Key Predictors of Primary Care Providers' Self-Efficacy in Caring for Children with Overweight or Obesity

Janice L. Liebhart, MS[a], **Alyson B. Goodman, MD, MPH**[b], **Jeanne Lindros, MPH**[a], **Catherine Krafft, MD**[c], **Stephen R. Cook, MD, MPH**[c], **Alison Baker, MS**[a], **Sandra G. Hassink, MD, MS**[a]

[a]Institute for Healthy Childhood Weight, Department of Child & Community Health, American Academy of Pediatrics (AAP), 345 Park Blvd, Itasca, IL, USA, 60143

[b]Division of Nutrition, Physical Activity and Obesity, Centers for Disease Control and Prevention (CDC), 4770 Buford Hwy, MS 107-5, Atlanta, GA, USA, 30341

[c]University of Rochester Medical Center, 601 Elmwood Ave, Box 777, Rochester, NY, USA, 14642

Abstract

Objective: Self-efficacy is a crucial factor in enabling pediatric primary care providers (PCPs) to deliver recommended care to children with overweight and obesity. This study, conducted with a large, national sample of PCPs, aimed to identify key factors which may contribute to PCP self-efficacy for obesity-related care, from a list of previously reported barriers and facilitators.

Methods: A national random sample of American Academy of Pediatrics members were surveyed in 2017 (analytic n=704). Factor analysis was used to identify self-efficacy variables from relevant indicators and assess fit. Multivariable linear regression analyses were conducted to identify key predictors of PCP self-efficacy from reported facilitators or barriers to care, including characteristics of the PCP, practice, community, and payment systems.

Results: Two PCP self-efficacy variables were identified: health risk assessment and patient-centered counseling. Both were positively predicted by relevant training, the belief that pediatricians play an important role in obesity, and awareness of barriers to payment for dietitians or weight management programs. Both were negatively predicted by a perceived lack of available PCP time for counseling and inadequacy of available referral resources to assist with treatment. Additional predictors of counseling self-efficacy included PCP beliefs that they are paid for treatment (+) and that patients/families lack time for healthy behaviors (–). Electronic health record clinical decision supports or registries and patient social disadvantage were not predictive.

Corresponding Author: Janice Liebhart, MS; AAP Institute for Healthy Childhood Weight, 345 Park Blvd, Itasca, IL 60143; Office: (630)626-6239; Fax: (847)434-8000; jliebhart@aap.org.

Conclusions: Results suggest multiple potential roles and strategies for local and national organizations seeking to facilitate improvements to PCP self-efficacy in caring for children with overweight and obesity.

What's new: This study adds to our understanding of key factors associated with provider self-efficacy in caring for children with overweight or obesity, based on a national survey of pediatricians that included a broad list of potential barriers and supports to care.

Keywords

childhood obesity; primary care providers; self-efficacy; recommended care

Introduction

Pediatric obesity affects nearly 14 million US children, with serious and costly consequences.[1–4] Expert Committee Recommendations for pediatric obesity and subsequent, supportive literature elucidate the importance of primary care providers (PCPs) in helping address this issue, through their unique role in obesity assessment, prevention, and treatment.[1,5,6]

Self-efficacy is considered a pivotal predictor of human behavior,[7,8] and studies relevant to healthcare and obesity-related primary care support its importance to performance by providers in following recommended clinical practices.[9–14] However, despite considerable recent progress in PCP implementation of recommendations and reductions in barriers to obesity-related care,[15] many potential barriers to PCP self-efficacy development remain.[11,12,15–19] The purpose of this study was to further investigate these barriers.

Recommendations for obesity prevention and treatment include BMI screening and clinician counseling on nutrition and physical activity for all children. A tiered approach is recommended for children with obesity or overweight and obesity-related risk factors, including assessment for obesity related co-occurring conditions and the provision of or referral to evidence-based interventions for obesity.[1,20] Such interventions often require linkages with other clinical- or community-based resources and are ideally consistent with the 2017 U.S. Preventive Services Task Force (USPSTF) grade B recommendation for child obesity. The USPSTF recommendation includes screening all children 6 years and older for obesity and offering or referring those with obesity to family-centered, multi-component interventions that include   26 hours of nutrition and physical activity counseling and behavior modification techniques over 2-12 months.[20]

To routinely deliver recommended obesity-related care, PCPs need education, skills, and confidence or self-efficacy. Self-efficacy is "the belief in one's capabilities to recruit the resources and execute the actions required to manage prospective situations."[21] Self-efficacy predicts not only whether or not individuals will attempt a given behavior but also their likely persistence in overcoming barriers and, ultimately, successful behavioral performance across circumstances.[7]

PCP skills and self-efficacy in assessment and counseling are foundational to their roles in identifying and evaluating pediatric patients with obesity and facilitating their engagement in treatment. The fact that patients with obesity typically require longitudinal care[1,20] and PCPs play a critical role in ensuring ongoing access to care[22] only amplifies the importance of these attributes.

Self-efficacy primarily develops through successful enactment of a behavior in different or progressively challenging circumstances. However, it can be enhanced through observation of others' behavioral performance and outcomes and, to a lesser extent, verbal persuasion or heightened self-awareness during performance. Conversely, exposure to seemingly insurmountable barriers can reduce self-efficacy levels and extinguish motivation and behavior. As a result, self-efficacy often develops through complex processes, influenced by characteristics of individuals as well as their social and physical environments.[7,8]

Similarly, to deliver quality obesity care, PCPs need to have a firm understanding of their own role[1,6] and be supported by healthcare and community systems.[23] Thus, numerous factors previously identified as either facilitating or hindering care have implications for self-efficacy development. These factors include characteristics of the PCP (e.g., relevant training, belief in the effectiveness of recommended care and of patient/family interest or ability to participate in care), the practice (e.g., electronic health record (EHR) supports, sufficient PCP time for care), the broader community (e.g., referral resources) and payment systems (for PCPs/referral resources).[6,9,12,14,19,24]

It is unclear which previously identified barriers or supports appear most closely associated with PCP self-efficacy in this context and, thus, may also be particularly relevant to advancing recommended care. The purpose of this study is to use national-level survey data, based on a representative sample of primary care pediatricians, to examine the relative importance of barriers or facilitators to PCP self-efficacy in caring for children with overweight or obesity.

Methods

Instrument and software

Data were obtained from the 2017 Periodic Survey, sent to a randomly selected national sample of non-retired, US-based members of the American Academy of Pediatrics (AAP), excluding subspecialists. The survey, which is fielded annually to approximately 1600 pediatrician members based on established methodology, was specifically focused on obesity-related topics in 2017 (response rate=50.1%). Questions were developed collaboratively by AAP Research staff and experts in childhood obesity at the Centers for Disease Control and Prevention and the AAP Institute for Healthy Childhood Weight and included new and historical items. Surveys were mailed to each AAP member up to seven times, with up to two additional email contacts that included a link to an electronic version of the survey. The analytic sample for this analysis (n=704) was limited to those who presently provide health supervision visits. Detailed survey procedures and an assessment of non-response bias for the sample have been previously described.[25] Relative to the target sample, respondents were slightly older (46 vs 43 years) but did not differ with respect

to sex or geographic region. Analyses were primarily conducted using SPSS Statistics 25 with listwise deletion and a significance level of p<0.05; confirmatory factor analysis was conducted using R version 4.1.2. The survey was exempted by the AAP Institutional Review Board.

Participant characteristics/control variables

Provider or practice characteristics selected as controls have been used in recent studies relevant to provider self-efficacy or behavior.[15–17] Geographic census region was based on the address listed within the AAP member database. All other variables were obtained from the survey. These included PCP sex (male or female), age (year of birth) and hours/week worked in direct patient care. The last two variables were retained as continuous variables in subsequent analyses. PCPs also reported practice location (urban inner-city, urban non-inner city, suburban, rural) and setting. Setting options included: 1) Solo/2-physician practice 2) pediatric group practice, 3-10 pediatricians 3) Pediatric group practice, >10 pediatricians 4) Multispecialty group practice (other than staff model HMO) 5) Staff/group model HMO 6) Medical school/hospital (or parent university) 7) Government hospital or clinic 8) Nongovernment hospital or clinic 9) Nonprofit community health center. Settings were combined into three categories, prior to analyses: a) Solo/2-physician practice b) Group practice/HMO (#2-5) and Academic/hospital/clinic/community health center (#6-9).

Participants were more commonly female, with a mean age of 46 years and worked an average of 39 hours per week in direct patient care (Table 1). Respondents were distributed across US regions and most commonly worked in group practices/HMOs and suburban locations.

Independent variables

Independent variables were selected based on literature supporting their potential to influence PCP care and self-efficacy outcomes and included various resources and barriers to practice.[6,9,12,14,19,24]

- Resources/supports:
  - Training:
    - Motivational interviewing (MI): Respondents reported (Y/N) whether they received Continuing Medical Education (CME) sessions or trainings in the past 3 years regarding using motivational interviewing/shared decision-making strategies for behavior change.

    - Comorbidities: Respondents reported (Y/N) whether they received Continuing Medical Education (CME) sessions or trainings in the past 3 years regarding a) evaluating comorbidities of childhood obesity or b) treatment of comorbidities. These items were combined into a single variable (≥1 comorbidities training).

  - EHR supports:

■ Registry: Respondents reported (Y/N) whether their practice uses an EHR system that automatically creates a registry or list of patients with overweight or obesity.

■ Decision support: Respondents reported (Y/N) whether their practice uses an EHR that automatically a) flags patients with overweight or obesity or b) provides prompts for preventive services, including counseling. These items were combined into a single variable (1 EHR decision support tool).

• PCP attitudes/beliefs regarding facilitators/barriers to practice: Thirteen PCP attitude questions representing possible resources or barriers for obesity-related care were included, each of which was followed by a five-point response scale from 1=strongly disagree to 5=strongly agree, with 3=neutral. Based on item analysis, six moderately correlated pairs of attitudes were averaged, resulting in seven PCP attitude variables: 1) Time constraints make counseling for prevention/treatment difficult 2) Pediatricians can help prevent/treat/manage childhood obesity 3) There is a lack of adequate services/resources in my practice area to refer children/families for weight management 4) I am usually paid for obesity counseling/treatment 5) Dietitian/weight management services are generally not covered by health insurance 6) Patients/families lack access to healthy food/safe places to be active 7) Patients/families lack time for healthy behaviors. Descriptive statistics and correlations for initial attitude variables are provided in Supplementary File 1; final attitude variables are shown in Table 2.

Outcome variables

Self-efficacy variables were identified based on factor analysis of indicators from two survey questions, pertaining to confidence/perceived ability for aspects of care relevant to children with overweight or obesity. Indicators for the first question, focused on counseling for behavior change, had means between "slightly' and "somewhat" perceived effectiveness/ comfort with relevant practice (Table 3). Indicators for the second question, focused primarily on recommended assessments, had mean values ranging from "good" to "very good" perceived ability (Table 3). Principle component analysis and exploratory factor analysis with principal axis factoring and Promax rotation were conducted with consistent results. After removal of two cross-loading indicators, two correlated factors were identified based on scree plots, which collectively explained 56% of variance: Self-Efficacy in Basic Practice/Health Risk Assessment and Self-Efficacy/Perceived Effectiveness in Patient-Centered Behavioral Counseling ("assessment self-efficacy" and "counseling self-efficacy"; 6 and 5 items, respectively). To assess potential replicability, an additional bootstrap procedure was also conducted,[26] which supported the same two-factor solution (data not shown).

Confirmatory factor analysis (CFA) was conducted, using ULS estimation and polychoric correlations to obtain accurate parameter estimates for categorical variables, as well as fit indices, although exact cutoff values for fit indices have not yet been established.[27] Based on traditional cutoff values (RMSEA .05, p <.05=NS; CFI .95; SRMR .08), results for

a two-factor model with correlated counseling and assessment self-efficacy variables were mixed (Table 3). Modification indices identified the primary area of misfit as a lack of correlation between the first two counseling self-efficacy indicators concerning expected outcomes.

Expected outcomes and self-efficacy are often considered distinct, but relevant judgements are closely intertwined within the minds of respondents, making any such distinction murky.[28] A second two-factor model in which error terms for these two indicators were allowed to correlate showed improved fit, with appropriate factor loadings and fit indices falling within traditional standards (Table 3) and ranges for which different estimation methods tend to agree.[27] An additional model in which the two indicators were separated into a third factor produced only slightly better fit and negligible differences in fit indices. As a result, the two-factor model with correlated error terms appeared reasonable and preferable for reasons of stability and parsimony, with good index reliability (Table 3; Supplementary File 2). Residuals indicated some expected remaining areas of misfit related to counseling appropriate to assessment-focused contexts. Consequently, assessment and counseling self-efficacy indices were interpreted as both encompassing counseling, but at substantively different depths.

Regression Analysis

Each self-efficacy index was standardized, and multivariable linear regression was conducted on all independent variables. Continuous variables were centered, and categorical independent variables were dummy coded, using the lack of an available resource (i.e., specific type of training or EHR support) as the reference category.

Regression models were checked for multicollinearity, mis-specified relationships, and outliers (|Bonferroni studentized deleted residual|>3.9). For the model predicting assessment self-efficacy, a single potential outlier was identified (studentized deleted residual =−4.63). If removed, the coefficient for comorbidities training decreased slightly and fell below the level of significance (from B=.178; 95% CI=.004-.352; p=.045 to B=.170; 95% CI=.00-.341; p=.051). No other potential changes to interpretation were noted, and no additional reasons were apparent to exclude this point.

Results

Descriptive statistics

About one-third of PCPs reported having received recent training in motivational interviewing or evaluating/treating comorbidities (Table 2). Though half reported having EHRs with one or more decision support tools, relatively few had EHRs with registry capabilities.

Regarding PCP attitudes/beliefs, respondents generally agreed that pediatricians had a role in preventing and managing childhood obesity but disagreed that pediatricians were usually paid for counseling/treatment (Table 2). Most agreed to the existence of all other barriers, including a lack of adequate weight management services/resources in their practice area,

available time for counseling, and payment for referral resources, as well as a lack of patient/family access to resources and time for healthy behaviors.

Both self-efficacy indices had significant bivariate correlations with most potential barriers or supports (Supplementary File 3).

Regression—Assessment Self-efficacy

Multivariable regression analysis identified independent predictors of PCP assessment self-efficacy (Table 4). Recent training in evaluating/treating comorbidities was a positive independent predictor, as were the belief that pediatricians can play an important role in obesity care and the belief in a lack of available payment for referral resources. A perceived lack of time for counseling/treatment and lack of adequate referral resources/services were independent negative predictors. Having an EHR registry or EHR decision support tool did not predict self-efficacy.

Regression—Counseling Self-efficacy

Multiple independent predictors were also identified for PCP counseling self-efficacy (Table 4). Training in motivational interviewing was a positive predictor. Similar to assessment self-efficacy, the general perception that pediatricians have a role in obesity care and the belief in a lack of available payment for referral resources were positive predictors. A perceived lack of time and lack of adequate referral resources were negative independent predictors. Neither EHR registry capability nor decision support were predictors of counseling self-efficacy. Unique predictors of counseling self-efficacy included (+) a perception by respondents that they were usually paid for counseling, and (−) a belief that patients/families lack time for healthy behaviors.

Discussion

Results support the existence of two types of provider self-efficacy for obesity-related care related to assessment and counseling and their associations with characteristics of providers, their practices, the community, and payment systems. Results reinforce the complexity of obesity-related care and the significance of a diverse set of previously identified barriers to PCP self-efficacy for providing recommended care.[9,12,19,24] Findings also appear congruent with previous reports in which interventions to improve obesity-related care by targeting multiple systems (i.e., healthcare, community) resulted in improvements to PCP self-efficacy and providing recommended care.[13,29] Provider self-efficacy is an important determinant of behavioral performance, including following recommended clinical practices.[9–14] Our findings suggest potential avenues for building provider self-efficacy across settings and ecological levels that might be leveraged by local and national organizations seeking to facilitate improvements in care.

PCP level

Previous studies have noted that a lack of belief in the effectiveness of recommended treatment strategies can diminish PCP motivation for practice.[9,12] In our study, PCPs' favorable belief that pediatricians play an important role in addressing obesity was the

strongest predictor of both assessment and counseling self-efficacy. Continuing to frame such beliefs in positive terms may be useful for maintaining a positive approach to PCP self-efficacy development through a combination of relevant education and skill building activities. Most PCPs may also be open to such an approach, given that only a small proportion expressed disagreement that PCPs play a role in childhood obesity prevention (3%) or treatment (7%) (data not shown).

Similar to previous studies, we found positive associations between training relevant to pediatric obesity and increases in self-efficacy/success expectations.[10,13,30] Here, training in comorbidities predicted assessment self-efficacy, whereas training in motivational interviewing predicted counseling self-efficacy. This is consistent with a general understanding of self-efficacy as limited to a specific domain of behaviors[7,21] and has implications for the specificity and breadth of obesity education.

A negative predictor of counseling self-efficacy was the perception by PCPs that patients lack time for healthy behaviors. This could indicate a need for training that patient motivation is a developmental process, rather than a fixed state of mind.[1,31] Interestingly, a perceived lack of patient access to healthy food/safe places to be active was not related to either type of self-efficacy for obesity-related care, although social drivers of health are known to play a significant role in other important outcomes, such as the risk of developing obesity and access to treatment.[3,32]

Practice level

Previously identified practice-level influences include a perceived lack of time as a barrier to evidence-based practice and pediatric obesity care.[9,24] Our results refine these findings by showing that a perceived lack of PCP time was a shared negative predictor of both assessment and counseling self-efficacy. In this regard, self-efficacy development is thought to involve effortful cognitive judgments,[7,8,21] which are sensitive to time pressure in general.[33] In this analysis, neither EHR registry capabilities nor decision support tools significantly predicted either type of PCP self-efficacy. This finding contrasts with previous reports, associating EHR tools with increased PCP capacity for recommended care.[9,34,35] However, other studies have found that the availability of EHR tools alone may be insufficient to improve care if support for implementation is lacking.[35,36] It is possible that our questions, which focused on EHR tool availability, lacked sufficient specificity to assess EHR value.

Community level

With respect to factors within the broader community, PCPs' perceptions of a lack of adequate referral resources for weight management services was an independent negative predictor of both assessment and counseling self-efficacy. Such perceptions could conceivably hinder PCP self-efficacy development in multiple ways, such as by diminishing motivation when clear next steps are unavailable or by reducing or eliminating opportunities for PCPs to co-manage patients with other providers. Referral resources are often integral to a PCP's ability to offer obesity treatment to their patients, [1,6,20] and weight management programs that meet present recommendations are frequently unavailable, due

to location, backlogs, or long waiting periods.[37,38] PCP uncertainty about the quality of known resources or lack of awareness of available resources may also curtail opportunities for collaboration and relevant practice.[6,17] Both spread and scale of effective weight management resources and facilitation of clinician awareness may support PCP self-efficacy.

Payment systems—When PCPs perceived that they were typically paid for obesity counseling/treatment, counseling self-efficacy tended to be higher, but there was no such relationship with assessment self-efficacy. This might reflect either the short amount of time required and thus lack of need for additional payment to incorporate assessment into routine care or the fact that assessment may already be integrated, in contrast to in-depth counseling. This highlights the well-documented need for improved payment for specific obesity related treatment. Previous publications have identified a lack of available payment for services as a barrier to implementing practice guidelines.[6,24] Others have offered that the effect of reimbursement on guideline implementation is likely to be transient, at best.[9,19] Our results suggest that clinicians under time and payment pressure might be more likely to counsel efficaciously if paid for this service.

Counterintuitively, PCP perceptions of a barrier to insurance coverage for dietitians/weight management programs, instead of being a negative predictor, turned out to be a positive predictor of both types of PCP self-efficacy. This, however, was only apparent within multivariable models in which all other barriers were held to modest levels (i.e., average conditions, under which PCPs saw some role for themselves in obesity care and did not perceive particularly strong barriers to care, such as a lack of referral resources, time for counseling, or payment for themselves). Available payment for pediatric obesity treatment is often inadequate or inconsistent but considered essential to the viability of many referral resources.[6,37] Under such circumstances, PCPs may perceive a greater need to treat the patient within primary care and have increased motivation to develop their own skills, possibly in collaboration with some available referral resources. In comparison, when PCPs perceive a lack of adequate referral resources, this may represent a relatively intractable barrier to obesity treatment that greatly diminishes PCP opportunities or motivation for self-efficacy development. However, it is unclear why a perceived payment barrier for existing referral resources and a perceived lack of adequate resources might differ in their relationship to self-efficacy.

Limitations of this study are those common to survey and cross-sectional research, including the possibility of self-report, social desirability, and non-response bias, measurement error and the inability to establish causal direction. The study population consists of Fellows of the American Academy of Pediatrics who may be meaningfully different than other pediatricians or practice providers who care for children (e.g., family practitioners, physician assistants), and so results may not be generalizable. Analyses also involved exploratory components, including methods used to identify primary outcome variables. Although steps were taken to minimize limitations, these, and other issues (such as the use of listwise deletion) may limit the generalizability of these findings. Results also leave room for additional work to further refine self-efficacy outcomes, particularly as relevant theory and methods evolve. Furthermore, study data were collected in 2017 and might not reflect current conditions.

Nevertheless, this analysis of survey data from a nationally representative sample of practicing pediatricians, which included self-efficacy indicators and many variables considered potentially important to self-efficacy development, allowed for novel insight into key areas of practice for which PCPs may be in need of additional support to provide optimal care to children with overweight or obesity.

Conclusion

PCP self-efficacy in obesity-related care, including the assessment of obesity-related health risk and the provision of patient-centered counseling, is associated with provider-, practice-, community- and payment-related factors. Our results suggest that training modalities that might improve PCP self-efficacy could address motivational interviewing, obesity comorbidities, and the importance and effectiveness of PCP-delivered obesity care. Increasing the availability of scarce obesity referral resources and PCP awareness of these, as well as ensuring PCP payment and time for patient counseling could potentially remove important barriers to PCP self-efficacy in providing obesity-related care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Funding Source:

References

1. Barlow S, Expert Committee. Expert committee recommendations regarding prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. Pediatrics. 2007;120(4):S164–S192. [PubMed: 18055651]

2. Skinner AC, Ravanbakht SN, Skelton JA, Perrin EM, Armstrong SC. Prevalence of obesity and severe obesity in US children, 1999–2016. Pediatrics. 2018;141(3):e20173459. [PubMed: 29483202]

3. Centers for Disease Control and Prevention. Childhood obesity facts https://www.cdc.gov/obesity/data/childhood.html. Accessed February 16, 2022.

4. Freemark MS. Childhood obesity in the modern age: global trends, determinants, complications, and costs. In: Freemark MS, ed. Pediatric Obesity: Etiology, Pathogenesis and Treatment 2nd ed: Springer; 2018:3–24.

5. Daniels SR, Hassink SG. The role of the pediatrician in primary prevention of obesity. Pediatrics. 2015;136(1):e275–e292. [PubMed: 26122812]

6. Wilfley DE, Staiano AE, Altman M, et al. Improving access and systems of care for evidence-based childhood obesity treatment: conference key findings and next steps. Obesity. 2017;25(1):16–29. [PubMed: 27925451]

7. Bandura A. Self-efficacy mechanism in human agency. American Psychologist. 1982;37(2):122.

8. McAlister A, Perry C, Parcel G. How individuals, environments, and health behaviors interact In: Glanz K, Rimer BK, Viswanath K, eds. Health Behavior and Health Education: Theory, Research, and Practice. San Francisco, CA: John Wiley & Sons; 2008:169–188.

9. Lavoie KL, Rash JA, Campbell TS. Changing provider behavior in the context of chronic disease management: focus on clinical inertia. Annual Review of Pharmacology and Toxicology. 2017;57:263–283.

10. Lowenstein LM, Perrin EM, Campbell MK, Tate DF, Cai J, Ammerman AS. Primary care providers' self-efficacy and outcome expectations for childhood obesity counseling. Childhood Obesity. 2013;9(3):208–215. [PubMed: 23635310]

11. Steeves JA, Liu B, Willis G, Lee R, Smith AW. Physicians' personal beliefs about weight-related care and their associations with care delivery: The US National Survey of Energy Balance Related Care among primary care physicians. Obesity Research & Clinical Practice. 2015;9(3):243–255. [PubMed: 25175671]

12. Guo H, Pavek M, Loth K. Management of childhood obesity and overweight in primary care visits: gaps between recommended care and typical practice. Current Nutrition Reports. 2017;6(4):307–314.

13. Barlow SE, Salahuddin M, Butte NF, Hoelscher DM, Pont SJ. Improvement in primary care provider self-efficacy and use of patient-centered counseling to address child overweight and obesity after practice-based changes: Texas Childhood Obesity Research Demonstration study. Childhood Obesity. 2018;14(8):518–527. [PubMed: 30153036]

14. Rhee KE, Kessl S, Lindback S, Littman M, El-Kareh RE. Provider views on childhood obesity management in primary care settings: a mixed methods analysis. BMC Health Services Research. 2018;18(1):55. [PubMed: 29378579]

15. Belay B, Frintner MP, Liebhart JL, et al. US pediatrician practices and attitudes concerning childhood obesity: 2006 and 2017. The Journal of Pediatrics. 2019;211:78–84. [PubMed: 31113716]

16. Imoisili OE, Goodman AB, Dooyema CA, et al. Referrals and management strategies for pediatric obesity-DocStyles Survey 2017. Frontiers in Pediatrics. 2018;6:367. [PubMed: 30619783]

17. Imoisili OE, Goodman AB, Dooyema CA, Harrison MR, Belay B, Park S. Screening and referral for childhood obesity: adherence to the US Preventive Services Task Force recommendation. American Journal of Preventive Medicine. 2019;56(2):179–186. [PubMed: 30573333]

18. Brown CL, Perrin EM. Obesity prevention and treatment in primary care. Academic Pediatrics. 2018;18(7):736–745. [PubMed: 29852268]

19. Perrin EM, Flower KB, Garrett J, Ammerman AS. Preventing and treating obesity: pediatricians' self-efficacy, barriers, resources, and advocacy. Ambulatory Pediatrics. 2005;5(3):150–156. [PubMed: 15913408]

20. Grossman DC, Bibbins-Domingo K, Curry SJ, et al. Screening for obesity in children and adolescents: US Preventive Services Task Force recommendation statement. JAMA. 2017;317(23):2417–2426. [PubMed: 28632874]

21. Eva KW, Regehr G. Self-assessment in the health professions: a reformulation and research agenda. Academic Medicine. 2005;80(10):S46–S54. [PubMed: 16199457]

22. Turchi RM, Antonelli RC, Norwood KW, et al. Patient-and family-centered care coordination: a framework for integrating care for children and youth across multiple systems. Pediatrics. 2014;133(5):e1451–e1460. [PubMed: 24777209]

23. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness: the chronic care model, Part 2. JAMA. 2002;288(15):1909–1914. [PubMed: 12377092]

24. Story M, Neumark-Stzainer D, Sherwood N, et al. Management of child and adolescent obesity: attitudes, barriers, skills, and training needs among health care professionals. Pediatrics. 2002;110(1 Pt 2):210. [PubMed: 12093997]

25. Boundy EON, Boyd AF, Hamner HC, et al. US pediatrician practices on early nutrition, feeding, and growth. Journal of Nutrition Education and Behavior. 2020;52(1):31–38. [PubMed: 31759892]

26. Zientek LR, Thompson B. Applying the bootstrap to the multivariate case: bootstrap component/factor analysis. Behavior Research Methods. 2007;39(2):318–325. [PubMed: 17695360]

27. Shi D, Maydeu-Olivares A. The effect of estimation methods on SEM fit indices. Educational and Psychological Measurement. 2020;80(3):421–445. [PubMed: 32425213]

28. Williams DM. Outcome expectancy and self-efficacy: Theoretical implications of an unresolved contradiction. Personality and Social Psychology Review. 2010;14(4):417–425. [PubMed: 20505161]

29. Polacsek M, Orr J, Letourneau L, et al. Impact of a primary care intervention on physician practice and patient and family behavior: Keep ME Healthy—the Maine Youth Overweight Collaborative. Pediatrics. 2009;123(Supplement 5):S258–S266. [PubMed: 19470601]

30. Frintner MP, Liebhart JL, Lindros J, Baker A, Hassink SG. Are graduating pediatric residents prepared to engage in obesity prevention and treatment? Academic Pediatrics. 2016;16(4):394–400. [PubMed: 26826440]

31. Resnicow K, Davis R, Rollnick S. Motivational interviewing for pediatric obesity: conceptual issues and evidence review. Journal of the American Dietetic Association. 2006;106(12):2024–2033. [PubMed: 17126634]

32. Shaffer LA, Brothers KB, Burkhead TA, Yeager R, Myers JA, Sweeney B. Factors associated with attendance after referral to a pediatric weight management program. The Journal of Pediatrics. 2016;172:35–39. [PubMed: 26947949]

33. Evans JSB, Stanovich KE. Dual-process theories of higher cognition: advancing the debate. Perspectives on Psychological Science. 2013;8(3):223–241. [PubMed: 26172965]

34. Williams A, Turer C, Smith J, et al. Adoption of an electronic medical record tool for childhood obesity by primary care providers. Applied Clinical Informatics. 2020;11(02):210–217. [PubMed: 32187633]

35. Keyworth C, Hart J, Armitage C, Tully M. What maximizes the effectiveness and implementation of technology-based interventions to support healthcare professional practice? A systematic literature review. BMC Medical Informatics and Decision Making. 2018;18(1):93. [PubMed: 30404638]

36. Dryden EM, Hardin J, McDonald J, Taveras EM, Hacker K. Provider perspectives on electronic decision supports for obesity prevention. Clinical Pediatrics. 2012;51(5):490–497. [PubMed: 22330047]

37. Children's Hospital Association. 2013 Survey findings of children's hospitals obesity services. 2014; https://downloads.aap.org/dochw/2013SurveyFindingsofChildrensHospitalsObesityServices--CHA.pdf. Accessed April 4, 2022.

38. Block JP, Oken E. Practical considerations for the US Preventive Services Task Force recommendations on obesity in children and adolescents. JAMA Internal Medicine. 2017;177(8):1077–1079. [PubMed: 28632842]

Table 1:

Descriptive Statistics for Control Variables, n=704[a]

Categorical variables	n	Percent
Sex (n=693)		
Female	476	68.7
Male	217	31.3
Primary practice setting (n=667)		
Solo/2-physician practice	95	14.2
Group practice/HMO	364	54.6
Academic/hospital/clinic/community health center	208	31.2
Primary practice location (n=686)		
Urban inner city	164	23.9
Urban non-inner city	160	23.3
Suburban	277	40.4
Rural	85	12.4
Region (n=704)		
Northeast	196	27.8
Midwest	163	23.2
South	213	30.3
West	132	18.8

Continuous variables	Mean	SD
Age (n=690)	45.9	12.6
Hours per week in direct patient care (n=682)	39.3	17.7

[a]Sample sizes for individual questions vary somewhat due to missing values

Table 2:

Descriptive Statistics for Independent Variables, n=704[a]

Categorical variables (training/EHR supports)	n	Percent
CME or training in the past 3 years		
Using motivational interviewing/shared decision-making strategies for behavior change (n=676)		
Yes	210	31.1
No/Don't know	466	68.9
Evaluating/treatment of comorbidities of childhood obesity (n=677)		
Yes	260	38.4
No/Don't know	417	61.6
EHR supports (n=684)		
Registry capabilities		
Yes	110	16.1
No/Don't know	574	83.9
Decision support tools (flags or prompts)		
Yes	346	50.6
No/Don't know	338	49.4

Continuous variables (attitude variables)[b]	Mean	SD
1. Time constraints make counseling for prevention/treatment difficult (n=695)	3.7	0.9
2. Pediatricians can help prevent/treat/manage childhood obesity (n=700)	4.1	0.7
3. There is a lack of adequate services/resources in my practice area to refer children/families for weight management (n=694)	3.2	1.2
4. I am usually paid for obesity counseling/treatment (n=671)	2.7	0.8
5. Dietitian/weight management services are generally not covered by health insurance (n=676)	3.3	0.8
6. Patients/families lack access to healthy food/safe places to be active (n=696)	3.4	1.1
7. Patients/families lack time for healthy behaviors (n=695)	3.6	0.9

[a]Sample sizes for individual questions vary somewhat due to missing values

[b]Values for attitude variables represent the mean of a single indicator or two related indicators, based on a scale from 1=strongly disagree to 5=strongly agree with 3=neutral. Original indicators are provided in Supplementary File 1.

Table 3.

Indicator Descriptive Statistics, Factor Loadings, Model Fit Statistics, and Index Reliability for Self-Efficacy in Basic Practice/Health Risk Assessment (Factor 1) and Self-Efficacy/Perceived Effectiveness in Patient Centered Counseling (Factor 2), n=704. [a]

Question	Variable	n	Mean (SD)	Factor 1	Factor 2
1[b]	How effective do you think your counseling on *prevention* of obesity is among patients and their parents? **(EffPrev)**	693	2.7 (0.7)		0.55
	How effective do you think your counseling on obesity *management* is among your patients and their parents? **(EffMgt)**	693	2.6 (0.7)		0.64
	How comfortable are you using behavior change techniques like motivational interviewing in the treatment of obesity? **(ComfMI)**	694	2.6 (0.9)		0.78
	How comfortable are you monitoring behavior change goals of patients with obesity? **(ComfGls)**	694	2.8 (0.9)		0.82
2[b]	Take family history of overweight and obesity **(HxOb)**	685	3.7 (1.0)	0.65	
	Begin the discussion of overweight/obesity in the clinical visit **(DiscOb)**	685	4.0 (0.8)	0.88	
	Assess behaviors (e.g., nutrition, activity, screen time/sedentary, sleep) **(EvalBhv)**	684	4.1 (0.8)	0.83	
	Evaluate for obesity-related medical comorbid conditions **(EvalMed)**	684	3.9 (0.8)	0.79	
	Evaluate for obesity-related psychosocial comorbid conditions (e.g., teasing, bullying, depression) **(EvalPsy)**	684	3.4 (0.9)	0.79	
	Counsel families on healthy behaviors **(CnsBhv)**	682	3.8 (0.8)	0.87	
	Use motivational interviewing/shared decision-making strategies for behavior change **(SklMI)**	681	3.1 (1.0)		0.91
	Reliability (McDonald's omega)			.88	.82

Model	Description	Chi-square (df)	RMSEA (CI) [c]	CFI	SRMR
1	Two correlated factors	244.7 (43)	.084 (074, .094)	.979	.074
2	Two correlated factors with a correlated error term	138.28 (42)	058 (048, .069)	.990	.056
3	Three correlated factors	134.03 (41)	.058 (.047, .069)	.990	.055

[a] Descriptive statistics pertain to all available cases. Factor loadings, model fit, and index reliability were obtained from confirmatory factor analysis (n=673). Factor loadings represent those for Model 2.

[b] Question 1 instructed respondents to circle one response from the following four categories: (1) not at all, (2) slightly, (3) somewhat, (4) very. Question 2 asked: "How would you rate your ability to perform the following?". A five-category response scale followed: (1) poor, (2) fair, (3) good, (4) very good, (5) excellent. To account for differences in scaling, indices were constructed as the mean of standardized indicators. Final sample sizes for the assessment self-efficacy index and counseling self-efficacy index were 682 and 675, respectively.

[c] A test of RMSEA   .05 was rejected for model 1 (p=.000) but not for models 2 and 3 (p= .095 and .105, respectively).

Table 4.

Multivariable Linear Regression of Self-efficacy in a) Basic Practice/Health Risk Assessment and b) Patient Centered Counseling, Predicted by Recent Training, Electronic Health Record (EHR) Supports, and Provider Attitudes.[a,b]

Category	Variable	Self-Efficacy in Basic Practice/ Health Risk Assessment (n=590)	Self-Efficacy/Perceived Effectiveness in Patient-Centered Counseling (n=588)
Recent Training [c]	Motivational interviewing for behavior change	.140 (−.044 to .323)	**.367 ***(.200 to .535)**
	Evaluation/treatment of comorbidities	**.178 *(.004 to .352)**	.089 (−.070 to .248)
EHR Supports [c]	Registry capabilities	.136 (−.079 to .350)	.136 (−.059 to .331)
	Decision support tools (flags/prompts)	.065 (−.091 to .220)	.134# (−.008 to .275)
Attitudes [d]	Time constraints make counseling for prevention/treatment difficult	**−.102 *(−.194 to −.011)**	**−.156 ***(−.240 to −.073)**
	Pediatricians can help prevent/treat/manage childhood obesity	**.258 ***(.143 to .373)**	**.467 ***(.362 to .572)**
	There is a lack of adequate services/resources in my practice area to refer children/families for weight management	**−.130 ***(−.202 to −.058)**	**−.123 ***(−.188 to −.058)**
	I am usually paid for obesity counseling/ treatment	.048 (−.057 to .153)	**.137 **(.041 to .233)**
	Dietitian/weight management services are generally not covered by health insurance	**.110 *(.009 to .212)**	**.099 *(.007 to .192)**
	Patients/families lack access to healthy food/safe places to be active	.013 (−.074 to .101)	.011 (−.069 to .091)
	Patients/families lack time for healthy behaviors	−.032 (−.125 to .061)	**−.088 *(−.173 to −.004)**
	Adjusted R-Squared [b]	**.105**	**.283**

[a]Significant, unstandardized coefficients are bolded and labeled as follows:

#p<.10 (ns);

*p<.05;

**p<.01;

***p<.001.

[b]Models are controlled for pediatrician age, sex, and hours worked in direct patient care and practice setting, location, and region. Adjusted R^2 values pertain to models that include all independent and control variables, but controls account for a very small amount of variance in each outcome. Adjusted R^2 for just the control model for self-efficacy in basic practice/health risk assessment and patient-centered counseling are =.001 (p=.415) and .01 (p=.119), respectively. Coefficients for all independent variables are interpreted at the arithmetic means of continuous variables.

[c]For categorical independent variables, coefficients represent the difference in means of the outcome variable (in standard deviations) for the condition of having the listed resource (recent training or EHR support) versus having no resource (reference category).

[d]For attitude variables, coefficients represent the amount of change of the outcome variable (in standard deviations) with a change of 1 point in attitude, measured on a 5- point scale.