

# Associations of obesity with psychiatric disorders and suicidal behaviors in a nationally representative sample

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## Abstract

**Objective:** To determine whether obesity is associated with a variety of psychiatric outcomes after taking into account physical health conditions. **Methods:** Data came from the public use dataset of the Canadian Community Health Survey Cycle 1.2 (age 15 years and older,  $N=36,984$ ). *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* psychiatric diagnoses of major depressive disorder, mania, panic attacks, panic disorder, social phobia, agoraphobia, alcohol dependence, and drug dependence were examined, as was suicidal behavior (ideation or attempts). Multiple logistic regression was utilized to examine the association between obesity (defined as body mass index  $\geq 30$ ) and mental health outcomes. Covariates in the regressions included sociodemographic factors and a measure of physical illness burden (the Charlson Comorbidity Index). **Results:** In adjusted models, obesity was positively related to

several lifetime psychiatric disorders (depression, mania, panic attacks, social phobia, agoraphobia without panic disorder), any lifetime mood or anxiety disorder, suicidal ideation, and suicide attempts [adjusted odds ratio (AOR) range: 1.22–1.58]. Obesity was similarly positively associated with past-year depression, mania, panic attacks, social phobia, any anxiety disorder, and suicidal ideation (AOR range: 1.24–1.52), and negatively associated with past-year drug dependence (AOR=0.53, 95% CI 0.31–0.89). Most of these associations were found to be specific to women, while some were also present in men. **Conclusion:** Independent of physical health conditions, obesity was associated with psychiatric disorders and suicidal behavior in the Canadian population. Possible mechanisms and clinical implications of these findings are considered.

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## Introduction

Obesity is becoming a significant problem for many countries around the world. Rates of obesity have reached epidemic levels, and both developed and developing countries are now affected [1]. Conservative estimates indicate that at least 15% of the Canadian population [2] and 30% of the US population [3] is obese. Similarly,

approximately 15% of European adults are obese [4], and a worldwide estimate places the number of obese individuals at over 250 million people [5]. Emerging evidence into the correlates of this prevalent problem is establishing that, in addition to the known physical health consequences of obesity [6], there also exist relationships between obesity and various facets of mental health.

Overweight and obesity [defined as a body mass index (BMI) of 25–29.9 and 30.0 and above, respectively] [7] have shown positive associations with depression and depressive symptoms [8–11]. Some evidence [12–14] exists that contradicts the contention of a link between obesity and depression, instead reporting either no relationship or an

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inverse relationship between the two (in line with the “jolly fat” hypothesis of Crisp and McGuiness) [15]. In general, however, research indicates that there is some link between obesity and depressive symptoms, though the mechanism of this association remains uncertain. There is emerging evidence to suggest that obesity may also be linked to nondepression mental disorders (i.e., anxiety and substance use disorders), as well as to suicidal behavior. The extant research in this area shows a positive association between anxiety and obesity [10,16,17] and a negative association between obesity and both substance use [18,19] and substance abuse or dependence [13,17]. Furthermore, a positive link between obesity and increased suicide ideation and attempts has also been demonstrated [20,21].

One area of uncertainty in the population-based work in the area involves the issue of comorbid physical health conditions. The few studies [16,17,20,22] that have taken into account the impact of other somatic conditions on the relationship between obesity and mental health have demonstrated a decrease or complete removal of the relationship between these two factors after such an adjustment is made. However, inconsistent methods of accounting for physical health leave unanswered the question of whether physical health truly mediates the relationship between obesity and mental health, as has been hypothesized [23,24]. In their examination of a nationally representative German sample, Hach et al. [22] adjusted for the presence of 0, 1–2, or 3 or more physician-assessed physical health conditions and found no differences between obese and nonobese individuals on *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* mood, anxiety, or substance use disorder category diagnoses. Similarly, Pickering et al. [17] controlled for the sum of the number of self-reported past-year physical health conditions (out of 11 assessed conditions) and found that only drug dependence, specific phobia (for women), and bipolar I disorder (for women) were associated with obesity in a representative sample of US residents. In another nationally representative US sample, Carpenter et al. [20] adjusted for the lifetime presence of at least one of eight somatic conditions related to obesity and found no relationships between obesity and depression, suicidal ideation, and suicide attempts for men or women. Finally, Jorm et al. [16] found that once physical functioning (as measured by the physical health component score of the Short Form Health Survey) were adjusted for, obesity was not associated with depressive symptoms or anxiety symptoms in a random sample of an Australian community. Although these findings are in line with the hypothesis that the relationship between obesity and mental health may be mediated by the physical health problems that often accompany obesity [23,24], they are based on inconsistent (and in some cases insufficient) methods of controlling for physical health and are in conflict with other population-based research.

Several limitations of the existing literature merit further investigation in this area. First, there are inconsistencies in

the findings between population-based studies regarding whether and which mental health variables are related to obesity. Second, although mood disorders have received a relatively large amount of attention in this regard, there is a paucity of research examining associations with obesity among suicidal behaviors and individual anxiety and substance use disorders. Third, those studies that have taken into consideration physical health problems have done so inconsistently, and opportunities for improvement often exist either in the range of physical health problems examined or in the method of adjusting for somatic conditions. We aim to extend existing research in three ways. First, we examine a wider range of disorders than has been covered previously and conduct this examination in a very large ( $N=36,984$ ), nationally representative sample. We also examine suicidal behavior (ideation and attempts) in relation to obesity to expand on the results of Carpenter et al. [20] and Dong et al. [21]. Finally, we include a superior measure of physical health problems in our analyses to more effectively address the concern that these problems may mediate the obesity–psychiatric disorder association [23] and to help resolve inconsistencies between previous studies.

The questions we seek to answer in this paper are as follows: (1) Is obesity associated with a greater likelihood of psychiatric disorders and suicidality in this nationally representative sample? (2) Are these associations still present when we take into account factors such as sociodemographics and physical health problems, which are known to be associated with both obesity and mental health? and (3) Do these associations differ by gender, as previous work [10,17,20] has suggested they might?

## Methods

### Sample

As described elsewhere [25], the Canadian Community Health Survey-Mental Health and Well-Being (CCHS 1.2) is a cross-sectional, nationally representative survey of Canadians ages 15 and older. The survey was conducted by Statistics Canada in 2002 in order to obtain modern and standardized information about the mental health of Canadians at the provincial level. Respondents were 36,984 individuals living in private dwellings in all ten Canadian provinces. Residents of certain remote regions or of Canada’s three territories, individuals living on Indian Reserves or Crown Lands, full-time members of the Canadian Armed Forces, and residents of health care institutions were excluded from the sample. A multistage stratified cluster design was used to select respondents. An overall response rate of 77% was obtained, with 86% of interviews taking place face to face and the remaining 14% being conducted by telephone. The analyses conducted in this paper are based on the public use CCHS 1.2 dataset made available by Statistics Canada. A more detailed

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