



Teen and caregiver perspectives on success, clinician role, and family involvement in ACTION PAC, a weight management intervention trial



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ABSTRACT

Objective: Describe perspectives of teens and caregivers regarding motivations, successes, and challenges related to participation in ACTION PAC ([ClinicalTrials.gov: NCT02502383](https://clinicaltrials.gov/ct2/show/study/NCT02502383)), a two-year weight management trial.

Methods: Intervention group participants received 16 short motivational interviewing (MI) sessions with school-based health center (SBHC) primary care clinicians over two years. Post-study, we conducted semi-structured interviews with purposefully sampled intervention group teens and their caregivers. Interviews were audio recorded, transcribed, and managed in NVivo 11. Three independent coders analyzed the data, developed a coding tree, examined how codes intersected and clarified relationships through memo writing.

Results: The clinician's role and use of motivational interviewing and family involvement in behavior changes were cited as critical to success. Some adolescents noted difficulty in sustaining behavior changes post-intervention and social and systemic barriers to behavior change.

Conclusion: Future studies should identify strategies to sustain teen motivation, better involve families, and address systemic barriers.

Innovation: In this study, which simulated real-world SBHC conditions, adolescents appreciated the use of an MI approach and felt that was key to their success, indicating the potential to continue use of this approach to motivating behavior changes in SBHC settings.

1. Introduction

The prevalence of obesity in U.S. adolescents surpassed 20% in 2015–2016 [1,2]. Obesity during adolescence is likely to continue into adulthood, increasing risk for chronic health conditions [3,4]. To mitigate such risks, the U.S. Preventive Services Task Force (USPSTF) began recommending behavioral weight loss interventions for children >6 years of age in 2017 [5].

Recent studies have investigated the perceptions and experiences of adolescents to identify ways to improve interventions for obesity that use a variety of behavioral change techniques. In one study conducted in urban clinics in Canada offering multicomponent, multidisciplinary obesity treatment, teens noted that limited self-regulation, intrinsic motivation, and social support for behavior change and mental health struggles interfered with their weight management efforts [6]. They also cited poor access to healthy home, school and workplace food and built environments as barriers, indicating the need to consider factors across the socio-ecological model when evaluating teen experience with weight management interventions [6,7]. In contrast, social support from peers, family members, and

health care providers helped the teens to succeed [6]. Another study in Denmark examining longer-term outcomes from a multicomponent, multidisciplinary weight management intervention with adolescents noted that some teens had difficulty maintaining weight loss after support from the intervention ended [8]. A systematic review of twenty-eight studies examining teen perceptions of obesity interventions noted similar themes [9].

Motivational interviewing (MI) is a patient-centered, brief behavioral intervention that may address some of the challenges with health behavior change that have been noted by teens. It is designed to elicit patients' goals and foster motivation for change using a reflective and non-confrontational style [10]. MI is effective for treating adolescent substance use and for facilitating changes in eating and physical activity behaviors [11,12]. There is mixed evidence regarding benefits of MI as a stand-alone treatment for adolescent obesity [13,14]. However, MI has shown promise as an adjunct to obesity interventions by enhancing patient engagement and treatment adherence [15].

Few qualitative studies have been conducted to examine participant perceptions of brief, MI-focused interventions for adolescent obesity

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delivered by a primary care provider. To address this gap in knowledge, this post-study qualitative evaluation of the Adolescents Committed to Improvement of Nutrition and Physical Activity (ACTION PAC) cluster-randomized clinical trial ([ClinicalTrials.gov](https://clinicaltrials.gov) identifier: NCT02502383) aimed to examine the perspectives of adolescent participants and their caregivers regarding motivations, successes, and challenges associated with participation in the MI-based weight management intervention.

2. Methods

The ACTION PAC study protocol was approved by the University of New Mexico Health Sciences Center Human Research Protections Office (#12-614). Caregivers provided written informed consent and adolescents provided assent for participation. The consolidated criteria for reporting qualitative research (COREQ) checklist was used to prepare this manuscript [16].

2.1. Study and evaluation design

ACTION PAC was a two-year, cluster-randomized controlled trial. Participants were recruited from eight public high schools with school-based health centers (SBHC) across two locations in the U.S. Southwest. Sites were evenly distributed across the two locations. This post-study evaluation collected information on the experience of adolescents with a baseline body mass index (BMI) percentile ≥ 85 th percentile enrolled in the weight management study at a control or intervention school. Evaluation data were collected from a purposefully sampled subset of participating teens and their caregivers from intervention schools via semi-structured interviews.

2.2. SBHC model

SBHCs are a particularly important source of health care for adolescents, who often do not seek care elsewhere [17]. They are generally co-located with schools and offer care that is student-focused during convenient times (i.e., during school hours) [17,18]. In the study locations, SBHCs provide medical and behavioral health care services, including primary and preventive care (e.g., well child checks, immunizations, reproductive health care services), urgent care, and mental health screening and counseling, and can connect students with community medical and behavioral services as needed (e.g., for intensive or after hours care) [17,18].

2.3. Intervention

Adolescents at intervention schools were recruited during general school registration events, the classes or practices of interested teachers and coaches, and lunch time. They received sixteen 10–20-minute MI sessions, eight of which also included cognitive behavioral therapy (CBT), with a SBHC primary care provider (nurse practitioner or physician's assistant). Session length was consistent with typical SBHC visits. Total contact time was about 3-6 hours over two years. Clinicians aimed to increase engagement using MI and to assist with nutrition and physical activity skill-building using CBT. A copy of the goal-focused clinician progress note for each session was given to the adolescent to share with caregivers. Teens were offered the option for study clinicians to call caregivers during six of the MI-only sessions to discuss the teen's selected goal and strategies for caregivers to support their teen. At the beginning, middle, and end of the study, all teens at intervention schools discussed a letter summarizing physical exam, blood pressure and cardiometabolic lab results, with normal or expected parameters for each marker and healthful behaviors recommended by the American Academy of Pediatrics with the ACTION PAC SBHC clinician. In addition, this letter was sent by postal mail to participants' primary caregivers. All adolescents could independently use routine SBHC services before, during, and after the intervention based on their individual needs.

2.4. Interview data collection

The qualitative study team consisted of the lead author, a female cultural anthropologist, with >20 years of experience leading qualitative and mixed methods studies, and five female interviewers: a nurse/exercise physiologist; a clinical research manager; an English/Spanish bilingual research specialist with a nutrition degree; and two qualitative research specialists. All interviewers were trained by the lead author. The lead author and one qualitative research specialist had no prior relationship with the participants. The other team members had contact with the study participants about once per year when they conducted data collection (e.g., BMI measurements). The study team developed semi-structured interview guides informed by social cognitive theory [19] and strengths-based [20] and socio-ecological [7] approaches, which recognize and attempt to understand the relationships between individual, family, community and social environments and how they affect well-being. Questions were open-ended and covered motivation for participating in the intervention, caregiver role in the intervention, successes and challenges associated with participation in the intervention, suggestions for intervention improvement, and facilitators and barriers to changing and maintaining physical activity and nutrition behaviors.

A purposive sampling strategy was used to maximize variability among interviewees, with selected adolescents approximately evenly distributed by sex, school site and "success," as measured by positive or negative changes in BMI z-score during the study. Participants were contacted by phone call or text message and invited to participate in interviews.

A total of 31 interviews were conducted. Interviewees comprised 15 complete adolescent-caregiver dyads; one caregiver declined to participate in the interview. Caregivers and teens were interviewed separately, but during the same time period, to better protect adolescent/caregiver privacy. All interviews were conducted this way, with the exception of one adolescent whose caregiver joined the interview part-way through. Interviews occurred in participants' homes or a public setting (e.g., library). The average interview lasted 24 minutes (range: 9-46 minutes). Interviews were conducted in English (n = 27) or Spanish (n = 4) and were audio recorded with participants' consent.

2.5. Interview analysis

Audio recordings from interviews conducted in English were transcribed verbatim by a professional transcriptionist. The bilingual research specialist transcribed interviews conducted in Spanish and then translated transcripts to English. Participants did not review transcripts. Interviews were deidentified, checked for accuracy and uploaded into NVivo 11 (QSR International, Doncaster, Australia). Each transcript was independently coded by two coders trained by the lead author. Inter-coder reliability analysis was completed in NVivo, with 82% of nodes displaying a Kappa coefficient ≥ 0.75 , indicating excellent agreement. A constructivist grounded theory framework guided the analysis.

Constructivist grounded theory is an interpretivist approach, however, acknowledging the importance of the specific place and time during which the research is conducted. Further, it acknowledges that analysis is a co-construction of researchers and participants, uses an abductive approach and encourages interpretations to stay close to the data, examine processes, all of which are critical when eliciting and analyzing participant perspectives of an experience [21]. The lead author and coders developed a coding tree deductively according to evaluation aims, as well as inductively based on participant responses. The lead author created queries to examine intersections among specific codes (Table 1) and used matrices created during the querying process to identify predominant thematic areas for focused coding including [21]: successes, caregiver involvement, clinician role and intensity of the intervention. Focused coding involved identifying patterns in the textual data, including examining similarities and differences within and across purposively sampled categories of gender, rural/urban school, and BMI changes, within thematic categories. The study team wrote memos for each thematic category to provide an in-depth analysis of

Table 1
Query results showing positive & negative aspects of intervention with more than 10 coding references

Positive aspects of program	# of coding references	Negative aspects of program	# of coding references
Clinician Role	17	Getting pulled out of class	12
Motivational Interviewing (MI)	15		
Changes, progress as a result of program	14		
Body weight	13		
Clinician communication	13		
Result letters	11		
Healthy, unhealthy eating	10		
Learning in project	10		
Motivation to participate, keep participating	10		

variable meaning for participants, using a constant comparison method to ascertain the range of responses (including anomalous responses), the condition under which the category arises, its consequences and how it relates to other categories [21]. The differences reported by gender, schools and BMI changes were not substantive, thus we report generally across these categories. Caregiver involvement was categorized by analyzing all caregiver-adolescent dyads and characterizing high, medium or low-involvement based on both caregiver and teen interview responses. Parents characterized as high-responsive typically mentioned how they encouraged their teen, generally, and specifically in response to participation in the intervention. These parents mentioned following up on health and social concerns related to their teens (e.g. bullying), and actively made changes in the household in response to their teen’s requests. Medium involvement parents mentioned responding to teen’s requests related to the intervention, but typically followed a child-led approach regarding participation. Low-involvement parents described not knowing about the program, not seeing it as necessary, or said they had no involvement or significant barriers to involvement. These predominant thematic areas were used to structure the results section: teen and caregiver perspectives of success relative to the intervention and the relationship between success and clinician role and caregiver involvement. We also discuss challenges and facilitators related to changing and maintaining healthy behaviors across the socio-ecological model. All participant names are pseudonyms.

3. Results

3.1. Interviewee characteristics

Of the 31 interviewees, nine were men or boys (caregivers = 2; adolescents = 7) while the rest were women or girls, and 88% were Hispanic. Characteristics of teen interviewees are presented in Table 2.

3.2. Teen perspectives on success

For youth participants, the primary accomplishments of the intervention included, but also extended beyond, weight loss. Several teens did describe weight loss as the primary accomplishment. For example, Jane said, “My overall [success] was the loss of weight that I had. I guess it was just with the support there, it motivated me to do better.” Other participants discussed stabilizing their weight, in accordance with clinician recommendations.

Another success for teens was learning to make healthier food choices. They described gaining awareness of which foods to reduce or avoid, learning about portion sizes, and the effects of added sugar and saturated and trans fats on the body. Teens responded positively to incentives offered at clinician visits, which were designed to reinforce healthy eating and physical activity behaviors (e.g., water bottles, yoga mat). Many adolescents talked about increased awareness of the importance of nutrition. The

Table 2
Interview participant demographics.

Baseline demographics	Teen Interviewees ¹ , N = 16
Mean age, years ± SD	15.1 ± 0.61
Sex, n (%) female	9 (56)
Ethnicity, n (%) Hispanic	14 (88)
Race, n (%)	
White	2 (12.5)
Native American	2 (12.5)
Other ² /multiple race	0
Missing (only ethnicity selected)	12 (75)
Caregiver education level, n (%)	
Less than high school	8 (50)
High school graduate	4 (25)
Some college	3 (19)
College graduate	1 (6)
Yearly household income, n (%)	
<\$40,000	12 (75)
>\$40,000	4 (25)
Baseline body mass index percentile category, n (%)	
Overweight (85th to <95th percentile)	8 (50)
Obese (≥95th percentile)	8 (50)

Abbreviations: SD - standard deviation; BMI - body mass index [weight (kg)/(height (m)²]

¹ All interviewed participants were part of the intervention group in the weight management study

² Other includes: Black, Asian, Native Hawaiian/Pacific Islander

most cited behavior change was eliminating or reducing sugar-sweetened beverage consumption.

Another important success mentioned by both teens and caregivers was categorized as “changes in attitudes.” Teens discussed changes that included feeling empowered to take charge of their health, as well as being happier, experiencing more self-regulation, having more self-esteem, and better ability to manage their mental health. For example, Liliana said:

So it’d be like my health, like my weight, and all, but it’d also be like taking care of myself, and caring about myself too, and that I take the time... That was a good thing, and I really needed to learn that. And not to stress so much.

3.3. Caregiver perspective of success

Caregivers also saw accomplishments that went beyond weight loss. Caregivers described their teen’s increased awareness of the impact of body weight on health, as well as increased ability of their teen to take charge of their health. For example, Mary’s mother described how participation impacted Mary: “She changed a lot. Now she’s watching her weight, she’s watching what she eats, she’s exercising more. She’s getting outdoors more... It did good for her.”

Several caregivers stated that they worried about their teen’s health and how they felt like participation in the intervention helped to address these worries (Table 3). Caregivers responded positively to the intervention’s focus on the relationship between food and health. They recognized that the intervention emphasized their teen’s self-efficacy by helping them set goals and enact mechanisms for behavior change. Caregivers also noted the intervention had an overall positive effect on their teen’s mental health and self-esteem.

3.4. Clinician role – clinician attitude

Adolescent participants discussed how clinician interactions, motivation and support were key to their participation, enjoyment and success in the program.

Clinician attitudes were described in similar terms by all youth. Important aspects included their non-stigmatizing or non-judgmental nature, which are integral to the MI approach. Mark said, “she wasn’t telling me it was bad I was unhealthy” (Table 3). Teens repeatedly said that clinicians listened and made them comfortable. Further, youth had the sense that

Table 3
Comparison of primary & sub-themes related to success by youth and caregivers.¹

Youth		Caregivers	
Success			
<i>Biometric Changes</i>	Jane: My overall [success] was the loss of weight that I had. I was actually really proud and my mom was also really proud about that, too. I guess it was just with that support there, I – it motivated me to do better. Because every time I would go in to do my measurements and stuff, I wanted to be less. So it was like a challenge for me to do it. So that’s what I liked best.	<i>Healthier Child</i>	Mark’s caregiver: Yes [laughing], yes it has changed. Because I [know] that my son is much healthier than before. I have less to worry about and not having to worry about him having problems in the future, and he knows how he needs to stay healthy and why he needs to be healthy and what foods can do to him.
<i>Maintaining Weight/Controlling Weight</i>	Daniel: Like I said, the system was really great. I did learn that out of this . . . from freshman year to now, I did gain a lot of weight. I did see that, but nonetheless, I controlled it because I feel like if without this program I didn’t learn how to do this. I wouldn’t have controlled it so much. . . . And also I do know how to get back on track to losing more weight and stuff like that so it does help.	<i>Goal Setting</i>	Interviewer: What are ways your family tries to maintain or develop healthy habits? Ada’s caregiver: My goal is to lose this in the next two to three months, so we’re setting goals now. Not outrageous goals.
<i>Changes in attitudes</i>	Interviewer: So has it (the program) changed your feelings toward your own health?	<i>Changes in attitudes</i>	Interviewer: Are there any other changes that we haven’t asked about that your family has experienced as a result of participating in this project?
	Jane: It has, it has. Because at first I didn’t really care much. I didn’t care at all. I was like, I don’t care. I’ll just gain as much weight as I want, it’s whatever. And now, it’s just like you know what? You need to take care of yourself. I want to feel better about myself, and if in order for me to feel better about myself, I have to be fit, then that’s what I need to do to feel better about myself.		Mark’s caregiver: I think the only thing is he seems more happier with himself. He’s more involved with his friends. Yeah. Interviewer: Good. So it’s changed his social relationships? Mark’s caregiver: Yeah, that has changed a lot. ‘Cause when he first started he didn’t really have much friends, he told me he was depressed. But now he’s much happier, and he’s got more friends and he’s more outgoing.
<i>Clinician role Clinician was non-judgmental and supportive</i>	Mark: She wasn’t telling me that it was bad that I was unhealthy, but she was really open to what my ideas were. I really like that she was easy to talk to. She was able to help me through my process and to really support me. She was really supportive with what I was doing. It really helped me to make change and stuff.	<i>Benefit of frequent meetings</i>	Roberta’s caregiver: Because also like it helps educate them to be more responsible in that— Interviewer: Yes, not just one telling them what to do.
<i>Clinician Cared</i>	Sara: So I’m proud I would always talk to her about this app I would use to work out. So I was always proud of that because I knew she would always ask, “Oh and how’s it going with your app?” and I knew someone cared that I was trying.	<i>Made school more enjoyable</i>	Roberta’s caregiver: Yes, yes or they go to the doctor and they tell them one day but since they know that they won’t go back for another year to them it’s the same, and here no, they know that they are more consistent and they know that you’re going and that you will check up on them and how they are doing.
<i>Clinician was compassionate and goal-focused</i>	Ada: Yes. She would talk to me and, you know, I was going through a lot these past few years, so she would just talk to me. She was always there, and it was great to have her around, you know, when I had my meetings because she just – I could talk to someone, and she didn’t have to do that for me. She didn’t have to let me vent or talk about anything. . . . Sometimes my weights would like fluctuate, and she would ask me, “Are you okay?” Even if it was five pounds, she’d be like, “Are you okay?” She would always keep track.		Ada’s caregiver: [My daughter] really, really enjoyed it. It was – I think it made her past three years enjoyable. Because, you know, like I said, she really looked forward to going and meeting with the people.
<i>MI Strategies</i>	Ada: My provider, actually, she would help me. I would set goals, personally, every time I met with her. Not only through the project, but with her. So every time I’d meet her, I’d be like, “I’m going to try to cut out like soda from my diet. I didn’t want to drink so much soda,” so that would be one. And then the next time, she’s like, “Well, now that you’ve done that, that’s great. You’ve met your goal. . . . And we’re going to try something else.” So then I’d be like, “I’m going to try and cut out junk food. Like if I don’t have to eat junk food, I’m not going to.” And that was a big thing.		
<i>Clinician as providing motivation</i>	Jane: I saw [the clinician] as my support and motivation, so I just would tell her everything. So she was kind of like my – I don’t know how to say it. You know that supporter there. So I really liked it.		
<i>Losing momentum after project ended</i>	Interviewer: Has how you feel about your health changed as a result of this project?		
	Robert: When they were there, it helped me out because I felt changes, but once they left, I didn’t have anybody really there to motivate me anymore. So it kind of just started to slack off and so like, “Oh well.” Interviewer: Why do you think that is? Is it because they’re not in your face trying to help you? Robert: Like now everyone just tells me it’s your choice. If you want to lose weight, you already know what you got to do. And there they tell me the same thing but they’d encourage me to do it.		
<i>Caregiver/Family Involvement</i>	Interviewer: Anything else that you’re really proud of, or your accomplishments related to the project?		Interviewer: Any other changes that you observed in your family as a result of participating in the project?

Table 3 (continued)

Youth	Caregivers
Liliana: I eat a lot better now. What else? I don't know. I did change my lifestyle at home. My whole family does it now. And besides my immediate family, my cousins are into it, and it's cool to see everybody going on with this.	Roberta's caregiver: Well, like we now all take care of each other. My family. I guess it's like, when you start feeling healthier, eating healthier, and you're just being healthy, you have more energy, and my family's been doing that. We do more, or just a lot more involved with each other, I guess. Does that make sense? It makes things easier, and you feel good because everybody's taking care of themselves. And everybody's doing okay with their health.

¹ All names included in table are pseudonyms.

clinicians really cared about them. Teens recognized and appreciated that clinicians linked their goals to their overall health and well-being, including mental health. For example, Ada said she preferred the ACTION PAC clinician over the school therapist. Ada also talked about how meeting with the clinician helped her realize the interrelated nature of her mental, physical health and how her behaviors related to her weight loss (Table 3). The clinician interaction left the teen with the message that the clinician was concerned about the whole person and not just BMI changes.

3.5. Clinician role – use of MI strategies

During interviews, teens clearly articulated how clinicians promoted individual decision-making by guiding the conversation and building motivation to navigate ambivalence and explore self-selected, achievable goals, one at a time. Descriptions of the goal setting process highlighted that it was teens selecting the goals and achieving them with clinician support. Further, as one teen reported, clinicians presented “both sides of an issue,” as a way of helping teens develop agency over decision-making. The on-going relationship established by the study structure was beneficial, as clinicians and teens could re-group when certain strategies did not work, or stopped working, and take a new approach.

3.6. Clinician role - youth interpretations of clinician-teen relationship

Teens saw clinicians as motivators. For example, Jane said: “I saw [the clinician] as my support and motivation, so I just would tell her everything.” However, there may be a downside to this perception of clinician as external motivation. Post-intervention, Robert reported a lack of motivation and encouragement to lose weight. He did not receive the same encouragement and support from interactions with his family and friends, who emphasized that losing weight was “his choice.”

3.7. Caregiver and family involvement

We characterized seven adolescent-caregiver dyads as high involvement, five as medium and three as low involvement. High-involvement caregivers were encouraging, supportive, and expressed concern or worry about their child's weight. These caregivers valued teen participation in family life, tended to have an active lifestyle themselves, and supported nutrition and physical activity changes at a household level. Medium-involvement caregivers tended to express that they would like to be more involved, but were unsure how. Low-involvement caregivers had limited awareness of the teen's participation in the intervention or did not take it seriously, for example one caregiver in this category said she thought it was “like a game.” Low-involvement caregivers reported being less receptive to clinician communication.

Overall, teens and caregivers described family involvement as critical to their success in the intervention. Importantly, many teens and caregivers included siblings, grandparents, and other family members in their description of family involvement (Table 3). The majority of caregivers in the program expressed support for their adolescent's efforts and expressed the willingness or desire for increased involvement. For example, one caregiver said:

I think they should have more family involvement, so to speak. ...The more people that you could get involved within that household, the easier it is for the child that is doing it, because let's face it: the child don't shop.

Caregivers reported benefits for the entire family when teens initiated changes in healthy eating or exercise habits. Mary's mother described this effect, “It makes her more healthier. We feel more healthier. Because of the change of things we've been doing. Now more greens instead of more greasy foods. We eat less salt and stuff. So it did help with us all.” Roberta's mother talked about the impacts of the intervention saying, “Now we all take care of each other” (Table 3).

Some caregivers provided suggestions about how to increase caregiver involvement in the program. For example, several caregivers mentioned not receiving materials directly from their teens, and suggested that a website with materials (e.g. recipes or family activities) would be helpful.

3.8. Multi-level challenges & facilitators

Challenges mentioned by teens crossed the levels of the socio-ecological model [7]. When asked directly about community- or societal-level challenges, teens did not identify many of these – although when probing questions were asked, they did mention challenges in accessing places to be physically active (e.g., gyms, parks). Teens also mentioned the easy accessibility of unhealthy food. For example, two teens talked about eating at work. For example, Dylan said, “I work at Sonic so when I'm hungry I tend to eat a lot of Sonic, but I try to eat the chicken and stuff like that, I don't really go for the burgers.” Access to sugar sweetened beverages (SSBs) was the most discussed issue among teens. Some teens described familial habits (e.g. having SSBs in the house) or familial resistance to change (e.g. to stop buying SSBs) as a challenge. The most often cited facilitator for making changes in nutrition and physical activity was family support, while individual factors (e.g. positivity, self-motivation) were also predominant.

4. Discussion and conclusion

4.1. Discussion

This evaluation of a weight management intervention for teens supports previous studies that demonstrated the positive impact of clinician support in weight loss interventions [6,8,9] and the particular strength of the MI communication style for interacting with teens [22]. Challenges related to intrinsic motivation, weight loss maintenance, and food environments noted by teens were similar to those described by adolescents in Canada and Denmark [6,8]. Our results also support the potential importance of continued caregiver involvement for adolescents and add that extended family involvement may be key to success [9].

The fact that adolescents reported high levels of engagement and satisfaction with the MI-based intervention is encouraging for several reasons. In the context of the recommendation that treatment of obesity in children and adolescents include ≥ 26 hours of contact time over 2-12 months [5], this was a low intensity intervention, involving a few hours of contact with SBHC clinicians who were not trained behavioral health clinicians, had no prior training or experience in MI [23], and did not have the support of a multidisciplinary team (e.g., registered dietitian, exercise physiologist). Limited contact time was meant to reflect typical SBHC practice and to avoid interfering with student academic progress. Despite these limitations, which reflect real-world implementation issues in SBHC settings, there was strong evidence from the interviews that a therapeutic alliance developed between teens and their study clinicians.

The interviews conducted with teen-caregiver dyads highlighted potential benefits of incorporating and involving caregivers and other family members in MI-based weight management interventions for teens. Most caregivers who were interviewed exhibited moderate to high levels of involvement, indicating a substantial level of interest in knowing about and supporting teens' healthy lifestyle changes. More direct caregiver involvement in behavioral interventions is consistent with current obesity treatment recommendations [5] and other studies have found some benefits to including caregivers in obesity treatment interventions [24-27], although the evidence is mixed [28,29]. Clinician support was a primary source of motivation, and the discontinuation of clinician support and encouragement after intervention completion was experienced by some adolescents as a significant barrier toward sustaining progress [8,9]. Other sources of support, encouragement, and motivation are necessary to sustain progress beyond the end of an intervention [8]. Thus, a particularly pivotal role for caregivers may be providing teens with ongoing encouragement and motivation to buffer the loss of clinician support. Empowering caregivers to provide ongoing goal-setting support and encouragement to teens could help with intervention sustainability.

Unfortunately, however, there are few guidelines on how to effectively involve caregivers in weight management interventions for adolescents in school settings, where teens spend most of their time and are able to easily access health care services. One possibility is to directly include caregivers as attendees during MI sessions with adolescents. However, direct caregiver involvement during MI sessions in school settings may introduce logistical challenges for SBHC clinicians and parents [30]. Additional possibilities include involving caregivers indirectly, by providing them with web-based information and resources to support family lifestyle changes in the home, as suggested by some of the caregivers that were interviewed. Clearly, further study is needed to identify the best way to facilitate caregiver involvement in weight management interventions for adolescents in school settings and to understand the impact of caregiver involvement on teen weight management outcomes [25].

The interviews with adolescents and caregivers also highlighted some institutional and systemic barriers (e.g. neighborhood design, jobs in fast food restaurants) that pose challenges to adopting active lifestyle and healthy nutrition habits. While support from health care clinicians and caregivers at least temporarily empowered some teens to make lifestyle changes, despite these systemic barriers, ultimately policy interventions need to address these factors as well to support sustainable individual and family level behavior changes [6,31].

Finally, caregiver and teen descriptions of what constituted success suggest that weight management interventions should take a holistic, more patient-centered approach to assessing outcomes, with expanded focus on healthy lifestyle, mental health, self-efficacy, and well-being rather than a narrow focus on physical health outcomes and reducing BMI z-scores. This approach is consistent with American Academy of Pediatrics recommendations for prevention of obesity and eating disorders in adolescents [32] and with findings from other qualitative studies with adolescents [6].

The strengths of this evaluation include consideration of both teen and caregiver perspectives to more deeply understand how teens experienced an MI-based school-based weight management intervention. This study also has some limitations. The interviews were conducted with a small subset of the study participants, and may not be generalizable to the experience of all participating teens, especially as we deliberately sampled some teens that had positive changes in their BMI z-score during the intervention.

4.2. Innovation

This study adds to the limited evidence-base regarding adolescent perspectives on the implementation of MI-based care by primary care clinicians in SBHCs, specifically in the context of a weight management intervention. Adolescents appreciated the approach and felt it was key to their success. Since implementation reflected real-world conditions (i.e., fairly limited contact with clinicians who were not experienced with MI before delivering the intervention [23]) there is potential to continue

use of this approach to motivating behavior changes in SBHC settings, which are an integral part of the health care system for vulnerable adolescents [17]. Additional qualitative studies could be conducted with adolescents and their caregivers and clinicians to identify ways to optimize delivery of MI-based care for adolescents in SBHCs.

4.3. Conclusion

In this study, based on teen report, SBHC clinicians were effective in using MI to engage adolescents to make holistic, positive changes in their health behaviors, and most caregivers were eager to support those changes. Future studies should identify strategies to sustain teen motivation, to more extensively involve families and to address environmental barriers to behavior change.

We confirm all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story.

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Declaration of Competing Interest

The authors have no conflicts of interest to declare.

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