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Access to a scale and self-weighing habits among public housing residents

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Summary

Having access to a scale is essential for individuals to engage in self-weighing; however, few studies examine scale access, particularly among low-income individuals. Our objectives were to (i) determine how many public housing residents have access to a scale and (ii) describe their self-weighing habits. We conducted a cross-sectional survey of public housing residents in Baltimore, MD, from August 2014 to August 2015. Participants answered questions about their access to a scale ('yes'/'no') and daily self-weighing habits ('no scale/never or hardly ever' vs. 'some/about half/much of the time/always'). We used *t*-tests or chi-square tests to examine the association of scale access with respondent characteristics. Overall, 266 adults participated (48% response rate). Mean age was 45 years with 86% women, 95% black and 54% with obesity. Only 32% had access to a scale; however, 78% of those with this access reported engaging in some self-weighing. Residents who lacked access to a scale were younger ($P = 0.03$), and more likely to be unemployed/disabled ($P = 0.01$) or food insecure ($P < 0.01$). While few public housing residents have access to a scale, those who do report daily self-weighing with some regularity. Financial hardship may influence scale access in this population, as potential proxies of this status were associated with no scale access.

Keywords

Obesity; public housing; self-weighing

Introduction

In 2011–2014, 69% of US adults had overweight or obesity (1). This high prevalence of overweight/obesity is significant given the association between elevated body mass index

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Conflict of Interest Statement

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(BMI) and increased morbidity from cardiovascular disease, hypertension, high cholesterol and type 2 diabetes mellitus (2, 3). Furthermore, these poor health outcomes disproportionately affect low-income individuals as well as racial and ethnic minorities (4, 5). The risks for obesity and its health consequences are particularly high among those who live in racially segregated low-income housing residents (6, 7). Weight loss can improve cardiovascular risk by reducing blood pressure and cholesterol (3, 8); therefore, efforts are needed to promote weight loss among these vulnerable high-risk populations. However, research is needed to understand the challenges particular to this population, so that weight loss interventions can be tailored to their needs.

Self-monitoring (e.g. weight, food intake) has become a common element of many behavioural weight loss interventions. Self-monitoring is grounded in self-regulation theory, which outlines the importance of awareness of current behaviour to achieve a desired state (9). Daily self-weighing is often a component of successful weight loss and weight maintenance efforts (10–15). In weight maintenance, self-weighing helps individuals catch gains in weight that alert them to alter behaviours before the weight gain is significant, and conversely, decreased frequency of self-weighing is associated with weight gain (10, 11). Reduced frequency of self-weighing has been associated with individuals reporting increased caloric intake from fat and decreased cognitive restraint (10).

Having access to a scale is essential for individuals' ability to engage in self-weighing. However, little research has examined the ready availability of scales. A study of primary care patients in Ireland showed that 30% of patients did not have access to a scale (16). We know of no studies examining access to scales in the United States, and none among high-risk populations such as low-income or minority groups. Despite the effectiveness of self-weighing as a weight-management tool, access to a scale may be particularly challenging for low-income populations, where the costs of purchasing a scale may be prohibitive.

Our primary objective was to determine the proportion of residents living in Baltimore public housing developments who had access to a scale for self-weighing. In the United States, public housing residents are low-income individuals and predominantly racial/ethnic minorities. We hypothesized that few residents would have access to a scale. Secondly, we examined characteristics associated with scale access, as well as explored individuals' self-weighing habits.

Methods

We conducted a secondary analysis of data from a cross-sectional survey of adult residents living in randomly selected households in two public housing developments in Baltimore, MD. The survey was conducted from August 2014 to August 2015. The purpose of the original study was to characterize the relationship between social networks and lifestyle behaviours among persons living in public housing. In brief, 266 heads of households participated out of 556 occupied households (48%). Details on survey design and administration have been published previously (17). The Johns Hopkins School of Medicine Institutional Review Board approved this study.

Our primary dependent variable was self-reported access to a scale, which we determined by asking ‘I have access to a scale where I can weigh myself’ (yes/no). Secondly, we also explored self-weighing habits. Participants responded to the statement, ‘I weigh myself daily’ (response options: no scale, never or hardly ever, some of the time, about half the time, much of the time and always or almost always), from the validated Eating Behaviours Inventory (18). We grouped responses using two strategies. First, answers were dichotomized as ‘no self-weighing’ (no scale/never or hardly ever) vs. ‘any self-weighing’ (some/about half/much/ always or almost always). This approach captures whether any degree of daily self-weighing was occurring, which we felt it was appropriate given that the individuals surveyed represent the habits of a public housing residents in general (i.e. those not taking part in a weight loss intervention where more frequent self-weighing would be critical). Second, we also wanted to identify those who engage in frequent self-weighing rather than any self-weighing. Therefore, we categorized responses as ‘no scale’, ‘does not self-weigh’, ‘sometimes self-weighs’ (some/about half of the time) or ‘frequently self-weighs’ (much of the time/always or almost always).

We explored several categories of independent variables including demographics, proxies of financial hardship, health behaviours and health status. (i) Demographics included age, gender, race and educational attainment. (ii) Proxies of financial hardship included unemployment/ disability status and a two-item food insecurity screener (19). (iii) Health behaviours included smoking status, physical activity status (dichotomized physical activity as active (‘highly active or moderately active’) vs. inactive [‘low active’ or ‘very low active’]) (20), as well as daily fruit/vegetable and added sugar intakes using the National Health Information Survey 5-factor screener (dichotomized as the sample’s upper quartile of daily intakes for both) (21). We also identified individuals with a weight control goal who endorsed that it was true that they either ‘deliberately took small helpings as a means of controlling my weight’ or ‘held back at meals in order to not gain weight’, which are elements from the Three-Factor Eating Questionnaire (22). (iv) Health status included several items. We measured participants’ height and weight using the same methods described in the ‘Moving to Opportunities’ evaluation, and then calculated BMI (7). Few participants self-reported either weight or height (5.3%). We examined BMI as a continuous variable and categorical variable using standard categories of weight based on BMI. Participants also reported whether they had been told by a health professional that they have heart failure, hypertension or diabetes mellitus, as well as completed a two-item depressive symptoms screener (23).

We used *t*-tests and chi-square tests, as appropriate, to determine the association between scale access and each independent variable. Similarly, we examined the association between self-weighing and each independent variable using *t*-tests, ANOVA or chi-square tests, as appropriate. We also repeated these analyses examining factors associated with self-weighing among the subset of participants who had access to a scale ($n = 85$). We conducted sensitivity analyses for examining the association with BMI and weight category groups that excluded participants with self-reported height or weight, which produced similar results (data not shown).

Results

Our sample included 266 adults. Overall, mean age was 44 years (standard deviation 12 years), and most were women (86%) and self-identified as black (95%). The majority had obesity (54%) and reported a weight control goal (52%).

Out of our total sample ($n = 266$), only 32% had access to a scale (Fig. 1). However, among the subset who had access to a scale ($n = 85$), 78% of these individuals reported engaging in any self-weighing (Fig. 1). Table 1 compares characteristics between individuals with and without scale access. Residents who did not have access to a scale were significantly younger, more likely to be unemployed/disabled, and more likely to report food insecurity. There were no statistically significant associations between scale access and any health behaviour or health status factor.

Overall, 25% engaged in any self-weighing. When examining the more detailed self-weighing variable, we found that 7% does not self-weigh, 20% sometimes self-weighs and 5% frequently self-weighs (68% did not have a scale). Table 2 compares characteristics by self-weighing habits. Individuals who engage in any self-weighing were significantly older, and less likely to be black, have less than a high school education or be food insecure. The frequent self-weigh group was less likely to be unemployed/disabled and food insecure than those without a scale. However, those who had a scale but did not self-weigh had lower proportions of unemployment/disability and food insecurity than the frequent self-weighing group. There were no statistically significant associations between self-weighing with any health behaviour or health status factor. There were no statistically significant between-group differences in any characteristic when examining these factors among only those with access to a scale.

Discussion

Self-weighing has demonstrated effectiveness as a weight loss program component; however, having access to a scale is necessary for self-monitoring of weight. Given the excess burden of obesity in low-income, minority populations, it is critical to understand the access to scales among this high-risk population in order to tailor weight loss interventions to this population. This is the first study to examine scale access and self-weighing habits among public housing residents, which is a low-income and predominately minority population. We found that few residents had access to scales. Based on our results and others from Ireland, lack of access to a scale is a common problem (16). However, we did find that a majority of residents with access to a scale did engage in self-weighing, which may suggest that if a scale is available for use, public housing residents will engage in self-monitoring of weight.

We found that scale access was significantly associated with our proxy variables to indicate financial hardship – unemployment/disability status and food insecurity. Having access to a scale was associated with lower likelihoods of both factors. While individuals who qualify for US public housing must meet certain criteria regarding income, variability exists regarding household financial status (24, 25). There is not necessarily a correlation between

income status and material deprivation (25); therefore, it is critical to examine other aspects of hardship, such as unemployment/disability and food insecurity, to identify greater levels of deprivation. We also found a significant association between any self-weighing and lower likelihood of food insecurity. However, when examining the different levels of self-weighing frequency, this difference was likely driven by those individuals who lack scale access, as there was no significant difference in food insecurity by self-weighing frequency among the subset that had access to a scale. Given that no health behaviours or health status indicators were associated with scale access, our results suggest that financial hardship may be the primary determinant of whether a public housing resident has access to a scale. Future studies should verify our findings as well as explore the associations of other dimensions of financial hardship with scale access, as weight loss interventions that address these barriers may facilitate scale access and promote self-weighing behaviours.

Self-weighing has been found to be an effective self-monitoring tool for losing weight – sometimes as the primary strategy (14, 15, 26, 27) or often as a component of a comprehensive weight management intervention (11, 12, 26, 28–30). The most recent systematic review of self-weighing found that 75% of ‘self-weighing only’ interventions improved weight outcomes (26). Self-weighing appears to be most effective when occurring in conjunction with an accountability component or other weight management intervention (e.g. diet and physical activity change), yet having access to a scale is necessary to engage in this practice. Interestingly, we found no significant association between weight control goal with scale access or self-weighing habits. Overall, our participants represent the general habits of a low-income, predominantly minority population in public housing, rather than a population actively working on weight loss. Given that 52% did endorse a desire to control their weight, this population may be interested in future interventions, such as having a scale to self-weigh, to lose weight. It is important to note that some literature has suggested that negative psychological outcomes can occur with regular self-weighing; however, these findings have been mostly in populations particularly vulnerable to poor psychological effects from self-weighing (i.e. adolescents, young adults, women with history of eating disorders) (31). In contrast, a number of studies in the general adult population have found no negative psychological effects from daily self-weighing (13, 26, 28, 32, 33).

We also found no associations between scale access or self-weighing with history of heart failure, which is a condition where self-weighing is a common clinical recommendation (34). There was also no significant association between BMI and scale access or self-weighing. Advanced kidney and liver disease are conditions for which access to a scale for self-weighing is medically important, unfortunately our survey did not assess for these conditions. These findings warrant follow-up through additional research, given that scale access and self-weighing are critical management tools for several advanced medical conditions as well as obesity.

This study has several limitations. First, we did not ask the reason(s) for the lack of scale access, which could be multifactorial. We also did not obtain additional details about the scale, such as where the scale was accessible (e.g. home, work) or perceived accuracy of the scale. A previous study did find that the accuracy of typical digital bathroom scales is generally accurate (35). We also did not ascertain the individuals’ willingness to self-weigh

or directly inquire about their weight loss goals. Future research examining scale access should also include these dimensions. Second, we did not collect information on income level or household financial status; therefore, we could not make definitive conclusions regarding economic status and relied on proxy variables that suggest financial hardship. Future research should consider obtaining direct measures of income, as well as multiple dimensions that might represent material deprivation and financial hardship as income often is insufficient to capture these aspects. Third, we relied on self-reported measures of health behaviours, such as physical activity, and several health status indicators. While height or weight was self-reported for 5%, we found no differences in sensitivity analyses when we excluded these participants. Fourth, the response rate for this survey was 48%. This rate may be considered low, although it is about average among public housing residents where the response rates range between 18% and 84% (7, 36, 37). Given recruitment restrictions required by the housing authority, we had to rely on anonymous mailings and knocking on residents' doors. As a result, we were unable to contact 23% of households randomized. An additional 26% of households refused to participate in the research. Finally, the sample for this study was predominantly black women living in public housing, which is similar to other studies of public housing residents (7, 36). While important for understanding the scale access among this marginalized population, the results are not generalizable to the general population. Future studies are needed to determine the prevalence of scale access in more general US populations.

Conclusion

This study gives important insight into the lack of access that public housing residents have to an important device for weight management, and shows that when scales are available, public housing residents do participate in self-monitoring of weight. Our results suggest that financial hardship may be the primary determinant of whether a public housing resident has access to a scale. If our results are confirmed, addressing financial hardship barriers to scale access may be a reasonable target for future weight management interventions in low-income, minority populations at high risk for obesity.

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What is already known about this subject

- Low-income and minority groups have increased risk for obesity, and tailored weight-loss interventions are needed for this population.
- Self-weighing is an effective component in a comprehensive weight management program; however, access to a scale is essential to engage in this behaviour.
- Availability of scales among low-income groups is unknown.

What this study adds

- Access to scales is limited among low-income group, predominantly black, public housing residents.
- Public housing residents who have access to a scale typically engage in some daily self-weighing.

Figure 1.

Proportion of participants with access to a scale and subset of patients with scale access who participate in any self-weighing. The image on the left shows the proportion of participants who have access to a scale compared to those who do not have access ($n = 266$). The image on the right shows the proportion of those participates in any self-weighing vs. those who do not, only among the subset of individuals who have access to a scale ($n = 85$).

Table 1

Characteristics associated with scale access among public housing residents

	Overall (n = 266)	No scale access (n = 181)	Access to a scale (n = 85)	P-value*
Demographics				
Mean age in years (SD)	44	43 (12)	47 (12)	0.03
% Women	86	88	81	0.11
% Black	95	97	92	0.05
% Single	78	80	74	0.32
% Less than high school education	34	38	26	0.06
Financial hardship				
% Unemployed/disabled	72	77	61	0.01
% Food insecure [†]	67	74	53	<0.01
Health behaviours				
% Never smoker	28	27	31	0.56
% Physically active [‡]	20	18	24	0.31
% High fruit/vegetable intake [§]	26	25	26	0.94
% High added sugar intake [§]	25	28	20	0.18
% Weight control goal [¶]	52	52	51	0.77
Health status				
Mean BMI in kg/m ² (SD)	33	32 (10)	33 (10)	0.76
% BMI categories				
Underweight (<18.5 kg/m ²)	4	4	4	0.94
Normal (18.5–24.9 kg/m ²)	22	22	20	
Overweight (25–29.9 kg/m ²)	20	22	18	
Class I Obesity (30–34.9 kg/m ²)	18	17	20	
Class II Obesity (35–39.9 kg/m ²)	14	13	16	
Class III Obesity (≥ 40 kg/m ²)	22	22	22	
% Heart failure	5	4	5	0.92
% Hypertension	57	57	55	0.74

	Overall (n = 266)	No scale access (n = 181)	Access to a scale (n = 85)	P-value*
% Diabetes	20	21	18	0.64
% Depressive symptoms ^{††}	31	33	27	0.36

* P-values from bivariate analyses using t-tests or chi-square tests as appropriate.

[†] Food insecurity determined using two-item screener (19).

[‡] Physical activity status determined using validated tool (20) dichotomized as 'physically active' if high or moderate level vs. 'not physically active' if low or very low levels.

[§] Dietary intakes determined using validated tool (21) to estimate daily fruit/vegetable and added sugar intakes, and 'high' intakes defined as the upper quartile of the sample (6.1 servings/day for fruit/vegetable and 39.9 tsp/day for added sugars).

[¶] Weight control goal determined if endorsed either deliberately taking small helpings as a means of controlling my weight or holding back at meals in order to not gain weight (22).

^{††} Depressive symptoms determined using two-item screener (23).

BMI, body mass index; SD, standard deviation.

Table 2

Characteristics associated with daily self-weighing habits among public housing residents

	No self-weighing (n = 200)	Any self-weighing (n = 66)	P-value*	No scale (n = 181)	Does not self-weigh (n = 19)	Sometimes self-weighs (n = 54)	Frequently self-weighs (n = 12)	P-value*
Demographics								
Mean age in years (SD)	43 (12)	48 (12)	<0.01	43 (12)	42 (12)	49 (12)	45 (9)	0.02
% Female	88	82	0.25	88	79	83	75	0.36
% Black	97	91	0.04	97	95	89	100	0.06
% Single	80	73	0.25	80	79	70	83	0.52
% Less than high school education	38	21	0.01	38	42	22	17	0.09
Financial hardship								
% Unemployed/disabled	74	67	0.29	77	42	69	58	0.01
% Food insecure [†]	71	56	0.03	74	42	61	33	<0.01
Health behaviours								
% Never smoker	28	30	0.41	27	32	31	25	0.49
% Physically active [‡]	18	27	0.09	18	11	28	25	0.30
% High fruit/vegetable intake [§]	26	26	0.97	25	26	20	50	0.21
% High added sugar intake [§]	28	18	0.13	28	26	20	8	0.38
% Weight control goal [¶]	52	52	0.95	52	47	56	33	0.55
Health status								
Mean BMI in kg/m ² (SD)	33 (11)	32 (9)	0.38	32 (10)	37 (14)	32 (9)	30 (8)	0.24
% BMI categories								
Underweight (<18.5 kg/m ²)	4	3	0.85	4	5	2	8	0.96
Normal (18.5–24.9 kg/m ²)	21	23		22	11	22	25	
Overweight (25–29.9 kg/m ²)	21	18		22	16	19	17	
Class I Obesity (30–34.9 kg/m ²)	18	20		17	21	20	17	
Class II Obesity (35–39.9 kg/m ²)	13	18		13	11	19	17	
Class III Obesity (≥ 40 kg/m ²)	23	18		22	37	19	17	
% Heart failure	5	5	0.99	4	5	4	8	0.92
% Hypertension	57	56	0.89	57	53	57	50	0.94

	No self-weighing (<i>n</i> = 200)	Any self-weighing (<i>n</i> = 66)	<i>P</i> -value*	No scale (<i>n</i> = 181)	Does not self-weigh (<i>n</i> = 19)	Sometimes self-weighs (<i>n</i> = 54)	Frequently self-weighs (<i>n</i> = 12)	<i>P</i> -value*
% Diabetes	20	21	0.76	21	5	20	25	0.41
% Depressive symptoms ^{††}	32	27	0.47	33	26	26	33	0.78

* *P*-values determined using *t*-tests, ANOVA or chi-square tests as appropriate. Sensitivity analyses among only those with access to a scale (i.e. does not self-weigh, sometimes self-weighs and frequently self-weighs groups) showed no statistically significant between-group differences (*P* > 0.05).

[†] Food insecurity determined using two-item screener (19).

[‡] Physical activity status determined using validated tool (20) dichotomized as 'physically active' if high or moderate level vs. 'not physically active' if low or very low levels.

[§] Dietary intakes determined using validated tool (21) to estimate daily fruit/vegetable and added sugar intakes, and 'high' intakes defined as the upper quartile of the sample (6.1 servings/day for fruit/vegetable and 39.9 tsp/day for added sugars).

[¶] Weight control goal determined if endorsed either deliberately taking small helpings as a means of controlling my weight or holding back at meals in order to not gain weight (22).

^{††} Depressive symptoms determined using two-item screener (23).

BMI, body mass index; SD, standard deviation.