Prevalence of Severe Obesity among New Zealand Adolescents and Associations with Health Risk Behaviors and Emotional Well-Being

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Objective To describe the prevalence of severe obesity among New Zealand young people attending secondary school and the associations of severe obesity with health risk behaviors and emotional well-being.

Study design A random sample of 9107 secondary school students in New Zealand participated in a 2007 health survey. Participants had their height and weight measured and answered an anonymous survey on multiple aspects of their health and well-being.

Results Overall, 2.5% of students met the International Obesity Task Force definition of severe obesity. Students with severe obesity had more weight-related concerns, were more likely to have used unhealthy weight control strategies, and were more likely to experience bullying compared with healthy weight students. For example, students with severe obesity were 1.7 times more likely to have been bullied at school (95% CI 1.2-2.7) and 1.9 times more likely to vomit for weight loss (95% CI 1.1-3.3) than were healthy weight students. Indicators of emotional well-being and most health risk behaviors were similar among young people with severe obesity and a healthy weight.

Conclusions Clinicians who work with young people with severe obesity should prioritize discussing issues of bullying and healthy weight control strategies with families and their children. *(J Pediatr 2013;163:143-9)*.

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The effects of obesity on the physical health of young people are well documented,[1] and there is an emerging body of literature that suggests that the health effects of obesity extend to poor mental health and well-being for young people, but these findings are inconsistent. For example, studies have found that young people who are overweight or perceive themselves to be overweight are at increased risk for attempted suicide,[2,3] although such findings are not consistent. Studies have found that adolescent depression causes later-onset obesity,[4-6] and another study[7] found that obesity at age 14 predicted depressive symptoms at age 31. Furthermore, in a study of young adults with weight loss surgery, Dixon et al[8] observed improvements in depression with ongoing weight loss. It appears that depression and obesity can co-occur for many young people, but the causal relationship between the two is poorly understood.

There is growing concern about the subgroup of young people who are severely obese. Studies from the US estimate that between 3%[9] and 7%[10] of young people are severely obese, and severely obese young people have additional physical health concerns,[11,12] high rates of depression,[13,14] and health-risking behaviors, including smoking for both male and female subjects and more risky sexual experiences for female subjects.[15]

The aim of the current study is to describe the prevalence of severe obesity (using measured height and weight) among young people attending secondary school in New Zealand and to determine the association between severe obesity and indicators of mental well-being and risk-taking behaviors.

Methods

Data for the current study were drawn from Youth'07, the national survey of the health and well-being of secondary school students in New Zealand conducted in 2007. Youth'07 used a 2-stage sample cluster design to select a nationally representative sample of secondary school students. First, 115 schools were randomly selected and 96 agreed to participate (84% response rate for schools). In schools with <166 students (n = 7), 30 students were chosen at random to participate to maintain anonymity of students. In the participating schools, 12 355 students were invited to complete the survey and 9107 took part (73% response

BMI	Body mass index
IOTF	International Obesity Task Force

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rate for students). Apart from a slightly higher percentage of male students (54%), the participating students were similar demographically to the national population of secondary school students.[16]

The Youth'07 survey included 622 items assessing the health and well-being of adolescents. The survey was conducted at school during the school day. Students completed the survey using Internet tablets; questions and answers could be heard through headphones, and responses were made by touching the screen with a stylus. Participation in the survey was voluntary and anonymous.

Ethical approval for the Youth'07 survey was granted by the University of Auckland Human Participants Ethics Committee. School principals consented to participation by schools on behalf of the boards of trustees. Parents and guardians were informed about the survey and were encouraged to discuss decisions about participation with their children but were not required to sign a consent form. Students consented to participate in the survey.

Weight status was assessed objectively by trained research staff according to standardized procedures and protocols. Height was measured using a portable stadiometer (214; Seca, Hamburg, Germany) to the nearest 0.1 cm. Weight was measured using digital scales (349KLX; Health-o-Meter, New York, New York) to 0.1 kilograms. Body mass index (BMI) was calculated by dividing weight (kilograms) by height squared (meters). Weight status (healthy weight, overweight, obese, and severe/morbid obesity) were defined by the International Obesity Task Force (IOTF) classification system.[17,18] The IOTF classification system provides BMI cut-points by age and sex for overweight, obesity, and severe obesity among children aged 2-18 years. These cut-points were created from international data and correspond to an adult BMI of 25, 30, or 35 kg/m^2 for overweight, obesity, and severe obesity, respectively.

Age, sex, and ethnicity were determined by self-report. Ethnicity was assessed using the standard measures developed for the New Zealand census,[19] where participants can select all of the ethnic groups with which they identify. Approximately 40% of students identified with more than one ethnic group.[16] To facilitate statistical analyses, discrete ethnic populations were created using a prioritization method in which students were assigned to one ethnic group in the following order: Māori, Pacific, Asian, other ethnicity, European.[19]

During the survey, students were asked to provide their residential address, which was used to identify the small area geographical unit in which they lived. That unit (not their address) was recorded and later linked to the 2006 New Zealand Deprivation Index[20] to identify the extent of deprivation in the small area where each student lived. The index measures 8 dimensions of deprivation (income, home ownership, support, employment, qualifications, living space, communication, transport) using 2006 census data. The index deciles were categorized into 3 groups reflecting low deprivation (deciles 1-3), middle levels of deprivation (deciles 4-7), and high deprivation (deciles 8-10). Living in an urban/rural locality was based on the location of the student's residential small area geographical unit. Urban areas were defined as a population of $\geq$1000, and rural areas had a population between 300 and 999.[16]

Current cigarette use included students who reported smoking cigarettes "occasionally," "once or twice a month," "once or twice a week," "most days," or "daily." Frequent alcohol use included students who reported drinking alcohol "several times a week" or "most days" during the past 4 weeks. Risky motor vehicle use was defined as reporting one or more risky behaviors related to motor vehicle use in the past month. These behaviors were assessed with 6 questions that asked about past month frequency of driving a car (and riding in a car) when the driver had drunk >2 glasses of alcohol in the 2 hours before driving, had been using drugs, or was driving dangerously (eg, speeding, chases, burnouts).

Involvement in violent behaviors was assessed by 4 questions regarding past year frequency of getting into a serious fight, being hit or physically harmed someone on purpose, carrying a weapon (eg, knife) and thinking about harming someone, or being attacked by someone using a weapon. Students who reported one or more of these behaviors were defined as engaging in violent behaviors.

Unsafe sexual health was defined as the inconsistent use of contraception and condoms among sexually active students. Students who had responded that they had ever had sex were asked, "How often do you use condoms as protection against sexually transmitted infections?" and "How often do you or your partner use contraception?" Students were defined as engaging in unsafe sexual behaviors if they reported inconsistent use (sometimes or never) of condoms or contraception.

To assess student satisfaction with their current body weight, students were asked, "At this time how happy are you with your weight?" with 5 response options ranging from "very happy" to "very unhappy." Students who responded "unhappy" or "very unhappy" were classified as being unhappy with their weight. Students were also asked, "Do you worry about putting on weight" with 4 response options. Students who indicated they "worry a lot" were classified as being worried about gaining weight.

To assess students' weight loss strategies, students were asked, "In the past 12 months have you ever tried to lose weight?" Students who responded "yes" were asked about strategies used to lose weight or stop gaining weight, including, "I fasted or did not eat for more than a day," "I skipped one or more meals a day," "I smoked cigarettes," and "I made myself vomit."

Well-being was assessed with the World Health Organization–Five Well-being Index,[21] which measures 3 underlying constructs of positive mood, vitality, and general interests. The index includes 5 items rated on a 6-point Likert scale from 0 (at no time) to 5 (all of the time). The responses were summed to derive an overall score with higher scores indicating better well-being; the scores were dichotomized, such that students scoring >17 are described as having very good mental health. Depression was assessed with the Reynolds Adolescent Depression Scale short form,[22] which has acceptable reliability and validity for New Zealand