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ORIGINAL PAPER

Reaching Uninsured Overweight and Obese Children Through the FitKids Mobile Lifestyle Modification Program: Lessons Learned

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Abstract

The US prevalence of childhood obesity remains high with ~ 1 in five children diagnosed with obesity, and rates of obesity are likely higher in uninsured and Medicaid populations than in those with private insurance. To understand the impact of an obesity intervention, an established mobile clinic program conducted a study to determine whether a FitKids Mobile Lifestyle Modification Program could reach overweight and obese uninsured children. Eighty-six children (ages 8–18 years) participated in the FitKids study over two trial periods. The first trial consisted of four total visits, but subsequent visits after the initial visit had poor turnout. Through telephonic interviews, parents described positive aspects of the program: (1) providers' individual attention to their child, (2) increased knowledge about obesity, nutrition, and diet, (3) and parent and child were motivated to be more active. The most common barriers noted for return visits were (1) personal/family factors, (2) scheduling issues, and (3) distance to the clinic. As quality improvement, for the second trial, total number of visits was reduced from 4 to 3 visits and reminder calls were instituted. Percentage of children who returned for the third visit (67.5% for Trial 1 and 62.5% for Trial 2) was not improved despite quality improvement interventions. Mobile clinics provide a unique solution to reach underserved overweight and obese children to help them create a more active and healthy lifestyle, but more research is needed to understand how best to optimize programs.

Keywords Obesity · Overweight · Underserved · Mobile clinics

Background

The prevalence of childhood obesity in the US remains high with ~ 1 in five children being defined as obese. Substantial differences in rates of obesity between races-ethnicities remain, with Hispanics and African Americans having the highest prevalence of obesity [1]. Rates of obesity have also been found to be higher in uninsured and Medicaid populations than in those covered by private insurance [2–4]. Programs for weight management have been created across the United States with mixed success. Comprehensive medium to high-intensity behavioral interventions for obese children and adolescents aged > 6 years can effectively produce short-term improvements in weight and probably also in adiposity [5]. Although most comprehensive behavioral interventions have been targeted towards middle to upper class children, programs do exist for children of lower socioeconomic status. These programs have been proven to be effective in those children who complete the program [6]. However, many factors lead to problems with attrition in this

Dr. Misra, Dr. Gupta and Cassandra Garcia conceptualized the study. All authors participated in the execution of the study and wrote, reviewed, and finalized the manuscript.

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population. Specifically, logistic factors including appointment scheduling, ease and cost of parking, and location of the clinic often lead to families dropping out of programs. Additional reasons for program withdrawal include concerns about missed school and work commitments, mismatch of expectations between parents and clinic providers, lack of readiness to make a change from both the parents and the children, perceived cost of healthy foods and exercise options, and lack of healthcare coverage [7–9]. Factors facilitating participation include well organized programs with an organized referral process, free programs, rewards given for patient progress with weight loss and having the program at a convenient location [8, 9].

The Texas Children's Mobile Clinic Program (TC-MCP) includes two large fully-equipped mobile clinics and one smaller back-up unit. The mission of the program is to provide underserved children in the Houston area with comprehensive medical services and health education. The mobile clinic services offered include immunizations, well-child checks, sick visits, and follow-up visits. The mobile clinics drive into the community daily and park at host sites like elementary schools and community centers to provide services to the general public. When fully staffed, each clinic has three medical assistants and two health care providers. All team members and providers are bilingual in English and Spanish. Families who seek care on the mobile clinic are mostly uninsured immigrants, primarily Spanish or English speaking, with a small percentage speaking other languages. Registration forms are provided in English and Spanish. Because of the availability and ability to care for children who do not otherwise have access to care, a mobile clinic program is a unique healthcare delivery model which can impact hard to reach overweight and obese children. To understand the possible impact of an obesity intervention, the TC-MCP providers conducted a study to determine whether a FitKids Mobile Lifestyle Modification Program could reach and impact children who are overweight or obese and uninsured with limited access to care.

Methods

This study was approved by the Baylor College of Medicine Institutional Review Board and was funded by a grant from the Ronald McDonald House Charities of Greater Houston and Galveston. The authors of this paper do not have any relevant financial disclosures or conflicts of interest. Informed consent was received from all participants in this program per the Baylor College of Medicine IRB protocol process.

The FitKids mobile lifestyle modification pilot program included two Trails during a 1 year period, 8 months apart. The entire program including laboratory screening was free to all participants.

Trial 1

Children who were diagnosed as overweight or obese by body mass index (BMI) greater than or equal to the 85th percentile for age at well child visits from 2/1/2016 to 5/31/2016 were invited to participate. Trial 1 consisted of three standardized visits.

Trial 2

In Trail 2, the Trial 1 design was used with a few modifications. Children who were diagnosed as overweight or obese and presented to the clinic for well child visits from 10/1/2016 to 6/1/2017 were invited to participate. Trial 2 consisted of two standardized visits.

The FitKids Mobile Lifestyle Modification Program was implemented on the TC-MCP mobile clinics named Ronald McDonald Care Mobile (RMCM) and Superkids Mobile Clinic (SKMC). The participants in the study included children ages 8–17 years old with a body mass index (BMI) greater than or equal to the 85th percentile. All participants in the program received the same medical standard of care. Patient visits were scheduled on days that one of the mobile clinics was located close to the patient's home or school. Patients were excluded from the study if (1) they were not English or Spanish speaking, (2) if they knew they would be unable to return for all visits, (3) if they did not have access to a home or cellular phone, or (4) if they did not have access to a smart mobile phone.

In both trials, patients who were overweight or obese on RMCM who enrolled in the pilot program were randomly assigned to receive either a Garmin Vivofit or a simple pedometer for the duration of the study. Patients who were overweight or obese on SKMC who enrolled in the pilot program served as the comparison group for the study and received a stopwatch. There was no control group. The participants and families were expected to attend all the visits.

Intervention

During the first visit in Trial 1, (1) both the participant and the parent/guardian completed surveys to assess demographic information as well as baseline data on participant's lifestyle, diet, and physical activity. (2) The participants were randomized on RMCM to receive a Garmin Vivofit or pedometer and educated on how to use it. Participants on SKMC were the comparison group and received a watch with a stopwatch feature. Participants who received the Garmin Vivofit or pedometer were asked to track daily steps and daily minutes of physical activity. Participants who received the stopwatch were asked to track only daily

minutes of physical activity. All participants were given an activity tracker paper calendar to record daily steps and/or minutes. (3) All participants were given a tote bag with a folder and myplate.gov official plate inside of it at the first visit. Participants were instructed to use the MyPlate for lunch and dinner to help control portion sizes. (4) Three individual goals for healthy eating and physical activity were set by the participant and written on the goal sheet. The Houston YMCA application was provided for participants and families interested in membership based on sliding scale dependent income. The list of free/low-cost resources with places to exercise was another option given to families. (5) The last part of the first visit included laboratory screening for fatty liver disease, cholesterol, and diabetes. The participants and families were asked to bring back the activity tracker calendars and goal sheet to all subsequent visits.

The second visit in Trial 1 consisted of (1) reviewing laboratory values with participants and families, (2) reviewing activity tracker calendars for daily steps and minutes of physical activity for participants who received the Garmin Vivofit or pedometer and minutes of physical activity were reviewed with participants who received the stopwatch, (3) reviewing of individualized goals for healthy eating and physical activity from the previous visit, and (4) setting of three new goals. The participants and families were asked to bring back the activity tracker calendars and goal sheet to all subsequent visits.

The third visit in Trial 1 consist of (1) reviewing activity tracker calendars for daily steps and minutes of physical activity for participants who received the Garmin Vivofit or pedometer and minutes of physical activity were reviewed with participants who received the stopwatch, (2) reviewing of individualized goals for healthy eating and physical activity form the previous visit, (3) setting of three new goals, (4) surveying the participants and parent/guardian to assess for the patient's lifestyle, diet, and physical activity, and (5) rewarding the participant for completing the program with two of the following: soccer ball, football, or volleyball.

Table 1 illustrates the interventions for each visit in Trail 1 and Trail 2. See Table 1.

After completion of Trial 1, preliminary data revealed that only a small percentage of participants completed the entire program. Based on these results, further information was gathered from participants of Trial 1. In particular, Trial 1 parents were called and asked the following questions:

1. What did you like most about our weight management program?

Table 1 Interventions in Trial 1 and Trial 2

Trial 1—first visit	Trial 2—first visit
1. Surveys completed by participant and parent/guardian	1. Surveys completed by participant and parent/guardian
2. Participants randomized on RMCM to receive a Garmin Vivofit or pedometer	2. Participants randomized on RMCM to receive a Garmin Vivofit or pedometer
3. Participants on SKMC participants received a stopwatch	3. Participants on SKMC participants received a stopwatch
4. Tote bag given with a myplate.gov official plate inside and a folder with the a copy of the completed consent form, activity tracker calendar, refrigerator and pantry clean out handout, individualized goal sheet with three goals, Houston YMCA application, and list of free/low cost resources	4. Tote bag given with a myplate.gov official plate inside and a folder with the a copy of the completed consent form, activity tracker calendar, refrigerator and pantry clean out handout, individualized goal sheet with three goals, Houston YMCA application, and list of free/low cost resources
5. Laboratory screening for fatty liver disease, cholesterol, and diabetes	5. Laboratory screening for fatty liver disease, cholesterol, and diabetes
Trial 1—second visit	**Trial 2—second visit**
1. Reviewed laboratory values with participants and families	1. Reviewed laboratory values with participants and families
2. Reviewed activity tracker calendars with participants and families	2. Reviewed activity tracker calendars with participants and families
3. Reviewed individualized goals	4. Reviewed individualized goals
4. Set three additional individualized goals	5. Set three additional individualized goals
	6. Surveys completed by participants and parent/guardian
	7. Participants rewarded with two of the following: soccer ball, football, or volleyball
Trial 1—third visit	
1. Reviewed calendars and individualized goals with participants and families	
2. Reviewed individualized goals	
3. Set three additional individualized goals	
4. Surveys completed by participants and parent/guardian	
5. Participants rewarded with two of the following: soccer ball, football, or volleyball	

2. What did you like least about our weight management program?
3. You were only able to make it to 1 or 2 of the 3 scheduled visits. Could you tell me why you were unable to attend all the visits?
4. We appreciate you bringing your child/children to see us but we understand that it is difficult to make it to all of the appointments. In the future, what could we do to help parents like you succeed in bringing a child to all scheduled visits?
5. Did your child receive a Garmin Vivofit, pedometer, or stopwatch? How was that experience? Did you understand fully how to use the device before you left clinic? What could we have done better?
6. We asked your child to record the amount of steps and/or minutes of physical he/she did daily. Was that difficult to do or hard to do? If hard, why was it hard?

Interviews were conducted by a trained research assistant in either English or Spanish dependent upon caregiver preference. Based on feedback from patients, specific modifications were made between Trials 1 and 2. A major modification was a decrease from 3 total visits in Trial 1 to 2 total visits in Trial 2. A second modification was that in Trail 2, participants received weekly phone calls from a trained research assistant requesting the participants' step data and/or minutes of physical activity. At each weekly call, the participant family was also asked if they were having any problems with their device and reminded about their upcoming follow up visit. Information gathered during the weekly calls was given to research investigators in real time so concerns could be addressed quickly and efficiently.

Results

Statistical Analysis

The descriptive data analysis consisted of frequencies for categorical variables, with means/medians for continuous variables. Secondary data analysis consisted of comparing demographic variables between Trials 1 and 2 and consisted of Chi square test for categorical variables and t-tests for continuous normally distributed variables. Logistic regression was conducted to examine the association between the variables. Because the dependent variable was dichotomous, binary logistic regression was used. The overall model significance for the binary logistic regression was examined using the χ^2 omnibus test of model coefficients. In order to assess the percent of variance accounted for by the independent variables Nagelkerke R2 was examined. The data was analyzed using IBM SPSS Statistics Version 24 Software (SPSS Inc, Chicago, IL, USA).

A total of 86 children (ages 8–18 years) participated in the FitKids study over two trial periods (Trial 1: June 2016–August 2016 and Trial 2: March 2017–June 2017). When Chi square analysis was done on the following categorical variables (sex, ethnicity, and annual family income), there was no significant difference between the study populations in the two different trails. There was a difference between the two study populations when looking at primary language spoken in the home ($p = 0.04$). There were more English speaking households in Trial 2 than Trial 1. When t-test was done to compare the age between the two study time periods, there was no significant difference in age between the two study periods ($p = 0.81$). Table 2 demonstrates the demographic information from both trials of the study. See Table 2.

FitKids Study Trial One (June 2016–August 2016)

During Trial 1 of the FitKids study (June 2016–August 2016), 40 children enrolled, attended the first clinical visit, and completed the pre-participation survey. Of the 40 children, 27 (67.5%) attended the second visit, and 4 attended the third visit. The follow up percentage from first visit to third visit was 10%. Based on this data, further information was collected to understand the reasons why patients did not return for subsequent visits. This data was collected via

Table 2 FitKids demographic factors

Category	Total from Trials 1 and 2 N (%)	Trial 1 N (%)	Trial 2 N (%)
	Total N = 86	Total N = 40	Total N = 46
Sex			
Male	42 (48.8)	21 (52.5)	21 (44.7)
Female	44 (51.2)	19 (47.5)	25 (54.3)
Mean age			
Age in years ± SD	12.2 ± 2.8	12.08 ± 3.0	12.23 ± 2.6
Ethnicity			
Hispanic	82 (95.4)	38 (95.0)	44 (95.6)
African American	2 (2.33)	2 (5.0)	0 (0)
Asian	1 (1.2)	0 (0)	1 (2.2)
Other	1 (1.2)	0 (0)	1 (2.2)
Primary language spoken at home			
English	16 (18.6)	4 (10.0)	12 (26.1)
Spanish	64 (74.4)	31 (77.5)	33 (71.7)
English/Spanish	6 (7.0)	5 (12.5)	1 (2.2)
Annual family income			
< $40,000	53 (61.6)	23 (57.5)	30 (65.2)
$40,000–$80,000	13 (15.1)	6 (15.0)	7 (15.2)
> $80,000	2 (2.3)	1 (2.5)	1 (2.2)
No response	18 (20.9)	10 (25.0)	8(17.4)

telephonic interview by a trained Spanish–English bilingual research assistant.

Overall, the program was well liked by parents and children. Most importantly, parents noted that the program increased their knowledge about obesity, nutrition, and diet. The parents also reported that the program motivated them and their children to be more active. They specifically mentioned that they appreciated the individual attention that was provided by the healthcare providers. See Fig. 1.

With regard to barriers to attending visits, interestingly, family/personal barriers were just as common as scheduling conflicts. Parents also noted transportation issues as well as concerns about missed school for the visits. Please see Fig. 2. Figure 3 demonstrates the common themes from parents regarding solutions to increase visit attendance. Please see Fig. 3.

Based upon the results from Trial 1 of the FitKids program and the telephonic phone interviews, the program was revised prior to implementing Trial 2 of the program.

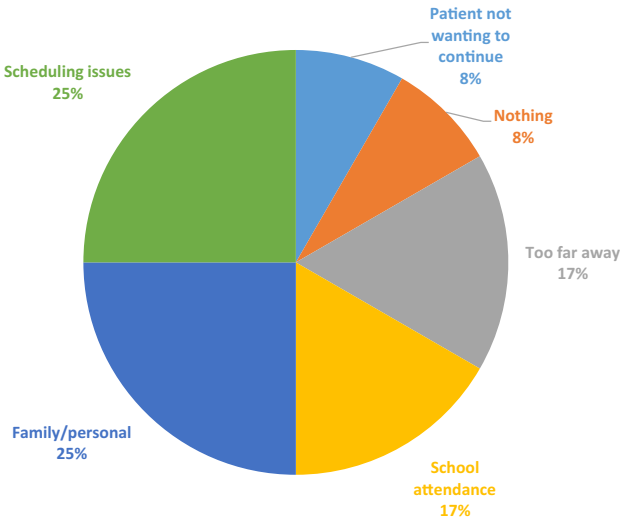

Fig. 2 Common themes on barriers to attending visits

FitKids Study Trial 2 (March 2017–June 2017)

During the second phase of the FitKids study (March 2017–June 2017), 46 children were enrolled, attended their first FitKids visit, and completed the intake survey. Of those 46 children, 30 children (65.2%) attended the second and final visit.

Combined Results from Visits 1 and 2

Data from both phases were combined to assess for differences in completion of visit number two. There was a significant difference in gender when assessing for completion of visit 2. Logistic regression was performed to ascertain the effect of gender, and age on the likelihood that participants attended the follow-up visit. Linearity of continuous variable age with respect to the logit of the dependent variable (follow-up at visit 2) was assessed via the Box-Tindell (1962) procedure. Age was found linearly related to the logit of the dependent variable. The logistic regression model was statistically significant, χ^2 (2) = 10.8, p = 0.005. The model explained 16.3% (Nagelkerke R^2) of the variance in the second follow-up visit and correctly classified 70.9% of cases. Sensitivity was 84.2%, and specificity was 44.8%. Of the two predictors only gender was statistically significant. Females had 4.7 (1.8–12.7 95% CI, p = 0.002) times the odds of attending visit 2 when compared to males. See Table 3.

However, when looking at age, ethnicity, primary language spoken in the home and annual family income, there

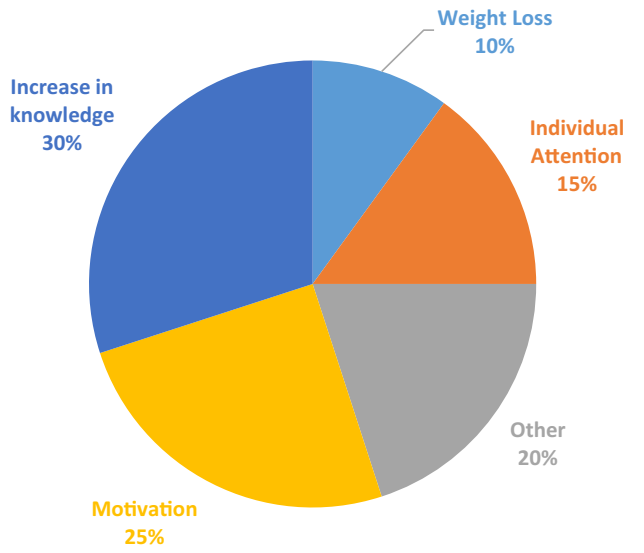

Fig. 1 Common themes on positive aspects of the program

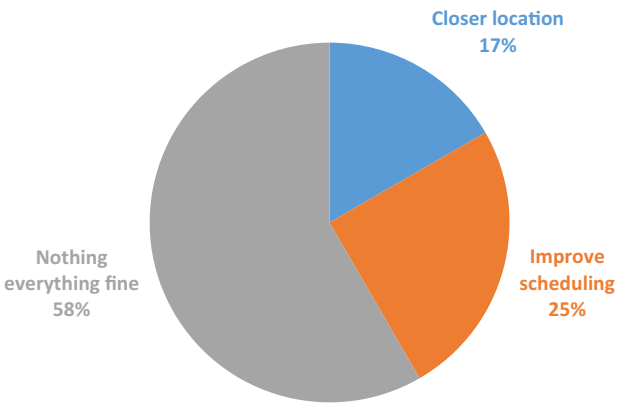

Fig. 3 Common themes of solutions to increase visit attendance

Table 3 Logistic regression predicting likelihood of attending follow-up visit based on age and gender

Variable	B	SE	Wald	df	p	Odds ratio	(95% for odds ratio)	
							Lower	Upper
Age	− 0.08	0.08	0.80	1	.372	0.93	0.78	1.10
Gender	1.55	0.51	9.42	1	.002	4.71	1.75	12.65
Constant	0.934	1.09	0.74	1	.391	2.54		

Gender is for females compared to males

was no significant difference in characteristics of those who completed visit 2.

Discussion

The FitKids Mobile Lifestyle Modification Program was created to reach children who were overweight or obese and uninsured. Utilization of a mobile clinic program is a unique strategy to bring care to children who face multiple barriers to accessing adequate, comprehensive health care. Most of the children who utilize the TC-MCP for care do not receive regular well child care and rarely have received counseling or help with their overweight or obesity diagnosis.

The program was initially created with four total visits: a well child visit with 3 subsequent lifestyle modification visits. Due to recognized poor turnout for subsequent visits, a quality improvement measure was implemented. Through telephonic interviews, the providers learned that parents enjoyed the FitKids program because it increased their knowledge about obesity, nutrition, and diet, motivated their children to be more active, and they appreciated the individual attention that was provided by the healthcare providers. However, despite the positive reviews of Trial 1 of the program, 67.5% of the participants returned for the second visit and only 10% returned for the third visit. The most common barriers noted for return visits were personal/family factors, scheduling issues, and distance to the clinic. Parents only noted that improving the scheduling process and finding a closer location would improve their ability to complete the program. In the research related to social determinants of health and barriers to adequate healthcare, many topics like poverty level, health literacy, transportation, funding, and understanding of the need for preventative healthcare are often mentioned [10]. However, in our study, the most commonly noted barrier was personal/family factors which are vague but do not fall specifically into our commonly noted barriers. These personal/family factors may or may not be modifiable but they need to be understood in more depth.

By understanding the barriers and potential solutions from our program, the providers decreased the number of visits for the program in Trial 2 from a total of 4 to 3: a well child visit with two subsequent lifestyle modification visits. In addition, weekly phone calls were made to retrieve study information, remind patients about their visits, and change appointment dates and times to suit their needs. With the change in the program, 65.2% of participants attended the second and final visit. Completion of the second visit was essentially unchanged from Trial 1 to Trial 2 (67.5–65.2%) despite the quality improvement measures that were implemented. This may show that reaching children who are uninsured and underserved is difficult and that bringing the clinic closer to their home may not be enough to practically keep parents and children coming and engaged in the program.

Reaching children who are underserved and uninsured is a uniquely complicated problem. Our study demonstrated that female patients were four times more likely to complete the second visit in each trial. There are many reasons that this may hold true including level of motivation from either the child and/or the parent to address unhealthy weight in the child. This finding will help shape subsequent interventions on the TC-MCP such as assessing level of motivation early in the program and using targeted phone calls to adequately reach the males and their parents in the program.

Conclusion

Mobile clinics provide a unique solution to reach children who are uninsured as well as overweight or obese to help them create a more active and healthy lifestyle. Although the program was considered to be successful from parent comments, proximity to home and school was not sufficient to reach 100% compliance with program visits for this lifestyle modification program. Family and personal factors were the most common reason that parents were unable to complete the program. More focused studies are needed to understand what family and personal factors are barriers to completion of the program and how we can modify programs to improve patient visit compliance.

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Compliance with Ethical Standards

Conflict of interest The authors of this paper do not have any conflicts of interest to disclose.

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