Is Diabetes Related Distress a Risk Factor for Depression in Diabetes?

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Introduction: Recent meta-analysis showed that diabetes seems to be a risk factor for incident depression. This prospective study examines the role of elevated diabetes related distress on the persistence or the recovery from elevated depressive symptoms at a 6-month follow-up.

Methods: Participants completed the Center for Epidemiologic Studies Depression Scale (CES-D). A score of ≥ 16 indicate elevated depressive symptoms. The Problem Areas in Diabetes Scale (PAID) assessed diabetes related distress; a PAID score of ≥ 30 indicates moderate diabetes related distress. Logistic regression models were performed: Persistence and recovery from elevated depressive symptoms were the dependent variables. The independent variable was diabetes related distress. The models were adjusted for potential demographic (age, gender) or medical confounders (BMI, diabetes duration, A1C, diabetes type and late complications).

Results:

- 351 diabetic patients were included (age 50.8 ± 11.4 yrs., 52% female, 58% type 2 diabetic patients, diabetes duration 12.9 ± 11.1 yrs., BMI 29.9 ± 6.9 kg/m², A1c 7.9 ± 1.5%) (see table 1). At baseline 125 patients (35.7%) reported elevated depressive symptoms and 24.9% of the sample had an elevated PAID score, indicating a higher amount of diabetes related distress. The distribution of PAID- and CES-D score are depicted in figure 1. The course of depression is shown in figure 2. From 125 patients with elevated depressive symptoms 72 patients (20.5% from the total sample and 57.6% from the subsample of depressed patients) still had an elevated CES-D score at follow-up, indicating persistent depressive symptoms. From 125 patients with elevated CES-D scores 53 patients (15.0% of the total sample and 42.4% of the subsample elevated depressive symptoms) showed a recovery from depressive symptoms. In 24 cases elevated depressive symptoms occurred in previously non-depressed diabetic patients (10.6% with incident elevated depressive symptoms).

- If diabetes related distress was present at baseline (PAID score ≥ 30) the hazard ratio of having persistent elevated depressive symptoms at follow-up was 6.67 (95% CI 3.79 - 11.72). Adjusting for confounding variables did not change the hazard ratio substantially (HR 6.02 95% CI 3.32 - 10.89) (see figure 3 and table 2).

- In addition the chance for recovery from elevated depressive symptoms was significantly reduced if diabetes related distress was present (odds ratio 0.37 95% CI 0.17 - 0.77). Controlling for possible confounders did not change the odds ratio (0.36 95% CI 0.16 - 0.82) (see figure 4 and table 3).

- In figure 5 and 6 the odds ratio for persistent depression respectively recovery from depression is shown if diabetes related distress was present. But these odds ratios refer to a higher PAID cut-off score (≥ 40). This indicates that the relationship between diabetes related distress and persistence respectively recovery from depression in diabetic patients is true for a rather large range of cut-off scores of the PAID-questionnaire.

Conclusion: Diabetes related distress seems to play a decisive role for an unfavourable course of depressive symptoms. Diabetes related distress may be a mediating factor between diabetes and depression. This relationship was confirmed with two different cut-off scores to operationalize elevated diabetes related distress. Thus, addressing diabetes related distress may be able to ameliorate depression in people with diabetes. In future studies with more statistical power the role of diabetes related distress for incident depression should be examined.

Table 1: Sample characterstics

Characteristics	
n	351
mean age ± SD (yrs.)	50.8 ± 11.4
% female	52.0
% type 2 diabetes	58.0
mean diabetes duration ± SD (yrs.)	12.9 ± 11.1
mean BMI ± SD (kg/m²)	29.9 ± 6.9
mean A1c ± SD (%)	7.9 ± 1.5
% with complications	41.3
% CES-D ≥ 16	35.7 (mean CES-D 14.9 ± 8.4)
% PAID ≥ 30	24.9 (mean PAID 26.6 ± 15.9)

Figure 1: Scatterplot CES-D-Score and PAID-Score

Figure 2: Flow chart: Course of depressive symptoms from baseline to 6-month follow-up

Figure 3: Odds ratio for persistent depressive symptoms, if diabetes related distress is present (PAID ≥ 30)

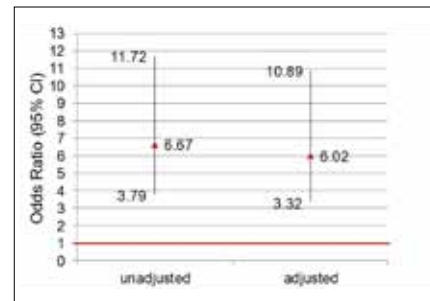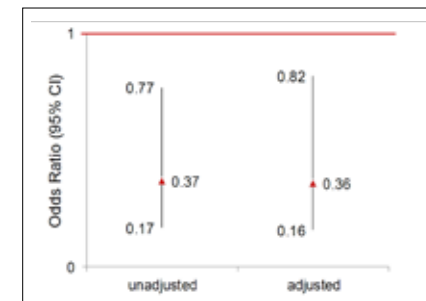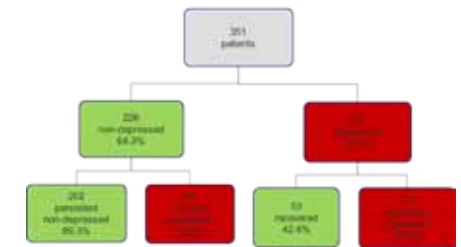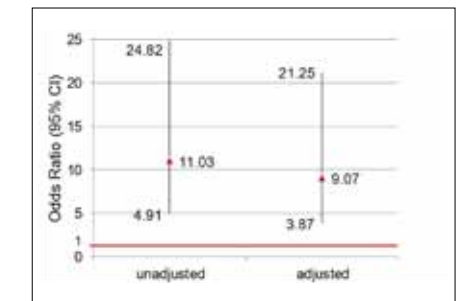Figure 4: Relative chance of recovery from depression, if diabetes related distress is present (PAID ≥ 30)

Figure 5: Odds ratio for persistent depressive symptoms, if diabetes related distress is present (PAID ≥ 40)

Table 2: Adjusted model for persistent depression

	ODDS RATIO	LOWER 95% CI	UPPER 95% CI
diabetes distress	6.02	3.32	10.89
age	1.00	0.98	1.03
male gender	0.50	0.28	0.92
BMI	0.96	0.91	1.01
diabetes duration	1.00	0.96	1.04
A1c	0.98	0.80	1.19
diabetes type	2.34	0.82	6.7
complications	1.42	0.75	2.69

Table 3: Adjusted model for recovery from depression

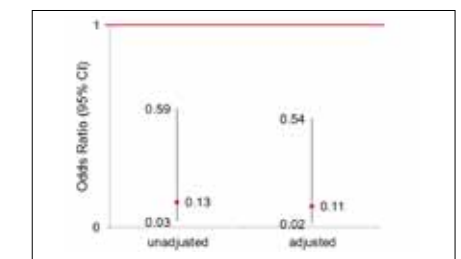|	ODDS RATIO	LOWER 95% CI	UPPER 95% CI
diabetes distress	0.36	0.16	0.82
age	0.94	0.91	0.99
male gender	0.84	0.39	1.84
BMI	1.00	0.94	1.07
diabetes duration	1.02	0.98	1.07
A1c	0.95	0.74	1.24
diabetes type	2.41	0.61	9.6
complications	1.20	0.53	2.68

Figure 6: Relative chance of recovery from depression, if diabetes related distress is present (PAID ≥ 40)