Depressive symptoms are associated with physical inactivity in patients with type 2 diabetes
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Depressive symptoms are associated with physical inactivity in patients with type 2 diabetes. The DIAZOB Primary Care Diabetes study

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**Background.** Depression is a common complication of type 2 diabetes, associated with poor disease outcomes such as impaired glycaemic control, cardiovascular disease and increased mortality. The mechanisms behind these associations are unclear. Depression might contribute to poor disease outcomes through decreased physical activity.

**Objective.** To test whether type 2 diabetes patients with elevated depression scores are more often physically inactive.

**Methods.** Demographic features, clinical factors, level of physical inactivity and depressive symptoms were assessed in 2646 primary care patients with type 2 diabetes. Sequential multiple logistic regression analyses [odds ratio, 95% confidence interval (CI)] were performed to test the association between depressive symptoms and physical inactivity.

**Results.** About 48% of the respondents were physically inactive. Elevated depressive symptoms were found in 14% of the respondents. After adjustment for potential confounders, the odds for being physically inactive were almost doubled in depressed patients with type 2 diabetes 1.74 (95% CI 1.32–2.31).

**Conclusions.** Presence of depressive symptoms almost doubles the likelihood of physical inactivity in patients with type 2 diabetes. Longitudinal studies are needed to investigate whether physical inactivity forms the link between depression and poor disease outcomes.

**Keywords.** Depression, physical activity, type 2 diabetes.

**Background**

In a recent meta-analysis, the prevalence of depression was significantly higher in patients with type 2 diabetes compared to those without [18% versus 10%, odds ratio (OR) = 1.6, 95%, confidence interval (CI) 1.2–2.0]. The relationship between diabetes and depression is complex and probably bidirectional, and mechanisms linking both conditions are still unclear. In prospective studies and meta-analyses, depressive symptoms were associated with a range of adverse health outcomes including disability, impaired glycaemic control, impaired quality of life, morbidity and mortality in patients with diabetes. These poor health outcomes may be mediated through physical inactivity. Research concerning the association between depression and physical inactivity in patients with type 2 diabetes patients is scarce. Therefore, the aim of this study was to examine the association between depressive symptoms and physical inactivity in primary care patients with type 2 diabetes.

**Methods**

**Subjects**
The current study was performed using baseline data from an ongoing diabetes management project in...
A general practice called ‘DIAZOB’ (Diabetes Care Zuidoost Brabant). In this project, the participants are, apart from their regular three monthly diabetes control, annually assessed for biological, demographic, psychosocial and lifestyle factors. All 3300 patients with type 2 diabetes from 100 GPs in the Eindhoven region, The Netherlands, were asked by their nurse practitioner to join this project, during their regular diabetes check-up. After exclusion of respondents who gave no informed consent and after excluding records due to missing data, 2646 participants (80%) were included in the final analysis.

Assessments
Demographic variables were assessed during a nurse-led interview. Glycated haemoglobin (HbA1c) levels and body mass index (BMI) values were determined at the regional primary care diagnostic institute.

Physical inactivity. Physical inactivity was assessed during a nurse-led interview. The nurse practitioner asked the patient how many hours per week one spends on ‘active’ physical activity (like e.g. walking, cycling, stair climbing, gardening, other than sports). Answer categories were as follows: ‘never’, ‘1–2 hours’, ‘between 2 and 4 hours’, ‘between 4 and 6 hours’ and ‘over 6 hours’ per week. Since national public health recommendations indicate moderate physical activity for at least 30 minutes on preferably all days of the week,11 respondents who said they were physically active for 4 or less hours/week were labelled ‘inactive’, the others as active.

Depressive symptoms. Depressive symptoms were patient reported and assessed using a validated Dutch version of the Edinburgh Depression Scale.12–14 This is a 10-item self-rating scale in which each item is scored on a four-point Likert scale. Total scores range from 0 to 30 points, with a score of over 11 points indicating elevated depressive symptoms.

Statistical analyses
Analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 16. Sequential multiple logistic regression analyses (OR, 95% CI) were performed to assess the relative importance of depressive symptoms and potential confounders to physical inactivity by entering the following sets of independent variables: (i) age, female sex, being single, low education; (ii) depressive symptoms; and (iii) BMI.

Results
The sample was predominantly Caucasian (98%), with a roughly equal sex distribution. The average age was 68 years, the average HbA1c level was 6.7% and the average BMI was 29.6. The majority of respondents had a low level of education (62%) and lived with a partner (72%). About half (49%) of the respondents were classified as physically inactive. Elevated depressive symptoms were found in 14% of all respondents.

In Table 1, the results of the sequential multiple regression analyses are shown. In the final model, physical inactivity was predicted by depressive symptoms (OR = 1.74), higher BMI (OR = 1.04), older age (OR = 1.02), female sex (OR = 1.27) and being single (OR = 1.32).

Conclusions
Some 49% of the respondents were physically inactive. Similar to findings in the general population, physical inactivity was related to older age, being female, being without a partner and having a high BMI. The prevalence of elevated depressive symptoms in the entire sample was 14%, which was 4% point lower than the prevalence reported in the meta-analysis by Ali et al.1

Key finding of the present study is that participants who reported elevated depressive symptoms had

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Sequential multiple logistic regression predicting physical inactivity by demographic features, depression and BMI (n = 2646)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1: demographics only</td>
</tr>
<tr>
<td>I Demographic features</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.01 (1.00–1.02)</td>
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<tr>
<td>Female sex</td>
<td>1.40 (1.15–1.70)</td>
</tr>
<tr>
<td>Low education</td>
<td>1.05 (0.86–1.29)</td>
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<tr>
<td>Being single</td>
<td>1.38 (1.10–1.71)</td>
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<tr>
<td>II Depressive symptoms</td>
<td></td>
</tr>
<tr>
<td>EDS score &gt;11</td>
<td></td>
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<tr>
<td>III BMI</td>
<td></td>
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<tr>
<td>Higher BMI</td>
<td></td>
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<tr>
<td>Goodness of fit [chi-square (d.f.), P-value]</td>
<td>23.55 (8), 0.003</td>
</tr>
</tbody>
</table>

Bold depicts that ORs are significant. EDS, Edinburgh Depression Scale.
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References


Declaration

Funding: Zon-MW, The Netherlands Organization for Health Research and Development.

Ethical approval: None.

Conflicts of interest: None.