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Overeat today, skip the scale tomorrow: An examination of caloric intake predicting non-adherence to daily self-weighing

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Abstract

Objective—Daily self-weighing is an effective weight loss strategy. Little is known about “micro” factors influencing non-adherence to self-weighing (e.g. daily overeating). We hypothesized that increased caloric intake on a given day would increase odds of not self-weighing the following day.

Methods—Daily self-reports of weight and caloric intake were collected from 74 obese and overweight adults (mean BMI=31.2±4.5 kg/m², age=50.6±10 years, 69% Female, 87% Caucasian) throughout a 12-week Internet-based weight management intervention. Multilevel logistic regression investigated odds of non-adherence to self-weighing on a given day based on the previous day’s caloric intake.

Results—Self-monitoring adherence was high (weights: 87%; calories: 85%); adherence was associated with greater 12-week weight loss (weighing: $r=-.24$, $p=.04$; calories: $r=-.26$, $p=.04$). Increased caloric intake on a given day, relative to the individual’s average intake, was associated with increased odds of non-adherence to self-weighing the next day ($F(1,5106)=12.66$, $p=.0004$, $\beta=.001$). For example, following a day of eating 300 calories greater than usual, odds of not self-weighing increased by 1.33.

Conclusions—Odds of non-adherence to self-weighing increased following a day with higher-than-usual caloric intake. Weight management interventions collecting daily self-monitoring data could provide support to participants who report increased caloric intake to prevent self-weighing non-adherence.

Keywords

adherence; self-weighing; weight management program

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Introduction

A growing literature has demonstrated the importance of daily weighing for success with weight management^{1–5}. Findings from the National Weight Control Registry (NWCR), a database of individuals who have successfully lost 30 lbs and maintained this weight loss for at least 1 year, found that 44% of these participants weighed themselves at least daily, and an additional 31% weighed weekly^{1,6}. Further, a longitudinal study of adults in a health promotion program found that participants who weighed themselves daily had better weight loss than those who took breaks from weighing, and abstaining from self-weighing for more than a month was associated with greater likelihood of regaining weight⁷. Another longitudinal study of participants in a randomized controlled weight loss trial found that daily weighing was associated with more weight loss and more adoption of weight control behaviors, even compared with participants who self-weighed the majority of the days⁸. Thus, frequent self-monitoring of weight, in addition to monitoring of physical activities and eating behaviors, is crucial for success in weight management^{9–13}.

Given that frequent self-weighing has been associated with improved weight loss, additional research is needed on factors associated with non-adherence to self-monitoring of weight. Research on the factors that promote frequent self-weighing and on barriers to self-weighing is limited. Existing research on self-weighing tends to focus on “macro-level” factors, such as participant characteristics and attitudes that could influence overall behavior. For example, one study of weighing behavior in young adults found that those who reported frequent weighing also reported more previous dieting attempts, a larger gap between current and highest past weight, the placement of greater importance on weight or shape, and feeling that maintaining weight requires significant effort⁵. The current literature on barriers to daily self-weighing primarily comes from research in heart failure patients, for whom factors such as lack of motivation, low self-efficacy, and not knowing why it is important to self-weigh regularly present barriers to daily weighing^{14,15}.

These factors, while relevant and important, do not shed light on “micro” or day-to-day influences, such as overeating on a given day; these factors may be essential points of early intervention to prevent smaller lapses in behavior before they lead to relapse¹⁶. A qualitative study comparing adults who maintained weight loss with adults who regained weight found that the those who regained weight spoke about avoiding the scale due to shame, denial, being “scared”, and wanting to avoid bad news while those who maintained their weight continued to self-weigh and rely on this feedback¹⁷. Drawing upon these findings, it was hypothesized that lapses in behavior on one day (i.e. overeating) may lead to avoidance of self-weighing the following day. This current study examined whether an increase in daily caloric intake on one day led to non-adherence to self-weighing the next day.

Methods

Participants

The current study was a secondary data analysis of an existing behavioral, Internet-based weight loss intervention. Participants in the parent study¹⁸ were 75 employees or dependents of employees of a large healthcare corporation in Providence, Rhode Island. Potential

participants were adults (18 to 70 years old) with a BMI equal to or greater than 25 kg/m² who had enrolled in a workplace healthcare reward program, expressed interest in weight loss, and had Internet access at home. They were contacted through e-mails, texts, and advertisements on the worksite intranet, and if interested, were pre-screened with an online questionnaire. Following pre-screening, initially eligible individuals attended an in-person orientation at the Weight Control and Diabetes Research Center (WCDRC) in Providence, Rhode Island to determine final eligibility and obtain informed consent. Full eligibility criteria are described in the main study paper¹⁸. Approval for this study was obtained from the Miriam Hospital Institutional Review Board.

Intervention

A complete description of the methods and intervention has been published previously¹⁸. This was a 12-week, Internet-based lifestyle weight management program adapted from the Diabetes Prevention Program¹⁹ and Look AHEAD²⁰. First, participants attended a baseline in-person group visit to receive basic education regarding weight management, tailored calorie, dietary fat, and physical activity goals, and instruction to self-monitor caloric intake and weight on a daily basis and to enter these data into the study website throughout the 12 week intervention. At this visit, participants were provided with a Calorie King book and taught how to use this book to calculate caloric intake²¹. Participants were asked to record their caloric intake in a paper log over the course of each day and compute the total number of calories at the end of each day. At the end of each week, participants were instructed to enter their total daily caloric intake and daily weight into the study website. To improve adherence to submitting weight and dietary information, small weekly incentives (ranging from \$1 to \$10; total possible \$86) were given in return for submitting these data.

Measures

Participants self-reported their daily weights and caloric intake on the study website throughout the 12-week intervention period. Demographic data were collected at baseline assessment using a self-report questionnaire. Weight data were collected by a trained research assistant at baseline and 12-week assessments and was measured to the nearest 0.1 kg at each assessment, using a calibrated digital scale and with participants in light indoor clothing and no shoes.

Analyses

Descriptive statistics were used to investigate the frequency with which individuals adhered to self-weighing and the patterns of lapses in self-weighing. Adherence to weighing and to calorie reporting over the 12-week program were calculated using self-monitoring data from the study website and Pearson correlations were used to examine the association between self-monitoring of weight and calories and 12-week weight loss. The GENLINMIXED module of SPSS Statistics version 22 was used to run a multilevel logistic regression to test the relationship between daily self-reported caloric intake and likelihood of self-weighing the next day²². We averaged each individual's caloric intake across the 12-week intervention, and then computed the difference between this average and the self-reported caloric intake on each specific day. This variable was entered into the model to predict the

next day's adherence to self-weighing (which was a binary variable for each day: 0 for "did not weigh" and 1 for "weighed").

Results

One participant did not complete provide any daily self-monitoring data or attend follow-up assessments, so this individual was excluded from analyses (total $n=74$). Participants had a mean age ($\pm$ SD) of 50.7 ± 10.4 years and 86.5% self-identified their race as Caucasian, 9.5% as African American, 2.7% as Asian and 5.4% as other or reported multiple categories; 97.3% self-identified their ethnicity as not Hispanic or Latino. Mean BMI at the start of intervention was 31.2 ± 4.5 kg/m².

Overall, adherence to self-weighing and self-monitoring of caloric intake was high; on average, participants self-reported weight on 87% of days (72.9 ± 15.7 days, or an average of 5.89 ± 1.53 days per week) and self-reported caloric intake on 85% of days (72.2 ± 16.2 days). Thirty-five percent of participants weighed themselves every day over the 12-week program; 32.4% weighed themselves 6 to 6.9 days per week, 18.9% weighed themselves on 4 to 5.9 days per week, 9.5% weighed on average 2 to 3 days per week, and 4.1% weighed themselves less than twice per week on average. Across all participants, there was an average of 3.8 ± 10.8 days between lapses in self-weighing. Participants were most likely to skip self-weighing on Saturdays and Sundays (on which 16.1% and 16.2% of skipped weights occurred, respectively) and were least likely to skip on Mondays (on which 12.6% of skipped weights occurred); overall, there was a trend for participants to skip self-weighing on weekend days more frequently than on week days, $z=-1.63$, $p=.103$. Higher adherence to self-monitoring of weight and caloric intake were both independently associated with greater weight loss at 12 weeks (weight: $r=-.24$, $p=.04$; caloric intake: $r=-.26$, $p=.04$).

Participants reported on average eating 1,412.37 calories ($SD=227.34$) per day. The day before a lapse in self-weighing, participants reported consuming an average of 63.29 ($SD=314.56$) calories over their typical daily intake. A multilevel logistic regression demonstrated that greater caloric intake on a given day, relative to one's average caloric intake, significantly predicted failure to self-weigh the next day, $F(1,5106)=12.66$, $p=.0004$, β coefficient $=.001$ (the β indicates the log odds of failure to self-weigh given a one-calorie increase in intake on the previous day relative to average intake). As an interpretation of this effect, an overage of 300 calories per day (similar to the standard deviation of overage observed) would be associated with a 1.33 increase in odds of not adhering to self-weighing the following day.

Discussion

The current study demonstrated that an increase of caloric intake on one day was associated with increased odds of non-adherence to self-weighing the following day. While some research has investigated characteristics of individuals who engage in frequent vs. infrequent self-monitoring of weight, this study was the first investigation into caloric intake as a potential micro-factor predicting adherence to self-weighing. Understanding micro-level

factors, such as daily overeating, may be important for identifying earlier points of intervention before patterns of non-adherence to self-weighing and other weight management behaviors emerge.

Strengths of the current study include the fact that there was excellent adherence to daily weighing and self-reports of caloric intake, allowing us to conduct this type of secondary analysis. Although the use of incentives may have improved the submission rates, it is unlikely that they would have affected the information provided since participants were incentivized for submission of data, not for losing weight or keeping intake below calorie goals.

The current study has several limitations. First, as the current study is a secondary analysis of existing intervention data, we were unable to prospectively measure other micro-level factors that may impact adherence to self-weighing (e.g. daily mood). We also did not have additional data regarding reasons for non-adherence to self-monitoring following a day of increased caloric intake. Results from previous qualitative research suggest that such non-adherence may relate to shame, denial, or wanting to avoid “bad news;”¹⁷ future studies should employ advanced research methods such as ecological momentary assessment to obtain data on other micro-level factors that may influence self-weighing, to further explore other factors that may exist in a behavioral chain between overeating one day and not self-weighing the next, and to examine these micro-level factors in the context of larger weight change trajectories. Second, our study was based on self-reported weight and caloric intake data. Participants were asked to keep paper records of weight and calories throughout the week and enter data into the study website at the end of each week. As we did not explicitly instruct them not to enter data retrospectively, some calorie entries may have been based on recall several days after the fact, which may have affected accuracy. Further, missing weights may have been due to failure to report weight data rather than not self-weighing. Future research should address these limitations by using newer assessment tools that improve data quality, such as wireless “smart” scales that directly submit participant weights and smartphone-based food records that provide timestamps when used.

This study is unique in its investigation of the micro-level influence of caloric intake on adherence to self-weighing using 12 weeks of daily weighing and caloric intake data. Our findings suggest failure to self-monitor on a given day is not just a random occurrence; rather, the odds of not self-weighing are related to the caloric intake that was reported the prior day. More research is needed to understand motivations behind weighing or not weighing following a day of increased caloric intake to understand how best to identify lapses in weight management behaviors that would benefit from intervention. Weight management interventions that collect daily self-monitoring data are well positioned to prevent non-adherence to self-weighing by responding and providing additional support to participants who report increased caloric intake on a given day; preventing such episodes of non-adherence may help to interrupt the vicious cycle in which a lapse in behavior turns into a relapse, leading subsequently to weight regain.

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What is already known about this subject?

- Daily self-weighing has been associated with increased success in losing weight and maintaining weight loss.
- Research on self-weighing has focused on “macro-level” factors, such as participant characteristics and attitudes that influence overall behavior.
- Little is known about “micro-level” or day-to-day factors that influence adherence to self-weighing.

What does this study add?

- This study was the first examination into caloric intake as a potential micro-factor predicting adherence to self-weighing.
- Results demonstrate that increased calorie intake on a given day (compared to average intake) was associated with increased odds of not self-weighing the next day.
- Understanding day-to-day influences on adherence to self-weighing can assist weight management programs in intervening to prevent lapses in adherence and encourage continued self-weighing.