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Rolling with Resistance: Expand, Connect, Thrive Acceptability and Feasibility and Participant Perspectives on how to Impact Change

Ruth Bernstein[1,2]*, Christina J Nicolais[2,3], Kaitlyn E Brodar[2], Twala Kelly[4], Annette M La Greca[2], Lisa Gwynn[4] and Elizabeth Pulgaron[4]

[1]Bariatric and Weight Management Center, Wake Forest Baptist Medical Center, North Carolina, United States

[2]Department of Psychology, University of Miami, Florida, United States

[3]Department of Pediatrics, Golisano Children's Hospital, SUNY Upstate Medical University, New York, United States

[4]Department of Pediatrics, University of Miami, Florida, United States

Abstract

Introduction: Effective interventions to increase positive health behaviors (PHB; e.g., healthy eating, exercise, stress management) in adolescence are vital; yet, PHB-promoting interventions have been less effective in minority populations. We aimed to evaluate the feasibility, acceptability, and preliminary outcomes of the Expand, Connect, Thrive (ECT) program, a PHB intervention for minority, low-SES adolescents.

Methods: Forty-eight adolescents (56% female, ages 10-14 years; 17% Hispanic, 56% Haitian/Creole) participated in the pilot ECT program at a school-based health clinic. Half of the sample was randomly assigned to receive motivational interviewing (MI) sessions. Adolescents were assessed at baseline, post-intervention, and 3- and 6-months follow-up regarding their self-reported eating behaviors, physical activity, and coping skills. Focus groups were conducted to determine next steps.

Results: The ECT program demonstrated strong attendance and retention. Adolescents' reported satisfaction with the program; 75% rated the quality as "Excellent" or "Good" and about 73% indicated they would recommend the ECT program to a friend. Repeated measures MANOVA revealed that participants reported significantly less sedentary behaviors at post-intervention, compared to pre-intervention. No other main effects were seen and no differences emerged between those who did and did not receive MI. Focus groups indicated that the intervention could be more individually tailored, foster more adolescent ownership, integrate real-world applications, and facilitate more environmental support following the intervention.

Discussion: The ECT program provides a strong foundation on which future interventions within this at-risk population can build. Future interventions and studies can utilize focus group data as a guide for development of effective interventions.

Keywords: Healthy Behaviors; Adolescents; Intervention; Minority; Prevention

Correspondence to: Ruth Bernstein, Bariatric and Weight Management Center, Wake Forest Baptist Medical Center, North Carolina, United States; E-mail: rbernste@wakehealth.edu

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Introduction

Positive health behaviors (PHBs), or habits related to physical activity, sedentary behavior, dietary choices, and stress management, can prevent obesity and chronic disease [1]. They may be particularly important for adolescents, who have demonstrated increased rates of obesity over time (from 9.1% in 1991 to 17.0% in 2004, and somewhat stable since [2], and low-income and minority youth who have a higher risk of obesity [3,4]. While the consequences of poor PHBs include increased long-term morbidity and earlier mortality, they also extend beyond a child's health, disrupting school attendance, academic performance, and social relationships [1]. This may compound already at-risk children of low socioeconomic status (SES), who experience poor nutrition, and have lower math scores, poorer school attendance, more behavior problems, and lower test scores overall [5-7]. Given these direct and indirect impacts of PHBs, preventive interventions that aim to increase the use of PHBs are particularly critical for low-income and minority youth. Yet, to-date no research has identified an intervention that effectively increases PHBs in low-income, minority youth. This could be due to a lack of inclusive change strategies (e.g., providing education that cannot be applied due to financial barriers or cultural restrictions/sensitivities) and/or lack of diversity in the study sample.

A recent meta-analysis indicated that of the 57 existing interventions aimed at increasing PHBs in adolescents, only four demonstrated statistically significant effects [8]. Of those four, three studied elementary-age children and one studied high-school-age youth. Furthermore, most interventions in this meta-analysis focused on one specific domain (e.g., increase physical activity, decrease sedentary

activity, increase consumption of fruits and vegetables). Contrasting this, the American Dietetic Association (ADA) recommends that interventions to promote PHBs in adolescents include three domains:

1. Nutrition education,
2. Regular physical activity, and
3. Behavioral counseling [9].

Additionally, interventions have typically only demonstrated effectiveness for White, middle- to high-income participants. It is thus vital to determine if an intervention including all three ADA recommended domains to promote PHBs is feasible and acceptable with minority, low-SES adolescents.

Aims

The primary aim of this pilot study was to evaluate the feasibility and acceptability of administering the Expand, Connect, Thrive (ECT) program designed to improve adolescent health behaviors, to minority, low-SES middle school students. The secondary aim was to examine preliminary outcome data and to identify necessary adjustments to the intervention to improve effectiveness.

Methods

Study Design

The current study was a randomized open pilot, and feasibility and acceptability study. Recruitment began in February 2017 and ended in May 2017. The appropriate Institutional Review Board approved all procedures. Following an eligibility screening, parents/guardians and adolescents provided written consent and assent, respectively, and subsequently completed baseline measures. Participants were randomized to ECT-only, or ECT-plus-motivational interviewing (MI). The motivational interviewing group received one hour per week of MI, replacing one team-building activity. Participants completed three follow-up assessments: one immediately post- intervention, one 3-months later, and one 6-months later. Focus groups were conducted after the final follow-up.

Process data were collected based on NIH Behavior Change Consortium Treatment Fidelity Workgroup recommendations [10]. Feasibility was evaluated by examining patterns of enrollment, dropout, and program attendance. Satisfaction surveys assessed acceptability. Additionally, fidelity to the intervention and the context of the intervention delivery were examined to inform the extent to which the intervention was implemented as intended.

Participants

Participants were recruited using flyers in schools inviting adolescents who would like to improve their health behaviors to participate in the ECT program (Figure 1). Participants were eligible to participate if they:

1. Had completed 5th grade,
2. Had not yet entered 9th grade,
3. Were able to speak and read English, and
4. Were enrolled in the host school in Fall 2017.

Intervention Program

The ECT program was designed specifically for the Dr. John T. MacDonald Foundation School Health Clinic. A school based health clinic is an ideal setting for this service delivery due to the significant disparity in healthcare utilization by minority, low-SES adolescents [11], which largely diminishes in the school setting [12].

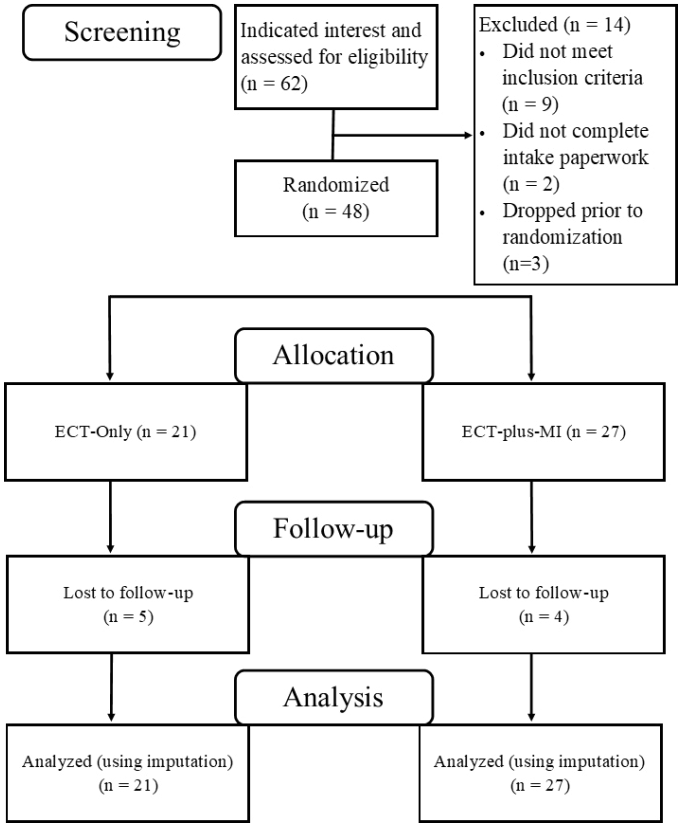

Figure 1: CONSORT flow chart.

Nutrition: Nutrition instruction was completed in accordance with the Center for Disease Control's recommendations for high-quality course study in health education [13,14]. Nutrition education, led by two MD/MPH students, included the topic areas of: hydration, breakfast, healthy snacks, MyPlate [15], fast food, and reading nutrition labels topic areas [15]. Adolescents were also taught: how to start a home garden using food scraps; how to access healthy foods at their local grocery store; and how to walk safely in their neighborhood, aimed at improving access to local grocery stores [14].

Physical Fitness: Adolescents were taught physical activity recommendations and completed a minimum of one hour of physical activity each day, including a selection of activities chosen by the adolescents, as well as mandatory activities (e.g., basketball, yoga, urban hikes, Tae Kwon Do). Physical fitness was instructed and monitored by an interdisciplinary staff that included specialty instructors, nurses, social workers, and Clinical Psychology PhD students.

Cognitive Behavioral Therapy: A variety of cognitive behavioral therapy (CBT) techniques were adapted for a prevention group setting (e.g., techniques were selected based on large-scale application, rather than being specific to depressive symptoms [16,17]. Content areas included emotion identification, behavioral activation, healthy stress responses, mindfulness, progressive muscle relaxation, and problem-solving skills). Clinical Psychology PhD students with at least one year of clinical training delivered the content and were supervised by an

advanced graduate student and a licensed psychologist.

Motivational Interviewing: Motivational interviewing (MI), which helps individuals explore and resolve ambivalence about behavior change [18], was evaluated as an enhanced intervention to improve the effects of the primary intervention. Sessions involved establishing goals, identifying pros and cons of changing, setting rewards, checking progress and adjusting goals based on progress and barriers. Clinical Psychology PhD students with a minimum of three years of clinical training administered the sessions and were supervised by a licensed psychologist.

Measures

Demographic variables: Parents reported on their child's age, sex, ethnicity, race, mental health, and major medical history. Parents also reported on their own marital status, education, and employment status.

Eating behaviors: The *Eating Behavior Survey* (EBS) [19], is a 20-item scale designed to assess eating behaviors in low-income, minority, urban adolescents. Participants were asked to report consumption frequency of healthy and unhealthy foods during the previous 24-hours (i.e., None, 1 time, 2 times, 3 times or more). For this study, the EBS was split into two subscales: Healthy and Unhealthy. Reliability and validity on the EBS are acceptable, based on test-retest reliability (Spearman correlations coefficients = 0.72-0.98) and a 24-hour recall (kappa = 0.42-0.87) [19]. In this sample, reliability of the Healthy subscale was adequate (Cronbach's alpha = 0.63), while the reliability of the Unhealthy subscale was strong (Cronbach's alpha = 0.85).

Physical activity: The *Physical Activity Questionnaire* (PAQ) is a 9-item measure that assessed a variety of physical activity behaviors. It extends the questions asked on the *Youth Risk Behavior Survey* to assess physical activity. Kappas for items range from .41-.84, representing moderate to substantial reliability [20]. Questions were split into two subscales: Active and Sedentary (Active Cronbach's alpha = 0.68; Sedentary Cronbach's alpha = 0.71).

Coping: The *Coping Strategies Index, Short Form* (CSI-SF) [21] assessed adolescents' strategies for coping with stress. The CSI-SF is a 16 item, shortened version of the 72-item CSI, with items rated on a 5-point Likert scale, from 0 (*Never*) to 5 (*Almost Always*). The CSI-SF has two subscales: Engagement and Disengagement. The CSI-SF has been identified by the *Society of Pediatric Psychology* as a Well-Established measure for use with youth 3-19 years to assess coping [22]. In this sample, reliability of the Engagement subscale was low (Cronbach's alpha = 0.62), while the reliability of the Disengagement subscale was problematic (Cronbach's alpha = 0.58).

Client satisfaction: The Client Satisfaction Questionnaire (CSQ) is a 12-item measure written for this study that assessed the child's satisfaction with the overall 6-week intervention program. The measure consists of 9 items on 4-point Likert scales. Sample items include: "*To what extent has camp met your needs?*" and "*If a friend were in need of a similar program, would you recommend ECT camp to him/her?*" Items were summed, with higher total scores indicating higher satisfaction.

Content completion questionnaires: Content completion questionnaires were created for each didactic session and completed by each clinician involved in the session. Instructors rated the extent to which they covered each topic on a 7-point Likert scale ranging from 1 (Not well at all) to 7 (Extremely well). A summary score was computed; higher scores indicated higher levels of content completion.

Focus groups: All ECT participants were invited to participate in focus groups to provide feedback on the intervention. Additional informed consent and assent was obtained from parents and adolescents; 10 adolescents returned completed forms and nine participated (one way absent from school when focus groups were conducted). The nine participants were split into two focus groups; each lasted for approximately one hour. Two graduate students moderated the groups using a semi-structured interview guide. Water bottles were provided as an incentive.

Analyses for Quantitative Data

All statistical analyses were conducted in SPSS Version 24. Relevant demographic variables, including age, sex, race, and ethnicity were examined. Analyses were completed with mean imputed data (3.89% data missing; Little's MCAR test $\chi^2 = 250.322$, $p = .279$, indicating data missing completely at random) with the intent-to-treat sample (i.e., all randomized participants who completed the intervention).

A repeated-measures, multivariate analysis of variance (MANOVA) was used to evaluate changes of the primary outcome variables (i.e., EBS, PAQ, and CSI) from pre-to-post intervention, and from pre-intervention to 6-month follow-up. Group membership (ECT or ECT-plus-MI) was entered into the model as the between-subjects variable to evaluate differences between the groups.

Analyses for Qualitative Data

Each focus group was audio-recorded and transcribed. Three graduate students trained in qualitative methods reviewed the transcripts, developed a codebook, and coded each transcript independently, focusing on the participants' suggestions for improvement. Coding was completed using a thematic coding approach to categorize suggested changes into key themes [23]. After the coding phase, the coders met to discuss and summarize their findings, which are presented below.

Results

Fifty-one adolescents enrolled in the ECT program (M_{age}=12.06, SD=1.16, Range=10-14). The majority of the sample identified as female (56%) and Haitian/Creole (56.3%); 17% identified as Hispanic. With the majority of the sample (85.4%) reporting their race as Black, every participant in the sample identified themselves as belonging to a minority group (Table 1).

Preliminary analyses: There were no significant differences between the ECT-only and ECT-plus-MI groups at baseline in demographics (i.e., age, sex, race, ethnicity, parental marital status, education, income), or any main outcome measure (p-values >.14). Comparisons of adolescents who dropped out of the study (n=10) versus those retained (n=38), also revealed no significant differences in baseline demographics.

Enrollment, Drop-out, and Attendance

Sixty-two individuals expressed interest in participating in the ECT program. Of those, 53 (85%) were eligible for participation, and 51 (96%) of those eligible enrolled. Forty-eight were randomized; 3 dropped out prior to randomization; which represents a 96% capture rate.

Adolescents had high rates of attendance (M=83% of 29 days; range=38-100%). During the follow-up period, 9 adolescents (19%) dropped out of the study, indicating an overall study retention rate of 81%.

Table 1: Demographics of study sample.

	ECT-only n=21	ECT-plus-MI n=27	p
Age	12.10 (1.09)	12.04 (1.22)	.18
Male	57.1%	33.3%	.14
Ethnicity			
Hispanic	23.8%	11.1%	.50
Haitian/Creole	57.1%	55.6%	.16
Race			.64
White	19.0%	11.1%	
Black	81.0%	88.9%	
Parent Marital Status			.40
Single	33.3%	37.0%	
Married	52.4%	44.4%	
Divorced	9.5%	3.7%	
Widowed	--	3.7%	
Separated	4.8%	11.1%	
Mother's Education			.69
0-8 years	4.8%	3.7%	
High school graduate	23.8%	29.6%	
Some college	28.6%	37.0%	
College degree	23.8%	14.8%	
Advanced or professional degree	19.0%	14.8%	
Father's Education			.75
0-8 years	4.8%	7.4%	
High school graduate	38.1%	33.3%	
Some college	14.3%	11.1%	
College degree	9.5%	18.5%	
Advanced or professional degree	14.3%	7.4%	
Did not respond	19.0%	22.2%	
Mother's Employment			.35
Unemployed	14.3%	11.1%	
Part-time	19.0%	29.6%	
Full-time	57.1%	51.9%	
Did not respond	9.5%	7.4%	
Father's Employment			.56
Unemployed	14.3%	11.1%	
Part-time	9.5%	7.4%	
Full-time	57.1%	51.9%	
Did not respond	19.0%	29.6%	

Acceptability

Results from the CSQ, administered at the conclusion of the ECT intervention, indicated that, overall, participants were satisfied with the ECT program (Table 2). Over two-thirds of participants rated the quality of the program as "Excellent" or "Good" and indicated that they would likely recommend the ECT program to a friend in need of a similar program. When broken down by primary program goal, participants reported that they were Very or Mostly Satisfied with the nutrition skills (56.9%), physical activities (65.9%), and stress management skills (61.3%). Most participants (68%) reported that camp helped them deal more effectively with their problems.

Content Completion

The intervention was implemented as intended. Participants received nutrition education twice per week for 1 hour, 1-3 hours of physical activity per day, and 1-hour per week of CBT. Those allocated to receive MI, received 1-hour per week of instruction. Content completion questionnaires indicated that clinicians were able to cover the majority of the planned information in each session. Nutrition session completion rates ranged from 85.71% to 97.14%, with an overall average rating of 89.28%. CBT session ratings ranged from 71.43% to 88.10%, with an overall average rating of 81.41%.

Preliminary Outcomes

When evaluating change from pre- to post-intervention, the overall main effect for time was significant, $F(6, 41) = 2.951$, $p = .017$, partial $\eta^2 = .302$ for the Physical Activity Questionnaire: Sedentary scale. There was a significant decrease from pre- to post-intervention; youth in the ECT program became less sedentary while in the program. No other significant main effects were seen for the primary outcomes (*p's*=.15-.97). No significant interaction effects were identified when evaluating differences in change by group membership (ECT-only vs. ECT-plus-MI). See Table 3 for means and standard deviations separated by group membership. When evaluating change from baseline to 6-month follow-up, no significant main effects were identified for any of the primary outcome measures (*p's*=.11-.48). No significant interaction effects were identified when evaluating differences in change by group membership.

Table 2: Results of Post-Intervention Satisfaction Survey.

Questions	Ratings							
	4	%	3	%	2	%	1	%
How would you rate the quality of the program (care) you received?	Excellent	27.3	Good	47.7	Fair	22.7	Poor	2.3
Did you get the kind of program (help) you wanted?	Yes, definitely	13.6	Yes, generally	47.7	No, not really	29.5	No, definitely not	9.1
To what extent has the ECT camp met your needs?	Almost all of my needs have been met	20.5	Most of my needs have been met	34.1	Only a few of my needs have been met	29.5	None of my needs have been met	15.9
If a friend were in need of a similar program, would you recommend ECT camp to him/her?	Yes, definitely	25	Yes, I think so	47.7	No, I don't think so	15.9	No, definitely not	11.4
How satisfied are you with the nutrition skills you learned?	Very satisfied	20.5	Mostly satisfied	36.4	Indifferent or mildly dissatisfied	29.5	Quite dissatisfied	13.6
How satisfied are you with the physical activities you did?	Very satisfied	31.8	Mostly satisfied	34.1	Indifferent or mildly dissatisfied	22.7	Quite dissatisfied	11.4
How satisfied are you with the stress management skills you learned?	Very satisfied	13.6	Mostly satisfied	47.7	Indifferent or mildly dissatisfied	31.8	Quite dissatisfied	6.8
Has camp helped you deal more effectively with your problems?	Yes, they helped a great deal	20.5	Yes, they helped somewhat	47.7	No, they really didn't help	18.2	No, they seemed to make things worse	13.6
In an overall, general sense, how satisfied are you with the camp program you received?	Very satisfied	34.1	Mostly satisfied	38.6	Indifferent or mildly dissatisfied	15.9	Quite dissatisfied	11.4

Table 3: Means and standard deviations of primary outcomes for participants in the ECT-only and ECT plus MI program.

Outcome	ECT-Only	ECT-plus-MI
	M (SD)	M (SD)
EBS: Healthy		
Pre-Intervention	11.13 (5.18)	11.05 (5.51)
Post-Intervention	9.00 (4.44)	10.25 (5.67)
3-month Follow-up	11.56 (7.5)	9.3 (5.29)
6-month Follow-up	8.89 (3.63)	9.57 (5.08)
EBS: Unhealthy		
Pre-Intervention	6.25 (5.41)	9.09 (5.75)
Post-Intervention	5.93 (4.65)	7.25 (5.15)
3-month Follow-up	7.13 (4.99)	8.38 (4.43)
6-month Follow-up	6.37 (3.34)	7.26 (4.53)
PAQ: Active		
Pre-Intervention	18.19 (7.30)	16.68 (7.39)
Post-Intervention	20.80 (7.83)	18.65 (6.83)
3-month Follow-up	20.00 (7.97)	17.90 (6.49)
6-month Follow-up	20.52 (9.59)	18.52 (8.50)
PAQ: Sedentary		
Pre-Intervention	7.19 (3.62)	7.41 (3.32)
Post-Intervention	6.33 (3.22)	5.80 (3.44)
3-month Follow-up	7.69 (3.70)	6.86 (4.34)
6-month Follow-up	6.85 (3.45)	8.02 (3.84)
CSI: Engagement		
Pre-Intervention	15.40 (6.46)	17.83 (5.00)
Post-Intervention	15.07 (3.77)	17.06 (5.97)
3-month Follow-up	13.71 (6.47)	16.53 (4.49)
6-month Follow-up	13.36 (5.54)	15.53 (6.16)
CSI: Disengagement		
Pre-Intervention	15.00 (3.63)	18.06 (5.03)
Post-Intervention	15.87 (4.03)	16.11 (3.76)
3-month Follow-up	15.79 (6.34)	17.07 (4.22)
6-month Follow-up	15.21 (6.30)	14.53 (4.79)

Note: N=48; EBS=Eating Behavior Survey; PAQ=Physical Activity Questionnaire; CSI=Coping Strategies Inventory

Focus Groups

Two major themes emerged from adolescents' suggestions for how to improve the program: increased adolescent involvement in planning and increased parental involvement. Specifically, adolescents emphasized the importance of increased ownership over the program as well as the necessity of parents facilitating behavior change at home. These themes are expanded on below. See Figure 2 for codes and sample quotes.

Increased involvement in planning: Adolescents expressed a desire to be more involved in planning various aspects of the intervention to increase their feelings of ownership. Specifically, adolescents wanted to choose the daily activities and the order of activities. In terms of intervention content, adolescents reported that the information presented during the intervention was useful and appropriate. However, they desired increased tailoring of information to individual goals and preferences, which they indicated would increase motivation and likelihood of engagement in the intervention. One participant suggested that program groups reflect adolescent goals (e.g., diet versus physical activity). They also desired an increase in hands-on intervention content, whenever possible. For example, they wanted to make their own food during camp in addition to learning about healthy food. The adolescents agreed that increased ownership and responsibility would support maintenance of behavioral changes after camp.

Intervention Format: Adolescents noted desired adjustments to the frequency, duration, and format of intervention lessons. Adolescents also noted that all information should be presented in an interactive format to the greatest extent possible. They also indicated that physical activities should have an increased emphasis on teamwork. Additionally, they reported that coping techniques should be taught in a shorter, more behaviorally focused format (e.g., taught briefly, practiced 5-10 minutes per day), which would more closely translate to real-world situations.

Parental involvement: Adolescents noted a desire for an increased alignment of healthy goals with their parents. Adolescents felt that getting their parents involved would be difficult, due to limited time and financial resources. Despite potential barriers, they noted that an agreement with their parents about goals was critical to behavior change. Some reported that they had shared information they learned at camp with their families, and this had successfully resulted in family-

Code	Sample Quotations
Input in Planning	***Male:*** "Maybe you could have like all of the snacks that you want and give it to people at the beginning of camp and find out which ones we actually want to eat." ***Male:*** "…have a survey of what should be, what activities we should vote on. So like voting on what activity we should do next." ***Female:*** "If we have to plan in advance and at the beginning of camp, we should have like a list of field trips for each week and then for each week you can, whichever one gets the most votes. Then you can do that one and plan for it in advance."
Adjust the Assignment of Groups	***Male:*** "[It would have been better] if you grouped people based on what they need to change." ***Female:*** "I think the yoga would have been more fun if we were in the groups we wanted to be in." ***Male:*** "…people who are athletic can work and help people who are unathletic at physical activity…so you could just mix it up I guess."
Adjust Frequency/ Duration of Intervention	***Male:*** "Okay, since [yoga is] relaxing I don't think it should be taking as much time as it did before. Like when we were in camp I don't think calming down and stuff would take that long if like if you're in the actual situation or if you're stressed or something like that." ***Female:*** "[Keep yoga] three times per week at least. Or two or three times per week." ***Male:*** "Let's say three times per week." ***Male:*** "Yeah, doing it more often."
Increase Family Involvement	***Male:*** "Well, you know yourself and your parent knows so you're basically committing to yourself. It's only two people that are going know I guess." ***Female:*** "That's not [food] I typically have at home. I'd have to talk to my mom about that."
Create After-School Program	***Male:*** "Like do like, like what they do like they do cheerleading at the school and all that. You know it would be like fun if they do a gardening group." ***Female:*** "…we could have an after-school type of program."
Reminders	***Female:*** "Maybe we need a reminder on our phones." ***Male:*** "Like when you are at home, you could actually put an alarm for like if you are in the building. You are working. And you don't understand something you could just take over the relaxation time and just."
Teamwork	***Female:*** "Y'all remember that game we were playing with the balls and we were like – it was with the boys and the girls – that was kind of fun with all of us trying to stay in the game." ***Male:*** "…with the physical activities, like when you group people on teams … like group people on teams you have to work together and socialize instead of arguing with each other. Even if it's kickball or something and everyone was so surprising to go in front of me and kick and then I'll be over here. Its stuff like that that makes people socialize and work together." ***Male:*** " …a bigger garden. That way the kids can contribute to gardening, like doing actual work, watering." ***Male:*** "Yeah, like a group."
More Interactive Intervention Components	***Male:*** "Interactive activities. I don't know what interactive activities, but it's one way to [teach about food]." ***Male:*** "[The most important thing about nutrition is] making food, and like what kind of food is like good for you." ***Female:*** "More arts and crafts"
Prioritizing Information/ Focus of Intervention	***Male:*** "Well, to be honest it's not really the nutrition stuff that I'm majorly worried about. It's like if you're going to be involved in physical activities and actually make them work instead of just them hiding in a corner…" ***Female:*** I think that, what would help us better would be going outside more, instead of doing all the other stuff. ***Male:*** "Yeah, more yoga. I feel that as it yoga was really good thing. "

Figure 2: Focus group codes and sample quotations.

level behavior change, citing the family exercising together as examples.

Reminders: Adolescents wanted a guide and/or reminders that could be used during the school year. One described how frequent practice of skills and teaching the skills to their family was instrumental for remembering the techniques. Adolescents indicated that these guides could be something that they made during camp. The guides should include nutrition facts and "rules," but also healthy foods that they enjoy and unhealthy foods they should avoid. Additionally, the guide should include coping techniques with step-by-step guides. Finally, the guides could include a calendar for reminders to engage in healthy behaviors.

Discussion

Results indicated that the intervention was highly acceptable to low-income minority youth and largely feasible. This is particularly important as this intervention was conducted within a population that is considered difficult to engage. Initial outcomes demonstrated changes in sedentary behaviors during the intervention but no changes on other primary outcomes. Because of the minimal changes from pre- to post-intervention, a follow up qualitative study was conducted. Adolescents offered a multitude of suggestions for future iterations of the ECT intervention. This preliminary data also can be a guide for future PHB interventions attempting to intervene with this population.

Indicators of feasibility and acceptability demonstrated promising results. In particular, enrollment was completed quickly and easily. Interest continued, despite the cap on enrollment (due to resource restrictions). Thus, the level of interest may be even higher than reflected by our enrollment numbers. A review of similar studies (interventions to prevent obesity in minority populations) indicated that 32% of the studies identified did not meet their intended capture

rate [24]. Of the studies that reported their capture rate, rates ranged from 10-90%. Our success may be due to targeted recruitment efforts, as well as planning efforts that focused specifically on the needs of the targeted population. During enrollment, families generally indicated that the ECT program was important and, desired, and that many aspects of the program were designed thoughtfully to fit their lives and restrictions, including complimentary bus service, provision of meals and snacks, and a constructive activity to keep youth active and safe during the summer.

Focus group data provided strong guidance for improvements to the intervention. Specifically, adolescents reported a desire for increased ownership and individual tailoring of the intervention. This is consistent with previous research, which has found that engagement in obesity prevention efforts improves when adolescents' agency and autonomous motivation are enhanced [25]. Tailoring would also likely improve the usefulness of the specific techniques presented. For example, many of the goals established in the MI sessions by the adolescents focused on behavioral responses to emotional triggers that interacted with nutrition and physical activity, such as emotional eating and poor sleep habits, which were not targeted by the intervention.

Similarly, adolescents reported a desire for intervention presentation that more closely resembled real-life application, such as frequent, short duration practice of coping skills. Doing so would utilize the strengths of a school-based health clinic, which integrates healthcare into the school setting, where many of these techniques would be used by adolescents.

Adolescents also indicated a desire for environmental support after the intervention. Previous research suggests that parental involvement and support is significantly related to adolescents' success within interventions [26,27]. Yet, this low-income minority population faces significant access and availability barriers to parental involvement. Telemedicine has increasingly been utilized as a promising option to reduce access barriers, with responses to interventions similar across telemedicine and in-person treatment delivery [28,29], and should be considered and evaluated in future research.

Several study strengths and limitations should be acknowledged. This study is unique in that a significant portion of the sample was Haitian. However, generalizability does not extend to all racial/ethnic minority, low-SES adolescents. Further, as this was a pilot study aimed at assessing feasibility and acceptability, this study has a small sample size and may have been under-powered to identify changes in outcomes. Additionally, due to limited resources, an enrollment cap was used, which may have resulted in a limited understanding of feasibility. However, due to the ease and speed of enrollment, it may be inferred that the enrollment cap resulted in an under-estimate of program feasibility. In addition, it is important to note that self-report data was used rather than objective measures of health behaviors. Future iterations of the intervention should utilize objective measures of health behaviors to better elucidate potential changes. Finally, focus groups were conducted with a subset of the study sample and their views may not represent the full range of participants.

Conclusions

Findings from this study contribute to the understanding of obesity prevention methods within minority, low-SES adolescents. Feasibility and acceptability data indicate that the ECT intervention is appropriate for use with this population, particularly following adjustments based on focus group data. Future research should evaluate the extent to which a revised version of the ECT intervention is effective at changing positive health behaviors.

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Availability of Data and Materials

There is no availability of data.

Authors' Contributions

Ruth Bernstein, Elizabeth Pulgaron, Annette M La Greca, and Lisa Gwynn were responsible for study conception and design. Ruth Bernstein and Twala Kelly were responsible for data collection. Ruth Bernstein, Christina J Nicolais and Kaitlyn E Brodar were responsible for analyses. Ruth Bernstein was responsible for initial manuscript preparation. All authors completed manuscript review, edits, and approved of final manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest.

Consent for Publication

All parents/guardians completed an informed consent, and participants completed an assent, prior to any study involvement.

Ethical Approval

This research was approved by the University of Miami IRB.

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