Title

Weight Measurements in School: Setting and Student Comfort.

Journal

Journal of nutrition education and behavior, 54(3)

ISSN

1499-4046

Authors

Altman, Emily
Linchey, Jennifer
Santamaria, Gabriel
et al.

Publication Date

2022-03-01

DOI

10.1016/j.jneb.2021.11.007

Peer reviewed

HHS Public Access

Author manuscript

J Nutr Educ Behav. Author manuscript; available in PMC 2023 March 01.

Published in final edited form as:

J Nutr Educ Behav. 2022 March ; 54(3): 249–254. doi:10.1016/j.jneb.2021.11.007.

Weight Measurements in School: Setting and Student Comfort

Emily A. Altman, MPH[a], **Jennifer Linchey, MPH**[a], **Gabriel Santamaria**[a], **Hannah R. Thompson, PhD MPH**[a], **Kristine A. Madsen, MD MPH**[a]

[a]UC Berkeley School of Public Health

Abstract

Objective: To examine how body mass index (BMI) assessments are conducted in schools and whether student comfort with assessments varies by students' perceived weight status, weight satisfaction, or privacy during measurements.

Methods: In-person cross-sectional surveys with diverse fourth to eighth grade students (n=11,510) in 54 California schools in 2014–2015 about their experience being weighed in the prior school year.

Results: Half of students (49%) reported being weighed by a PE teacher and 28% by a school nurse. Students were more comfortable being weighed by nurses than PE teachers. Only 30% of students reported privacy during measurements. Students who were unhappy with their weight and those who perceived themselves as overweight were less comfortable being weighed than their peers.

Conclusions and Implications: Prioritizing school nurses to conduct weight measurements could mitigate student discomfort, and particular attention should be paid to students who are unhappy with their weight to avoid weight stigmatization.

INTRODUCTION

In approximately half of schools in the United States, school staff measure students' height and weight annually to assess students' body mass index (BMI),[1] thereby assessing health risk. Despite the widespread use of BMI assessments in schools, few studies have reported on who conducts measurements, the level of student privacy, and how comfortable students are with the measurements. A handful of validation studies examining school staff's accuracy in conducting anthropometric measurements have provided details on who conducted the assessments,[2–5] but no studies have reported on who conducts assessments in day-to-day practice, which may have implications on both the accuracy of the measurement data and students' comfort with the measurements. Further, although the Centers for Disease Control and Prevention recommends maintaining privacy during weight measurements,[6] there is limited literature on students' perceptions of privacy and how this may impact students' comfort with the process; one study found that 20% of elementary students thought

Corresponding author: Emily A. Altman, MPH, UC Berkeley School of Public Health, 2121 Berkeley Way, 5th Floor, Berkeley, CA 94720-7360, Phone: 510-664-9070, Fax: 510-643-4404, ealtman@berkeley.edu.

Financial disclosure: Authors have no financial disclosures.

privacy was lacking during weight screening, and students with overweight had higher odds of reporting discomfort with being weighed.[7]

The goal of the present research was to determine who conducts weight measurements in schools, the degree of privacy of such assessments, and whether student comfort with these measurements varies by who conducts them, the students' perceived weight status, weight satisfaction, and privacy during measurements, and parent-reported sex. This research leverages data collected for a statewide study of BMI screening and reporting in California schools.

METHODS

Participants and Recruitment

In the 3-year *Fit Study*[8,9] (2014–15 – 2016–17), we cluster-randomized 79 schools in 5 California school districts (one in Northern CA, one in Central CA, and three in Southern CA) to one of three study arms: 1) BMI screening and reporting (27 schools); 2) BMI screening only (27 schools); or 3) no BMI screening (25 schools).[8] Students enrolled in participating schools in grades 3–7 during the fall of 2014 and 2015 were eligible for the study. This study was approved by the Committee for the Protection of Human Subjects, University of California, Berkeley, and by participating school districts.

The present cross-sectional analyses are limited to students in arms one (BMI screening and reporting) and two (BMI screening only) who had their height and weight measured at school during their baseline year of study participation (grades 3–7, spring 2014 or spring 2015) and completed a survey the following school year (grades 4–8, fall 2014 or fall 2015).

Procedure

California Education Code requires that all public schools conduct the FITNESSGRAM®, a battery of 6 fitness assessments including BMI, with students in grades 5, 7, and 9 each spring. For the *Fit Study*, arm 1 and 2 schools expanded BMI assessments to include all students in grades 3–8. School staff involved in BMI assessments were asked to watch a 10-minute training video on how to collect heights and weights appropriately (available on the study website) and received laminated instruction cards for measuring heights and weights, along with research-grade assessment equipment,[8] and height and weight recording forms. The video and instruction cards both emphasized the importance of finding an appropriate location for BMI assessments for maintaining student privacy. Among the 119 school staff who conducted BMI assessments at baseline, almost half (47%) attested to watching the video, 23% registered for the video and watched all or part of it, and 30% did not open the video link.

Student Survey and Demographics

The survey, administered by research team members (non-authors), asked students who conducted the weight measurement (another student, PE teacher, classroom teacher, school nurse, another adult, student weighed themselves, other); the perception of privacy during their measurements ("could other students see you being weighed at school last year?" with

response options, “no,” “sort of,” “yes,” “don’t remember”); and comfort being weighed (“how did you feel being weighed at school last year?” with response options, “it didn’t bother me at all,” “it bothered me a tiny bit,” “it bothered me somewhat,” “it bothered me a lot”). Students were asked how happy they were with their weight, (with responses ranging on a 5-point scale from “very unhappy” to “very happy”).[10,11] The survey also asked students how they felt about their weight (with responses ranging on a 5-point scale from “very underweight” to “very overweight”).[12]

For all participating students, schools provided parent-reported sex (male, female); race/ethnicity (Black, Asian, Latinx, White, Other), and grade.

Data Analysis

For analysis, we created a 3-level student weight satisfaction variable for students who were unhappy (collapsing “very unhappy” and “unhappy”), neutral, or happy (collapsing “very happy” and “happy”) with their weight. We also created a 4-level variable for how students felt about their weight, collapsing “very underweight” and “underweight” into one category. The outcome variable, comfort with the measurements, was collapsed into a binary variable (“not bothered at all” and “bothered”). Using mixed effects logistic regression with a random effect for school, we assessed associations between comfort being weighed and the following: the person conducting weight measurements, the perceived privacy of weight measurements, student weight satisfaction, and perceived weight status, and additionally adjusted for sex, race, and grade. All analyses were conducted in Stata/SE 16.1 (StataCorp LLC, College Station, TX, USA).

RESULTS

A total of 11,510 students were included in this analysis; 4,566 students were excluded because they did not remember being weighed at school during the prior school year, and 298 students were excluded because of missing outcome or covariate data. Those who remembered being weighed at school the prior year had a slightly higher mean BMI than those who didn’t (19.4 vs 20.0, $p<0.05$). The sample was diverse: 60% Latinx, 16% White, 16% Asian, and 6% Black (Table 1). Forty percent of students had a BMI $\geq 85^{th}$ percentile for age and sex based on the CDC growth charts,[13] although only 26% considered themselves somewhat or very overweight. Most students reported being weighed by a PE teacher (49%), school nurse (28%), or classroom teacher (10%). Only 1% of students were weighed by another student, 5% by another adult, and 1% by themselves; 6% did not remember who weighed them. Among the 90% of students who remembered how private their weight measurement was, only 30% of students reported complete privacy while being weighed; 32% reported partial privacy, and 38% reported no privacy. One in five students (20%) reported being unhappy with their weight. Overall, 64% of students reported that being weighed at school did not bother them at all, 25% were bothered “a tiny bit”, 7% “somewhat”, and 5% “a lot”.

In the fully adjusted model (Table 2), students who were weighed by nurses were less bothered by the weight measurements than those who were weighed by PE teachers (OR 0.81, 95% CI 0.69, 0.96). Those who reported having partial privacy were more bothered by

being weighed at school than those with no privacy (OR 1.34, 95% CI 1.21, 1.49). Students neutral (OR 2.26, 95% CI 2.04, 2.51) or unhappy with their weight (OR 3.31, 95% CI 2.92, 3.75) were more bothered by being weighed at school than students happy with their weight; and students who considered themselves somewhat overweight (OR 2.33, 95% CI 2.07, 2.61) or very overweight (OR 2.59, 95% CI 2.11, 3.19) were more bothered than those who felt they were “about the right weight”. Female students were more bothered by being weighed than male students (OR 2.17, 95% CI 2.00, 2.36).

DISCUSSION

Despite half of schools in the United States assessing students’ BMI, we have a limited understanding of the student experience of getting weighed in schools.[1] The objective of the present research was to determine who conducts weight measurements in schools, the degree of privacy of such assessments, and whether student comfort with being weighed varies by the person conducting the measurements, students’ perceived weight status, their weight satisfaction, and privacy during measurements. This is the first study to document this among a large and diverse group of elementary and middle school students. We demonstrate significant associations between student discomfort and being weighed by PE teachers compared to school nurses, and that student weight dissatisfaction, higher perceived weight status, and being female are associated with discomfort with school-based weight measurements.

In the present study, PE teachers conducted more measurements than any other school staff, but students were least comfortable with PE teachers weighing them. PE teachers, who feel pressure to be role models with respect to their own body shape,[14] have been shown to demonstrate weight bias;[14,15] which may affect students’ comfort with being weighed by PE teachers compared to other adults. While having school nurses conduct all BMI screenings would be ideal, not all schools have a school nurse. As of 2014, 85% of elementary schools and 78% of middle schools had access to a school nurse, though less than 60% had a full-time nurse.[16] With limited access to nurses, many schools rely on PE teachers or other adults to conduct BMI screenings. Our findings suggest that if schools continue to conduct BMI screenings, they must ensure that all staff involved are trained to demonstrate sensitivity around the process.

While the Centers for Disease Control and Prevention advocates for privacy during BMI assessments in schools,[6,17] only 30% of students reported full privacy in the present study. Notably, this is despite all assessments being done in the context of a research study in which all school staff were asked to watch a training video and were given additional instructions on the importance of privacy during weight measurements. A study in Massachusetts, where PE teachers weighed 5^{th} −8^{th} grade students (n=786) in the corner of a gym, reported that 80% of students said they had “enough” privacy during measurements.[18] Thus, comfort may be less about whether or not other students can see, and more about the appropriateness of, and fidelity to, a privacy protocol. This may explain our findings that suggest that having partial or complete privacy during weight measurements is associated with greater odds of discomfort compared with those who reported no privacy. Nonetheless,

schools should take extreme care to ensure that weight measurements follow a clear protocol and are conducted as privately as possible.

We found that being unhappy with one's weight and perceiving oneself to be overweight were risk factors for discomfort with weight measurements, independent of each other and of the setting for such measurements. A prior study similarly found that students with overweight were less comfortable with weight measurements than students with normal weight.[7] Notably, in the present study, 28% percent of students did not remember being weighed, suggesting the process did not bother them, and the majority of students who did remember being weighed reported no discomfort. Thus, the students whom BMI assessments are intended to help – those with an elevated weight status – are precisely those who tend to experience discomfort with the process. This raises concerns for weight stigmatization, as research suggests that weighing students at school leads to decreased weight satisfaction,[9] and adolescents with overweight report being teased more than those with average weight.[19] Additionally, our findings demonstrate that female students experienced greater discomfort being weighed than male students. This is consistent with previous research that found a greater focus on weight and lower body satisfaction among adolescent girls.[11]

The present study has important limitations. Schools included in the study may not be representative of weight-measurement settings in other schools in and outside of California. Students who did not remember being weighed the prior school year had a lower mean BMI than those who were included in our study but were excluded from analysis. As is a concern in many studies, unmeasured confounders such as the extent to which students previously experienced weight stigmatization in schools, or the gender of those conducting the measurements, may have biased our findings. Additionally, the question that asked students about their comfort with measurements was not previously validated. Despite low levels of complete privacy and only a portion of school personnel completing training, results regarding the presence of complete privacy during weight measurement may be higher than normal due to training that school personnel received as part of *The Fit Study*.

IMPLICATIONS FOR RESEARCH AND PRACTICE

The present research highlights student discomfort with school-based weight measurements, particularly among students weighed by PE teachers, those who are unhappy with their weight, and those who perceive themselves to be overweight. While schools should strive for staff sensitivity and follow privacy protocols during weight measurements, our results suggest this may be difficult to achieve in the real-world, and some students will continue to feel uncomfortable with the process, regardless. When conducting school-based weight measurements, particular attention should be paid to students who may be unhappy with their weight to help avoid weight stigmatization.

Acknowledgements:

This study was funded by NIH/NHLBI R01HD074759. The funders were not involved in the collection, analysis, or interpretation of study data.

REFERENCES

1. Ruggieri DG, Bass SB. A comprehensive review of school-based body mass index screening programs and their implications for school health: do the controversies accurately reflect the research? J Sch Health 2015;85(1):61–72. [PubMed: 25440454]
2. Morrow JR Jr., Martin SB, Jackson AW. Reliability and validity of the FITNESSGRAM: quality of teacher-collected health-related fitness surveillance data. Res Q Exerc Sport 2010;81(3 Suppl):S24–30. [PubMed: 21049835]
3. Stoddard SA, Kubik MY, Skay C. Is school-based height and weight screening of elementary students private and reliable? J Sch Nurs 2008;24(1):43–48. [PubMed: 18220455]
4. Berkson SS, Espinola J, Corso KA, Cabral H, McGowan R, Chomitz VR. Reliability of height and weight measurements collected by physical education teachers for a school-based body mass index surveillance and screening system. J Sch Health 2013;83(1):21–27. [PubMed: 23253287]
5. Thompson HR, Linchey JK, King B, Himes JH, Madsen KA. Accuracy of School Staff-Measured Height and Weight Used for Body Mass Index Screening and Reporting. The Journal of school health 2019;89(8):629–635. [PubMed: 31140199]
6. Sliwa SA, Brener ND, Lundeen EA, Lee SM. Do Schools That Screen for Body Mass Index Have Recommended Safeguards in Place? J Sch Nurs 2018:1059840518758376.
7. Kalich KA, Chomitz V, Peterson KE, McGowan R, Houser RF, Must A. Comfort and utility of school-based weight screening: the student perspective. BMC Pediatr 2008;8:9. [PubMed: 18312696]
8. Madsen KA, Linchey J, Ritchie L, Thompson HR. The Fit Study: Design and rationale for a cluster randomized trial of school-based BMI screening and reporting. Contemp Clin Trials 2017;58:40–46. [PubMed: 28479218]
9. Madsen KA, Thompson HR, Linchey J, et al. Effect of School-Based Body Mass Index Reporting in California Public Schools: A Randomized Clinical Trial. JAMA Pediatrics 2021;175(3):251–259. [PubMed: 33196797]
10. Neumark-Sztainer D, Bauer KW, Friend S, Hannan PJ, Story M, Berge JM. Family weight talk and dieting: how much do they matter for body dissatisfaction and disordered eating behaviors in adolescent girls? J Adolesc Health 2010;47(3):270–276. [PubMed: 20708566]
11. Neumark-Sztainer D, Croll J, Story M, Hannan PJ, French SA, Perry C. Ethnic/racial differences in weight-related concerns and behaviors among adolescent girls and boys: findings from Project EAT. J Psychosom Res 2002;53(5):963–974. [PubMed: 12445586]
12. Neumark-Sztainer D, Paxton SJ, Hannan PJ, Haines J, Story M. Does body satisfaction matter? Five-year longitudinal associations between body satisfaction and health behaviors in adolescent females and males. J Adolesc Health 2006;39(2):244–251. [PubMed: 16857537]
13. Kuczmarski RJ, Ogden CL, Grummer-Strawn LM, et al. CDC growth charts: United States. Adv Data 2000(314):1–27.
14. Greenleaf C, Martin SB, Rhea D. Fighting fat: how do fat stereotypes influence beliefs about physical education? Obesity (Silver Spring) 2008;16 Suppl 2:S53–59. [PubMed: 18978764]
15. Greenleaf C, Weiller K. Perceptions of youth obesity among physical educators. Social Psychology of Education 2005;8:407–423.
16. Centers for Disease Control and Prevention. Results from the School Health Policies and Practices Study 2014 2015.
17. Nihiser AJ, Lee SM, Wechsler H, et al. BMI measurement in schools. Pediatrics 2009;124 Suppl 1:S89–97. [PubMed: 19720672]
18. Kalich KA, Chomitz V, Peterson KE, McGowan R, Houser RF, Must A. Comfort and utility of school-based weight screening: the student perspective. BMC Pediatr 2008;8:9. [PubMed: 18312696]
19. Neumark-Sztainer D, Falkner N, Story M, Perry C, Hannan PJ, Mulert S. Weight-teasing among adolescents: correlations with weight status and disordered eating behaviors. Int J Obes 2002;26(1):123–131.

Table 1:

Characteristics of students who remembered being weighed at school in prior school year in 4 school districts across California, USA (n=11,510)

Characteristic	Overall, N (%)	Student comfort with measurements, N (%)	
		Not bothered 7,328 (64%)	Bothered 4,182 (36%)
Female	6,066 (53%)	3,349 (54%)	2,717 (65%)
Grade			
4th grade	3,837 (33%)	2,556 (35%)	1,281 (31%)
5th grade	2,222 (19%)	1,379 (19%)	843 (20%)
6th grade	982 (9%)	588 (8%)	394 (9%)
7th grade	2,624 (23%)	1,624 (22%)	1,000 (24%)
8th grade	1,845 (16%)	1,181 (16%)	554 (16%)
Race			
Latinx	6,876 (60%)	4,265 (58%)	2,611 (62%)
White	1,815 (16%)	1,191 (16%)	617 (15%)
Asian	1,808 (16%)	1,160 (16%)	655 (16%)
Black	737 (6%)	536 (7%)	201 (5%)
Other	274 (2%)	176 (3%)	98 (2%)
BMI category			
Underweight (BMI <5th %tile)	379 (3%)	261 (4%)	109 (3%)
Normal weight (BMI ≥5th – <85th %tile)	6,498 (57%)	4,786 (66%)	1,712 (42%)
Overweight (BMI ≥85th – <95th %tile)	2,032 (18%)	1,119 (15%)	913 (22%)
Obese (BMI ≥95th %tile)	2,498 (22%)	1,103 (15%)	1,395 (34%)
Perceived weight status			
Underweight	2,424 (21%)	1,728 (24%)	696 (16%)
About the right weight	6,044 (53%)	4,419 (60%)	1,625 (39%)
Somewhat overweight	2,486 (22%)	991 (14%)	1,495 (36%)
Very overweight	556 (5%)	190 (3%)	366 (9%)
Weight satisfaction			
Very happy	2,243 (19%)	1,887 (26%)	356 (9%)
Happy	4,132 (36%)	3,016 (41%)	1,116 (27%)
Neutral	2,885 (25%)	1,568 (21%)	1,317 (31%)
Unhappy	1,446 (13%)	550 (8%)	896 (21%)
Very unhappy	804 (7%)	307 (4%)	497 (12%)

BMI, body mass index

Table 2:

Odds[A] of discomfort with weight measurement by characteristics of students who remembered being weighed at school in prior school year in 4 school districts across California, USA (n=11,510)

Characteristic	Odds Ratio	95% CI
Person weighing		
PE teacher	Ref	
Nurse	0.81*	0.69, 0.96
Classroom teacher	0.82	0.67, 1.01
Other adult	0.82	0.64, 1.05
Other student	1.46	1.00, 2.12
Self	1.11	0.67, 1.82
Don't know	0.98	0.79, 1.20
Privacy during measurement		
None	Ref	
Partial	1.34***	1.21, 1.49
Complete	1.11	1.00, 1.25
Don't remember	0.95	0.81, 1.12
Perceived weight status		
Underweight	0.94	0.84, 1.05
About the right weight	Ref	
Somewhat overweight	2.33***	2.07, 2.61
Very overweight	2.59***	2.11, 3.19
Weight satisfaction		
Happy	Ref	
Neutral	2.26***	2.04, 2.51
Unhappy	3.31***	2.92, 3.75
Sex		
Male	Ref	
Female	2.17***	2.00, 2.36
Grade		
4th grade	1.31**	1.09, 1.57
5th grade	1.49***	1.23, 1.80
6th grade	1.45***	1.18, 1.79
7th grade	1.18*	1.03, 1.36
8th grade	Ref	
Race		
Latinx	1.43***	1.18, 1.73
Asian	1.27*	1.01, 1.58
Black	Ref	

Characteristic	Odds Ratio	95% CI
White	1.39 **	1.13, 1.73
Other	1.35	0.97, 1.88

* p<0.05

** p<0.01

*** p<0.001

A Data derived from mixed effects logistic regression model with a random effect for school, adjusted for the person conducting weight measurements, the perceived privacy of weight measurements, student weight satisfaction, student perceived weight status, sex, race, and grade.