Weight Perception, Satisfaction, Control, and Low Energy Dietary Reporting in the US Adult Population: Results from the National Health and Nutrition Examination Survey 2007-2012

Stefanos Tyrovolas, PhD; Ai Koyanagi, MD, PhD; Andrew Stickley, PhD; Josep Maria Haro, MD, PhD

ARTICLE INFORMATION

Article history:
Submitted 4 June 2015
Accepted 29 September 2015
Available online 21 November 2015

Keywords:
Dietary assessment
Misreporting
Low energy reporting
Self-perceived weight status
National Health and Nutrition Examination Survey (NHANES)

http://dx.doi.org/10.1016/j.jand.2015.09.022

ABSTRACT

Background Prior research has indicated that several factors are associated with low energy dietary reporting; however, there is comparatively little information on the association between body image, weight control, and low energy reporting.

Objective Our aim was to evaluate the association between low energy reporting and aspects of weight perception, satisfaction, and control in a nationally representative US adult sample.

Design This was a cross-sectional study.

Participants/setting Data were analyzed from 13,581 adults aged 20 years and older who participated in the 2007-2012 National Health and Nutrition Examination Survey. Data on sociodemographic, clinical, and lifestyle characteristics, and weight perception, satisfaction, and control were collected. The ratio of reported energy intake to estimated basal metabolic rate (EI/BMR) was calculated and used for the assessment of low energy reporting.

Main outcome measures The relationship of low energy reporting with various aspects of weight perception, satisfaction, and control was evaluated.

Statistical analyses performed Multivariable logistic regression was used to assess the association between the variables.

Results Low energy reporters were significantly more likely to consider themselves overweight (perception), want to weigh less (satisfaction), and to have tried to lose weight in the past 12 months (control). Compared with having no desire for weight change, wanting to weigh less was associated with 1.28 (95% CI 1.07 to 1.53) times higher odds for low energy reporting. Trying to lose weight was also associated with low energy reporting (odds ratio=1.56; 95% CI 1.38 to 1.76). Effect modification by obesity status was observed for the weight perception, satisfaction, and control variables where the odds ratios of these factors for low energy reporting were higher among those who were not obese.

Conclusion Weight perception, satisfaction, and control are related to low energy reporting, and should be taken into account in nutritional assessments. In addition, the effect of these factors can differ by obesity status.
J Acad Nutr Diet. 2016;116:579-589.

THE ACCURATE EVALUATION OF DIETARY INTAKE IS essential for assessing an individual's nutritional status and undertaking preventive and therapeutic strategies, as well as for nutritional education programs. Until now, several methods have been utilized for dietary assessment.[1] In previous studies, however, irrespective of the method used, there has been a high prevalence of reporting low daily dietary energy intake (low energy reporting).[2] For example, a previous review has reported that the prevalence of low energy reporting is between 2% and 85%,[3] with national surveys in Finland, the United States, and United Kingdom reporting figures between 40% and 50%.[4] In addition, underreporting may have risen over time in the United States. Data from National Health and Nutrition Examination Survey (NHANES) II (1976-1980) showed that there was a strong relationship between increased body mass index (BMI; calculated as kg/m^2) and higher odds of underreporting dietary intake,[5] a finding that has been replicated in many studies across different populations in subsequent years.[6,7] Although none of the studies mentioned took into account the effect of weight stability in dietary and energy reporting, if higher weight is an important factor in underreporting, then the fact that the prevalence of adult obesity more than doubled (from 15% to 34%) in the United States

in the period between 1976-1980 and 2007-2008[8] might have also resulted in increased energy underreporting in recent years.

To date, apart from obesity, several factors have been associated with low energy reporting, such as female sex and socioeconomic status.[9-11] Other factors, which have also been investigated, include eating behaviors, psychological status, physical activity, and dietary practices, but results are mixed.[10-12] One factor that might be closely associated with low energy reporting, but that has been little studied to date, is self-perceived body weight and weight-control behavior. Although obesity has been associated with low energy reporting in a number of studies,[11,12] research on the effects of self-perceived weight and attempted weight loss has been comparatively limited, and how it interacts with obesity status is still largely unknown. This is an important omission, as the effect of psychological factors on low energy reporting may differ by obesity status.[13]

Understanding the factors associated with low energy reporting is of considerable importance, as 24-hour dietary recall data are commonly used for establishing nutrition intervention and health education policies. Those who are prone to underreporting their energy intake may be at higher risk for developing obesity, or may have difficulty reducing their weight because they are less aware of their energy intake.[14] Identification of the source of error is also crucial because it can help improve the quality of dietary data as well as the assessment of energy balance, which are known to be related to longevity and better health outcomes.[15,16] This is a particularly relevant issue in countries such as the United States, which has one of the highest obesity rates in the world.

Given the scarcity of large population-based US data on this topic, the rapid increase in the number of epidemiologic studies that use nutritional energy intake data, and the potential complexity of intervening factors that might be associated with low energy reporting, the aim of the present work was to evaluate the association between low energy reporting and weight perception, satisfaction, and control in a large, nationally representative sample of noninstitutionalized individuals from the United States in the period from 2007 to 2012.

METHODS

The Survey

Data from NHANES in 2007-2012 were analyzed. This is a nationally representative survey conducted by the National Center for Health Statistics, Centers for Disease Control and Prevention. A multistage probability sampling design was used to select the participants who were representative of the noninstitutionalized US population.[17] The National Center for Health Statistics Research Ethics Review Board approved the study protocol of the NHANES 2007-2008, 2009-2010 (protocol 2005-2006), and 2011-2012 (protocol 2011-2017) surveys and all participants provided written informed consent.

Dietary Assessment and Energy Reporting

Trained interviewers conducted 24-hour dietary recall assessments using the US Department of Agriculture's Automated Multiple-Pass Method.[18] The first dietary recall interview was conducted in person, and the second was conducted by telephone 3 to 10 days later. Dietary data included detailed descriptions of all food consumed and the quantities eaten. A detailed description of the dietary interview methodology is provided in the NHANES Dietary Interviewer's Training Manual.[19] Dietary and energy intake data from two 24-hour dietary recall evaluations were analyzed in this study. These data were collected with a specific dietary data collection tool (Automated Multiple Pass Method), which provides an efficient and accurate means of assessing nutritional intake for large studies (http://www.ars.usda.gov/ba/bhnrc/fsrg). Specific quality-assurance procedures were applied in order to ensure the acceptability of each recall.[20] Only information considered to be reliable, based on this guideline, was used in the analysis. Macronutrient intake was expressed in terms of the total energy intake percentage. Water intake was calculated by adding the moisture from food sources and the water intake from natural sources, tap water, etc.

To assess low energy reporting, several steps were taken. First, information on age and weight was used to estimate the basal metabolic rate (BMR) with the use of the Schofield prediction equations[21] as reported by the Food and Agriculture Organization of the United Nations/World Health Organization/United Nations University in 2004.[22] Next, information on energy intake (EI) was obtained from the two 24-hour recalls mentioned here. Finally, for each individual, we calculated the EI/BMR ratio. The cutoffs proposed by Goldberg and colleagues[21] were used to classify participants with EI/BMR <1.14 as "low energy reporters" and those with EI/BMR >2.4 as "energy overreporters," as the range 2.0 to 2.4 has been suggested as being optimal for a sustainable lifestyle.[22] In this study, "acceptable energy reporters" or non−low energy reporters were participants with $1.14 \leq$EI/BMR≤ 2.4. This method has been suggested as an indirect way of assessing the plausibility of dietary intake[20] and has been used widely in previous studies.[11,12,23]

Weight Perception, Satisfaction, and Control

In this study, to examine the way in which self-perceived body image and behavior associated with that image might be important for low energy reporting, we focused on three principal areas that we have termed *weight perception*, *weight satisfaction*, and *weight control*. Details of the measures that were used to operationalize these concepts are presented below.

Weight Perception. Weight perception was assessed by asking whether the participant considered him- or herself to be overweight, underweight, or about the right weight. Those who were currently pregnant were asked about their weight before pregnancy.

Weight Satisfaction. Information on weight satisfaction was obtained by asking respondents about whether they would like to be a different weight from their current weight. Specifically, the desire for weight change was assessed by asking whether the participant would like to weigh more, weigh less, or stay about the same. For those respondents who stated that they wanted their weight to be different, a second variable was examined that combined elements of