RESEARCH
Original Research

Weighing Every Day Matters: Daily Weighing Improves Weight Loss and Adoption of Weight Control Behaviors

Dori M. Steinberg, PhD, RD; Gary G. Bennett, PhD; Sandy Askew, MPH; Deborah F. Tate, PhD

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ABSTRACT

Background Daily weighing is emerging as the recommended self-weighing frequency for weight loss. This is likely because it improves adoption of weight control behaviors.

Objective To examine whether weighing every day is associated with greater adoption of weight control behaviors compared with less frequent weighing.

Design Longitudinal analysis of a previously conducted 6-month randomized controlled trial.

Participants/setting Overweight men and women in Chapel Hill, NC, participated in the intervention arm (N=47).

Intervention The intervention focused on daily weighing for weight loss using an e-scale that transmitted weights to a study website, along with weekly e-mailed lessons and tailored feedback on daily weighing adherence and weight loss progress.

Main outcome measures We gathered objective data on self-weighing frequency from the e-scales. At baseline and 6 months, weight change was measured in the clinic and weight control behaviors (total items=37), dietary strategies, and calorie expenditure from physical activity were assessed via questionnaires. Calorie intake was assessed using an online 24-hour recall tool.

Statistical analyses We used χ^2 tests to examine variation in discrete weight control behaviors and linear regression models to examine differences in weight, dietary strategies, and calorie intake and expenditure by self-weighing frequency.

Results Fifty-one percent of participants weighed every day (n=24) over 6 months. The average self-weighing frequency among those weighing less than daily (n=23) was 5.4±1.2 days per week. Daily weighers lost significantly more weight compared with those weighing less than daily (mean difference=−6.1 kg; 95% CI −10.2 to −2.1; P=0.004). The total number of weight control behaviors adopted was greater among daily weighers (17.6±7.6 vs 11.2±6.4; P=0.004). There were no differences by self-weighing frequency in dietary strategies, calorie intake, or calorie expenditure.

Conclusions Weighing every day led to greater adoption of weight control behaviors and produced greater weight loss compared with weighing most days of the week. This further implicates daily weighing as an effective weight loss tool.
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OBESITY AFFECTS MORE THAN ONE-THIRD OF Americans[1] and is associated with an increased risk for many chronic diseases[2] and some cancers.[3] The new guidelines for the management of overweight and obesity in adults released from the American College of Cardiology, the American Heart Association, and The Obesity Society indicate that even a 3% weight loss among overweight and obese individuals can improve risk factors for these chronic diseases.[4] Thus, finding ways to produce even small amounts of weight loss can be clinically meaningful. The most successful weight loss treatments include elements of self-monitoring as a means to increase self-awareness about how behaviors influence weight.[5,6] This is supported by self-regulation theory, which posits that individuals are better able to self-regulate behaviors when they self-monitor and evaluate current behavior compared with goals.[7] This then reinforces current behavior or allows for self-correction. One such self-monitoring strategy is daily self-weighing. Compared with less frequent weighing, daily self-weighing may allow for better self-regulation of body weight because small changes in body weight can be identified on a daily basis and changes in diet and exercise behaviors initiated as a result.[8] Although there is emerging

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evidence that daily weighing can promote greater weight loss compared with less frequent weighing,[9-12] the mechanisms are unclear. Given that daily self-weighing does not influence weight loss directly, but rather via diet and physical activity behaviors that result in calorie deficits, it is important to better understand the behavior changes prompted by daily weighing. Few studies have examined associations between daily weighing and discrete weight control behaviors. Results suggest that more frequent weighing is associated with greater adoption of diet and exercise behaviors that may promote weight loss.[13,14] These studies were conducted cross-sectionally and did not specifically assess whether daily weighing within the context of a behavioral weight loss intervention leads to greater engagement in weight control behaviors compared with less frequent weighing. It is less clear whether daily weighing will trigger uptake of diet and exercise behaviors that promote weight loss, in that it prompts these behavior changes rather than happening concurrently. As such, it is important to examine whether there is greater adoption of behaviors known to be associated with weight loss among individuals who are instructed to weigh daily.

We recently conducted Weighing Everyday to Improve and Gain Health (WEIGH), a 6-month randomized controlled trial assessing the efficacy of a weight loss intervention focusing on daily weighing compared with a delayed intervention control group.[9] Participants were instructed to weigh daily using network-connected e-scales and were provided with tailored feedback and skills training via weekly e-mail messages. Using the e-scales we were able to capture an objective measure of self-weighing frequency. We also measured various diet, exercise, and behavior-related outcomes associated with weight loss success. As such, our study provides a unique opportunity to assess the relationship between daily weighing and weight control behaviors, along with nuanced differences in weight loss by self-weighing frequency. We hypothesized, based on self-regulation theory, that daily weighing would lead to greater adoption of weight control behaviors compared with less frequent weighing.

METHODS

Study Design

This study is registered at clinicaltrials.gov (identifier: NCT01369004). As previously stated, we present a secondary analysis from the WEIGH study. A detailed description of the study design, intervention, and report of the main outcomes has been previously published.[9] Briefly, eligibility criteria included adults aged 18 to 60 years, body mass index (BMI) 25 to 40, Internet access, and no medical conditions that might affect participation. Participants were recruited predominantly from the Chapel Hill, NC, area. Following eligibility screening, informed consent was obtained and baseline measures were collected. Participants (N=91) were then randomized to a 6-month daily self-weighing intervention (n=47) or a delayed intervention control group (n=44). All participants were reassessed at 3 and 6 months. Data collection occurred from February to August 2011 in Chapel Hill, NC. The University of North Carolina at Chapel Hill Institutional Review Board approved and monitored the study.

Intervention Description

Intervention participants were instructed to weigh themselves daily and were provided with network-connected e-scales. The e-scale uses the wireless cellular network to transmit weight data. Weights were then automatically transferred to a website that displayed individualized graphs of weight change over time. Participants were able to log on to the website and view these graphs. Participant data on self-weighing frequency and weight change were also displayed in a separate researcher interface. These data informed an algorithm that was used to provide tailored feedback on self-weighing frequency and weight loss to each participant via weekly e-mail messages. The e-mail messages also included behavior-related weight-control lessons based on topics from gold standard weight loss trials and other Internet-based trials that were adapted for the WEIGH study.[15-17] These lessons provided information on evidence-based strategies for weight loss, along with mini exercises for self-reflection and problem solving. The delayed control group received no intervention during the study period and was blinded to the focus on daily weighing. They received a modified version of the intervention after the 6-month study period was complete. We did not collect any data other than weight from the control group after they received the delayed intervention. As such, our analysis is focused on participants in the intervention group.

Measures

Demographic Characteristics. At baseline, a variety of demographic variables were collected to help characterize the sample, including age, sex, race/ethnicity (American Indian/Alaskan Native; Asian; black or African American; Hispanic, Latino, Portuguese, or Cape Verdean; white; and other), and education (grade school: 6 years or less; junior high school: 7 to 9 years; high school: 10 to 12 years; vocational training beyond high school; some college: <4 years; college/university degree; graduate or professional education).

Anthropometric Measurements. At baseline and 6 months, blinded evaluation staff collected height at baseline using a wall-mounted stadiometer, and weight using a calibrated and standardized digital scale at the University of North Carolina Weight Research Program clinic. Percent of body weight lost and absolute weight loss were calculated from baseline to 6 months.

Self-Weighing Frequency. Self-weighing frequency was measured objectively throughout the intervention using the e-scales. E-scale data included the weight measurement and the date and time of day of weighing. The maximum number of person-days for e-scale measurement totaled 168 days, equivalent to 24 weeks of intervention. The total number of days weighed was calculated for each participant. Average number of days weighed per week was calculated by dividing the total number of days weighed by 24. For participants with multiple weights on each day, we marked it as 1 day of weighing. To better assess differential outcomes among those who weighed daily vs less often, we created two categories: participants with an average weighing frequency of 7 days per week (n=24) vs those with an average weighing frequency <7 days per week (n=23).