

Non-pharmacological Weight Loss Program in a Rural Community: Feasibility Study

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Abstract

Background: Obesity is a complex health problem that affects over one-third of US adults. Obesity rates are higher in rural communities, which may not have the resources to address. A community-based non-pharmacological weight loss program was implemented to address the limitations of managing rural obesity, specifically cost and transportation.

Methods: A descriptive study was used to explore the feasibility of an 8-week non-pharmacological weight loss program that included nutrition and healthy lifestyle education for overweight or obese adult residents of a rural community in Western Maryland (n=23).

Results: The program was low-cost and had high participant satisfaction. Participants whom completed the program showed an increase in motivation to making lifestyle changes (p=0.0002); consumed fewer calories from fat (p=0.029); and had a small change in BMI (p=0.0389). The increase in physical activity minutes with program completion was not statistically significant (p=0.2285). Weather, family and work obligations were barriers to attendance.

Conclusions: This rural community-based weight loss program was feasible, addressed the barriers of cost and transportation, and can be adapted to meet the needs of other rural communities.

Keywords: obesity, obesity intervention, rural, community, feasibility, non-pharmacological

DOI: <http://dx.doi.org/10.14574/ojrnhc.v19i2.516>

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More than one-third of adults in the United States (US) are obese, which is approximately 34.9% or 78.6 million adults (Ogden, Carroll, Kit, & Flegal, 2014). Overweight and obese adults have higher rates of morbidity from conditions such as hypertension, coronary artery disease, dyslipidemia, stroke, type 2 diabetes, sleep apnea, respiratory problems, and endometrial, breast, prostate, and colon cancers (Flegal, Kit, Orpana, & Graubard 2013). The number of extremely obese individuals has been steadily increasing (Fryar, Carroll, & Ogden, 2014).

There is a direct link between the increased rates of obesity and increased medical spending and costs. According to Finkelstein, Trogon, Cohen, and Dietz, (2009), the estimated annual medical cost of obesity in the US was \$147 billion in 2008. Moreover, medical costs for individuals who are obese were estimated to be \$1,429 higher than those of individuals with a healthy weight.

The percentage of adults that are obese is higher in rural areas as compared to urban areas of the US. In a *Journal of Rural Health* published study, the prevalence of obesity was 39.6 percent for rural adults and 33.4 percent among urban adults between 2005 and 2008. Nearly 20 percent of the US population resides in non-metropolitan areas and face barriers to adopting healthy lifestyles and nutritional behaviors (Befort, Nazir, & Perri, 2012). A rural community is defined as “all population, housing, and territory not included within an urban area. The Census Bureau identifies two types of urban areas: Urbanized Areas of 50,000 or more people; Urban Clusters of at least 2,500 and less than 50,000 people” (U.S. Department of Health and Human Services [USDHHS, Federal Office of Rural Health Policy [FORHP] , n.d. para 2).

According to Rural Healthy People 2020, barriers include limited access to supermarkets that provide fresh produce, high poverty rates with lower household incomes, limited transportation, lower education levels, and lack of community based resources and programs that are designed to help facilitate and promote healthy lifestyles. These limitations put the rural populations at greater risk for numerous diseases and health disorders, including obesity. Rural healthcare facilities are less likely to have nutritionists, dietitians, or weight management experts available (Bolin & Bellamy, 2011).

This study was completed with consideration of all ethical and legal rights of the participants. The feasibility study proposal was submitted to the Pennsylvania State University Internal Review Board for approval prior to implementation, and was approved as exempt. The consent form and research was discussed with all participants prior to the start of the first session. Verbal consent was obtained from all eligible program participants before the start of the first educational session and any data collection.

Literature Review

The high prevalence of overweight and obese individuals and limitations faced by rural communities leads to an increased need for evidence-based interventions for weight management. The literature search was conducted to obtain relevant research articles regarding the use of weight loss interventions for underserved or rural populations. To guide the development, implementation, and evaluation of an evidence-based non-pharmacological weight loss program for rural communities, a literature review was conducted to answer the research question: What is the feasibility of a non-pharmacological weight loss program that includes nutrition and healthy life style education for overweight or obese adult residents of a rural community? The bibliographic databases used were PubMed (Medline), Cumulative Index to Nursing and Allied

Health Literature (CINAHL), Cochrane Library, and Joanna Briggs databases. Combinations of keywords and subject headings in all databases included “complementary therapies”, “weight loss”, “rural”, “rural population”, “weight loss program”, "weight reduction programs", “physical activity”, “exercise”, “healthy eating”, and “nutrition”. The limiters applied were English language, human subjects, and articles published from January 2000 until February 2016. Titles and abstracts containing one or more keywords were reviewed for inclusion. Articles that were not original research studies were eliminated. Thirty-seven articles were obtained for further review.

Studies with subjects over the age of 18 with a diagnosis of obesity, residing in a rural or medically underserved community setting, and participated in a non-pharmacological weight loss intervention were included. Fifteen of the best-quality articles were included for the purpose of this literature review: five reported randomized control trials (RCT); six reported quasi-experimental studies; three reported cohort studies; and one reported telephone questionnaire. The Strength of Evidence Rating Pyramid (Melnik, & Fineout-Overholt, 2011) was used to score the strength and quality of evidence of the research articles included in this review. The quality rating scores of the fifteen studies included in this review, range from level II through IV, and include RCTs, quasi-experimental, and cohort studies.

Based on the results of the fifteen studies included in the literature review, evidence suggests that rural weight loss programs focusing on educational and motivational methods at the community level can result in weight loss and/or increased self-efficacy and individual satisfaction. The implementation of a rural weight loss program will help health care providers in rural communities plan an approach to addressing obesity. Many factors affect feasibility and should be assessed on an individual basis for each program.

Significance

Many rural communities lack the resources to address the treatment of obesity (Bolin, & Bellamy, 2011). Furthermore, rural communities are less likely to have appropriate facilities and professionals specializing in weight management, such as certified health coaches, wellness counselors, or dietitians. Consequently, the responsibility for promoting a healthy life-style and weight may lie with the primary care provider, health practitioners, or health workers within the community. To address the lack of resources, community-based health practitioners can help implement programs and services within the community that focus on weight management. Rural communities need to build the capacity to help their residents through an investment in health and fitness programs and in particular, programs designed to guide residents in adopting healthy habits for weight control.

In the area of interest for this study, Garrett County, MD, the adult obesity rate is at 31%, which is higher than the national average. Trends show that the obesity rates in Garrett County are rising. Additionally, the physical inactivity rate in Garrett County is 30% and trends show that physical inactivity is rising. The incidence of inactivity is higher than the national average (County Health Rankings & Roadmaps, n.d.). Community needs carried out in Garrett County, MD revealed the prominent barriers and limitations to health within the county are related to factors of nutrition and physical activity. Dr. Virginia Brown, DrPH, Assistant Professor at University of Maryland School of Public Health, conducted 17 focus groups, including 175 individuals residing and/or working in Garrett County MD to assess community needs. The top concerns for participants in the assessment were nutrition (36%) and physical activity (33%). The focus groups included county leaders, residents, health care providers, and social workers. The data results of the study revealed that residents of Garrett County MD were dissatisfied with

the current resources available to them for physical activity and healthy eating. According to residents of Garrett County, the most prominent barriers are cost and transportation. The proposed practice suggestion was to implement community-based resources to promote physical activity and healthy eating that are affordable and accessible by county residents (Argabrite, & Brown, 2016).

Successful weight loss has been seen with the utilization of face-to-face interventions, phone interventions, a combination of face-to-face and phone interventions, and self-monitoring tools for both weight loss (decrease in BMI) and improved self-efficacy and life satisfaction. Better success in weight reduction with the completion of a program was seen with group interventions than individual counseling sessions (Befort, Donnelly, Sullivan, Ellerbeck, & Perri, 2010), possibly due to additional motivation from other group members.

The evidence indicates that face-to-face and phone follow-up and weight maintenance interventions can have a positive impact on long-term weight maintenance and decrease the occurrence of weight regain (Miedema, Reading, Hamilton, Morrison, & Thompson, 2015; Milsom, Middleton, & Perri, 2011; Radcliff et al., 2012)..

Cost and demand are driving factors in rural weight loss interventions, especially in regards to feasibility. Evidence suggests that low cost telephone or mobile phone interventions can be cost-effective and acceptable (Gorton, Dixon, Maddison, Mhurchu, & Jull, 2011; Radcliff et al., 2012). A cost-analysis of a program will help determine feasibility, and should be an important part of the implementation of weight loss programs (Bowen et al., 2009). Participant attendance rates and participant retention rates are important factors in assessing feasibility. Attendance and retention can vary for each rural weight loss program and should be assessed for each type of weight loss intervention in rural communities. The RCT study by Mayer-Davis et al. (2004)

tailored the program to participant needs, such as transportation. Participant attendance and retention in a rural weight loss program may be higher if community needs such as transportation are assessed prior to implementing the weight loss intervention.

Purpose

The purpose of this feasibility study was to address the limitations of managing rural obesity by assessing the feasibility of implementing an evidence-based physical activity and nutrition education weight loss program in one rural community for overweight or obese individuals. The research question for this was: What is the feasibility of implementing a non-pharmacological weight loss program that includes nutrition and healthy life style education for overweight or obese adult residents of a rural community?

The study included the implementation and feasibility assessment of an evidence-based, non-pharmacological weight loss program in one rural community located in western MD. The weight loss program included physical activity and nutrition education to 23 overweight or obese adults over the age of 18. The goal of program implementation was to identify a feasible and sustainable community-based outreach program to promote weight loss by providing education on lifestyle modification, methods to reduce negative health outcomes among overweight and obese individuals, and methods to improve overall quality of life of overweight and obese individuals.

Theoretical Framework

This study was guided by two theoretical frameworks: the Logic Model was used to guide the evaluation and implementation of the community based program and the Transtheoretical model (TTM) helped guide the education aspect of the program.

The Logic Model is a logical framework, or theory of change, that provides a systematic approach to help guide program implementation and evaluate program effectiveness. The Logic Model is a systematic way to describe logical associations among program resources, activities, outputs, audiences, and outcomes. The model displays the chain of connections showing how a program is anticipated to work to achieve the desired outcomes. A program logic model links both short-term and long-term outcomes with program activities and processes and the theoretical assumptions or principles of the program (W. K. Kellogg Foundation, 2001). The Logic Model has been successfully applied to health program planning and evaluation. A program logic model can help public health workers to identify the inputs and activities that will result in the desired health program outcomes. The Logic Model can also be utilized to engage stakeholders, ensure commitment to the development and evaluation of the health program, and help guide the future direction of the program (Longest, & Beaufort, 2005).

The TTM is a behavioral change model that is based on multiple theories, and accordingly given the name transtheoretical model. The TTM also integrates elements of Bandura's self-efficacy theory. This construct reflects the degree of confidence individuals have in maintaining their desired behavior change in situations that often trigger relapse (Prochaska & Velicer, 1997). The TTM focuses on the decision-making process of the individual and is a model of intentional change. This model has the assumption that people do not change behaviors quickly and decisively and a change in behavior occurs continuously through a cyclical process. According to Prochaska, DiClemente and Norcross (1992), the TTM interprets behavior change as an intentional process that unfolds over time and involves progress through a series of six stages of change. The Logic Model for this program is depicted in Figure 1.



Figure 1. Friendsville Weight Loss Program Logic Model

Design & Methods

A descriptive study was used to explore the feasibility of a rural healthy life style education weight loss program for overweight or obese adults. A pre-test, post-test design was used to measure changes in motivation for weight loss with the University of Rhode Island Change Assessment Scale (URICA) Weight Control: Stages of Change (short form) (Andrés, Saldaña, & Beeken, 2015; University of Rhode Island, Cancer Prevention Research Center, n.d.), changes in physical activity with the International Physical Activity Questionnaire Short For (IPAQ-SF) (Craig et al., 2013; IPAQ-SF, n.d.), changes in dietary habits with the Percentage Energy from Fat Screener (Thompson, 2007), and changes in body mass index (BMI) (Centers for Disease Control and Prevention, n.d.). Demographic data and transportation data were collected at the start of the program and a Likert-type satisfaction survey developed by the investigator was completed at the end of the program (Burns & Grove, 2001; Likert, 1932). Cost and attendance were measured throughout the duration of the program. The educational weight loss program consisted of 8 weekly group sessions providing participants with face-to-face education on physical activity and healthy eating. Data collection occurred weekly at each of the 8 educational sessions.

The setting for the program was in the community building of a rural community in Western MD with a population of 484 (US Census Bureau, n.d.). The educational sessions were held one evening a week from September 13, 2016 through November 1, 2016.

Twenty-three participants (n = 23) were recruited using a volunteer sampling procedure and met the criteria for inclusion if they were age 18 or older, had a BMI of 25 or greater, and had the ability to attend all of the educational sessions. Recruitment strategies included posting flyers around the community, announcements within the rural community of interest, word of mouth, and snowballing. The program was free to participants and consisted of 8 weekly sessions that were adapted from the curriculum for The Eat Healthy, Be Active community workshops. The *Eat Healthy, Be Active Community* workshops included six 1-hour workshops which included a lesson plan, learning objectives, talking points, hands-on activities, videos, and handouts. The workshops were designed for community educators, health promoters, dietitians/nutritionists, cooperative extension agents, and others to teach adults in a wide variety of community settings. The curriculum was adapted to incorporate and utilize community resources for healthy eating and physical activity to promote weight loss. A cooking demonstration by a registered dietician with the University of Maryland was included. All participants were given pedometers and encouraged to track daily steps and calories.

Data Analysis

Descriptive statistics were used to organize and summarize the data. SAS University Edition software was used for statistical analysis. The level of significance for all statistical procedures was set at 0.05. A Wilcoxon-Signed Rank test was used to analyze the pre-test and post-test URICA, IPAQ-SF and Percentage Energy from Fat Screener. A paired t-test was used to analyze the pre-test and post-test BMI data. Initial analysis of the data was collected and grouped into

categories based on similarity of responses. Common themes among the categories were identified and a thorough review of the data was conducted. To ensure that themes for coding were valid, a second individual reviewed the themes in an external audit. An attendance count was collected at every program session, and entered into an Excel spreadsheet where attendance percentage rates were calculated. Costs were collected throughout program implementation, entered into an Excel spreadsheet and totaled at program completion.

The public domain IPAQ questionnaire was used to determine participants' physical activity habits and all data was collected by the program coordinator and entered into Excel spreadsheets. Data was stored on a password locked laptop computer owned by the program coordinator. Only the program coordinator had access to the raw data. Participants were given an identification code and no names were associated with the collected data. Personal identifiers were kept in a locked filing cabinet in the home of the program coordinator and will be kept for 5 years. After 5 years all documents will be destroyed.

Results

Demographics

Participant age range was 28 years to 86 years, with the majority falling between 50-59 (n = 6). The mean age calculated was 64.85 (SD=15.13). The majority of participants were white (n = 23) females (n = 22). Additional demographics can be found in Table 1.

The average program attendance for all eight sessions was 72.83%. In total, 21.74% of participants (n = 5) attended 100% of the program sessions. Conversely, 17.39% of participants (n = 4) did not complete the program.

Table 1

Participant Demographics

Characteristic	n (N)	Percentage of those reporting (%)
Age	20 (23)	
20 - 29	1	5%
30 - 39	0	0%
40 - 49	1	5%
50 - 59	6	30%
60 - 69	3	15%
70 - 79	5	25%
80 - 89	4	20%
Gender	23 (23)	
Female	22	95.65%
Male	1	4.35%
Race	23 (23)	
White, non-Hispanic	23	100%
Marital Status	20 (23)	
Divorced	1	5%
Married	10	50%
Separated	1	5%
Single	1	5%
Widowed	7	35%
Education	20 (23)	
< 12 th Grade	5	25%
High School Diploma / GED	8	40%
Trade / Technical / Vocational Training	1	5%
Some College (no degree)	4	20%
Bachelor's degree	1	5%
Master's degree	1	5%
Income	20 (23)	
Less than \$20,000	10	50%
\$20,000 - \$39,000	3	15%
\$40,000 - \$59,000	4	20%
\$60,000 - \$79,000	1	5%
\$80,000 - \$99,999	2	10%

Attendance

Barriers to program attendance and completion.

The majority of participants responded that they would drive a vehicle they owned (n = 13) and had a travel time of 5 - 10 minutes (n = 11). The most frequently reported travel issue that could affect this program attendance was weather (n = 9). Four participants (n = 4) dropped-out of the program, but one participant that dropped-out could not be contacted. Reasons for dropout were family (n = 2) and work obligations (n = 1).

Barriers and Facilitators to Physical Activity and Healthy Eating

The top barriers to physical activity were weather (n = 6), no one to exercise with (n = 5), and safety concerns (n = 4). The top facilitators to physical activity were Internet access as a resource (n = 11), walking trails (n = 10), and parks (n = 9). The top barriers to healthy eating included the need to travel outside of the community to grocery shop (n = 15), no space for a garden at home (n = 7), and the cost of healthy foods (n = 5). The top facilitators to healthy eating included the Internet as a resource (n = 11), they felt it was easy to get healthy foods (n = 9), and gardens (n = 6). Desired resources for physical activity and healthy eating were church programs (n = 11), monthly group meetings (n = 10), more money (n = 7), a farmers market (n = 4), and workplace programs (n = 4).

Satisfaction

Overall, participants were satisfied (n = 2; 10.53%) or very satisfied (n = 17; 89.47%) with the program. The only satisfaction survey response that received a negative response was the statement “As a result of this program my ability to manage my weight has improved”. Although the majority of participants agreed (n = 13; 68.42%) or strongly agreed (n = 2; 10.53%) that as a result of this program their ability to manage their weight has improved, three participants

responded that they were undecided ($n = 3$; 15.79%) and one disagreed ($n = 1$; 5.26%). Overall, the participants identified the most helpful part of the program to be the nutrition education ($n = 9$). The most frequently reported hurdle to success was family obligations ($n = 9$). Five participants ($n = 5$) suggested adding exercise to each session.

Cost

The actual cost of the program was \$368.48 dollars and used for purchasing supplies, handouts, and healthy food. All costs were out of pocket.

A true cost analysis was calculated to represent the total cost of the program if the labor provided was based on personnel costs at the Garrett County Health Department in November 2016 (personal communication), and also included the cost of materials and healthy snacks. The calculations for true cost were based on 4 hours a week (1 hour per week to conduct the sessions and 3 hours per week for preparation) with a full-time equivalent (FTE) of 0.1. The true cost varied based on the qualifications of the instructor and ranged from \$738 to \$897.

Participant Changes with Program

Changes in readiness or motivation to make a lifestyle change.

The URICA pre-test mean was 2.84 ($SD = 0.7647$), indicating that most participants were already in the action stage at the start of the program; the post-test mean was 3.05 ($SD = 0.71$), indicating an increase in readiness or motivation to make a lifestyle change. There was a statistically significant increase from the pre-test mean URICA score to the post-test mean URICA score, indicating that there was a change in motivation or readiness to make a change with the completion of the program ($p = 0.0002$).

Changes in physical activity. The IPAQ-SF pre-test mean was 2954.3 ($SD = 3370.3$) and the post-test mean was 4534.8 ($SD = 3507.6$). Although there was an increase from the pre-test

mean MET minutes to the post-test mean MET minutes, a change in energy expenditure with physical activity was noted, however, this increase was not statistically significant ($p = 0.2285$).

Changes in dietary habits (nutrition). The pre-test Percentage Energy from Fat Screener mean ($n = 19$) was 33.81 ($SD = 3.90$); the post-test mean ($n = 19$) was 31.04 ($SD = 2.59$) indicating a statistically significant decrease in estimated percentage of calories from fat in their diets with the completion of the program ($p = 0.0291$).

Changes in BMI. The pre-test BMI mean was 35.02 ($SD = 8.10$) and the post-test mean was 34.73 ($SD = 8.07$), indicating a statistically significant decrease in the mean BMI with program participation ($p = 0.0389$). Although the change in BMI is statistically significant, it is small and not clinically meaningful to determine the effects of program completion on participant changes in BMI.

Discussion

This feasibility study shows that an 8-week, low-cost, evidence-based physical activity and nutrition education weight loss program can be successfully implemented in a rural community among primarily white, female adult participants. The results are grouped into outcomes of interest and the discussion of the data is grouped in the following categories: program utilization; program barriers; satisfaction; program cost; and participant changes (motivation, physical activity, dietary habits, and BMI).

Program Utilization

Program utilization was assessed to determine who used the program and what improvements can be made to improve overall participation. According to Leroy and Menon (2008), research on the utilization of nutritional interventions and programs is needed to help understand the potential of nutrition programs and how they can benefit an individuals' quality of life. The recruitment

goal for the study was 10, and the program exceeded that with the recruitment of 23 individuals that participated. In total, four participants dropped out of the program, and program completion occurred more frequently than program dropout. However, only 21.74% of participants (n = 5) attended 100% of the program sessions. Program attendance dropped in the middle of the 8-week program but increased at the last program session. Further research should be aimed at finding appropriate methods to increase program attendance and assess additional barriers to attendance.

This feasibility study shows that an 8-week, low-cost, evidence-based physical activity and nutrition education weight loss program can be successfully implemented and utilized in a rural community among primarily white, female adult participants of varying ages. This program was designed to address the most prominent barriers of cost and transportation (Argabrite & Brown, 2016); to address these barriers, this program was offered as a free community-based resource. Fifty-percent of program participants had an annual household income of less than \$20,000, and it is believed that the utilization of this program is dependent upon providing a free resource to community residents at an easily accessible location.

Although transportation was identified as a prominent barrier to the utilization of resources for physical activity and healthy eating, this program did not offer coordinated transportation. To promote program utilization and reduce the barriers to the utilization of rural resources to promote a healthy lifestyle, specifically transportation, program sessions were held in an area of a community that would permit individuals to walk to the location. Although previous research has identified transportation as a limitation in rural communities and can affect obesity care and the success of weight loss interventions (Bollin & Bellamy, 2011), the primary mode of transportation by participants of this program was by vehicle and the majority of patients had a travel time of less than 10 minutes. Participants saw distance, or a long commute time to the program, as a potential

barrier to participation. Programs in rural communities should utilize community resources to reduce these potential barriers and improve program feasibility. Additionally, coordination with public transportation should be considered to expand the outreach and participation.

In this program, participants did have the option to sign up for reminder calls, emails, or text messages. Considering the decrease in program attendance, additional methods to improve program attendance rates at each session should be incorporated. It may be difficult or impossible to determine the true cause of decreased attendance, as program attendance and attrition in weight loss programs is extremely complex. Previous research has concluded that this complexity is due to the influence of numerous external variables and pretreatment characteristics of program participants. Psychological variables that can affect program attendance and attrition include lack of motivation, stress levels, and self-confidence in the ability to lose weight. Other factors include age, BMI dietary restraint, depression, binge eating, and medical comorbidities (Grave, Suppini, Calugi, & Marchesini, 2006; Grossi et al., 2006). Methods to increase program participation should be explored further prior to program modification and further implementation.

Program modification to increase attendance should look at methods to include family involvement, as family obligations were seen as a reason for program dropout. Additionally, 50% of the program participants were married and 60% of participants had a household size that was greater than one. In future program implementation, strategies to improve attendance and encourage more male participants to attend would provide additional moral support. Family member involvement, including both spouses and children, has been seen as an effective method for increasing the effectiveness of weight loss interventions (McLean, Griffin, Toney, & Hardeman, 2003). If the program incorporates the needs of the family, including children, a multidisciplinary team approach should be utilized. Success with a multidisciplinary team

approach has been seen in the Brenner FIT program, which is a family-based pediatric weight loss program (Irby, Kaplan, Garner-Edwards, Kolbash, & Skelton, 2010). A multidisciplinary team for program development and implementation may include primary care providers, pediatricians, behavioral counselors, dietitians, exercise specialists, physical therapists, and social workers. Future research is needed to find successful family-based program interventions that would improve program utilization within rural communities. Additional feasibility or pilot testing would be needed to evaluate the modified family-based program curriculum.

Employment status may also impact program utilization and attendance. The largest percentage of program participants were retired or were not employed full-time, indicating that individuals whom work full-time were less likely to utilize the program. Furthermore, work obligations were reported as a reason for program dropout. It has been found that some workplace interventions can have health benefits for participants (Conn, Hafdahl, Cooper, Brown, & Lusk, 2009). In this study, only four program participants reported that their workplace offers programs focused on physical activity and healthy eating. This program could be easily adapted to workplace settings to encourage utilization.

Barriers to Program Attendance and Participation

Research by Bollin & Bellamy (2011), identifies transportation as a barrier to program utilization, which directly correlates to participant feedback on this program. However, the most frequent travel related issue that participants reported would affect their decision to continue the program was weather. Depending on the geographical location of the program, weather and climate may need to be considered during program planning and development. In some rural communities, snow may affect program participation. If the program is seasonal, programs may need to be held in the spring, summer, or fall to avoid snow, ice, and dangerous road conditions.

Although the findings in this study show that weather is a barrier to physical activity and is consistent with previous research (Chan & Ryan, 2009), there is currently a gap in the literature reflecting the true effects of weather on rural community-based programs and further research is indicated.

In an attempt to find sustainable interventions, it is important to address the needs of program participants and also community members. The most popular resources or services that participants were interested in using were monthly group meetings and support groups (Facebook/internet support group). A feasibility study by O'Brien et al. (2016), found that a free, readily available Internet program for the self-monitoring of weight loss was a feasible choice for a group of women living in a region with few resources. A majority of participants in this program reported that they have Internet access available to them, suggesting that an Internet support group may be a feasible option to incorporate in the program.

It was also found that most program participants attend church regularly and reported that they would attend programs held at their church. Although this program was implemented at the community building, churches may be an appropriate place for further program implementation. Previous research (Parker, Coles, Logan, & Davis, 2010), supports that churches are important community-based partners that can serve as the location for successful weight loss interventions.

Overall, most program participants reported that they already exercised prior to starting the program, and walking was the most frequently reported form of exercise. Additionally, the most frequently reported reason for not exercising, and an identified barrier to physical activity, was that participants had no one to exercise with. The results of this study indicate that most participants would prefer partner or group exercise options. Previous research also indicates that individuals have better success in weight loss reduction with the completion of group interventions

versus individual counseling sessions (Befort, Donnelly et al., 2010). From the results of this study and previous research, it can be concluded that group interventions and group exercise programs improve program feasibility and weight loss success.

Barriers to Physical Activity and Healthy Eating

An additional barrier to physical activity that was identified among program participants was safety concerns. Identified facilitators include outdoor resources, such as walking trails, the local park, and bike paths. Khan et al., (2009) identified in the Centers for Disease Control and Prevention community strategies guide, that improving access to outdoor recreational activities, such as parks, walking trails, and bike paths should be targeted to address obesity at the local or community level. Additionally, evidence-based physical activity and nutrition education weight loss programs in rural communities should help participants form walking groups or identify walking partners, promote the use of community resources, and should be individualized to adjust for resources available in each community to help encourage physical activity.

The barriers to healthy eating among program participants included limited food options and the high costs of healthy eating, which is consistent with the identified barriers in Rural Healthy People 2020 (Bolin & Bellamy, 2011). Only three program participants reported that they grocery shop within the community, and most participants travel more than 30 minutes due to limited grocery options. According to Bolin & Bellamy (2011), limited access to supermarkets that provide fresh produce is a barrier to healthy eating faced by rural communities. Food voucher programs have been found to be a successful method to improving fruit and vegetable consumption, and paired with nutrition education the effect is improved (An, 2013). To help offset the cost of healthy food items and increase fruit and vegetable consumption, program

coordinators should partner with federal and state programs that offer food vouchers to program participants to utilize concurrently with program enrollment.

A facilitator to healthy eating identified among program participants was having a garden at home, however this only improves access to healthy foods during a limited number of months in this rural community. Additionally, not everyone enrolled in the program had the ability to grow a garden to produce fresh produce due to space constraints. Participants reported that they would be more enabled to purchase and cook healthy foods if they had the money to spend, if a local farmers market was available, if they had time to do these activities, and if there were more grocery store options. Rural communities can utilize the Rural Health Information Hub's (RHIHub), Rural Hunger and Access to Healthy Food Guide (n.d.) and its resources to develop strategies to improve access to healthy food within the community. According to the Rural Hunger and Access to Healthy Food Guide , several recommended and successful approaches to address the issue of health food access include: special financing for food retailers through federal and state programs to bring more stores into rural communities; cooperative grocery store models where members can buy shares in the corporation; farmers markets; community supported agriculture programs that allow local residents to purchase part of a local farmer's crop at the beginning of the year; farm-to-school initiatives that help local farmers sell fresh fruits and vegetables directly to public schools or incorporate school gardens in meal programs; food pantries that distribute nutritious food to low-income families; and community education and outreach that is designed to assist low-income residents in learning about available food assistance programs, social services, and training related to home economics.

Satisfaction

Overall, the program was overwhelmingly well received, and participants were highly satisfied. A study by Yeary et al. (2011) showed that another program consisting of eight weekly small groups led by trained community members with an emphasis on healthy nutrition, physical activity, and faith's connection with health had high participant satisfaction. In terms of feasibility, satisfaction determines the acceptability of the program and helps determine areas that may need adaptation (Bowen et al., 2009). One area that program participants reported lower satisfaction scores was in response to the statement: "As a result of this program my ability to manage my weight has improved". Program adaptation should focus on incorporating more strategies for weight management to improve program satisfaction.

Program participants found the nutrition education session to be the most helpful aspect of the program. Additionally, program participants reported that the camaraderie in the program was helpful. Based on participant evaluation recommendations, program modification should incorporate a longer duration of a class; however, considering the results of this study and the study by Yeary et al. (2011), an increase in program duration may not necessarily have a significant impact on satisfaction, because an eight-week program can have high levels of satisfaction. Additional participant suggestions were the incorporation of exercise at each session, additional weight management strategies, and increased accountability for methods such as weekly weigh-ins were suggested. According to participant satisfaction, due to the camaraderie in the program and the results of the study by Befort, Donnelly et al. (2010), it was found that better success with group interventions and group sessions should be continued.

Cost

The actual cost of the program was relatively inexpensive at 368.48 dollars, which was used for purchasing supplies, handouts, and healthy food. Program cost analysis in terms of feasibility is useful to help determine program practicality and cost has been identified as a prominent barrier to participation in the rural community of interest. A previous study by Gorton et al. (2011) recommends that programs should be low-cost or free for individuals with low incomes to encourage participation. Rural communities should incorporate cost-effective methods of weight loss interventions. This program cost was contained because the labor provided was free, however, the true cost of the program was significantly higher when factoring in paid labor. Program coordinators should consider applying for a grant or assistance to carry out the program to provide at no cost to participants. Another solution is to partner with public health agencies for program funding.

Participant Changes with Program Completion

Participants who completed the program became more motivated to make life style changes. Completion of this program proved to be effective in promoting statistically significant changes in motivation or readiness to make a lifestyle change, improvements in dietary habits, and reductions in the participants' BMI. However, although the change in BMI is statistically significant, it is small and may not be as clinically meaningful to determine the effects of program completion strictly on participant changes in BMI.

The program included 8 weekly in-person sessions that included physical activity and nutrition education, a cooking demonstration with a registered dietician, demonstrations of sugar contents in drinks, weekly snacks with nutritional information, and the encouragement of recording calories consumed daily. The findings in this study are consistent with the previous

literature that supports the use of in-person group physical activity and nutrition education and reductions in BMI (Folta et al., 2009; Liu et al., 2015; Mayer-Davis et al., 2004; Miedema et al., 2015; Rowley et al., 2000; Yeary et al., 2011). Additionally, a previous study (Wang, Fetzer, Yang, & Wang, 2012) supports the use of self-monitoring weight loss diaries for BMI reductions. Participants were encouraged to track diet and exercise, but additional reductions in BMI may have been found if participants were provided with a weight loss diary.

Although program participants did have increases in their self-reported activity level at the completion of the program, these results were not statistically significant. This program encouraged weekly exercise, but it was not incorporated into the overall program curriculum. Additional research should be completed after the incorporation of weekly exercise or the formation of a walking group to see if self-reported exercise levels improve among program participants. Previous research supports group programs that include exercise interventions can result in weight loss (Ely et al., 2008; Mayer-Davis et al., 2004; Rowley et al., 2000), and greater weight loss may have been seen with the incorporation of exercise.

Limitations

Although the actual recruitment exceeded the goal for recruitment in this program, the sample size was still relatively small. The sample for this study was obtained by a volunteer sampling procedure in one rural community in Western MD with a population of 484, and recruitment was a limitation because I, the program coordinator, was the healthcare provider for many of the community members that were being targeted for program recruitment. Although this may have helped program recruitment, some participants may not have participated in the program and concurrent research because of privacy concerns. Additionally, the sample was predominately female and white. The lack of demographic diversity in the program may have skewed the results

of this study. Future programs and concurrent research should be aimed at including a more diverse population, and should be extended outside the geographical area of this program.

Self-reported data was used to collect data about participant demographics, dietary habits, physical activity, and motivation. The use of self-reported data increases the risk of measurement errors such as bias (Andrés et al., 2015). Another limitation was incomplete or missing data. Missing data can have a significant impact on the conclusions that are drawn from the study, decreasing the overall validity (Graham, 2009). The majority of data collected for this study was in the form of short answer questions due to time constraints, and many of the responses were not rich data. To obtain more rich data from program participants, a future recommendation is to conduct research using interviews or focus group methods.

Implications

The findings of this study contribute to current gaps in rural obesity and weight loss intervention research, policy and practice. This program and feasibility assessment is being utilized to help guide feasible rural weight loss interventions that address the prominent barriers of cost and transportation. Future research is needed to find successful family-based program interventions that would otherwise improve program utilization within rural communities.

Support of this program within the community and by the local health department will allow for continuation and modification of the program based on the data collected from participants. Rural health care providers can use this disseminated information to partner with communities and public health officials to help guide future rural obesity interventions. Further, the data collected in this program can help guide necessary health policy initiatives at the community level to improve physical activity and healthy eating. Rural communities should consider the implementation and upkeep of designated recreational areas that are easily accessible and safe to

promote increased physical activity. This should be a community priority as parks and walking trails were found to be top facilitators to physical activity, and safety was found to be a top barrier to physical activity. Communities should also focus on correcting the barriers of limited healthy food access with strategies such as the incorporation of farmers markets with the use of concurrent voucher programs.

Summary

This study focused on addressing the limitations of managing rural obesity by assessing the feasibility of implementing an evidence-based physical activity and nutrition education weight loss program in one rural community for overweight or obese individuals. The results have implications for future research, practice, and policy. The pilot program has been determined to be feasible, and program modifications and the implementation of a long-term intervention is suggested. This program can be easily adapted for implementation in other rural communities. Recommendation based results provide suggestions for improvements at the community level to promote physical activity and healthy eating. Future research is indicated and should be aimed at addressing the limitations discussed in this program. Despite the limitations, this study illustrated that a community, evidence-based physical activity and nutrition education weight loss program for overweight or obese individuals was feasible in a rural community and found that it can effectively address the barriers of cost and transportation.

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