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A longitudinal study of affective and anxiety disorders, depressive affect and diabetes distress in adults with Type 2 diabetes

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Abstract

Aims—To report the prevalence and correlates of affective and anxiety disorders, depressive affect and diabetes distress over time.

Methods—In a non-interventional study, 506 patients with Type 2 diabetes were assessed three times over 18 months (9-month intervals) for: major depressive disorder (MDD), general anxiety disorder (GAD), panic disorder (PANIC), dysthymia (DYS) (Composite International Diagnostic Interview); depressive affect [Center for Epidemiological Studies– Depression (CES-D)]; Diabetes Distress Scale (DDS); HbA_{1c}; and demographic data.

Results—Diabetic patients displayed high rates of affective and anxiety disorders over time, relative to community adults: 60% higher for MDD, 123% for GAD, 85% for PANIC, 7% for DYS. The prevalence of depressive affect and distress was 60–737% higher than of affective and anxiety disorders. The prevalence of individual patients with an affective and anxiety disorder over 18 months was double the rate assessed at any single wave. The increase for CES-D and DDS was about 60%. Persistence of CES-D and DDS disorders over time was significantly greater than persistence of affective and anxiety disorders, which tended to be episodic. Younger age, female gender and high comorbidities were related to persistence of all conditions over time. HbA_{1c} was positively related to CES-D and DDS, but not to affective and anxiety disorders over time.

Conclusions—The high prevalence of comorbid disorders and the persistence of depressive affect and diabetes distress over time highlight the need for both repeated mental health and diabetes distress screening at each patient contact, not just periodically, particularly for younger adults, women and those with complications/comorbidities.

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Keywords

affective and anxiety disorder; depressive affect; distress; prevalence

Introduction

Clinical depression, anxiety disorders, depressive affect and diabetes-specific distress are common conditions in patients with diabetes, and all have been linked with a variety of bio-behavioural variables: poor disease management [1], higher healthcare costs [2], more days of missed work [3] and mortality [4]. Previous reports have suggested that most patients with high depressive affect are not necessarily clinically depressed, but rather, are suffering from high levels of diabetes-related distress [5,6]. The prevalence of anxiety disorders and their linkages with diabetes indicators remain unclear, but several studies have shown negative associations with HbA_{1c} [7,8]. Studies of the prevalence of co-occurring anxiety and affective disorders have also yielded mixed results [9–11].

Studies of the prevalence of co-occurring mental disorders among patients with diabetes have been limited by a number of methodological problems: most studies rely on self-report measures and assume that high scores on these measures are equivalent to ratings based on structured interviews; rates are higher when patients are recruited from academic centres as opposed to when patients are recruited from community settings; many studies screen initially with self-report instruments and then confirm with structured interviews, causing a verification bias; and many studies have not investigated the impact of other psychiatric diagnoses in diabetes [7,8,12]. More importantly, none, to our knowledge, has provided information about the prevalence of mental disorders in the same sample over time. This frequency may have differential implications for treatment because it includes time in the calculation of prevalence, it identifies potential patterns of within-patient presentation, and it reveals how different frequencies of presentation over time may be linked to bio-behavioural variables.

We previously reported cross-sectional prevalence rates of major depressive disorder (MDD), high depressive affect and high diabetes distress in a diverse community sample of 506 patients with Type 2 diabetes and showed the associations between each of these conditions and a number of diabetes-related bio-behavioural variables [12]. In this report, we present expanded diagnostic data from an 18-month, three-wave, non-interventional study of the same sample, each wave separated by approximately 9 months. We report the prevalence of four affective and anxiety disorders, depressive symptoms and diabetes distress across patients and within the same patients with diabetes over time, and, secondarily, describe which demographic and diabetes factors are related to the frequency of presentation of these conditions across the three study waves.

Patients and methods

To ensure a diverse, multi-ethnic community sample, patients were recruited from several community medical groups and diabetes education centres. Inclusion criteria included: patient with Type 2 diabetes; age 21–75 years; read and speak English or Spanish fluently; no severe diabetes complications; and no diagnosis of psychosis or dementia. Letters were sent to each patient from their healthcare facility, co-signed by a facility and a project representative, informing them of the project and that they would receive a phone call from the project office if one of two opt-out procedures was not initiated: patient returned the enclosed post-card or called an 800 phone number. A screening phone call followed and, for eligible patients, an appointment was made in the patient's home, our office, or a community setting to explain the project in detail, collect informed consent and begin assessment. At initial assessment (T1)

patients received a 1.5-h home visit that included questionnaires, physical measurements and interviews, a 150-item mail-back questionnaire, and a visit to a community laboratory for collection of blood and urine specimens. Patients received a reminder letter approximately 9 months from T1 that a Research Assistant would be calling them to arrange their next assessment (T2). The same questionnaire and laboratory visit administered at T1 was repeated at T2, and was repeated again 9 months later, at T3. The mean between-wave interval was 9.1 months. All materials were prepared in English and Spanish, and Assistants were fluent in both languages. Patients who met criteria for an affective or anxiety disorder and who were not being treated were referred to their physician. The project was approved by the institutional review board at University of California, San Francisco and at each participating facility.

Patient characteristics included age, sex, education, number of comorbidities (from a list of 25), number of diabetes complications, self-identified ethnicity (White/non-White) and years since diabetes diagnosis. Biological variables included HbA_{1c} and non-high-density lipoprotein (HDL)-cholesterol. Depressive affect over the last week was assessed by the Center for Epidemiological Studies–Depression (CES-D) [13], a 20-item questionnaire ($\alpha = 0.89$), with a score of ≥ 16 used as the cut-point. Diabetes distress was assessed by the Diabetes Distress Scale (DDS) [14], a 17-item questionnaire ($\alpha = 0.93$), with a mean-item score of ≥ 3 used as the distress cut-point.

Comorbid mental disorders, defined by Diagnostic and Statistical Manual of Mental Disorders-IV criteria, were assessed at each wave by the Composite International Diagnostic Interview (CIDI) structured interview [15]. Assistants were trained by a CIDI-certified trainer (P.A.), they attended weekly supervisory sessions and they scored standard protocols throughout the course of the study to prevent rater drift over time. Because of the length of the CIDI and the very low prevalence of many disorders in community samples, patients were assessed only on the affective and anxiety disorder modules, yielding the following diagnostic categories: major depressive disorder (MDD), dysthymia (DYS), general anxiety disorder (GAD), and panic disorder (PANIC). Co-occurring MDD and GAD was the most frequent multi-diagnostic group and was included in all analyses. We report past year prevalence for T1 and ‘since we saw you last’ (9 months) for T2 and T3. We previously reported no significant differences between having a diagnosis within the last 1, 6 or 12 months and any demographic, disease status or behavioural management variable, using time-series analyses [12]. For comparability, we used data from the National Co-Morbidity Study–Revised (NCS-R) [16,17], a community study of prevalence of affective and anxiety disorders with similar sample age and gender distributions. The NCS-R also used the CIDI.

Data analysis

A drop-out analysis was undertaken by comparing 28 demographic, diabetes and behavioural variables in those patients who completed all three assessments with those who missed T2 or T3, or both T2–T3 investigations using χ^2 and correlation. Prevalence of each condition assessed by the CES-D, DDS and CIDI were calculated for each time period across patients and within patients across time periods. Multiple hierarchical regression then compared demographic data, HbA_{1c} and non-HDL cholesterol with those who reached the criterion for a condition at none, one, two and three study waves. The results were substantively the same when using a negative binomial regression. Analyses were undertaken using *SPSS* 11.0 (SPSS Inc., Chicago, IL, USA) and *SAS* 9.1 (SAS Inc., Cary, NC, USA).

Results

Screening identified 640 eligible patients and 506 completed T1 assessment (79.0%). There were no significant differences between eligible patients who participated at T1 and those who refused in age, sex, ethnicity, years with diabetes, number of comorbidities DDS and CES-D

scores, or any CIDI condition. At T1, age was 57.8 ± 9.86 years (mean \pm SD), 57.0% were female, and the average number of comorbidities was 3.8 ± 2.5 (Table 1).

Of the 506 T1 patients, 411 (81.2%) completed all three study waves, 21 (4.2%) missed T2 only, 40 (7.9%) missed T3 only and 34 (6.7%) missed both T2 and T3. Thus, overall attrition was 18.8% over 18 months. We compared 28 diabetes status and demographic variables in those who completed all three waves with those who missed one or two waves. Two low but statistically significant associations were found, which, given the number of analyses run, could have resulted by chance: those who missed a wave more often spoke Spanish than English ($r = 0.09$, $P = 0.04$) and experienced more years with diabetes ($r = 0.12$, $P = 0.01$). Those with CIDI conditions did not drop out more frequently than those without.

Prevalence of disorder

There were no significant differences in prevalence of each condition across the three waves, so Table 2 shows the prevalence of each condition at T1. Also included are data from the NCS-R, the prevalence of each condition over 18 months (any one or more waves), and the persistence of each condition over time (any single wave, any two waves, all three waves). Four findings are noteworthy. First, patients with diabetes had a significantly higher rate of MDD, GAD, DYS and PANIC at each wave than prevalence rates reported by the NCS-R: 60% higher for MDD, 122% higher for GAD, 85% higher for PANIC and 6% higher for DYS. Second, the prevalences of diabetes distress and depressive affect were each between 60 and 110% higher than MDD across all study waves. Third, about 30% of those with MDD and about 50% of those with GAD reached criteria for a dual MDD/GAD diagnosis at each study wave; anxiety and depression frequently co-occurred among a substantial number of patients. Fourth, the percentage of individual patients who reached criteria for a condition any time over 18 months was substantially higher than the percentage at any one wave. For example, the mean prevalence of MDD and GAD across the three waves was 10.1 and 8.0%, respectively; but the percentage of individual patients receiving a diagnosis of MDD or GAD at any of the three waves was 19.8 and 17.0%, respectively. These were approximately double the rate for that condition assessed at one point in time; and the percentages for high depressive affect and diabetes distress were about 60% higher. Expanding the time frame from one point in time, as in cross-sectional observation, to 18 months highlights the sharply increased prevalence of affective, anxiety and distress conditions among individual patients with diabetes.

Persistence of disorder

For those 411 patients on whom we had data at all three time points, Table 2 shows the number of waves at which individual patients reached criteria for a diagnosed condition. On average, the vast majority of patients with affective and anxiety disorders received a diagnosis only at one wave, whereas more patients with high depressive affect or diabetes distress reached criteria at multiple study waves. For example, 14.9, 4.2 and 1.7% of patients recorded a diagnosis of MDD at one, two and three study waves, respectively. Patients with high depressive affect and no affective and anxiety disorder, however, reported significantly greater persistence of their condition across study waves: 15.5, 11.8 and 9.0% (Bowker's test of symmetry, $P < 0.001$ for each contrast). Stated differently, 76% of those with ≥ 16 CES-D scores at one time point scored similarly at a second wave, and 77% of these patients scored similarly at a third wave. For the DDS, the percentages were 50 and 86%, respectively. In contrast, only 28% of those who reached criteria for MDD at one wave did so at a second, and only 14% of these did so at a third wave. The comparable percentages for GAD were only 27 and 19%. These findings suggest a greater persistence of depressive affect and distress over time, compared with the more episodic presentation of affective and anxiety disorders.

We used multiple regression to determine which factors were associated with the persistence of each condition across the three waves (Table 3). Education, duration of diabetes and non-HDL-cholesterol failed to display a significant, independent relationship with the frequency of presentation over time for any of the six conditions. However, younger age, female gender and high comorbidities were consistently and independently related to greater persistence of most conditions over time. High HbA_{1c} at T1 was also associated with persistence of depressive affect over time. Significance was maintained in all analyses when only patients who reached a criterion for a condition at one, two or three waves were included. Therefore, the findings were not due only to comparisons between those with and without a condition across waves.

Linkages with HbA_{1c}

Mean HbA_{1c} did not differ significantly across the three study waves ($F = 0.77$, $P = 0.46$). CES-D scores and DDS scores were each significantly and positively associated with HbA_{1c} at each wave: CES-D, $r = 0.11-0.17$ ($P < 0.01$); DDS, $r = 0.11-0.13$ ($P < 0.01$). In contrast, no significant correlation was found between any affective or anxiety disorder and HbA_{1c} at any study wave. Thus, only high depressive affect and diabetes distress were consistently linked to high HbA_{1c} over time.

Discussion

The results of this non-interventional, longitudinal study show that patients with Type 2 diabetes display high rates of several anxiety and affective disorders over time, rates 7–123% higher than community adults; that the percentages of patients with high depressive affect and diabetes distress are even higher than of affective and anxiety disorders; and that a substantial number of patients with MDD or GAD display dual MDD/GAD diagnoses. Of considerable clinical importance is the finding that the percentage of patients who display a condition at any of the three times over an 18-month period is dramatically higher than the already high percentages of patients with a diagnosis at one point in time: more than double the rate for anxiety and affective disorders and about 60% higher for depressive affect and distress. Documenting the much higher prevalence across study waves, which for many patients parallels the timing and frequency of visits for diabetes care, highlights the need for both repeated mental health and diabetes distress screening at each patient contact, not just periodically [18].

Our findings also indicate that patients with high depressive affect or diabetes distress display more persistent conditions over time than those with affective or anxiety disorders. We speculate that these differences may be explained at least in part by differential use of psychotropic medications. Using patient self-report data only, about 50% of patients with affective and anxiety disorders in our sample reported taking psychotropic medication, which is problematic in its own right; but this percentage is not significantly different from medication use reported among those with high depressive affect without an affective or anxiety disorder. Furthermore, both affective and anxiety disorders and high depressive affect patients reported greater medication use than those with high diabetes distress. Although we had no information regarding type or dosage of psychotropic medication, these preliminary findings suggest that clinicians may be more likely to detect and treat affective and anxiety disorders and those with high depressive affect than to diagnose and treat patients with high levels of diabetes distress. Considerable data suggest that many health professionals tend to minimize the seriousness of distress because they feel that it is 'expected' among those with diabetes or other chronic conditions [19,20]. This finding is especially problematic, since our data also show that high HbA_{1c} is more strongly related to depressive affect and diabetes distress than to affective and anxiety disorders. Thus, ongoing screening and treatment of diabetes distress appear warranted.

Younger age and high comorbidities/complications are each independently and linearly linked to the persistence of affective and anxiety disorders, high depressive affect and diabetes distress. Female gender is likewise linked to persistence of depressive symptoms, diabetes distress and PANIC. Several studies have shown a negative relationship between age and psychological distress [21,22]. Younger adults may be more reactive to life stressors, they may experience chronic disease as more developmentally unexpected, and they may cope less effectively with these conditions than older adults [23]. Gender differences in reported mood and relationships between comorbidities and anxiety/depression are also found in the literature [24]. These findings suggest that younger patients, women and those with many comorbidities may require particular clinical attention to reduce distress and its negative impact on diabetes outcomes.

Not surprisingly, the co-occurrence of anxiety and depression is relatively high among these patients—about 30% of those with MDD and about 50% of those with GAD. The treatment literature indicates that the combination of anxiety and depression is more difficult to treat, with greater risk of relapse and poorer treatment response, than either alone [25,26]. Thus, clinicians should explore the diagnosis of both conditions and be aware that co-occurring GAD and MDD requires more complicated and intensive treatment than either alone.

Several factors limit the interpretation of these findings. First, the study included only three waves. More waves over a longer time might reveal a different pattern of disorder. Second, the time interval between waves was only 9 months. This may not have allowed sufficient time to clarify potential confounding between the length and frequency of episodes. That is, it was not possible to document clearly whether reports of a disorder at successive waves were due to one single episode or to two distinct episodes. Third, even with the initial sample size, the number of patients who reached criteria for DYS and PANIC did not provide sufficient power for more detailed analysis. Thus, other potential contributors to our results may be undetected. Lastly, we compared our diabetes sample with a historical reference group and not a contemporaneous control group.

Our findings suggest that the assessment of anxiety, affective and distress-related disorders in patients with diabetes at successive patient visits provides a more clinically relevant estimate of their prevalence than when they are assessed only at one point in time. In addition, the significant linkages of depressive affect and distress with demographic variables and HbA_{1c}, and the lack of association between affective and anxiety disorders and these variables, continue at successive assessments over time. This suggests that high depressive affect and diabetes distress are more persistent than anxiety and affective disorders, at least within the time period of this study, and that young and middle-aged adults and those with many comorbid conditions are more at risk of these persistent problems than older adults. We suggest screening for distress, anxiety and affective disorders several times per year, perhaps at each clinical contact, particularly in younger adults and those with complications/comorbidities.

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Abbreviations

CES-D

Center for Epidemiological Studies–Depression

CIDI	Composite International Diagnostic Interview
DDS	Diabetes Distress Scale
DYS	dysthymia
GAD	general anxiety disorder
HDL	high-density lipoprotein
MDD	major depressive disorder
NCS-R	National Co-Morbidity Study–Revised
PANIC	panic disorder
T1, T2, T3	time 1, 2, 3

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Table 1

Description of sample

Male/female	218/288
Age (years)	57.8 ± 9.86
Education (years)	14.6 ± 3.33
Family income (\$1000)	52.7 ± 36.37
Body mass index (kg/m ²)	32.7 ± 7.74
Psychotropic medication <i>n</i> (%)	105 (20.8%)
Comorbidities (<i>n</i>)	3.8 ± 2.5
Diabetes duration (years)	8.1 ± 7.5
Ethnicity <i>n</i> (%)	
Asian-American	85 (16.8%)
African-American	104 (20.5%)
Hispanic	98 (19.3%)
Non-Hispanic White	185 (36.7%)
Other	34 (6.7%)

Table 2
Prevalence of each condition across waves

	Point prevalence at T1 (N = 506)		NCS-R		Prevalence over 18 months condition present at any of three waves		Persistence: percent of patients (N = 411) with a condition at:		
	%	SE	%	SE	%	SE	At only a single wave %	At any 2 waves %	At all 3 waves %
CES-D	22.6	1.87			34.4	2.11	15.5	11.8	9.0
DDS	18.0	1.72			29.2	2.02	15.2	7.5	6.4
MDD	10.7	1.38	6.7	0.3	19.8	1.79	14.9	4.2	1.7
GAD	6.9	1.13	3.1	0.2	17.0	1.69	14.4	3.9	0.7
PANIC	5.0	0.97	2.7	0.2	8.9	1.27	7.1	2.7	0.2
DYS	1.6	0.56	1.5	0.1	6.1	1.07	4.9	1.2	0.0
MDD/GAD	3.4	0.81			8.5	1.24	6.6	1.7	0.0

CES-D, Center for Epidemiological Studies–Depression; DDS, Diabetes Distress Scale; MDD, major depressive disorder; GAD, general anxiety disorder; PANIC, panic disorder; DYS, dysthymia.

Regression weights (β) of demographic and diabetes variables predicting frequency of occurrence of each condition (0, 1, 2 or 3 waves;
 $N = 411$)

Table 3

	CES-D	DDS	MDD	DYS	GAD	PANIC	MDD/GAD
Age	-0.18 [§]	-0.19 [§]	-0.24 [§]	-0.01 [*]	-0.20 [§]	-0.19 [§]	-0.15 [‡]
Education	-0.09 [*]	0.04	0.06	-0.07	0.01	-0.03	-0.01
Gender (female = 1)	0.13 [‡]	0.15 [§]	0.05	-0.04	0.04	0.13 [‡]	0.02
Ethnicity (White = 1)	0.07	-0.02	0.02	0.13 [‡]	0.06	-0.01	0.10 [*]
Diabetes duration	0.04	-0.01	0.05	0.04	0.01	0.02	-0.02
Diabetes							
Complications	0.06	0.15 [§]	0.00	0.03	0.13 [‡]	0.04	0.11 [‡]
Comorbidities	0.23 [§]	0.19 [§]	0.26 [§]	0.11 [‡]	0.22 [§]	0.18 [§]	0.17 [§]
HbA _{1c}	0.11 [‡]	0.06	0.00	0.01	0.07	-0.08	0.03
Non-HDL-cholesterol	0.03	0.03	-0.04	-0.03	-0.05	0.01	-0.09 [*]
r^2	0.14 [§]	0.12 [§]	0.09 [§]	0.04	0.10 [§]	0.09 [§]	0.07 [§]

* $P < 0.10$;

[‡] $P < 0.05$;

[#] $P < 0.01$;

[§] $P < 0.001$.

CES-D, Center for Epidemiological Studies-Depression; DDS, Diabetes Distress Scale; MDD, major depressive disorder; GAD, general anxiety disorder; PANIC, panic disorder; DYS, dysthymia; HDL, high-density lipoprotein.