

RUN FREE

A program to address the obesity epidemic in the homeless population of North Carolina's Triangle area

Proposed by Deborah Guthmann in completion
of Health and Wellness Curriculum
December 7, 2018

Evidence for proposed interventions

While mental health issues and malnutrition has been traditionally associated with homelessness, it is a surprising fact that obesity and obesity related diseases are highly prevalent in the same group. Research shows that obesity, diabetes, and hypertension are just as prevalent in homeless people as the general public, but individual and interpersonal factors lead to an especially vulnerable population.^{1,2} This chronic issue needs to be addressed with a health promotion program using physical activity, education about obesity and its health risks, and incorporation of health behavior models to improve outcomes.

Obesity is defined as a body mass index over 30 kg/m², indicating increased a risk of heart disease amongst other diseases. By definition, obesity necessitates weight loss as a component of its treatment, in addition to addressing associated health deficits such as diabetes, hypertension, and cardiovascular issues.¹ According to the American Heart Association, a loss of greater than 5% of body weight is correlated to reduction of cardiovascular risk.³ Physical activity as an isolated intervention encourages mild weight loss and improves cardiovascular function, glucose control, endothelial function, high density lipoproteins, and improves quality of life regardless of how many pounds are shed.⁴ This supports the use of aerobic physical activity to improve overall health.

There is also strong evidence that exercise prevents further weight gain and, when tied with dietary changes, results in significant weight loss.¹ Dosage is important for optimal health benefits and for the energy deficit required for weight loss. Persons who do not meet American College of Sports Medicine (ACSM) standards for weekly activity are three to four times more likely to gain weight and develop related health

deficits.⁴ The ACSM suggests 150-250 minutes per week of mod-vigorous activity, corresponding with a 1,500-2,000 calorie energy deficit for weight loss.¹ Other studies which analyzed walking and weight loss found that people who tracked greater than 10,000 steps had the greatest weight loss.⁵ Additionally, the longer the subjects maintained their activity, the greater the benefits of reduced BMI and blood pressure, indicating reduction of obesity and its related health issues.²

Research on physical activity's impact on weight loss and obesity reduction in the homeless population is sparse. One study analyzed a program that used educational material and physical activity promotion. The study found that using tailored education with a 10,000-step goal was effective in improving subjects' perception of health and quality of life.⁶ Researchers had difficulty with follow up but were able to extract enough data to find a moderate correlation between increased physical activity (measured through increase in steps) and subjects improved perception of health.

Additional evidence shows that group activity is superior to individual exercise for weight loss. A systematic review incorporated 47 trials of group exercisers and found that in six months, people who exercise and receive diet education as a cohort lose 7.7 lbs (CI 95% [6.2-9.3]) more than solo subjects.⁷ Additionally, isolation and lack of community support is common in the homeless population. A group-based intervention would address interpersonal determinants of behavior, providing social support and promotion of healthy behaviors.⁸

Yet physical activity is not the only component necessary for weight loss and obesity interventions. It needs to be accompanied by diet modifications for significant changes in BMI to occur.^{4,6} Weight gain occurs when the energy taken in (through

calories) is greater than the energy used.¹ Healthy weight loss necessitates not only a caloric restriction but also an intake of quality foods to support weight loss and optimal health. Information regarding nutrition and activity is best distributed through educational information. A study conducted in the general population found that when education on lifestyle modification was given every two weeks for six months, subjects had sufficient weight loss to reduce cardiovascular risk and BMI significantly.⁹ Specifically, 79% of the subjects had greater than a 5% reduction in body weight corresponding to improvements in cardiovascular health.¹¹

Educational interventions are used in the homeless population to improve health and reduce obesity. Health-e-Strides created online-based education which uses the transtheoretical model and culture tailoring to improve its outcomes.⁴ The material was tailored to individuals based on demographics, psychosocial measures, behaviors, and stage of change.⁶ Using outcome measures to identify the stage of change, administrators matched material to individual's stage. While this study was not of high quality due to lack of randomization or a consistent protocol, it is an interesting qualitative observation. 70.6% of all participants who responded found that the educational material helped them increase fruit and vegetable intake, improve their eating habits, find resources for healthy foods, and improve their quality of life.⁶ The tailored education assisted in changing obesity related behaviors. Informing persons about their weight status can also lead to weight reduction and improvement in health. When physicians talk to patients about obesity or risk thereof, patients are significantly more likely to report a 5% weight loss in the next year.¹⁰ Educating persons in

homelessness about their obesity status and ways to improve their health are vital interventions for health behavior change.

As mentioned previously, the transtheoretical model (TTM) is used for obesity in the general population as well as homeless populations.^{11,12} A systematic review looked at how the use of the model impacted weight loss, dietary habits, physical activity, and behavior changes, and the study found the model increased exercise duration, frequency, reduced intake of fat, and increased fruit and vegetable consumption.¹²

Measuring change is an important component of treatment. Utilizing such factors such as Health-Related Quality of Life, blood pressure, BMI and Stages of Change will help describe and identify changes within the homeless population as a result of interventions. Health Related Quality of Life Healthy Days is used in several studies aiming to reduce obesity in persons who are homeless.¹³ It has been used for decades by the Center of Disease Control, Medicare, and National Commission for Quality Assurance to identify health disparities, track trends, and work toward health behavior goals.¹⁴ The questionnaire determines how many days in the last thirty the subject felt their physical and mental health were less than good with a maximum score of 30. Healthy days are also calculated, subtracting unhealthy days from 30. The national average of healthy days is 24.7, therefore measurements of a subset of persons (such as homeless population in a city) would indicate deviations from the norm.¹⁴ This measure is a quantitative measure and while validity, reliability, and responsiveness are good to excellent, MCID and MCD are not beneficial as health is a complex concept and thresholds ignore the cost of producing a change.¹⁵ Assessors use this measure to identify overall trends. Blood Pressure is another relevant measure due to the

association of hypertension and obesity.^{1,9} Reduction in elevated BP is a sign of improved cardiovascular health and is correlated with improved physical fitness.^{9,15} BP of less than 120/80 mmHg is considered the optimal.³ There are different stages of hypertension, as defined by the American Heart Association, which can be used to track risk reduction.³ Also commonly used in obesity studies, body mass index (BMI) is an appropriate estimate for weight status definition. It is used in both the general and homeless populations.^{4,9} Weight divided by height (squared) is calculated to reveal a number that demarcates weight status. Obesity is defined as $>30 \text{ kg/m}^2$ while overweight is between $25\text{-}30 \text{ kg/m}^2$.⁴ Decreasing a high BMI indicates a reduction of obesity and related issues.⁴ As described previously, the TTM stages of change is beneficial for health behavior interventions. The Stages of Change for Exercise is an assessment which delineates readiness to engage in moderate exercise for 30 minutes per day, most days of the week.^{6,16} It has been used in numerous studies which have incorporated TTM to address health behaviors and found to be valid and precise.^{4,11} The measure consists of five questions used to determine stage. Each question correlates with a stage, directly asking about the respondents current practice and thoughts regarding exercise.¹⁶

Run Free Program Proposal

Run Free seeks to change how healthcare approaches the obesity epidemic in those who are homeless. Through a biweekly running group and educational session, individuals will be equipped to improve their health, independence and self-empowerment. For all who meet the criteria, Run Free seeks to provide individualized

support for obesity reduction, individualized education to promote behavior change, and a safe space for physical activity and peer support.

Specific program goals incorporate outcome measures which reflect a reduction in obesity as well as improvements in health and wellness. Goals using Body Mass Index (BMI) and attendance directly measure changes in behaviors regarding physical activity and obesity reduction. Because obesity is associated with poor quality of life, hypertension, and inactivity, improvement in blood pressure, healthy days, and attendance indirectly identifies change.

Program Goals:

- In 20 weeks, the participant will improve Health-Related Quality of Life Health Days to greater than 24.7 healthy days per 30-day period in order achieve national averages and improve overall quality of life.
- In 20 weeks, the participant will improve blood pressure to less than 120/80 mmHg indicating improved physical fitness and cardiovascular health.
- In 20 weeks, the participant will improve BMI to $<30 \text{ kg/m}^2$ or $>5\%$ of their baseline weight in order to have a reduced risk of cardiovascular incidence and improve weight by a clinically significant amount.
- In 20 weeks, the participant will reach the TTM maintenance stage indicating modifications have occurred in behaviors which improved obesity status and continue beyond the program.
- Over 10 weeks, the participant will attend 90% of the runs and education sessions in order to take new behaviors from the action stage to the maintenance stage.

Though these goals should be individualized and may not be appropriate for every person, they reflect the program's desire to see long-term improvements. While the program is ten weeks, the goals are created for a longer time frame, reflecting the slow and steady progress needed to bring about measurable change in obesity and health behaviors. Research suggests a 1500-2000 calorie deficit per week will result in a sustainable weight loss of half a pound per week.^{1,4} Therefore, it would take twenty weeks to see a ten pound change indicating significant weight loss. Five-percent decrease in baseline weight produces significant reduction of heart disease and associated obesity illnesses.¹⁰ Though it may vary significantly between participants, twenty weeks is the estimated time needed to see significant changes.

Program Description

Run Free will partner with an established triangle program, Raleigh Rescue Mission, whom provides housing and housing resources, addiction recovery programs, food, clothing, vocational training, education, and community support.¹⁷ The program will meet twice per week in the morning for an hour and a half. A running group will leave from the Raleigh Rescue Mission with options for one, three, and five-mile courses led by a volunteer or staff member. At the end of the run, group leaders will provide stretches and body-weight strengthening exercises. Once per week, the last half-hour will be an educational session incorporating topics of healthful living, obesity, nutrition, and benefits of physical activity. Classes will be held within a recreational room at the Mission. The program will run for ten weeks and those who complete two cycles (20 weeks) with 90% attendance will graduate and be able to apply for job training and potential part-time employment within the program. Initially the program will be run by a

full-time operations employee and a part-time managerial position whom are paid through individual donations, funding, and grants. They will be responsible for recruiting runners and volunteers, leading weekly education classes, taking all outcome measures, applying for grants and funding, and training volunteers for biweekly runs and exercises. A board of directors made up of volunteer business leaders, health care professionals, and community members will govern financial decisions and provide program evaluations. Volunteers recruited from nearby universities will assist in biweekly runs and education. Donated by local running stores, gently used and returned trainers will be provided to all runners who complete the first two weeks of the program.

Program Enrollment and Progression

Participants will be recruited directly from the Raleigh Mission's residents every ten weeks, corresponding to the initiation of a new education cycle. Outcome measures will be taken at baseline, ten-weeks, and 20-weeks. They will be taken by employees rather than volunteers to ensure consistency and accuracy of measurements. All outcomes will be documented electronically in order to be used for program evaluation and identification of subject's stage of change (Transtheoretical Model) for educational purposes.

Biweekly runs will meet at the Raleigh Rescue Mission and set routes will be introduced and learned by participants and volunteers. Stretches after the run will include instruction of proper form. Specific stretches and exercises are outlined in the table below with duration and intensity included.

Exercises	Frequency	Duration	Progression
Hamstring Stretch ¹⁸	2 x per week	2 x 45 seconds bilaterally	
Quadricep Stretch ¹⁸	2 x per week	2 x 45 seconds bilaterally	
Calf Stretch ¹⁸	2 x per week	2 x 45 seconds bilaterally	
Clock Lunges ¹⁸	2 x per week	8 repetitions each leg	Jumping lunges and monster walks
Single Leg Deadlifts ¹⁸	2 x per week	3 x 8 reps each leg	Single leg deadlift ċ resistance bands
Squats ¹⁸	2 x per week	3 x 8 reps	Jump squats

Once per week, education classes will provide participants with the tools and information needed to improve nutrition, reduce body weight, and maintain healthy habits. There will be ten, thirty-minute educational sessions which a participant will hear twice in twenty weeks (in duplicate) to emphasize material and ensure deep learning of concepts. Week one through three will define obesity, what it leads to, why it is an issue, and how to reduce it through calorie deficits of physical activity and changes in diet. The focus will be on why it is relevant to the participants who are in homelessness—its limiting illness initiating nature—which further disturbs function and can lead to secondary issues. Participants will be introduced to obesity-related diseases like diabetes, hypertension, heart disease, and chronic pain and provided with

information about screening, prevention, and rehabilitation.^{2,4,9} Weeks four through six will introduce the concept of calories and nutritious foods. Including discussion of types of food that are wholesome and why some are better than others, the classes will also guide participants to resources for finding nutritious foods and how to choose healthier foods which are easy to prepare and accessible in their area. Run Free will include information about “A Place at the Table,” The Table, Farm Church, and Open Table Ministries which provide organic, fresh foods at reduced or free costs to those in need in the Triangle. Weeks seven through ten will discuss the benefits of physical activity as well as what constitutes exercise for maximal health benefits. The education will follow suggestions put forth by the American College of Sports Medicine and American Heart Association.⁴

Subjects will be informed that greater than a 5% loss of body weight leads to a reduction of cardiovascular risk. Additionally, suggestions for weekly activity of 150-250 minutes per week of moderately vigorous activity leads to weight loss.⁴ To promote transition from early stages of change to later stages (Transtheoretical Model), individualized education material will be given to subjects based on their identified stage. Educational material will be modeled after stage-based, individualized workbooks created by Logue (2005) for promotion of physical activity and dietary changes.¹¹ For earlier stages, material will focus on introducing the benefits of physical activity and eating changes for weight loss and the detrimental effects of obesity.⁸ Addressing the individual determinants, the material will seek to eliminate the disadvantages of changing behavior while promoting the merits. Later stages of education will focus on

sustaining and maintaining healthy habits, providing tips for setting a fitness schedule, exercising with a group, and peer support for sticking to nutritional habits.

Evaluation

The program evaluation would help stakeholders determine if goals are reached effectively.¹⁹ The primary assessment will determine its impact on obesity through changes in participants' BMI. The evaluation will also identify the impact made on obesity-related conditions such as high blood pressure and poor quality of life. Other factors to be considered will be attendance and whether participants are effectively transitioning from early stages of change to later stages (transtheoretical model). A formal evaluation will take place after one year of operation, or five cycles of the ten-week program. The evaluation will be an "Outcome Assessment" to determine whether Run Free has brought about change in the homeless population. Careful baseline and post-ten- and twenty-week cycle measures will be taken. Performance indicators will be outcome measures used at baseline and completion of the program, specifically the mean BMI changes, mean BP changes, and average healthy days (health related quality of life). Secondary indicators will be transitions to later stages of change.

Firstly, the evaluation will engage stakeholders by taking into account which outcomes matter and what information is needed for them to stay engaged.²⁰ Because this program seeks to reduce obesity first and foremost, the evaluation will revolve around analyzing those goals. A detailed description will be given in the report, including an outline of the need, targeted population, activities in the program, outcomes, and resources as well as the relationship between activities and observed outcomes.²⁰

A controlled before-and-after study will be conducted, giving high-level evidence for change.¹⁹ It will observe the averages of the outcomes and compare it to the control group. The control group will be made up of non-participating users of the Raleigh Mission. A sample size of 72 people will be used for the control (95% CI +/- 10) and will be drawn at random from the homeless persons at the mission each year—293 persons.²⁰ Seventy-two people will have all outcome measures taken and compared to participants who have completed the twenty-week program. Appropriate statistical measures will be used to determine effect size and statistically significant changes between the control and program subjects. It is hypothesized that the program subjects will have significant reduction in BMI and improvement in obesity-related measures compared to non-treated control group. Interpretation of these findings and judgements will describe the merit, significance, and worth of this program, as well as its implications for health improvement in the homeless population.¹⁹ These results will then be disseminated to stakeholders: funders, volunteers, participants, Raleigh Rescue Mission, the board, and employees. This has the potential to increase the impact of the program and procure more support.¹⁹ The results of the evaluation can also be presented at public meetings, through social media, and local papers or publications.¹⁹

Conclusion

There are many programs in the Triangle area for homeless individuals. Housing, education, job training, free healthcare, and food kitchens provide various, needed resources. However, none specifically address obesity and therefore are not treating the whole person. Not only do people in homelessness spend more than \$54,000 per person a year in emergency room visits, but more than 80% visit healthcare providers

with preventable chronic diseases.¹² Of the most prevalent are cardiovascular disease, diabetes, and chronic pain, all of which are associated with obesity.⁶ Not only is it monetarily advantageous to reduce obesity through physical activity and weight loss in the homeless population, but it has the potential to bring about a greater quality of life.^{1,13} Reducing obesity in the homeless population as well as promoting physical activity and nutritional health will bring about changes with far-reaching, positive impacts on the community.

Run Free seeks to address individual and interpersonal determinants of health behavior, using the TTM stages of change as a method of identifying readiness to adopt and participate in healthier lifestyles. Providing screening for obesity, the program will educate participants on what leads to obesity, why it is detrimental, and how to change. The unique, social group addresses the interpersonal determinants, creating a positive space for peer support and normalization of healthy behaviors. Many studies have found that family units have similar BMIs because they adopt each other's attitudes, beliefs, and behaviors regarding health.³ Additionally, the biweekly workouts will facilitate weight loss and improve cardiovascular health, enabling the participants to engage fully in life with optimal health. Run Free is committed to improving our communities' health and wellness through addressing the obesity epidemic and its corresponding diseases in the homeless population of the Triangle.

References

1. Koh KA, Hoy JS, O'Connell JJ, Montgomery P. The hunger-obesity paradox: obesity in the homeless. *J Urban Health* 2012;89(6):952-964. doi:10.1007/s11524-012-9708-4.
2. Bernstein RS, Meurer LN, Plumb EJ, Jackson JL. Diabetes and hypertension prevalence in homeless adults in the United States: a systematic review and meta-analysis. *Am. J. Public Health* 2015;105(2):e46-60. doi:10.2105/AJPH.2014.302330.
3. The American Heart Association. What is high blood pressure? Available at: https://www.heart.org/-/media/data-import/downloadables/pe-abh-what-is-high-blood-pressure-ucm_300310.pdf. Accessed November 19, 2018.
4. Swift DL, Johannsen NM, Lavie CJ, Earnest CP, Church TS. The role of exercise and physical activity in weight loss and maintenance. *Prog Cardiovasc Dis* 2014;56(4):441-447. doi:10.1016/j.pcad.2013.09.012.
5. Richardson CR, Newton TL, Abraham JJ, Sen A, Jimbo M, Swartz AM. A meta-analysis of pedometer-based walking interventions and weight loss. *Ann Fam Med* 2008;6(1):69-77. doi:10.1370/afm.761.
6. Markus S, Allicock M, Businelle M, Yudkin J, Kendzor D. Targeting diet and physical activity: reaching homeless adults through customized interventions. *Diversity and Equality in Health Care* 2018;15(4):169-174.
7. NIHR Dissemination Centre. Group-based diet and exercise programmes can lead to weight loss.; 2018. doi:10.3310/signal-000607.
8. Schanzer B, Dominguez B, Shrout PE, Caton CLM. Homelessness, health status, and health care use. *Am. J. Public Health* 2007;97(3):464-469. doi:10.2105/AJPH.2005.076190.
9. Ostovan MA, Zibaenezhad MJ, Keshmiri H, Shekarforoush S. The impact of education on weight loss in overweight and obese adults. *Int. Cardiovasc. Res. J.* 2013;7(3):79-82.
10. Pool AC, Kraschnewski JL, Cover LA, et al. The impact of physician weight discussion on weight loss in US adults. *Obes. Res. Clin. Pract.* 2014;8(2):e131-9. doi:10.1016/j.orcp.2013.03.003.
11. Mastellos N, Gunn LH, Felix LM, Car J, Majeed A. Transtheoretical model stages of change for dietary and physical exercise modification in weight loss management for overweight and obese adults. *Cochrane Database Syst. Rev.* 2014;(2):CD008066. doi:10.1002/14651858.CD008066.pub3.
12. Kim CJ, Kim BT, Chae SM. Application of the transtheoretical model: exercise behavior in Korean adults with metabolic syndrome. *J Cardiovasc Nurs* 2010;25(4):323-331. doi:10.1097/JCN.0b013e3181c8a3e8.
13. Gregg MJ, Bedard A. Mission impossible? physical activity programming for individuals experiencing homelessness. *Res Q Exerc Sport* 2016;87(4):376-381. doi:10.1080/02701367.2016.1233314.
14. Centers for Disease Control and Prevention. Health related quality of life. *Measurement Properties* 2018. Available at: <https://www.cdc.gov/hrqol/measurement.htm>. Accessed November 19, 2018.

15. Hays RD, Woolley JM. The concept of clinically meaningful difference in health-related quality-of-life research. How meaningful is it? *Pharmacoeconomics* 2000;18(5):419-423. doi:10.2165/00019053-200018050-00001.
16. Sarkin JA, Johnson SS, Prochaska JO, Prochaska JM. Applying the transtheoretical model to regular moderate exercise in an overweight population: validation of a stages of change measure. *Prev. Med.* 2001;33(5):462-469. doi:10.1006/pmed.2001.0916.
17. Raleigh Rescue Mission. The need in raleigh. 2018. Available at: <https://www.raleighrescue.org/>. Accessed November 25, 2018.
18. Kisner C, Colby LA. *Therapeutic Exercise: Foundations and Techniques*. 4th ed. Philadelphia, PA: F. A. Davis Co., Publishers
19. Program Performance and Evaluation Office. CDC approach to evaluation. *Centers for Disease Control and Prevention* 2012. Available at: <https://www.cdc.gov/eval/approach/index.htm>. Accessed November 25, 2018.
20. Creative Research Systems. Sample size calculator. *The Survey System* 2018. Available at: <https://www.surveysystem.com/sscalc.htm>. Accessed November 25, 2018.