

Self-Perceived Emotional Distress and Diabetes Risk Among Young Men



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Introduction: There are mixed data regarding the effect of emotional distress on diabetes risk, especially among young adults. This study assessed the effect of self-perceived emotional distress on diabetes incidence among young men.

Methods: Incident diabetes during a mean follow-up of 6.3 (4.3) years was assessed among 32,586 men (mean age, 31.0 [5.6] years) of the Metabolic, Lifestyle, and Nutrition Assessment in Young Adults cohort with no history of diabetes between 1995 and 2011. Emotional distress was assessed by asking participants as part of a computerized questionnaire: *Are you preoccupied by worries or concerns that affect your overall wellbeing?* Time-dependent Cox models were applied. Data analysis took place between 2014 and 2015.

Results: There were 723 cases of diabetes during 206,382 person-years. The presence of distress was associated with a 53% higher incidence of diabetes (95% CI=1.08, 2.18, $p=0.017$) after adjustment for age, BMI, fasting plasma glucose, family history of diabetes, triglyceride and high-density lipoprotein cholesterol levels, education, cognitive performance, white blood cell count, physical activity, and sleep quality. These results persisted when distress, BMI, physical activity, and smoking status were treated as time-dependent variables (hazard ratio=1.66, 95% CI=1.21, 2.17, $p=0.002$). An adjusted hazard ratio of 2.14 (95% CI=1.04, 4.47, $p=0.041$) for incident diabetes was observed among participants persistently reporting emotional distress compared with those persistently denying it.

Conclusions: Sustained emotional distress contributes to the development of diabetes among young and apparently healthy men in a time-dependent manner. These findings warrant awareness by primary caregivers when stratifying diabetes risk.

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Introduction

The incidence of Type 2 diabetes is increasing worldwide, involving an increasing number of young adults. The observation that established risk factors such as obesity cannot solely account for this increase^{1,2} highlights the need to identify novel risk factors. Psychosocial factors, including emotional distress, have been suggested as potential risk factors for future diabetes.^{3–5} However, the data are conflicting, with some prospective studies reporting a twofold or higher risk of diabetes in people reporting excessive distress,^{6–8} whereas others report equivocal risk^{9,10} or even a risk reduction.¹¹ Each of these studies defined emotional distress differently while utilizing various approaches to adjust for confounders, with limited consideration of distress level changes over time. Moreover, these studies

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usually relied on a single baseline assessment in middle-aged individuals in their sixth decade of life or older.

The Metabolic, Lifestyle, and Nutrition Assessment in Young Adults (MELANY) cohort is an ongoing, large, prospective study in Israel assessing the effect of clinical and biochemical parameters on cardiometabolic morbidity among young adults.¹²⁻¹⁵ Data from more than 32,000 young healthy men were analyzed to explore the relationship between emotional distress and incident diabetes after accounting for a comprehensive set of confounders and after considering changes in distress level over time.

Methods

The Metabolic, Lifestyle, and Nutritional Assessment in Young Adults Cohort

The MELANY cohort is being conducted at the Israel Defense Forces screening center (Zrifin, Israel), to which all career service personnel aged >25 years are referred every 3-5 years for routine health examinations and screening tests.^{12,16} At each visit to the screening center, participants complete a detailed questionnaire in Hebrew assessing nutritional, medical, and lifestyle factors, including a brief question regarding self-perceived emotional distress. Blood samples are drawn and analyzed immediately following a 14-hour fast. Complete physical examination is performed by a physician at the center and includes measurements of blood pressure, weight, and height. Primary care for all Israel Defense Forces personnel between scheduled visits to the center is obtained at designated military clinics, and all medical information is recorded in a central computerized database.

Study Population

Figure 1 depicts the study design. Between 1995 and 2011, all first-time attendees examined at the screening center were asked the

following question: *Are you preoccupied by worries or concerns that affect your overall wellbeing?* This analysis included all men who answered either *yes*, *no*, or *I am not sure*; had a fasting plasma glucose (FPG) level <126 mg/dL; and denied a history of depression or diabetes. The IRB of the Israeli Defense Medical Corps approved this study with the assurance of strict participant anonymity during data analyses.

Measures

Participants were followed prospectively from enrollment (first visit to the screening center) and the primary outcome was diabetes onset. Participants underwent the same biochemical and clinical evaluation (including screening for emotional distress and FPG-based screening for diabetes) at each consecutive visit. All subjects were censored at the time of death, retirement from military service, March 8, 2011, or diabetes diagnosis, whichever came first. Incident cases of diabetes were diagnosed by a physician according to the American Diabetes Association diagnostic criteria, by documenting either two FPG levels ≥126 mg/dL or a glucose level ≥200 mg/dL 2 hours after ingestion of 75 grams of glucose. No antibody data were available; as such, the type of diabetes (e.g., Type 1) could not be ascertained. However, it was recently reported for this cohort that >98% of diabetes diagnosed cases were not prescribed insulin during the first year, thereby supporting Type 2 predominance. All laboratory studies were performed on fresh samples in an ISO-9002 quality-assured core facility laboratory.

Emotional distress was assessed by the question: *Are you preoccupied by worries or concerns that affect your overall wellbeing?* (*yes, no, uncertain*). The assessment of distress by similar single-item measures exhibited good test-retest reliability and good correlation with multi-item distress questionnaires,¹⁷ and was used to establish an association with different clinical outcomes,¹⁸⁻²⁰ including diabetes.⁶ The Mini Sleep Questionnaire (MSQ) is a ten-question questionnaire used in clinical studies to assess sleep quality.²¹⁻²³ Cognitive performance at pre-recruitment evaluation (approximately at age 17 years) was denoted by a

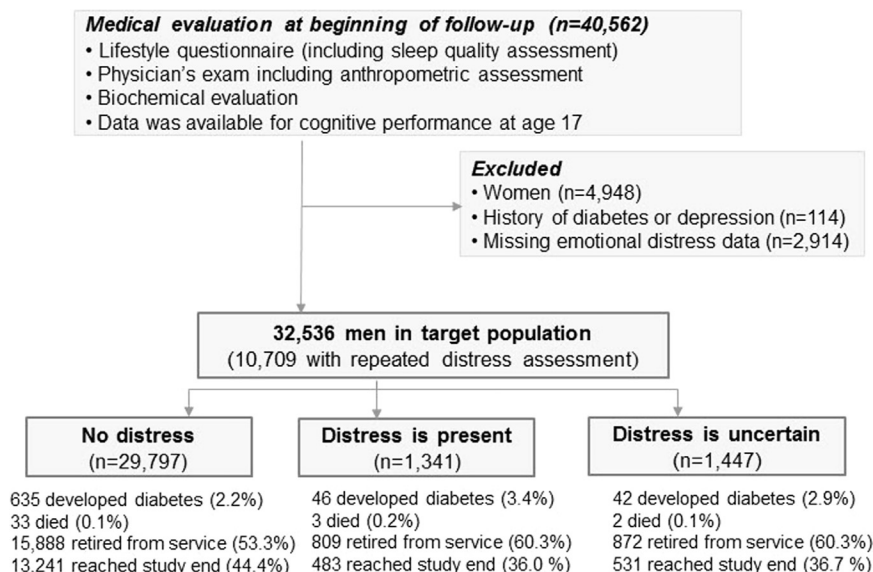


Figure 1. Diagram of study design and outcomes.

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