Loneliness is associated with double the risk of developing diabetes

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A new study published in *Diabetologia* finds that feelings of loneliness are linked to a significantly higher risk of developing type 2 diabetes (T2D).

The research was conducted by Associate Professor Roger E. Henriksen and his colleagues at Western Norway University of Applied Sciences. As well as examining the association between loneliness and the risk of developing T2D, it looked at whether depression and insomnia play a role.

A growing body of research has pointed to a link between psychological stress and an individual's risk of developing T2D. Loneliness creates a chronic and sometimes long-lasting state of distress which may activate the body's physiological stress response. While the exact mechanisms are not fully understood, this response is believed to play a central role in the development of T2D through mechanisms such as temporary insulin resistance brought on by elevated levels of the stress hormone cortisol.

This process also involves changes in the regulation of eating behavior by the brain, causing an increased appetite for carbohydrates and subsequent elevated blood sugar levels. Previous studies have found an association between loneliness and unhealthy eating including higher consumption of sugary drinks and foods rich in sugars and fats.

The researchers used data from the HUNT study, a collaboration between the HUNT Research Centre (Faculty of Medicine and Health Sciences, Norwegian University of Science and Technology [NTNU]), Trøndelag County Council, the Central Norway Regional Health Authority and the Norwegian Institute of Public Health. This database contains the health information (from self-reported questionnaires, medical examinations and blood samples) of more than 230,000 people and obtained via four population surveys: HUNT1 (1984-1986), HUNT2 (1995-1997), HUNT3 (2006-2008) and HUNT4 (2017-2019).

Baseline information for 24,024 participants was taken from HUNT2 after excluding individuals with metabolic disorders, type 1 and type 2 diabetes and those for whom blood test data were not available. T2D

status was the main outcome variable and was based on HbA_{1c} (glycated hemoglobin—a measure of long-term blood sugar control) being greater than 48mmol/mol when measured in the HUNT4 survey.

Loneliness was gauged from responses to the HUNT2 data survey. Participants indicated whether they had felt lonely over the previous 2 weeks and their responses were measured on a four-point scale ("no," "a little," "a good amount" and "very much"). Severity of depression symptoms was assessed using questionnaire completed during HUNT3 and consisting of 7 questions, each scored on a scale of 0-3 for a total of 0-21 points, with higher scores indicating more severe symptoms. Individuals with insomnia were identified based on their answers to the questions: "How often in the last 3 months have you: 'had difficulty falling asleep at night,' 'woken up repeatedly during the night' and 'woken too early and couldn't get back to sleep,'" respectively. These were asked as part of HUNT3 and participants could choose one of three answers: '"never/seldom," "sometimes" and "several times a week."

Out of 24,024 people, 1,179 (4.9%) went on to develop T2D over the course of the study (1995-2019). These individuals were more likely to be men (59% vs. 44%) and had a higher mean age (48 years vs. 43 years) than those without T2D. They were also more likely to be married (73% vs. 68%) and have the lowest level of education (35% vs. 23%). Feelings of loneliness were reported by 13% of participants.

The study found that higher levels of loneliness at baseline were strongly associated with a higher risk of T2D when measured 20 years later. After adjusting for age, sex and education level the researchers found that participants who responded "very much" when asked whether they had felt lonely were twice as likely to develop T2D than those who did not feel lonely. Further analysis showed that this relationship was not altered by the presence of depression, sleep-onset insomnia or terminal insomnia, although the team did find evidence of a link to sleep

maintenance insomnia.

Although their study did not examine the exact mechanisms involved, the researchers note that social support, influence and engagement may have positive effects on health-promoting behaviors. For example, advice and support from a friend may influence an individual's health-related choices and have a positive effect on their diet, physical activity level and overall feelings of stress. Fewer social ties and a lack of these positive influences can make lonely people more vulnerable to behavior which could increase the risk of developing T2D.

The researchers advise that loneliness should be included in clinical guidelines relating to T2D. They say, "It is important that healthcare providers are open to dialogue about an individual's concerns during clinical consultations, including with regard to loneliness and social interaction."

The authors recommend that further research be carried out regarding the mechanisms at play in the link between loneliness and T2D, as well as the roles played by insomnia and depression. They conclude, "Questions to be answered are the extent to which loneliness leads to the activation of stress responses, the extent to which loneliness affects health-related behavior, and importantly, how these two pathways interact in terms of contributing to an increased risk of T2D."

More information: Roger E. Henriksen et al, Loneliness increases the risk of type 2 diabetes: a 20 year follow-up—results from the HUNT study, *Diabetologia* (2022). DOI: 10.1007/s00125-022-05791-6

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