

Research and Professional Briefs

Faster Self-Reported Speed of Eating Is Related to Higher Body Mass Index in a Nationwide Survey of Middle-Aged Women

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ABSTRACT

This study is the first nationwide population survey to explore the association between speed of eating and degree of obesity. The objective was to cross-sectionally examine the relationship between self-reported speed of eating and body mass index (BMI; calculated as kg/m²) in a nationally representative sample of New Zealand women. In May 2009, a sample of 2,500 New Zealand women aged 40 to 50 years was randomly selected from the nationwide electoral rolls. A 66% participation rate was achieved. Potential participants were mailed a self-administered questionnaire containing questions on self-reported speed of eating, demographics, health conditions, menopause status, physical activity, height, and weight. Univariate models were used to examine the associations between demographic, health and behavioral variables, and BMI, while a multivariate model was developed to investigate the relationship between self-reported speed of eating and BMI. After adjusting for age, smoking status, menopause status, thyroid condition, ethnicity, socioeconomic status, and physical activity, BMI statistically significantly increased by 2.8% (95% confidence interval: 1.5% to 4.1%; $P < 0.001$) for each category increase in self-reported speed of eating. Although the direction of causality requires confirmation in longitudinal and randomized intervention studies, the results suggest that faster eating is associated with higher BMI in middle-aged women.

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Speed of eating has long been of interest as a factor potentially contributing to the development of obesity. However, research findings in this area are inconsistent. Studies in a laboratory setting using careful measurements of eating rate have compared obese participants with normal weight controls. Among obese participants, a higher eating rate was reported for a Swedish dish of potatoes/onions/meat (1), pasta or yogurt (2), and chocolate pudding (3); however, eating rate was not substantially different for bread with the participant's preferred filling (4). A recent study has demonstrated that across a wide variety of foods, eating rate is positively associated with the amount of food eaten (5). Studies examining the effects of various strategies intended to slow the rate of eating (eg, pausing between bites (6), putting down utensils between bites, or cutting food into smaller portions (7) have also produced inconsistent results. An experimental study conducted among 30 young women reported that the combination of taking small bites, pausing between bites, and chewing thoroughly decreased the speed of eating and energy intake and enhanced satiation (6). However, two studies (8,9) reported that although there was a decrease in eating rate with smaller bites (8) and pauses within meals (9), eating slowly did not reduce energy intake or enhance satiation (8,9). One behavioral weight-loss program incorporating recommendations for slow eating reported that obese women substantially decreased their rate of eating during treatment (7). Although slower speed of eating was associated with weight loss after 28 weeks, slower eating was not maintained at week 41, and the association between changes in rate of eating and weight was no longer statistically significant (7).

Few epidemiological studies have examined the association between speed of eating and obesity. In the only available prospective study, male fire service personnel ($n=438$) who reported faster eating rates gained more weight over 7 years (10). To date, only three cross-sectional studies have examined the relationship between speed of eating and body mass index (BMI; calculated as kg/m²) in healthy adult populations (11-13). All three studies were conducted among Japanese subjects and reported that faster eating was positively associated with BMI. A small study ($n=122$) of older Spanish adults reported that normal-weight subjects spent a longer time eating their breakfast than obese subjects (14). In a study of Japanese patients with diabetes or hyperlipidemia, faster eating was associated with obesity in men but not women (15). These studies relied on self-rated speed of

eating (11-13,15) and one used self-reported heights and weights (11).

The aim of this study was to investigate, in a nationally representative sample of middle-aged New Zealand women, the relationship between self-reported speed of eating and BMI. It was hypothesized that faster rates of eating would be associated with higher BMI.

METHODS

Study Design

In May 2009, the New Zealand electoral rolls, listings of New Zealand residents eligible to vote in elections (which includes both the General electoral rolls and the Maori electoral rolls), were used to randomly select 2,500 women aged 40 to 50 years. The 40- to 50-year-old age group was chosen for its high prevalence of obesity (16) and particularly high risk of weight gain (17). All potential participants were mailed a self-administered 21-page questionnaire with a cover letter and a postage-paid return envelope. Mail survey procedures were modified from Dillman's Tailored Design method (18). A thank you/reminder postcard was sent to all women 8 days after the first mailing, and up to two additional reminders were sent to nonrespondents at 20 and 28 days after the first mailing. This included a replacement questionnaire and postage-paid return envelope with the second reminder, and a thank you/reminder postcard as the final reminder. A University of Otago pen and an individually wrapped teabag were included with the initial mailing as nonmonetary incentives. To further encourage participation, those who returned a completed questionnaire within the first 2 weeks of the initial mailing were entered into a prize drawing to win one of three NZ\$200 (approximately US\$134) cash prizes or 10 NZ\$100 (approximately US\$67) cash prizes. Women who returned a completed questionnaire in response to the second mailing were entered into a drawing to win one of four NZ\$100 cash prizes. In addition to the lottery drawing, of the 2,500 participants, 400 women were randomly selected to receive an unconditional NZ\$5 (approximately US\$3.35) note in the initial mailing.

Before the main survey, 36 local Dunedin, New Zealand, women in the target age range were asked to provide detailed feedback on the questionnaire booklet about their perceptions of the layout, appearance of the booklet, and instructions, and the clarity, ease of completion, and interpretation of questions. Of these 36 women, seven identified as Maori and five were of Pacific origin. In response to their comments, improvements were made to the layout of the booklet and to the clarity of instructions. A pilot survey of 100 women selected randomly from the electoral rolls was also undertaken. The pilot study included a pen with the initial mailing and up to three reminders to nonrespondents, but did not include lottery drawings, and resulted in a 56% response rate. Based on the pilot study, the main survey was refined to include financial incentives in order to improve the response rate, and to change the final reminder from a phone call to a postcard in order to reach more participants.

This study was approved by the University of Otago Ethics Committee, Dunedin, New Zealand and the Ngai Tahu Research Consultation Committee. All participants

for the pilot and main surveys were informed in the cover letter that by completing and returning the questionnaire, this would be taken as their consent to take part in the study.

Questionnaire

As part of a larger study examining the associations between eating behavior regulation, lifestyle factors, and BMI, the survey questionnaire booklet included a question on self-reported speed of eating from Otsuka and colleagues (12), as well as questions on demographics (19), health conditions (19), menopause status (20), physical activity (21), and self-reported weight and height.

The original self-reported speed of eating question by Otsuka and colleagues (12) was modified from "How fast is your rate of eating?" to "How would you describe your usual rate of eating?" As in Otsuka and colleagues' study (12), participants were asked to choose one response from "very slow," "relatively slow," "medium," "relatively fast," or "very fast." The validity of this question has been demonstrated by the observed high level of agreement between a person's self-reported speed of eating and the person's speed of eating as reported by one of their friends (11). This question has also been shown to have good repeatability during a 1-year period (13). A Rapid Assessment of Physical Activity questionnaire by Topolski and colleagues (21) was modified and used to classify the amount and intensity of the respondents' usual physical activity during the last 12 months. Respondents were asked to either select "yes" or "no" in response to five items describing physical activity levels ranging from "I rarely or never do any physical activities" to "exercising vigorously 20 minutes on 3 or more days per week." Specific examples of physical activities of various intensities were provided, including sketches of women engaging in those activities. This physical activity questionnaire has been shown in a sample of US adults to be more highly correlated with caloric expenditure than two other self-report physical activity questionnaires (21).

Three questions on menopausal status from the Australian Longitudinal Study of Women's Health were included (20). Demographic and other health measurements were derived from questions included in the New Zealand Census 2006 (19). Using the New Zealand Socioeconomic Index 1996 (22), a continuous socioeconomic status score was determined from each participant's usual occupation. If a participant responded to a question on spouse/partner occupation, the higher of the two scores was used in all analyses as an estimate of household socioeconomic status (22).

Statistical Analysis

Linear regression models were developed to examine the univariate associations between demographic, health, and behavioral variables (age, smoking status, menopause status, thyroid condition, prioritized ethnicity, socioeconomic status, physical activity) and BMI.

A multivariate linear regression model was used to evaluate the association between self-reported speed of eating and BMI adjusting for age, smoking status, menopause status, thyroid condition, prioritized ethnicity, so-

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