Full title:

Diabetes distress, depressive, and anxiety symptoms in people with type 2 diabetes: A network analysis approach to understanding comorbidity

Running title:

Diabetes mental health symptom networks

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Abstract

Objective

This study aimed to explore interactions between individual items assessing diabetes distress, depressive symptoms, and anxiety symptoms in a cohort of adults with type 2 diabetes using network analysis.

Research design and methods

Participants (N = 1,796) were from the Evaluation of Diabetes Insulin Treatment (EDIT) study from Quebec, Canada. A network of diabetes distress was estimated using the 17 items of the Diabetes Distress Scale (DDS-17). A second network was estimated using the 17 DDS-17 items, the 9 items of the Patient Health Questionnaire, and the 7 items of the Generalized Anxiety Disorder Assessment. Network analysis was used to identify central items, clusters of items, and items that may act as bridges between diabetes distress, depressive symptoms, and anxiety symptoms.

Results

Regimen-related and physician-related problems were amongst the most central (highly connected) and influential (most positive connections) in the diabetes distress network. *Failure* (depressive symptom) was found to be a potential bridge between depression and diabetes distress, being highly connected to diabetes distress items. The anxiety symptoms of *worrying too much, uncontrollable worry,* and *trouble relaxing* were identified as bridges linking both anxiety and depressive items, and anxiety and diabetes distress items, respectively.

Conclusions

Regimen-related and physician-related diabetes-specific problems may be important in contributing to the development and maintenance of diabetes distress. Feelings of failure and worry are potentially strong candidates for explaining comorbidity. These individual diabetes-specific problems and mental health symptoms could hold promise for targeted interventions for people with type 2 diabetes.

Type 2 diabetes is associated with a significant mental health burden [1]. For instance, depression [2] and symptoms of anxiety [3] have been shown to be prevalent in people with type 2 diabetes. People with type 2 diabetes also risk experiencing diabetes-related distress, a diabetes-specific mental health comorbidity associated with reduced self-management and higher HbA1c [4, 5] Diabetes distress reflects feelings related to physical activity, diet, future complications, and doctor-patient relationships [6]. Diabetes distress is commonly measured using the Problem Areas in Diabetes (PAID) questionnaire [7] or the Diabetes Distress Scale (DDS; [6]. The conceptual distinction between the PAID and the DDS, and whether they measure the same or different constructs, has been the subject of recent debate [8, 9]. However, both the PAID and the DDS incapsulate a broad range of emotional problems associated with living with diabetes.

The co-occurrence of diabetes distress, depressive symptoms, and anxiety symptoms within the same person with type 2 diabetes is also common. Fisher et al. [10] found that, amongst people with type 2 diabetes, approximately 30% of those with major depressive disorder (MDD) and approximately 50% of those with a general anxiety disorder (GAD) met the criteria for a MDD/GAD dual diagnosis. Reported comorbidity between diabetes distress and depressive symptoms has ranged from 4.5% [11] to 22.5%-75.4% [12]. Longitudinal research with people with type 2 diabetes has shown diabetes distress and depressive symptoms to be cyclically related, influencing each other over time [13]. Questions have also been raised as to the overlap between depression and diabetes distress, with it being suggested that depression and diabetes distress are both aspects of the same emotional distress continuum [14] and, conversely, intersecting but distinct concepts [11]. There are anxieties that are unique to living with type 2 diabetes [15]. Worries about hypoglycaemic reactions, high blood sugar, and future complications are amongst the most frequently endorsed emotional problems for people with diabetes [16, 17]. Clarifying if and how specific diabetes distress problems, depressive symptoms, and anxiety symptoms interact and reinforce one another in people with type 2 diabetes could provide improved insight into their co-occurrence.

One overarching limitation to the current knowledge on diabetes distress and related psychological symptoms in people with type 2 diabetes relates to the use of summaries of scores on measurement items as an indicator of overall severity (e.g., by calculating an average or total summary score across all items of a depression measurement and interpreting it as an indicator of depression severity). However, this approach assumes, to some extent, that all items are equally indicative of an underlying mental health state and may cloud useful insights [18]. To improve our understanding of psychological comorbidity among people with type 2 diabetes, exploring individual symptoms/problems and item-level interactions could be advantageous. For instance, in a sample of adults with bulimia nervosa, binge eating was shown to be an important symptom to bulimia nervosa psychopathology, highly connected to other symptoms and therefore, likely to be implicated in the activation of other bulimia nervosa symptoms and the maintenance of bulimia nervosa [19]. Illuminating the interplay between individual mental health symptoms and diabetes-specific problems in people with type 2 diabetes, identifying symptoms/problems that cluster together or symptoms/problems that trigger or sustain others, may provide a more nuanced picture of the factors associated with the onset and maintenance of mental health comorbidity in people with type 2 diabetes.

Network psychometrics provides an opportunity for the underlying structure of mental health constructs and the connections between individual items or symptoms to be investigated and visualised [20]. With a network analysis approach, a mental health problem is explained as arising from the dynamic interaction between the symptoms themselves, with individual symptoms reinforcing and inhibiting others, rather than from an unmeasurable latent variable [20]. Applying network analysis to mental health constructs allows the relative contribution of symptoms in a network to be investigated, identifying influential, highly connected symptoms. The symptoms of multiple constructs can be modelled in the same network, which can enlighten understanding of their interaction and co-occurrence, presenting several opportunities for better understanding comorbidity. Symptoms that connect two mental health constructs (e.g., depression and diabetes distress), known as bridges, increase the likelihood of one construct activating another [21]. Using network analysis, symptom-level interactions can be examined between symptoms of mental health problems and the individual components of other psychological constructs (e.g., the individual diabetes-specific problems as measured by the DDS-17).

The current study aims to use network analysis to gain a fuller estimation of the dynamics between individual diabetes distress problems, as measured using the DDS-17, and individual depressive and anxiety symptoms in people diagnosed with type 2 diabetes in the last 10 years who were insulin naïve. To the best of our knowledge this has not yet been investigated. To do so, the study examines item-level interactions, and therefore, the terms diabetes distress problems, and depressive and anxiety symptoms do not refer to diagnostic entities, but rather groups of symptoms or problems. First, a network of diabetes distress is estimated. Second, the interplay between diabetes distress, depressive symptoms, and anxiety symptoms is explored, and the network examined for the presence of bridges.

Research Design and Methods

Participants

The sample was derived from the Evaluation of Diabetes Insulin Treatment (EDIT) study, a prospective cohort study of 2,033 middle-aged adults with type 2 diabetes living in Quebec, Canada. Potential participants were identified via the provincial insurance database, the Régie de l'assurance maladie du Québec, and were invited to participate based on random digit dialling and letters. Participants were eligible for the study if they were aged between 40 and 75 years, had been diagnosed with type 2 diabetes by a physician within the past 10 years, and were insulin naïve. Further details about the EDIT cohort are available elsewhere [13].

The study sample were N = 1,796 participants (88.3% of the full sample) with complete data on all diabetes distress, depressive, and anxiety items from the baseline EDIT study wave, conducted in 2011. In the included sample, the mean age was 60 (SD = 8; range = 40-76) years and 49% of the sample was female. The 237 participants with missing data were slightly older (mean age = 62; SD = 8 years, p = .001) and were more likely to be female (59%, p = .007) compared to the included sample.

Measures

Diabetes distress was assessed using the 17-item Diabetes Distress Scale (DDS-17) [6]. The scale includes 4 sub-scales addressing different types of distress experienced within the past month: emotional distress (e.g., "diabetes controls my life"), physician-related distress (e.g., "doctor doesn't give clear directions"), regimen-related distress (e.g., "not motivated to keep up self-management"), and interpersonal distress (e.g., "friends/family not supportive"). Items range from 1 ("Not a problem") to 6 ("A very serious problem"). In the present sample, internal consistency was excellent (alpha = .93).

The 9-item Patient Health Questionnaire (PHQ-9) [22] assessed the frequency of experiencing nine depressive symptoms within the past two weeks. Response options on each item range from 0 ("Not at all") to 3 ("Nearly every day"). The PHQ-9 is a screening tool with items based on the Diagnostic and Statistical Manual of Mental Disorders diagnostic criteria for major depressive disorder. The internal consistency of PHQ-9 items was good (alpha = .79) in the study sample.

The 7-item Generalized Anxiety Disorder Questionnaire (GAD-7) [23] assessed the frequency of experiencing seven symptoms of generalized anxiety disorder within the past two weeks. Response options for each item range from 0 ("Not at all") to 3 ("Nearly every day"). The GAD-7 scale items are based on criteria for generalized anxiety disorder from the Diagnostic and Statistical Manual of Mental Disorders. The internal consistency of GAD-7 items was excellent (alpha = .84).

A list of the DDS-17, PHQ-9, and GAD-7 items can be found in Supplemental Table S1.

Additionally, sociodemographic characteristics (including age, sex, marital status, and education), health (smoking status, frequency of physical activity, frequency of alcohol use, BMI, and physical health comorbidities, mental health diagnoses), and diabetes-specific characteristics (diabetes duration, diabetes complications, and self-rated diabetes control) are reported to describe the study sample.

Self-rated diabetes control was assessed by asking participants to rate their diabetes control within the previous month as poor, fair, good, very good, or excellent.

Statistical analysis

Statistical analyses were carried out using R version 4.0.5. See Supplemental Table S2 for detailed explanation on statistical analysis and R packages used.

A first network was estimated using only the DDS-17 items to explore the association between the diabetes distress items. A second network was modelled using the 17 items of the DDS-17, the 9 items of the PHQ-9, and the 7 items of the GAD-7 to explore interconnections between diabetes distress, depressive, and anxiety items. A network consists of nodes, representing the variables of interest (e.g., scores on each symptom/distress item), connected by edges, representing the relationships between nodes (e.g., partial polychoric correlations between item scores, adjusting for all other correlations in the network). For each network, a Gaussian Graphical Model was estimated with extended Bayesian Information Criterion (EBIC) model selection [24]. As the data were ordinal, a polychoric correlation matrix was estimated as input [25]. See Supplemental Table S2 for further information on the estimation procedure, the statistical regularization technique, and packages used.

The network centrality properties of strength and expected influence were examined. Strength refers to the sum of absolute edge weights directly connecting a node to others in the network [25]. One-step expected influence evaluates the (non-absolute) sum of the edges directly connecting a node to other nodes, allowing positive edges to outweigh negative [26].

For the diabetes distress network, communities/clusters were also examined. Further details on the cluster analysis can be found in Supplemental Table S2.

For the network modelling the items of the DDS-17, PHQ-9, and GAD-7 together, the role of individual items as bridges between constructs was examined. The bridge strength (the absolute sum of the edge weights connecting an item of one mental health construct to items of another mental health construct [21]) and bridge expected influence (the non-absolute sum of all edges connecting an item to others in a different construct [21]) of each item were investigated. Bridge strength and bridge expected influence were computed for each mental health scale item with the items of another scale separately (i.e., diabetes distress items - depressive items, diabetes distress items – anxiety items, and anxiety items – depressive items).

A post-hoc bootstrapping framework was used to investigate the stability and accuracy of the networks and to ensure that the sample size was adequate [25] and is described in more detail in Supplemental Table S2.

Results

Descriptive statistics and item inspection

The sample characteristics are described in Table 1.

The mean and standard deviation for each item is presented in Supplemental Table S3 and polychoric correlations for all items are reported in Supplemental Tables S4 - S8. The assessment of item informativeness and redundancy (as explained in Supplemental Table S2) indicated all items could be used in the analysis.

Diabetes distress network

The network estimated with the DDS-17 items is presented in Figure 1. A network was estimated with 81.6% (111/136) non-zero edges. Figure 1 also presents centrality indices as standardized z scores. Items high in strength are highly connected and those high in expected influence have more positive connections to other items.

Edge weight and centrality accuracy

The bootstrapped CIs around the estimated edge-weights were wide and overlapping, implying the order of edge-weights should be interpreted with caution. Case-dropping subset

bootstrapping indicated that, with a CS-coefficient of (CS[cor = 0.7] = 0.361), node strength is interpretable with caution, and expected influence was highly stable (CS[cor=0.7]=0.75).

Diabetes distress, depressive, and anxiety symptom network

Figure 2 presents the diabetes distress, depressive, and anxiety network. The network was estimated with 43.6% (230/528) non-zero edges. Figure 2 also presents node centrality indices as standardized z scores.

Edge weight and centrality accuracy

Bootstrapped CIs indicate that edge-weights are unlikely to differ significantly from one another. The CS-coefficient for strength (CS[cor = 0.7] = 0.439) indicates that order of node strength can be interpreted with caution. Expected influence was extremely stable (CS[cor = 0.7] = 0.75).

Bridges

Relatively strong bridging connections were observed between *Failure* (dep6) and *Not motivated to keep up self-management* (dd16); between *Trouble relaxing* (anx4) and *Sleep problems* (dep3); and between *Restless* (anx5) and *Moving/speaking slowly or being restless* (dep8), respectively.

Bridge strength and bridge expected influence produced identical results and so only bridge strength is reported in Figure 3. Bridge strength was highly stable with a CS-coefficient of (CS[cor=0.7]=0.75). The higher the standardized z score for an item (e.g., dd1), the higher its connections (strength) and positive connections (expected influence) with items of the other mental health construct (e.g., depression).

Conclusions

To our knowledge, this study is the first to examine the network structure of diabetes distress and the interconnections between individual diabetes distress problems, depressive symptoms, and anxiety symptoms in a sample of people with type 2 diabetes. A network analysis of diabetes distress items identified several highly influential problems. A second network analysis of diabetes distress, depressive, and anxiety items identified several influential problems/symptoms and bridges.

Diabetes distress network

The identified pattern of clusterization of diabetes distress items, as reported in Supplemental Table S2 and Supplemental Figure S1, matched the 4 subscales of the DDS-17: emotional burden; physician-related distress; regimen-related distress; and interpersonal distress [6].

Problems from the physician-related distress component on the DDS-17, *Doctor doesn't give clear directions* (dd4) and *Doctor doesn't take concerns seriously* (dd9) were identified as being high in node strength and expected influence in the diabetes distress network. The importance of the patient-doctor relationship in effective diabetes care and patient satisfaction is established [27, 28]. From the regimen-related distress sub-scale, *Not motivated to keep up self-management* (dd16) was also highly connected and influential. Diabetes is a largely self-managed condition. A considerable proportion of people with diabetes taking part in the Diabetes Attitudes, Wishes and Needs Study (the DAWN Study) reported that they felt "burnt out" from coping with their diabetes and stressed about the responsibility of their care [29]. These physician-related and regimen-related problems may be central to activating other diabetes-specific problems and burdens for people with type 2 diabetes and hold particular clinical importance. Highly central nodes in a cross-sectional network of social anxiety symptoms were shown to predict the correlation between change in one node and change in the other network symptoms [30]. *Friends/family don't appreciate difficulty of diabetes* (dd13; Interpersonal distress) and *Overwhelmed by demands of diabete*s (dd14; emotional distress) though not high in node strength, were high in expected influence, meaning, they had more positive connections to other nodes in the network. In network approaches to psychopathology, nodes high in expected influence are suggested to be important for the development and maintenance of mental health concerns [26]. By activating a relatively large number of other symptoms in the network, they may be more likely to trigger and sustain the other symptoms and therefore, the symptom network.

Our findings suggest that regimen-related and physician-related distress items are highly connected to other items within the DDS-17. There are two commonly used scales available at the present time for measuring diabetes distress, the PAID and the DDS, and differences have been reported between the two scales in terms of item content and psychometric properties [9]. Moreover, questions have been raised around the extent to which the individual subscales of the DDS reflect the underlying concept of diabetes distress. For instance, Fenwick et al., (2018)[8] found that physician-related distress failed to discriminate between levels of distress and therefore suggest that this subscale may not fit within the construct of diabetes distress. Gonzalez et al., (2015)[5] measured the construct of diabetes distress using only the 5-item emotional burden subscale. These debates surrounding the use of the DDS-17 as a measurement of diabetes distress should be considered when interpreting our findings on the connectivity of individual items in the diabetes distress network. However, regardless of whether regimen-related and physician-related distress are viewed as integral to the concept of diabetes distress, items reflecting regimen and physician-related problems were found to be the most highly connected and influential items within the DDS-17 network. This suggests that diabetes-specific regimen and physician-related problems may be triggering other diabetes-specific problems as measured on the DDS-17. Therefore, notwithstanding the aforementioned issues, regimen-related and physician-related problems should be considered as potentially contributing to the development and maintenance of negative emotion and other symptoms of distress in people with type 2 diabetes.

Diabetes distress, depressive, and anxiety symptom network

In the second network, the nodes highest in strength and expected influence were *Not motivated to keep up self-management* (dd16), *Failure* (dep6), and *Worrying too much* (anx3).

On visual inspection of the combined network, depressive and anxiety items cluster together and share several strong bridging connections, while the diabetes distress items form a separate cluster. The relationship between depression and diabetes distress is complex, and there is some confusion as to whether they are distinct, though overlapping, concepts [11] or both elements of the same underlying emotional distress continuum [14]. The combined network provides support for viewing diabetes distress and depression as discrete, though related, constructs. However, the edge-weight analysis indicated the order of edge-weights in the network should be interpreted with caution.

One strong connection between diabetes distress and depressive symptoms was observed between *Failure* (dep6) and *Not motivated to keep up self-management* (dd16). *Failure* (dep6) was the node highest in bridge strength and bridge expected influence, in the interplay between diabetes distress and depressive symptoms, indicating that it had the most connections and most positive connections with diabetes distress items. Within psychometric research adopting a network approach, the "spreading" of activation from one mental health problem to another, through bridging connections between items, is suggested to be central to explaining comorbidity [21]. Research has shown that people with diabetes report experiencing feelings of failure in relation to managing their condition [31] particularly in relation to starting insulin therapy (as it may be viewed as having "failed" at managing diabetes through other means) [32]. Feelings of failure may represent a link between the context of living with diabetes and managing the condition and the development of mental health issues, such as depressive symptoms. Equally, people with diabetes who also have depression may be more likely to have negative feelings around how they are managing their diabetes. Diabetes distress and depression have been shown to be bi-directionally [33] and cyclically [13] related. The role of the depressive symptom of *Failure* (dep6) in the connection between depressive symptoms and diabetes-specific problems as measured with the DDS-17 merits further investigation to tease apart the direction of activation.

For the interplay between depressive and anxiety symptoms, the nodes highest in bridge strength and bridge expected influence were all anxiety symptoms: *Worrying too much* (anx3), *Uncontrollable worry* (anx2), and *Trouble relaxing* (anx4). These findings support the role of symptoms of anxiety in the development and maintenance of depression, particularly the role of sustained worry in activating feelings of sadness or exhaustion. There is evidence that supports anxiety playing a role in the development of depression [34] including anxiety symptoms preceding the development of depressive disorders [35]. A strong connection was observed between *Trouble relaxing* (anx4) and *Sleep problems* (dep3). It is plausible that sleep problems may be linked to persistent agitation and arousal. Similarly, when bridges in the interplay between diabetes distress and anxiety were examined, anxiety symptoms were the most influential. People with diabetes frequently report experiencing worries that are unique to living with type 2 diabetes [16, 17] and these contextual worries and anxieties could be significant to understanding mental health problems and comorbidity in people with diabetes. While causal relations cannot be inferred from cross-sectional data, these findings highlight the potential for network analysis to identify meaningful symptom-level interactions that should be explored further.

Strengths and limitations

This study is based on a large sample of people with type 2 diabetes measuring diabetes distress, depression, and anxiety with validated measurements. Rather than using psychological scale sum-scores and cut-offs, this study uses a symptom-level approach to examining comorbidity. Investigating individual symptom-level interactions can take account of diversity in mental health symptomology and comorbidity with the ultimate ambition of leading to more personalised treatments [18]. The study also had several limitations which should be considered when interpreting the results. First, there are limitations associated with the sample and the generalisability of the findings. The sample was predominately white and thus results may not generalise to other racial or ethnic groups. The sample was insulin naïve, had been diagnosed with type 2 diabetes in the last 10 years, and were aged between 40-75. As this sample represents a specific group within people with type 2 diabetes, it would be important to examine item networks in other diabetes populations, such as those with type 1 diabetes, those with longer durations of type 2 diabetes, those using insulin treatment, and with more diverse sociodemographic characteristics. Another limitation is that the data were collected in 2011 and so the treatment and management options available to the study sample may differ from those available today. Second, the use of cross-sectional data means that it was not possible to make causal inferences about the symptom-level relationships. To gain further insight into temporal relationships and which item's activation precedes the activation of its neighbours, longitudinal analyses is needed. Third, network analysis does not take account of covariates or confounders; the partial correlations between items only control for the other items in the network. It is possible the observed associations between nodes are resulting from an external factor (e.g., stressors, biological factors, diabetes complications) not modelled in the network. Finally, there are limitations associated with the novelty of network analysis for psychological research. Dealing appropriately with ordinal data is an area of current discussion in network psychometrics and to date there is no 'gold standard' method [36]. Computing polychoric correlations is a commonly used method of dealing with ordinal data which assumes that a normally distributed latent variable underlies the ordinal data [25]. This method was chosen as it retains important information on the severity and order of the data, but it can be problematic with variables that may have a real zero as could be expected with some items (e.g., items assessing suicidal ideation) [25]. Future research should continue to develop and extend methods of using psychological data in networks analysis.

Future directions

This study identified specific psychological factors of potential importance for our understanding of mental health in people with type 2 diabetes. Future symptom-level diabetes-mental health research should use prospective data to investigate if the identified regimen-related and physician-related distress problems precede the development or worsening of diabetes distress. The EDIT study provides 5 years of follow-up data on participants with type 2 diabetes and would thus allow for further exploration of symptom-level connections by, for example, analysing changes in network structure and connectivity between study waves. Future research should look to utilise panel data of many subjects at

multiple time points and individual time-series data [37] and explore subgroups (e.g., by age, HbA1c levels, diabetes duration, or mental health status, such as major depression) to provide a more thorough and nuanced understanding of influential mental health components and interactions in people with type 2 diabetes.

Clinical implications

According to network theory, interventions that focus on highly connected nodes would have the greatest effect on reducing the severity of the network as a whole[38]. Interventions that effectively reduce regimen-related distress and physician-related distress may, therefore, be beneficial in reducing overall diabetes distress severity. For example, a 6-week empowerment-based intervention, focused on setting personally meaningful motivated goals, was found to be successful in reducing regimen-distress and physician-related distress in adults with type 2 diabetes [39].Similarly, deactivating bridge symptoms, could limit the spread of one mental health problem to another and reduce comorbidity [21]. Cognitive behavioural therapy is already a commonly used and effective treatment for depression in people with diabetes [40]. The current findings suggest that behavioural activation and cognitive restructuring focused on *Failure* (dep6), *Worrying too much* (anx3), *Uncontrollable worry* (anx2), and *Trouble relaxing* (anx4) early in the treatment process may reduce the emergence of comorbid mental health problems for people with type 2 diabetes, though this requires empirical examination.

This study highlights individual psychological symptoms and problems that could play a central role in the development and maintenance of diabetes distress and of comorbidity between diabetes distress, depressive symptoms, and anxiety symptoms in people with type 2 diabetes. Future research is needed to replicate these findings in different samples, explore temporal dynamics, and investigate the role of physician-related and regimen-related diabetes-specific problems and feelings of failure and worry in mental health comorbidity in people with type 2 diabetes. This study's findings provide a good starting point for further examining the symptom-level interplay between important mental health factors in people with type 2 diabetes.

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Table 1

Sample Characteristics

Sample Characteristic	Mean or *n*	SD or %
Age (mean, SD)	60.3	8.4
Woman	880	49%
Self-rated diabetes control in the past month		
Excellent	422	24%
Very good	456	26%
Good	564	32%
Fair	276	16%
Poor	56	3%
Marital Status		
Married or in a common law partnership	1,198	67%
Never married	199	11%
Divorced, separated, or widowed	393	22%
Education		
Less than secondary school graduation	705	40%
Secondary school graduation	557	31%
Some post-secondary education	148	8%
Post-secondary graduation	363	21%
Ethnicity		
White	1691	97%
Black	33	2%
Aboriginal	9	<1%
Hispanic	9	<1%
Asian or South Asian	8	<1%
Self-rated diabetes control in the past month		
Excellent	422	24%
Very good	456	26%
Good	564	32%
Fair	276	16%
Poor	56	3%
Current smoking status		
Daily	305	17%
Occasionally	62	4%
Not at all	1,423	80%
Number of days in the past 30 days with at least 15 minutes of physical activity		
0	470	27%
1-5	309	17%
6-10	228	13%
11-15	197	11%
16-20	143	8%
21-25	53	3%
26-30	373	21%
Alcohol use frequency		
Never	599	34%
Monthly or less	450	25%
2-4 times per month	344	19%

2-3 times per week	235	13%
4 or more times per week	162	9%
Body mass index category		
Underweight	9	<1%
Normal weight	290	17%
Overweight	650	38%
Obese	774	45%
Time since diabetes diagnosis in years (mean, SD)	5.7	3.2
Self-reported psychiatric diagnosis		
Depression	397	22.1%
Anxiety	324	18.1%
Other psychiatric diagnosis	67	3.7%
Diabetes treatment		
Diet	696	38.8%
Oral medication	1610	89.6%
Chronic Conditions		
0 conditions	324	18.6%
1 condition	540	31%
2 or more conditions	876	50.3%
Diabetes Complications Index		
0 complications	659	36.7%
1 complication	541	30.1%
2 complications	508	28.3%
Scores on psychological questionnaires	Mean (SD)	Median (interquartile range, 25^{th} -75^{th})
DDS-17	1.6 (0.7)	1.3 (1.1-1,9)
PHQ-9	3.9 (4.7)	3(0-6)
GAD-7	2.8 (4.3)	5 (0-4)

Note. Given missing data on some of the sociodemographic characteristics, sample sizes per variable reported may not equal the total sample of 1,796. DDS-17 = Diabetes Distress Scale [total score range = 1-6]; PHQ-9 = Patient Health Questionnaire [total score range = 0-27]; GAD-7 = Generalized Anxiety Disorder Questionnaire [total score range = 0-21].