MECHANISMS LINKING DAILY SELF-WEIGHING AND WEIGHT LOSS IN ADULTS

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Why Self-weighing?

- 66% of Americans are Overweight or Obese
- Self-weighing is an important tool for regulation of body weight
  - It allows individuals to make adjustments to eating and exercise behaviors to affect energy balance

Self-monitoring via Self-weighing → Proximal Feedback on Behaviors → Greater Self-regulation of Body Weight

Ogden CL et al., 2010, Boutelle K, 2006
Background: Self-weighing

- Most programs promote weekly self-weighing
- Evidence suggests that daily self-weighing is associated with greater weight loss

12-month BMI Change in the Weigh to Be Trial
Self-weighing Frequency

- Monthly: -0.5
- Weekly: -0.8
- Daily: -1.3* (*p<.05)

Linde JA et al., 2005
Background: Self-weighing

Daily Self-Weighing

? 

Weight Loss

Eating and Exercise Behaviors that can produce a caloric deficit
Background: Self-weighing

- More frequent self-weighing associated with
  - Less fat intake
  - More walking
  - Increases in self-monitoring of intake
  - Greater restraint, and stimulus control with regards to eating behaviors

- Limited evidence has *tested* these mechanisms

Linde JA et al., 2006, Qi BB et al., 2000
Objectives

Within the context of a 12-month Internet behavioral weight loss intervention:

1. Examine the effect of daily self-weighing on weight loss at 6 and 12 months

2. Examine the mediating effects of eating and exercise behaviors on daily self-weighing and weight loss.
METHODS
Intervention Description: healthElife

- 12-month internet weight loss intervention comparing weight loss therapy delivered via
  - Weekly Individual email counseling
  - Weekly Group chat counseling
## Intervention Results

<table>
<thead>
<tr>
<th>Baseline Characteristics (N=158)</th>
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<tbody>
<tr>
<td><strong>BMI (kg/m²)</strong></td>
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<tr>
<td><strong>Age (years)</strong></td>
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<tr>
<td><strong>Female</strong></td>
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<tr>
<td><strong>Caucasian</strong></td>
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<tr>
<td><strong>College-educated</strong></td>
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<tr>
<th>Weight Loss and Retention Results</th>
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<tr>
<td><strong>6-month (n=144)</strong></td>
</tr>
<tr>
<td><strong>Weight Loss</strong></td>
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<td><strong>Retention Rate</strong></td>
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Methods: Measurement of Daily Self-weighing

- Assessed via a single item, “I weigh myself daily” (from the Eating Behavior Inventory) with 5 response options ranging from never to always.

- Measured at baseline, 3, 6, and 12 months.

- Average daily self-weighing frequency was categorized as follows:
  - rarely/sometimes (1-3.9)
  - often/always (4-5)
Methods: Measurement of Possible Mediators

- Eating Behaviors
  - Eating Behavior Inventory Questionnaire: assessing dietary weight control behaviors
    - Positive behaviors (e.g., ‘I refuse food offered to me by others’)
    - Negative behaviors (e.g., ‘I eat when I am not really hungry’)
  - Higher total scores are associated with greater weight loss

- Exercise Behaviors
  - Paffenbarger Exercise Habits Questionnaire
    - Measures leisure-time physical activity
    - Data analyzed as total energy expenditure

*O’Neil PM et al., 2005; Sallis et al. 1985
Methods: Multiple Mediation Analysis with Controls

• c = the total effect
• c’ = the direct effect
• a \times b (c-c’) = the indirect (mediated) effect using bootstrapping

Covariates:
• Age
• Race/Ethnicity
• Baseline values of the mediators

Eating Behaviors

Exercise Behaviors

Weight Loss at 6 months or 12 months

MacKinnon DP et al., 2000; Preacher KJ et al., 2008; Zhao X et al., 2010
Results: Daily Self-weighing Frequency and Weight Loss [Mean (95%CI)]

Differences in percent weight loss between rarely/sometimes and often/always self-weighing frequencies at 6-month and 12-month follow-up.

- 6-month:
  - Rarely/Sometimes: -5.51
  - Often/Always: -8.27*

- 12-month:
  - Rarely/Sometimes: -4.6
  - Often/Always: -8.09*

* indicates p<.05
Results: 6-month Multiple Mediation Analysis (Unstandardized Regression Coefficients)

- Significant indirect effect for both mediators
- Non-significant direct effect = Full Mediation

Daily Self-weighing at 3 months

Eating Behaviors at 6 months

% Weight Loss at 6 months

Exercise Behaviors at 6 months

- $a1 = 5.08^*$
- $a2 = 0.34^*$
- $b1 = 0.14^*$
- $b2 = 1.07^*$
- $c = 1.80^{**}$
- $c' = 0.71$

*p<.05; **p=.05
Results: 12-month Multiple Mediation Analysis (Unstandardized Regression Coefficients)

- Significant indirect effect for Eating Behaviors, but not for Exercise Behaviors
- Significant direct effect = Partial Mediation

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Daily Self-weighing at 6 months
  ▶ Eating Behaviors at 12 months
    ▶ % Weight Loss at 12 months
      ▶ Exercise Behaviors at 12 months
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- $a1 = 6.03^*$
- $a2 = 0.15$
- $b1 = 0.20^*$
- $b2 = 0.45$
- $c = 3.78^*$
- $c' = 2.49^*$

*p<.05*
Summary & Conclusion

- Daily self-weighing is associated with greater weight loss
- This effect is mediated via behaviors that produce caloric deficits
  - 6 month weight loss: greater engagement in eating and exercise behaviors
  - 12 month weight loss: greater engagement in eating behaviors
- Daily self-weighing may be the more appropriate frequency recommendation
Implications for Future Research

- The observational nature of the data makes it difficult to infer causality.
- More experimental research is necessary, manipulating daily self-weighing, to assess the causal effect on weight loss and the mediating mechanisms.
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QUESTIONS?

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