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Weekly Self-Determination of Weight: A Simple Adjuvant Strategy for Reduction of BMI in Children with Obesity

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Abstract

Objective

To examine the feasibility and effectiveness of weekly home-based weight measurements as a motivational tool for improvement of Body Mass Index (BMI) among children with obesity followed in an academic outpatient clinic.

Methods

Subjects ages 8–18 years, with a mean age of 13 years and 7 months, were recruited from a pediatric endocrinology clinic. Inclusion criteria were BMI > 95th percentile and willingness to participate in weekly weight measurements for at least 3 months. Patients with obesity related to medication, genetic syndromes, or endocrine conditions were excluded. Participants were weighed at baseline and asked to weigh themselves at home weekly (same day, same time), recording weights via the Qualtrics survey platform. Weekly reminders were sent by email, text messaging, and/or phone calls. Mann-Whitney U test was used for statistical analysis with significance set at p 0.05.

Results

Fifty-four subjects (26 male, 28 female) were recruited. Twenty-four subjects (8 male, 16 female) completed 3- to 6-month follow-up. Fourteen subjects (5 male, 9 female) obtained at least one home weight measurement (adherent group), while ten subjects did not report any measurement (non-adherent group). The adherent group achieved a statistically significant reduction in median BMI z-score of 0.23 points (from 2.32 to 2.09), compared with an increase of 0.13 points (from 1.95 to 2.08) in the non-adherent group (p = 0.026). Barriers to adherence included difficulty with patient contact, insufficient parental involvement, absence of financial incentives, and lack of a home scale.

Conclusions

Weekly self-weighing can serve as an effective adjuvant strategy for reduction of BMI z-score in children and adolescents with obesity.

Introduction

Childhood obesity remains one of the most pressing public health challenges in the United States. The prevalence of obesity among US children and adolescents aged 2–19 years has more almost quadrupled from approximately 5% in the 1960s to nearly 20% in recent years.[1] A predictive epidemiologic model estimates that if current trends persist, 57% of children aged 2–19 years will have obesity by age 35 in 2050.[1] The Global Burden of Disease 2021 US Obesity Forecasting Collaborators estimated that over

15 million children aged 5–14 years had overweight or obesity in 2021, with a combined prevalence exceeding 36% in both sexes.[2] Childhood obesity is associated with serious cardiometabolic, psychosocial, and musculoskeletal consequences and is a strong predictor of adult obesity.[2]

The 2023 American Academy of Pediatrics (AAP) Clinical Practice Guideline recommends intensive health behavior and lifestyle treatment (IHBLT) as the most effective behavioral treatment for pediatric obesity, with interventions providing 26 or more hours of face-to-face, family-based, multicomponent treatment over 3–12 months demonstrating BMI z-score reductions between − 0.10 and − 0.50.[1] The 2024 US Preventive Services Task Force (USPSTF) updated recommendation similarly endorses comprehensive, intensive behavioral interventions, noting that higher-contact interventions (≥ 26 hours) produce greater weight loss than lower-intensity approaches.[3][4] However, access to such intensive programs remains limited, and many communities lack evidence-based, high-intensity weight management programs.[1] Trials of intensive interventions consistently face challenges with high attrition and low adherence, particularly among the most intensive protocols.[5]

Self-monitoring is a well-established behavioral strategy in weight management. Common behavior change techniques in pediatric obesity interventions include goal setting, stimulus control, and self-monitoring.[6][7] In adult populations, regular self-weighing has been consistently associated with greater weight loss and weight gain prevention.[8][9][10] A systematic review and meta-analysis by Madigan et al. found that adding self-weighing and self-regulation techniques to multicomponent behavioral programs resulted in a significant additional weight loss of − 1.7 kg (95% CI − 2.6 to − 0.8), and that accountability may improve the effectiveness of self-weighing interventions.[11] Steinberg et al. demonstrated that daily self-weighing using smart scales produced clinically significant weight loss in overweight adults, with daily weighers losing significantly more weight than less frequent weighers.[12][13] Zheng et al. confirmed that regular self-weighing was associated with more weight loss and was not associated with adverse psychological outcomes such as depression or anxiety.[9]

Despite this evidence in adults, the role of self-weighing as a standalone or adjuvant strategy in pediatric populations has been minimally studied. The AAP guideline emphasizes the importance of self-management in chronic disease management, including obesity, and acknowledges that individual patients and families will have unique challenges based on disease severity and environmental adversity.[1] When intensive programs are not available, the AAP recommends that clinicians provide the most intensive program possible and build capacity through community resources and accessible strategies such as telehealth and phone counseling.[1][5]

The purpose of this study was to examine the feasibility and effectiveness of a simple, low-cost intervention—weekly home-based self-weighing—as a motivational adjuvant tool for BMI reduction among children and adolescents with obesity followed in an academic pediatric endocrinology clinic.

Methods

Study Design and Setting

This was a prospective cohort study conducted at the pediatric endocrinology outpatient clinic of the University of Miami/Jackson Health Systems. The study was designed to evaluate the feasibility and effectiveness of weekly home-based weight self-monitoring as an adjuvant behavioural strategy for BMI reduction in children and adolescents with obesity.

Participants

Subjects aged 8–18 years were recruited during routine clinic visits. Inclusion criteria were: (1) BMI ≥ 95th percentile for age and sex, and (2) willingness to participate in weekly weight measurements for a minimum of 3 months. Exclusion criteria included obesity secondary to medication use, genetic syndromes (e.g., Prader-Willi syndrome, Bardet-Biedl syndrome), or endocrine conditions (e.g., newly diagnosed hypothyroidism, Cushing syndrome). Informed consent was obtained from parents/guardians.

Intervention

Participants were weighed at baseline during their clinic visit. They were then instructed to weigh themselves at home once per week, on the same day and at the same time each week, to minimize variability. A printed handout containing a QR code linked to a Qualtrics survey was provided to each family for weekly data entry. Contact information (email and phone number) was obtained from parents/guardians at enrollment.

Weekly reminders were initially sent via email. To optimize engagement, the reminder strategy was subsequently expanded to include text messaging and/or phone calls as needed. No additional dietary counseling, exercise prescriptions, or behavioral interventions beyond standard clinic care were provided as part of the study protocol.

Outcome Measures

The primary outcome was change in BMI z-score from baseline to follow-up (3–6 months). BMI z-score was calculated using age- and sex-specific CDC growth charts. Participants were categorized as "adherent" (those who submitted at least one home weight measurement during the study period) or "non-adherent" (those who did not submit any home weight measurements). Barriers to adherence were assessed qualitatively through follow-up communications.

Statistical Analysis

Given the small sample size and non-normal distribution of data, the Mann-Whitney U test was used to compare changes in BMI z-score between adherent and non-adherent groups. Statistical significance was set at p = 0.05. All analyses were performed using IBM SPSS

Statistics version 31.0.0.0.

Results

Participant Characteristics

Fifty-four subjects (26 male, 28 female) were recruited for the study. Of these, 24 subjects (8 male, 16 female; 44.4%) completed the 3- to 6-month follow-up assessment. Among the 24 who completed follow-up, 14 subjects (5 male, 9 female; 58.3%) submitted at least one home weight measurement and were classified as adherent. Ten subjects (41.7%) did not report any home weight measurement and were classified as non-adherent. The overall retention rate from enrollment to follow-up was 44.4%, and the adherence rate among those who completed follow-up was 58.3%.

Primary Outcome

The adherent group demonstrated a statistically significant reduction in median BMI z-score of 0.23 points, from a baseline of 2.32 to 2.09 at follow-up. In contrast, the non-adherent group experienced an increase in median BMI z-score of 0.13 points, from 1.95 to 2.08. The difference in BMI z-score change between groups was statistically significant (p = 0.026).

Barriers to Adherence

Several barriers to adherence were identified through follow-up communications. These included: (1) difficulty establishing effective patient contact for weekly reminders, (2) insufficient parental involvement in supporting the child's self-weighing routine, (3) absence of financial incentives for participation, and (4) lack of access to a home scale, which was reported by some subjects as a reason for non-participation.

Discussion

This pilot study demonstrates that weekly home-based self-weighing, used as a simple adjuvant strategy in addition to standard clinical care, is associated with a statistically significant reduction in BMI z-score among children and adolescents with obesity. The adherent group achieved a median BMI z-score reduction of 0.23 points over 3–6 months, which falls within the range of − 0.10 to − 0.50 reported for intensive health behavior and lifestyle treatment programs involving 26 or more contact hours.[1] This finding is notable given the minimal resource requirements of the intervention. Figure 1 illustrates the

distribution of individual BMI z-score changes (post minus pre) across both groups, highlighting the variability in response and the overall trend toward reduction in the adherent group

The magnitude of BMI z-score reduction observed in the adherent group compares favorably with published data on behavioral interventions for pediatric obesity. The 2017 Cochrane reviews found that multicomponent behavior-changing interventions achieved BMI z-score reductions of − 0.06 units in children and − 0.13 units in adolescents compared with no treatment or usual care.[6] The 2024 USPSTF systematic review reported a mean BMI difference of − 0.7 (95% CI − 1.0 to − 0.3) for behavioral interventions over 6–12 months.[3] While direct comparison is limited by differences in study design and population, the 0.23-point BMI z-score reduction observed in the present study suggests that self-weighing may provide a meaningful adjuvant benefit.

The theoretical basis for the effectiveness of self-weighing lies in self-regulation and self-monitoring theory. Self-monitoring is recognized as a core behavior change technique in obesity management.[6][7][14] The act of regular self-weighing is hypothesized to increase awareness of weight trends, reinforce motivation for healthy behaviors, and provide immediate feedback that can prompt corrective action.[9][12] In adult populations, multiple systematic reviews have confirmed that regular self-weighing is associated with greater weight loss and is not associated with adverse psychological outcomes.[11][9][10] Vuorinen et al. demonstrated in a cohort of 10,000 smart scale users that frequent self-weighing was associated with favorable weight outcomes in free-living settings, with more pronounced benefits among individuals with overweight or obesity.[8] Madigan et al. found that accountability—a component inherent in the weekly reporting structure of the present study—significantly improved the effectiveness of self-weighing interventions.[11]

The present study extends these findings to a pediatric population, where evidence on self-weighing as an isolated or adjuvant strategy has been limited. The AAP Clinical Practice Guideline emphasizes self-management as critical for chronic disease management in obesity and acknowledges the need for individualized, tailored self-management supports.[1] When intensive programs are unavailable, the AAP recommends that clinicians provide the most intensive program possible and leverage accessible strategies, including telehealth and phone counseling.[1] Weekly self-weighing represents a low-cost, scalable strategy that aligns with these recommendations.

The study also highlights important challenges in implementing self-monitoring interventions in pediatric populations. The overall retention rate of 44.4% and adherence rate of 58.3% among those who completed follow-up reflect the well-documented challenges of attrition and adherence in pediatric obesity interventions.[5] Barriers identified in this study—difficulty with patient contact, insufficient parental involvement, lack of financial incentives, and absence of a home scale—are consistent with the broader literature on barriers to treatment in pediatric obesity.[5][1][15][16] The AAP guideline notes that medium- to high-intensity parental involvement is associated with weight-related measures of treatment effectiveness, and the finding that insufficient parental involvement was a barrier in this study underscores the importance of engaging caregivers in self-monitoring interventions.[17][1]

The lack of a home scale reported by some participants highlights a practical barrier that may disproportionately affect families of lower socioeconomic status. Addressing this barrier through provision of scales at enrollment could improve adherence and is a relatively low-cost intervention. The evolution of the reminder strategy from email to text messaging and phone calls reflects the need for flexible, multimodal communication approaches to optimize engagement..[5][1]

Several limitations should be acknowledged. First, this was a small, single-center pilot study without randomization, limiting the generalizability and causal inference of the findings. The non-randomized design introduces the possibility of selection bias, as participants who adhered to self-weighing may have been more motivated at baseline. Second, the definition of adherence (at least one home weight measurement) was liberal, and the frequency and consistency of self-weighing within the adherent group were variable. Third, the baseline BMI z-scores differed between the adherent (2.32) and non-adherent (1.95) groups, which could introduce regression to the mean as a confounding factor, although the direction of change (reduction in the higher-baseline group) argues against this as the sole explanation. Fourth, the study did not control for concurrent dietary, physical activity, or other behavioral changes that may have contributed to the observed weight changes. Fifth, the short follow-up period (3–6 months) limits conclusions about the sustainability of the observed BMI z-score reduction.

Despite these limitations, the study provides preliminary evidence supporting the feasibility and potential effectiveness of weekly self-weighing as a simple, low-cost adjuvant strategy for BMI reduction in children and adolescents with obesity. Future studies should employ randomized controlled designs with larger sample sizes, standardized adherence definitions, longer follow-up periods, and assessment of potential mediators and moderators of the self-weighing effect. Provision of home scales, integration of digital health technologies (e.g., smart scales with automated data transmission), and structured parental engagement strategies may improve adherence and outcomes. Investigation of the psychological effects of self-weighing in pediatric populations, including potential impacts on body image and disordered eating behaviors, is also warranted, given the sensitivity of weight-related discussions in this age group.[3]

Conclusions

Weekly home-based self-weighing is a feasible and potentially effective adjuvant strategy for reduction of BMI z-score in children and adolescents with obesity. In this pilot study, participants who adhered to weekly self-weighing achieved a statistically significant reduction in BMI z-score compared with non-adherent participants. This simple, low-cost intervention may serve as a practical complement to standard clinical care, particularly in settings where access to intensive behavioral programs is limited. Larger, randomized controlled trials are needed to confirm these findings and to optimize implementation strategies.

Abbreviations

BMI
Body Mass Index
IRB
Institutional Review Board
QI
Quality Improvement
CDC
Centers for Disease Control and Prevention.

Declarations

Ethics approval and consent to participate: This project was reviewed by the University of Miami Human Subject Research Office Institutional Review Board (IRB) and was determined to be a Quality Improvement (QI) initiative conducted within the context of routine clinical care, and therefore did not constitute human subjects research requiring full IRB review or approval [IRB determination/reference number: XXXXXXX – to be confirmed by author]. Informed consent was obtained from parents/guardians of all participants prior to enrollment. All procedures performed in this study involving human participants were carried out in accordance with the ethical standards of the institutional research committee and with the 1964 Declaration of Helsinki and its later amendments.

Consent for publication: Not applicable. This manuscript does not contain any individual person's identifiable data, images, or other personal or clinical details.

Availability of data and materials: The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing Interests: The authors declare that they have no competing interests.

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Authors' contributions: SEY: study conception and design, data collection, formal analysis, and drafting of the manuscript. AK: data collection and critical review of the manuscript. TS: study supervision and critical review and editing of the manuscript. All authors read and approved the final manuscript.

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Figures

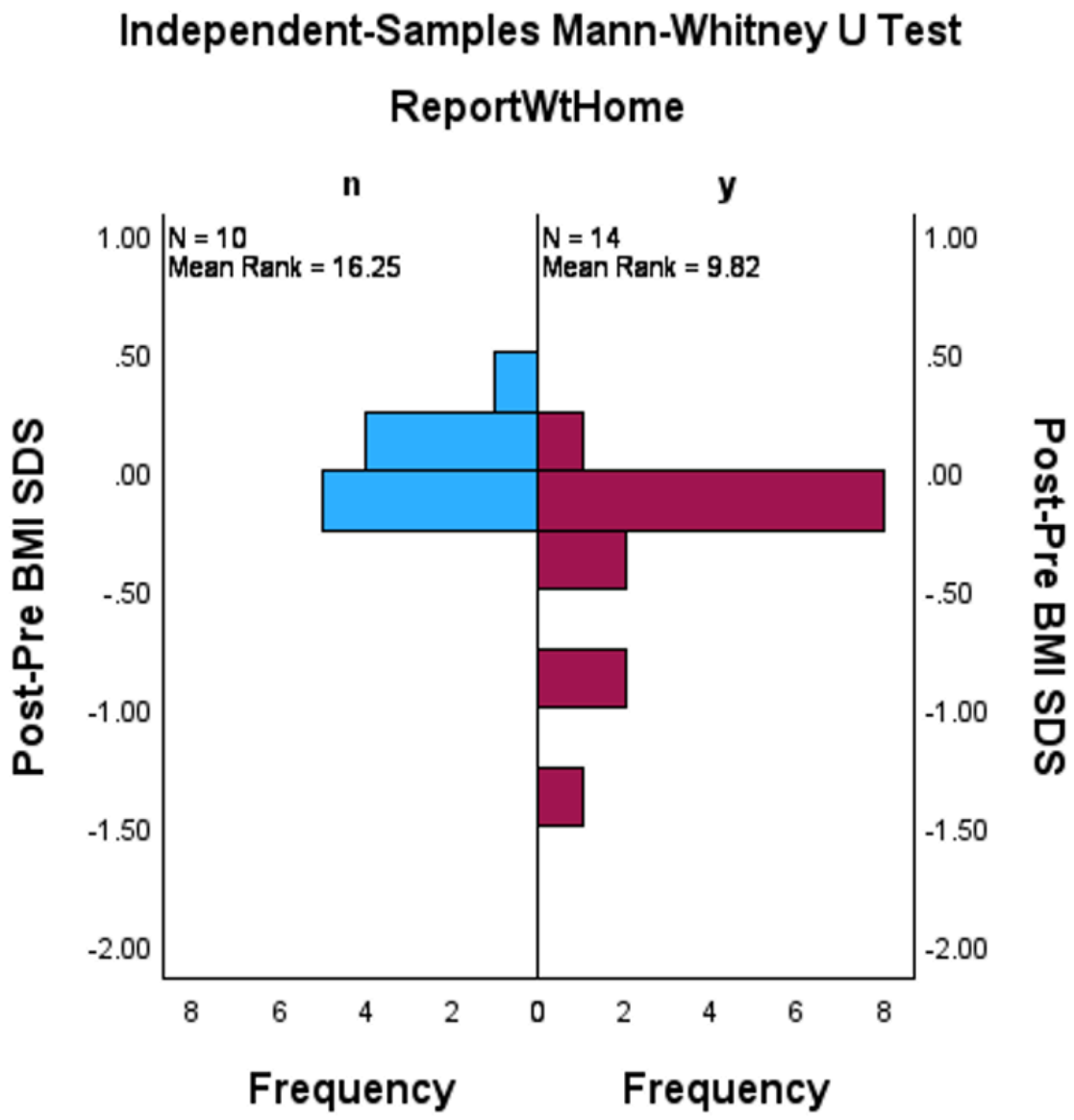


Figure 1

Distribution of Individual Change in BMI Z-score (Post-Pre)