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Abstract

Objective: To describe the development steps and feasibility test of a multi-level adolescent obesity intervention for delivery in pediatric primary care settings.

Method: To understand the target setting and population (i.e., perceptions of and receptivity to various intervention components), focus groups were conducted with clinicians, adolescents, and parents (N=58). Findings informed nutritionist-led adolescent group sessions) targeting overweight and obese adolescents (N=22). The intervention was pilot-tested for feasibility using a single group pre- and post-test comparison.

Results: Families and clinicians agreed on the importance of developing approaches to address adolescent obesity in the pediatric primary care setting, and favored family involvement. The pilot-study showed that it was delivered counseling algorithm were feasible. Adolescents participating in the intervention reported dietary improvements and movement toward the action stage for decreasing sedentary behavior.

Conclusion: Multi-level interventions for adolescent obesity in the pediatric primary care setting are feasible. Research to test the effectiveness of such interventions is warranted.

Keywords: Adolescents; Obesity; Pediatric primary care; Treatment; Clinician counseling; Diet; Physical activity

Introduction

The prevalence of obesity among adolescents has tripled over the past three decades, and currently one third of adolescents (33.6%) are either overweight or obese [1]. Excess weight is associated with adverse physiological and psychological problems in adolescence and adult

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interventions requires understanding of the new target setting and the target population, tailoring of the evidence-based protocols to the new setting and population, pilot-testing the feasibility of the adapted intervention, and evaluating its effectiveness [21]. The purpose of this study is to describe the initial steps of this process for adapting a multi-level intervention to treat adolescent obesity in the pediatric primary care setting: intervention adaptation and pilot testing of feasibility.

Methods

Consistent with the intervention translation framework [21], the study involved several phases and a mixed methods approach. The intervention development (formative) phase used qualitative methods, and the feasibility-testing phase used quantitative methods. Informed by Social Cognitive Theory [22,23] and the Social Ecological framework, [24,25] the intervention translation framework emphasizes the understanding of factors and challenges specific to real world settings and populations, and the adaptation of evidence-based interventions to their characteristics. For example, examining population characteristics such as weight-related knowledge, attitudes, and behaviors can inform the tone, content, and format of interventions. Understanding of setting characteristics, such as organizational structure, capacity, and resources, can help leverage available resources and facilitate integration of the intervention, maximizing feasibility of implementation [21]. We also drew from the Transtheoretical Model [26] which proposes that health behavior change is a process involving progress through a series of stages of change from pre-contemplation (not intending to take action) through contemplation (intending to change in the next 6 months), preparation (have a plan of action and intending to take action in the immediate future), action (have made specific overt modifications in their lifestyle), and maintenance (working to prevent relapse and continue the behavior change). All study procedures received approval from the University of Massachusetts Medical School Institutional Review Board.

Intervention adaptation (formative) phase

Qualitative input: The study site was a pediatric practice serving a multi-ethnic population in central Massachusetts. In accordance with the intervention translation model, we made efforts to gain insights on the target setting by conducting focus groups with pediatric providers and office staff (n=13). Similarly, to gain insights on adolescents that the intervention would target, we conducted focus groups with adolescents (n=29) age 10-17 years and body mass index (BMI) at or above the 85 percentile who were seeking care at the study site, and separate focus groups with their parents (n=14).

Focus group discussions consisted of semi-structured, open-ended questions designed to collect data from staff, adolescents, and parents on: (1) receptivity to addressing obesity within the pediatric primary care setting; (2) perceptions of current office systems for screening for obesity and risks factors; (3) knowledge of and reactions to current obesity interventions being delivered in the pediatric practice; (4) recommendations for implementing American Academy of Pediatrics (AAP) guidelines for preventing and treating obesity in the pediatric practice; and (5) recommendations for additional resources. Focus groups were moderated by an experienced focus group facilitator, audio-taped and transcribed. Informed consent was obtained from

stated need for concrete recommendations on achieving a healthy weight, the intervention messages were adapted from two existing childhood obesity campaigns: Blue Cross Blue Shield of

Frequency** of Intervention Steps Taken	Baseline	Follow-up	Difference		
	Mean (SD)	Mean (SD)	Mean (SD)	95% Conf. (Interval)	p-value†
With Obese Adolescent Patients					
Shared BMI with adolescent	3.1 (0.93)	3.7 (0.50)	0.6 (0.73)	1.11 (0.00)	0.05
Explained recommended BMI	2.2 (1.14)	2.9 (1.10)	0.7 (0.95)	1.38 (0.02)	0.04
Scheduled a follow-up visit	2.4 (0.70)	3.0 (1.05)	0.6 (0.84)	1.20 (0.00)	0.05
Referred adolescent to other resources	2.3 (0.67)	2.7 (0.82)	0.4 (0.52)	0.77 (0.03)	0.04
With Overweight Adolescent Patients					
Discussed healthy diet and physical activity	3.4 (0.52)	4.0 (0.00)	0.6 (0.52)	0.97 (0.23)	0.01

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**Scale of 1 (lowest) to 4 (highest) frequency.

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Table 2: & K D Q J H L Q & R X Q V H O L Q J , Q W H U Y H Q W L R Q 6 W H S V & R P S O H W H G I U R P % D V H O L Q H W R L J K R Q W M K D W R D Q

or BMI (91%); asked how the adolescent feels about his/her weight (60%); advised on the 5-2-1-0 goals (63%-86% depending on the group referred adolescent to the Healthy Living Classes (91%); and scheduled a follow-up appointment to assess weight and weight-related changes (91%). Intervention steps delivered less frequently included: provided recommended BMI (41%); stated concern regarding their weight (41%); congratulated adolescent on positive healthy behaviors (59%); set goals (50%); and provided monitoring log (27%). Similar patterns in intervention steps delivered were found at the follow-up visit (Table 1 for further details).

Table 2 presents significant changes in frequency of intervention steps implemented by clinicians from baseline (prior to intervention training) to follow-up, stratified by adolescent weight status (non-obese adolescents, significant changes not shown). Frequency was noted on a scale of 1 to 4, the latter indicating the highest frequency. Among obese adolescents, significant increases in the frequency of the following clinician intervention steps were observed from baseline to follow-up: sharing BMI information with the adolescent (3.1 to 3.7); discussing recommended BMI (2.2 to 2.9); scheduling a follow-up visit (2.4 to 3.0); and referring the adolescent to additional resources for weight-related behavior change (2.3 to 2.7) (p-values < 0.05). Among overweight adolescents, the only observed difference was an increase in the frequency of clinician discussion of healthy diet and physical activity levels (3.4 to 4.0, p = 0.03). Over half (62%) of clinicians perceived the intervention algorithm to be moderately helpful, and half perceived adolescents to be moderately receptive to the intervention.

Over half (55%) of adolescents attended all three group-based sessions; one-third (33%) attended two sessions; and one-fifth (20%) attended one session. Sessions were favorably received by the teens who attended, with the majority (88%) reporting being comfortable with discussing their weight, diet and level of physical activity with the pediatric nutritionist running the sessions. Girls reported higher level of engagement in intervention sessions than boys (4.7 vs. 3.8 out of 5, respectively; p = 0.03). No other gender differences were observed. Only two parents attended one of the two optional parent classes offered for parents (a resource strongly recommended by the pediatric participants during focus group discussions). Clinician outcomes: No significant changes in clinicians' perceptions of the following were observed from baseline to follow-up: extent of their role to help adolescents reduce their BMI; effectiveness of weight counseling (moderate at both time points); confidence in their counseling skills (moderate at both time points); perceived commitment of other physicians to address adolescent overweight; stage of change in addressing weight with adolescent patients; and barriers to pediatric obesity intervention. Main barriers cited included: patients having other acute medical problems, perceived lack of adolescent motivation to make changes, parents being overweight, perceived lack of effectiveness of counseling, and time-consuming nature of counseling.

Table 3 presents adolescents' diet, physical activity, and sedentary behaviors at baseline and 1-month follow-up. Adolescents had improvements in healthy diet scores over time, whereas change in physical activity and sedentary behaviors were not significant. The percentage of adolescents who reported being in the action stage of change for reducing their sedentary behavior (i.e., screen time) more than doubled from baseline (33%) to 1-month follow-up (72%; p = 0.04) (results not shown). Similar trends were noted with increases in percentage of adolescents in the action stage for improving their diet (44% to 67%) and level of physical activity (44% to 72%), though these improvements were not statistically significant. A majority of adolescents (81% or higher) reported being comfortable in discussing their weight, diet, physical activity, and sedentary behavior with their clinician, and 90% felt the clinician understood how they felt about their weight and about changing these behaviors. A slightly higher percentage of adolescents reported feeling more committed to making behavior changes to reduce weight at follow-up compared to baseline (90% vs. 82%).

Variable	Baseline	Follow-up	Difference	
	Mean (SD)	Mean (SD)	Mean (SD)	p-value*
Healthy diet score**	0.77 (0.29)	0.51 (0.28)	-0.25 (0.22)	0.0001
Physical activity	3.34 (2.04)	4.03 (1.98)	0.69 (2.04)	0.17
Sedentary behavior (TV)	2.20 (1.01)	1.92 (1.10)	-0.28 (0.83)	0.17
Sedentary behavior (computer)	1.39 (1.86)	1.11 (1.52)	-0.19 (1.20)	0.50

* Comparisons of means between baseline and follow-up were made using paired t-tests

** Lower scores indicate a healthier diet

Table 3: Dietary, Physical Activity, and Sedentary Behaviors among Adolescents (N=22) from Baseline to 1-Month Follow-up.

Discussion

Pilot study results demonstrated feasibility in recruiting overweight and obese adolescents from a large pediatric practice, with nearly half of eligible participants enrolled and high adherence to data collection procedures. However, recruitment required intensive on-site research staff resources and cooperation from clinic staff. Frequent prompting by research staff was required to ensure routine implementation of office systems to support intervention delivery. Systems barriers have been found to be related to a decreased sense of competence by clinicians

in treating obesity [12]. Evidence indicates the need to understand methods to maximize intervention implementation as part of routine clinical practice, consistent with research showing that systems-based interventions improve adherence to clinical practice guidelines for other behavioral interventions in primary care settings [18,19,35]. Integration into existing systems that do not require several new actions on the part of staff, including the use of electronic medical records with prompts built in may facilitate this process, as well as consideration of

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