

## SHORT COMMUNICATION

## Frequency of self-weighing and weight loss outcomes within a brief lifestyle intervention targeting emerging adults

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### Summary

#### Background

Frequent self-weighing is associated with better weight loss and maintenance among adults. Emerging adults ages 18–25 rarely enroll in behavioural weight loss trials, and thus, little is known about their willingness to engage in frequent self-weighing and its association with weight loss in this age group.

#### Purpose

The purpose of this study is to examine the frequency of self-weighing among 18–25-year-old over the course of a brief lifestyle intervention and to determine the association between frequent self-weighing and weight loss.

#### Methods

Emerging adults (EA) ages 18–25 [ $N=52$ , 54% racial/ethnic minority, 79% female, BMI = 34.2 (5.4)] enrolled in a 3-month lifestyle intervention with structure and content modified for EA. Benefits of frequent self-weighing were presented; participants were encouraged to weigh themselves at least weekly and no more than daily. Assessments occurred at baseline and post-treatment (3 months).

#### Results

At baseline, a majority of participants (63.5%) reported self-weighing less than once a week. Frequency of self-weighing increased over treatment ( $p < 0.001$ ), with 42.9% weighing weekly and 38.2% weighing several times per week or more (i.e. frequent self-weighing) at 3 months. Frequent self-weighing was associated with greater weight loss ( $p = 0.03$ ) and greater likelihood of achieving 5% weight loss ( $p = 0.01$ ) at post-treatment.

#### Conclusions

Frequent self-weighing may be a viable approach to promoting self-regulation during the high-risk developmental period of emerging adulthood. Consistent with findings among other adult samples, frequent self-weighing was associated with greater weight losses.

**Keywords:** Weight loss, emerging adults, self-weighing, young adults.

More than 40% of 18–25 year old in the U.S. meet criteria for overweight or obesity, (1) placing them at increased cardiometabolic risk (2). This developmental period is associated with numerous life transitions (e.g. living independently, balancing work and school) as well as

unhealthy weight-related behaviour (e.g. declines in physical activity, increased consumption of fast food, poor sleep) that contribute to weight gain and obesity during these years (3). Moreover, data indicate that this age group is all but absent from standard adult behavioural

weight loss trials, representing less than 1% of enrolled participants (4). Researchers have called for programs targeting this unique transition from adolescence into early adulthood, (5) including those specific to weight loss (6). Our formative data suggest that to effectively engage this population, lifestyle interventions must be brief, with minimal in-person contact, content tailored specifically to 18–25-year old, and importantly, that programs must promote autonomy and allow for choice in behavioural goals (7,8). Thus, it remains a challenge how best to adapt evidence-based programs in a way that will appeal to this population and can produce clinically significant weight losses through such a low touch program while still affording participants choice surrounding behavioural goals as opposed to providing prescriptions.

Frequent self-weighing may represent a simple self-regulation tool that can be used to promote clinically significant weight loss within a brief, reduced-intensity lifestyle intervention targeting emerging adults. In adults, frequent self-weighing has been associated with weight gain prevention, (9) weight loss (9–12) and weight loss maintenance (12–14) and is not associated with unhealthy weight control practices or worsening of psychological symptoms (11,15,16). Less is known about the effects of frequent self-weighing among young adults; some studies have reported associations between self-weighing and negative psychological symptoms (17), while others indicate that frequent self-weighing might be part of a constellation of healthy weight-related behaviour (18). Importantly, data suggest that within the context of a lifestyle intervention targeting young adults 21–35 years of age, frequent self-weighing was not associated with increased depressive symptoms, disordered eating or body satisfaction and was associated with better weight loss (19) Further, several studies have examined self-weighing within the context of weight gain prevention efforts targeting first year college students (20–23); and data indicate high adherence and acceptability of self-weighing (22). Impact on prevention of weight gain has been mixed with some studies reporting benefits of daily self-weighing within minimal weight gain prevention interventions (20,23), while others have noted benefits only within the context of a more comprehensive online healthy lifestyle program (21). In these studies, frequent self-weighing has not been associated with adverse psychological outcomes (21,22).

Of note, these previous studies were conducted within the context of weight gain prevention and focused exclusively on college students. To our knowledge, no previous studies have examined the relationship between frequent self-weighing and weight loss in a behavioural weight loss program targeting a broader sample of emerging adults. Thus, the primary aim of this

paper is to examine the frequency of self-weighing among a racially diverse sample of emerging adults between 18 and 25 years enrolled in a brief lifestyle intervention, and to examine the association between frequent self-weighing and weight loss.

## Methods

### Intervention description

These secondary analyses were conducted using data from a 3-month behavioural lifestyle intervention, SPARK RVA. The primary findings have been reported elsewhere (15), but in short, the aim of the original study was to examine the feasibility, acceptability and preliminary efficacy of three approaches to promote engagement and weight loss in this age group. Mode of delivery differed: face-to-face, web and hybrid (web lessons plus optional in-person classes), as did the relative emphasis on promoting autonomy. Across all arms, evidence of the benefits of regular self-weighing was presented to participants, but explicit self-weighing prescriptions were not provided. Instead, participants were encouraged to weigh themselves at least weekly and no more than once per day, but were allowed to choose their own target.

### Recruitment and participants

SPARK RVA was advertised via web and print advertisements, radio spots and email blasts throughout the Richmond, VA area. Interested individuals were directed to a study recruitment website, where they could review study details and if interested, were able to complete a secure survey in order to determine eligibility. Inclusion criteria were ages 18–25 and BMI 25–45 kg/m; exclusion criteria were physical or mental health conditions that pose a safety concern or are associated with unintentional weight change, recent (i.e. within the past 6 months) pregnancy and recent >5% weight loss. Participants ( $N=52$ ) were mostly female (79%), and the sample was diverse (54% racial/ethnic minority) with a mean age of 22.3 (2.0) and mean BMI of 34.2 (5.4).

### Measures

#### *Anthropometrics*

Measures of weight (kg) and height (cm) were taken by masked research assistants using standard protocols at baseline and post-treatment (3 months).

### Frequency of self-weighing

At all assessment points, participants responded to the following question: 'During the past month, how often did you weigh yourself?' Response options are (i) several times a day; (ii) once a day; (iii) several times a week; (iv) once a week; (v) less than once a week; (vi) less than once a month; and (vii) never.

### Statistical analyses

Data were collapsed across treatment arms and conducted with completers (retention > 80%). There were no baseline differences on weighing frequency for those participants who were retained vs. not. Generalized linear modeling was used to examine change in frequency of self-weighing over time as well as to compare weight loss at post-treatment for those who reported frequent self-weighing (i.e. several times per week or more) vs. those who reported weighing less frequently (once a week or less). Subsequent analyses were conducted in which participants were categorized according to their change in weighing frequency from baseline to 3 months (i.e. increasers, stable and decreasers). Chi-square analyses were conducted to examine categorical variables (e.g. achieving a 5% weight loss). Treatment arm, gender and race were included as covariates in all analyses; those analyses examining weight change in kilogram also included baseline weight as a covariate. All analyses were conducted using SPSS version 22.

## Results

At baseline, a majority of participants (64.5%) reported self-weighing less than once a week, with only 15.4% weighing once per week and 21.1% reporting frequent self-weighing defined as at least several times per week. Self-weighing increased over the 3-month treatment program ( $p < 0.001$ ); at post-treatment only 19% of participants reported self-weighing less than once per week, whereas 42.9% of participants reported self-weighing

weekly and 38.2% of participants reported self-weighing several times per week or more (Table 1). Increase in frequency of self-weighing from baseline to post-treatment was associated with greater weight loss ( $\beta = -0.433$ ,  $t = -3.02$  and  $p = 0.01$ ). Further, participants who reported frequent self-weighing (i.e. several time per week or more) at post-treatment achieved greater weight losses than those weighing weekly or less ( $p = 0.03$ , Figure 1). In addition, participants who endorsed frequent self-weighing were more likely to achieve a clinically significant (i.e. 5% of baseline weight) weight loss ( $p = 0.01$ ). Finally, when participants were grouped according to change in weighing frequency (increasers, stable and decreasers), those who increased their frequency of self-weighing experienced the greatest weight loss relative to those who remained at the same frequency of weighing or decreased frequency of weighing, although this effect only approached statistical significance ( $-4.9 + 4.2$  kg,  $-2.3 + 3.5$  kg, and  $-0.92 + 2.2$  kg,  $p = 0.06$ ).

## Discussion

In a brief lifestyle intervention specifically designed for 18–25 year old with overweight or obesity, frequent self-weighing was associated with greater weight loss at post-treatment. These results are consistent with findings among other adults (9–12) and suggest that frequent self-weighing may be an important factor in weight control

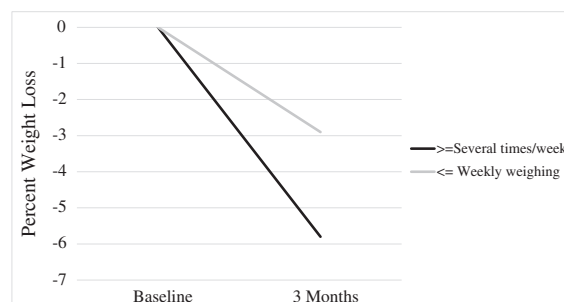


Figure 1 Percent weight loss by weighing frequency.

Table 1 Frequency of self-weighing

Frequency	Baseline (N = 52) (%)	Post-Treatment (3 month) (N = 42) (%)
Never	7 (13.5)	1 (2.4)
Less than once a month	15 (28.8)	0 (0)
Less than once a week	11 (21.2)	7 (16.7)
Once per week	8 (15.4)	18 (42.9)
Several times a week	9 (17.3)	13 (31)
Once per day	2 (3.8)	2 (4.8)
Several times a day	0 (0)	1 (2.4)

among this population as well. Of note, no prescriptions were given in the current study – rather, consistent with our formative data, evidence was presented about the benefits of self-weighing and participants were allowed to select the target they felt was best suited for them in order to promote autonomy. In light of the current findings and previous data demonstrating the benefits of more frequent self-weighing (9–14), future studies should consider providing this population with a forced choice between frequent self-weighing (i.e. >several times per week) and daily self-weighing to promote optimal weight management while still allowing for choice in behavioural targets. Indeed, frequent self-weighing might be a particularly valuable self-regulation tool for this age group given evidence to suggest dietary self-monitoring is a substantial challenge in this population (8); thus, the scale serving as an error detector might serve to enhance overall self-regulation of energy balance behaviour and weight loss in this high-risk age group.

Limitations of this secondary analysis include a limited sample size, lack of an assessment of psychological variables such as depression and disordered eating, and collapsing across treatment arms; further, within the trial from which these data are drawn, participants were not randomized to different self-weighing prescriptions, limiting the inferences that can be drawn regarding causality. Of note, many previous studies have demonstrated a lack of adverse psychological outcomes associated with frequent self-weighing in adults (11,15,16), as well as first-year college students (22) and a broader sample of young adults (19); nevertheless, future studies should explore the effects of frequent self-weighing on psychological variables including depressive symptoms and disordered eating within the context of a weight loss intervention targeting this specific age group. Strengths of the current study include a diverse sample including 54% racial/ethnic minorities, and the fact that this is the first study to examine the relationship between self-weighing and weight loss within a sample of treatment-seeking, overweight/obese 18–25 years old. Findings suggest that frequent self-weighing is associated with better weight loss outcomes among a racially diverse same of 18–25 years old enrolled in a brief lifestyle intervention.

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## Conflict of Interest Statement

Dr Tate serves on the Scientific Advisory Council for Weight Watchers. The other authors have no conflicts of interest to report.

## References

1. Mulye TP, Park MJ, Nelson CD, Adams SH, Irwin CE, Jr., Brindis CD. Trends in adolescent and young adult health in the United States. *J Adolesc Health* 2009; **45**: 8–24.
2. Merten MJ. Weight status continuity and change from adolescence to young adulthood: examining disease and health risk conditions. *Obesity (Silver Spring)* 2010; **18**: 1423–1428.
3. Nelson MC, Story M, Larson NI, Neumark-Sztainer D, Lytle LA. Emerging adulthood and college-aged youth: an overlooked age for weight-related behavior change. *Obesity (Silver Spring)* 2008; **16**: 2205–2211.
4. Gokee-LaRose J, Gorin AA, Raynor HA, et al. Are standard behavioral weight loss programs effective for young adults? *Int J Obes (Lond)* 2009; **33**: 1374–1380.
5. Arnett JJ. *Emerging Adulthood: The Winding Road from the Late Teens through the Twenties*. Oxford University Press: New York, NY, 2004.
6. Loria CM, Signore C, Arteaga SS. The need for targeted weight-control approaches in young women and men. *Am J Prev Med* 2010; **38**: 233–235.
7. LaRose JG, Morrow KM, Robichaud EF, Palmer K, Wing RR. Using qualitative research methods to inform treatment development efforts with young adults. Presented at the annual meeting of the Obesity Society; September, 2012; San Antonio, TX.
8. LaRose JG, Tate DF, Lanoye A, et al. Adapting evidence-based behavioral weight loss programs for emerging adults: Findings from formative work and a pilot randomized controlled trial. *J Health Psychol* [Under review].
9. Linde JA, Jeffery RW, French S, Prink NP, Boyle RG. Self-weighing in weight gain prevention and weight loss trials. *Ann Behav Med* 2005; **30**(3): 210–216.
10. Steinberg DM, Tate DF, Bennet GG, Ennet S, Samuel-Hodge C, Ward DS. The efficacy of a daily self-weighing weight loss intervention using smart scales and email. *Obesity* 2013; **21**: 1789–1797.
11. LaRose JG, Fava JL, Steeves EA, Hecht J, Wing RR, Raynor HA. Daily self-weighing within a lifestyle intervention: impact on disordered eating symptoms. *Health Psychol* 2014; **33**: 297–300.
12. Pacanowski CR, Levitsky DA. Frequent self-weighing and visual feedback for weight loss in overweight adults. *J Obseity* 2015. doi: 10.1155/2015/763680.
13. Wing RR, Tate DF, Gorin AA, Raynor HA, Fava JL. A self-regulation program for maintenance of weight loss. *N Eng J Med* 2006; **355**: 1563–1571.
14. Butryn ML, Phelan S, Hill JO, Wing RR. Consistent self-monitoring of weight: a key component of successful weight loss maintenance. *Obesity (Silver Spring)* 2007; **15**(12): 3091–3096.
15. Wing RR, Tate DF, Gorin AA, Raynor HA, Fava JL, Machan J. STOP regain: are there negative effects of daily weighing? *J Consult Clin Psychol* 2007; **75**: 652–656.

16. Steinberg DM, Tate DF, Bennett GG, Ennett S, Samuel-Hodge C, Ward DS. Daily self-weighing and adverse psychological outcomes: a randomized controlled trial. *Am J Prev Med* 2014; **46**: 24–29.
17. Quick V, Larson N, Eisenberg ME, Hannan PJ, Neumark-Sztainer D. Self-weighing behaviors in young adults: tipping the scale toward unhealthy eating behaviors?. *J Adolesc Health* 2012; **51**: 468–474.
18. Wing RR, Tate D, LaRose JG, et al. Frequent self-weighing as part of a constellation of healthy weight control practices in young adults. *Obesity (Silver Spring)* 2015; **23**: 943–949.
19. Gokee-LaRose J, Gorin A, Wing RR. Behavioral self-regulation for weight loss in young adults: a randomized controlled trial. *Int J Behav Nutr Phys Act* 2009; **6**. doi: 10.1186/1479-5868-6-10.
20. Levitsky DA, Garay J, Nausbaum M, et al. Monitoring weight daily blocks the freshman weight gain: a model for combating the epidemic of obesity. *Int J Obes (Lond)* 2006; **30**: 1003–1010.
21. Gow RW, Trace SE, Mazzeo SE. Preventing weight gain in first year college students: an online intervention to prevent the "freshman fifteen". *Eat Behav* 2010; **11**: 33–39.
22. Katterman SN, Butryn ML, Hood MM, Lowe MR. Daily weight monitoring as a method of weight gain prevention in healthy weight and overweight young adult women. *J Health Psychol* 2015 [epub ahead of print]. doi: 10.1177/1359105315589446.
23. Bertz F, Pacanowski CR, Levitsky DA. Frequent self-weighing with electronic graphic feedback to prevent age-related weight gain in young adults. *Obesity* 2015; **23**: 2009–2014.