelines (OR = 1.4; 95% CI 0.7, 3.0), although point estimates were suggestive of increased risk.

3.3. DD, DS and adherence to dietary behaviors

In adjusted analysis, compared to those without any symptoms, patients with both any level of DD or DS (DD: OR = 1.4, 95% CI 1.1, 1.7; DS: OR = 3.1; 95% CI 1.9, 5.1), and those with moderate–severe DD or DS (DD: OR = 1.5, 95% CI 1.1, 2.1; DS: OR = 5.2; 95% CI 2.7, 9.7), as well as those with both symptoms present at any level combined (any DD and DS: OR = 3.1, 95% CI 2.3, 4.1; moderate–severe DD and DS: OR = 2.5, 95% CI 1.6, 3.8) were more likely to have poor adherence to dietary behaviors.

4. Discussion

We found that T2D patients with DD, DS or both were more likely to have poor adherence to dietary behaviors and not to meet guidelines for PA. The presence of DS alone was not significantly associated with meeting PA guidelines. Overall, the findings reported in this study support the current notion that DD in diabetes self-management is an important consideration for practitioners. For example, DD and not DS or major depressive disorder, has been shown to be associated with glycemic control and self-management behaviors including PA and adherence to dietary recommendations for glycemic control (Pandit et al., 2014).

Few studies have examined associations between DD and self-management behaviors like diet and PA specifically and hence the results presented here extend our understanding of what factors may be influencing self-management behaviors. Furthermore, we have shown differing associations between DD and DS and physical activity and adherence to dietary recommendations. Our results suggest that adherence to dietary behaviors is more complicated by DS versus DD among patient with T2D. Why patients with T2D complicated by DS

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