

NC AW-SOME: North Carolina's African American Women Stopping Obesity through Education and Movement

Background

North Carolina's African American Women Stopping Obesity through Education and Movement (NC AW-SOME) is an evidence-based, community program geared toward addressing obesity and its associated comorbidities in African American women living in the rural areas of North Carolina. Several studies have demonstrated that comprehensive health promotion programs targeting both education and physical activity promote more substantial weight loss in African American women than either intervention alone¹⁻⁵. This weight loss often results in improvements in many obesity-associated comorbidities and improvements in health-related quality of life¹⁻⁵. Therefore, the focus of this program is centered on the creation and distribution of educational materials, the establishment and promotion of group exercise programs, and the implementation community based support and counseling in an effort to promote increased physical activity and improved nutritional habits.

In order to reduce obesity in this population, NC AW-SOME will utilize a number of principles from two models of behavior change. The first, the socioecological model (SEM), has been shown to effectively reduce obesity in African American women when implemented into a health promotion program⁶. This model stresses the importance of addressing the multitude of factors, spanning from the individual to larger society, that contribute to a given behavior⁷. Though NC AW-SOME may lack the scope to address factors at the level of national policy and sociocultural norms, the program can address factors at the intrapersonal and interpersonal level. At the level of the individual,

behavior is influenced by one's knowledge, beliefs, and attitude about health^{6,7}.

Interaction in social and family groups, community conditions and accessibility of resources also has tremendous influence on health behavior^{6,7}. Fluery and Lee found that, in addition to a number of other factors, a lack of health education, limited motivation due to perceived "laziness", and difficulty accessing safe spaces for exercise significantly reduces the likelihood that African American women will engage in regular activity⁶. To maximize its effectiveness, NC AW-SOME will target these factors by existing in multiple, easily accessible locations, focusing on providing targeted and salient educational material, and establishing group fitness activities and educational sessions.

A 2007 study featuring African American focus groups found that capitalizing on community pride and group socialization were two of the most effective means by which to promote behavior change¹. In a randomized controlled trial, researchers found that African American women participating in group education and exercise lost significantly more weight and had better adherence to the program than those receiving counseling alone². Several additional studies investigating weight loss in this population have found success utilizing such an approach³⁻⁵. A number of health promotion programs for African American women living in rural areas have also found success in utilizing faith-based approaches to intervention⁸⁻¹⁰. Religious establishments are often vital resources in rural areas, providing the sense of community and belonging that so many individuals seek⁸⁻¹⁰. Research suggests that health related materials interwoven with faith-based messages are more salient to participants, increasing adherence to the program⁸⁻¹⁰. That being said, it is important to remember that not everyone finds faith to

be a motivational tool or an important aspect of life. As such, NC AW-SOME will offer both faith and non faith-based program formats.

The transtheoretical model (TTM) will be integrated into NC AW-SOME to progress participants through behavior change. A central tenant of the TTM is that each individual possesses a certain motivational readiness to alter a given behavior^{11,12}. It is this level of motivational readiness that not only provides vital insight into how to best tailor a program for an individual's success, but also influences how someone will respond to that program^{11,12}. A study based on the framework of this model demonstrated significant improvements in weight, nutritional intake, and physical activity over a 24-week period in 58 obese females, suggesting that the TTM can effectively produce behavior change in the NC AW-SOME's target population¹². With the goal of progressing participants to the action or maintenance phase of physical activity and improved nutritional intake, all components of NC AW-SOME will be tailored match an individual participant's level of motivational readiness.

As previously stated, NC AW-SOME will work to improve participants' knowledge and beliefs about nutrition and exercise through the creation and distribution of culturally sensitive and targeted materials. Research suggests such material is most effective when it is relevant to the targeted population⁵; therefore, it is important that the educational materials provided by NC AW-SOME feature appropriate visual depictions (such as African American women) and language consistent with participants' level of education. Education on nutrition and physical activity must be consistent with the resources, habits, and values of the area if it is to be effective⁵. Focusing on healthy

alternatives to popular food items and restaurant choices has been shown to improve dietary habits in those living in rural areas where access to nutritious food is limited⁵. NC AW-SOME will also utilize a multidisciplinary approach through the implementation of group discussion and peer counseling. Regular access to a nutritionist and a peer counselor has been shown to successfully promote weight loss in African American women⁴. A randomized controlled trial of 200 African American women living in North Carolina found that those receiving a physical activity intervention in addition to regular group and individual counseling from peers and a nutritionist lost significantly more weight than those receiving usual clinic care⁴. These participants reported the contact with their nutritionist and peer counselor was beneficial in maintaining motivation and providing strategies to overcome obstacles⁴.

The physical activity component of NC AW-SOME will focus on achieving moderate intensity exercise. To increase salience and participation, the exercise portion of this program will be provided in a group format but be customizable to the capabilities and interests of the individual^{4,5}. Participants will engage in a warm up, moderate intensity aerobic activity, and a cool down during each exercise session, as this format has been shown to successfully promote weight loss^{4,5}. Possible options for the aerobic portion of the class include walking on treadmills, using stationary bikes or ellipticals, or participating in group dance^{4,5}. Both group dance and walking interventions have been shown to successfully promote weight loss in African American females^{13,14}. In a study comparing low intensity aerobic dance and walking for weight loss, researchers found that both interventions led to significant reductions in body mass and percentage of body fat in middle aged obese females¹⁴. As with diet and nutrition, participants should

be encouraged to monitor their own physical activity habits using logs and diaries, as doing so has shown to greatly increase participation and promote long-term changes in physical activity^{4,5,13,14}.

With any health promotion program, monitoring participant outcomes is essential. Research demonstrates that using food diaries and frequency questionnaires is a reliable and valid way to monitor nutritional intake and has been shown to promote weight loss in African American women^{4,5}. Likewise, tracking physical activity in a diary format can serve to increase engagement and agency in program participants^{4,5}. Physical activity logs, however, have been shown to be less reliable than food diaries and should be supplemented with some form of electronic tracking though the use of an accelerometer or pedometer⁴. The General Nutrition Knowledge Questionnaire has been used extensively to measure knowledge gains and is valid, reliable, and sensitive to change in a number of populations¹⁵. Monitoring body mass index and waist circumference, measurements often used to classify the severity of obesity, is common practice for many health promotion programs targeting weight loss^{2-5, 9, 10,13 14}. Waist circumference is generally accepted as a more valid measure of obesity than body mass index, but is less reliable when someone does not have truncal obesity¹⁶. Utilizing these measures will provide program staff with insight into the program's effectiveness while encouraging participants to play an active role in the monitoring of their own health behaviors.

Program Goals:

As previously stated, the mission of NC AW-SOME is to promote weight loss in African American women living in rural North Carolina. To achieve this mission, the

program has established a number of goals to be achieved at various points in the program. These goals pertain not only to participant outcomes, but also to the program's ability to target and recruit participants. They include:

1. 6 weeks after starting with NC AW-SOME, 80% of participants will engage in moderate level physical activity for a minimum of 60 minutes per day 3 days each week including time spent at NC AW-SOME sessions as monitored through logs, diaries, and questionnaires.
2. 8 weeks into the program, 80% of participants will demonstrate consistent compliance with food and activity tracking via a diary or log, where "consistent" is defined as at least five days/week. Tracking can be done by hand or electronically depending on the participant.
3. 12 weeks into the program, 80% of participants will demonstrate adherence to their established dietary program as measured by food logs or diaries at a minimum of five days/s week.
4. 16 weeks into the program, 80% of participants will demonstrate a minimum score improvement of 2 points on the General Nutrition Knowledge Questionnaire compared to baseline scores⁵. This improvement will be maintained at 6 and 12 months.
5. At 24 weeks, 80% of participants will demonstrate at least one of the following:
 - a. At minimum, a 5% reduction in body weight from baseline¹⁷.
 - b. At minimum, a 6kg/m² reduction in body mass index from baseline¹⁸.
 - c. At minimum, a 10cm reduction in waist circumference from baseline¹⁸.

6. At 24 weeks, 80% of participants will have progressed to the action or maintenance stage of the transtheoretical model of behavior change as determined by standard questionnaire and participant interview¹¹.

Program Methods:

In order for NC AW-SOME to effectively improve obesity in the communities in which it operates, it is imperative that every aspect of the program, from those leading it to the educational sessions and materials, be both relevant and meaningful for participants^{1,3}. As such, the first step in this program's success will be to establish focus groups in order to determine the values of potential participants and gain a better understanding of the area's resources. Focus groups have proven successful at establishing meaningful content in the past, and NC AW-SOME will utilize this format to establish a culturally relevant program^{1,2}. It is suggested that the most successful health promotion programs utilize staff that is similar to participants in some way²⁻⁴; NC AW-SOME will utilize such findings to its advantage by training women in the community to run portions of the program and implementing a peer counseling option. Consistent with previous studies, peer support will be available outside of program meeting times to offer encouragement when it is most needed.

Research has shown that intertwining health with faith-based messages serves can increase the saliency of material and improve health related outcomes for African American women⁸⁻¹⁰. NC AW-SOME will work to establish partnerships with at least two faith-based communities in each area it operates in order to not only establish a meaningful program, but recruit participants into the program. Faith-based organizations

often play vital roles in rural communities and provide an already established support structure that NC AW-SOME can utilize to its advantage⁸⁻¹⁰. If acceptable, the program can be promoted during church services and events verbally and through church bulletins.

In addition to being recruited and enrolled through faith-based communities, NC AW-SOME will utilize local medical providers and media outlets to advertise its mission. Participants can come to NC AW-SOME with or without referral from a medical professional as long as they are medically cleared to engage in moderate intensity exercise and have a body mass index of 30.0kg/m^2 or higher^{4,5}.

Upon entering NC AW-SOME, participants will have their body mass index and waist circumference measured using a standardized procedure. General health data will be collected via a standard form. Participants will fill out the General Nutrition Knowledge Questionnaire and physical activity frequency questionnaires. They will be provided with blank food and physical activity diaries to use for the first week of the program. At the end of the first week, participants will meet with a nutritionist and physical therapist to evaluate their habits and establish an individualized plan for moving forward while considering any medical concerns or comorbidities that may impact response to the intervention. These measures will be reassessed at one, three, six, and twelve months. Participants will be encouraged to keep track of their diet and exercise habits on a daily basis.

This program will be modeled after programs established by Agurs-Collins et al. and Keyserling et al. given the success noted by analysis of results^{4,5}. As previously

described, NC AW-SOME will feature educational and physical activity components that are to be delivered in a group format as well as a peer support program for participants.

By existing in multiple, accessible locations, utilizing a group format, and establishing a peer support program NC AW-SOME will address many of the intrapersonal and interpersonal aspects of the socioecological model (SEM)^{6,7}. The educational aspects of this program will also improve patient knowledge and motivation, which are intrapersonal components of the SEM^{6,7}. In an effort to maximize participant success, the educational materials and nutrition plans that participants receive will be adapted to reflect their specific stage of change as proposed by the transtheoretical model of behavior change (TTM)^{11,12}. As participants progress through the program, their educational materials and nutrition plans will be adapted accordingly^{11,12}.

Because the goals of NC AW-SOME are centered on long-term behavior changes, the program will meet for a one-year period. Participants will meet weekly for the first three months of the program and progress to biweekly meetings for the remaining nine months. Each meeting will last for 90-120 minutes to allow adequate time for discussion. It is the goal of NC AW-SOME to ensure that peer support is available outside of group meetings for the duration of the program^{4,5}.

Each group session will be held in a gymnasium or recreational type facility and feature a 30-60 minute educational session on topics related to nutrition and physical activity. If a recreational facility is not a feasible option, an open area meeting space will be sufficient and the physical activity portion can be adapted accordingly. To foster a stronger sense of community and support, groups will be no larger than 15 participants^{4,5}. During this time, participants will be encouraged to share their own perceptions of

health and wellness and discuss strategies to overcome obstacles. This portion of the group session will provide the opportunity to review food and physical activity logs and identify barriers to change. A licensed nutritionist will lead discussions on nutrition and be available for individual counseling once a month⁵. Session leaders will be provided with a list of suggested topics for discussion, but it is important that participants have some say in what is discussed.

The physical activity component of NC AW-SOME will feature 60 minutes of aerobic activity, including a warm up and cool down period⁵. To increase participant agency, it is important that multiple modes of exercise be available including machines such as treadmills, stationary bicycles, rowing machines, and ellipticals⁵. Participants will be instructed on proper use of such equipment to minimize the occurrence of injury or adverse events. As dance has been shown to improve weight loss in African American women, participants will also have the option to engage in group dance for a portion of the session^{13,14}. If exercise equipment is not available, then walking, jogging, or dance can serve as the primary aerobic activities. Participants will be instructed on how to monitor their own vital signs (pulse, respiration, etc.) during exercise in an effort to increase participant agency even further⁵. All activity will be closely monitored by the supervising physical therapist.

After one year, participants will be reassessed. Waist circumference and body mass index will be measured to quantify weight loss. Food frequency questionnaires will provide insight into how the program has impacted nutritional quality (such as reductions in fried food intake or increases in fruit and vegetable intake), while physical

activity questionnaires will provide insight into whether or not the program resulted in increased activity outside of program meetings.

Program Evaluation

As previously mentioned, participant outcomes will be assessed at baseline and again at one, three, six, and twelve months. These will be obtained and recorded by program staff in an electronic database; data from the three, six, and twelve-month time points will be used for statistical analysis of patient progress. Because participant satisfaction is important to program success, this will also be assessed at three, six, and twelve months. Participant responses will be kept anonymous to preserve the integrity of input and participants will be provided with multiple opportunities to make suggestions on how the program could be improved. Outcome measures to be assessed include weight, waist circumference, body mass index, physical activity levels, and nutritional quality/dietary habits.

According to the National Institute of Health (NIH), waist circumference should be measured at the top of the iliac crest¹⁹. This contradicts the protocol established by the World Health Organization, but it is believed this is a more accurate measurement than when it is taken at the level of the umbilicus¹⁹. To maximize the accuracy of the measurement, stretch resistant tape should be applied to the skin so that it is taut but does not squeeze or constrict the tissue¹⁹. During the measurement process, the participant should stand with their weight equally distributed through both extremities and the measurement be taken after the participant has exhaled¹⁹.

The General Nutrition Knowledge Questionnaire was first established in the 1990's and was recently updated by a group of researchers in the United Kingdom¹⁵. Their 88-item questionnaire is divided into four sections and covers a wide range of nutrition topics including portion sizes and recommended daily servings¹⁵. The updated version of the General Nutrition Knowledge Questionnaire has been shown to have good reliability, construct validity, convergent validity, and construct validity when compared to the original measure¹⁵. Because this measure is sensitive to change, it is an excellent measure for quantifying changes in knowledge over time¹⁵.

Although not ideal measures of physical activity, physical activity frequency questionnaires offer a cost effective way to quantify changes in physical activity. NC AW-SOME will also utilize food and physical activity diaries as a means to not only track participation, but to encourage participants to play an active role in their health and wellness decisions. Though self-report measures do introduce the possibility of recall bias influencing results, these tools can go a long way in monitoring how knowledge and skills gained in program sessions translates to life in the community.

As this program is based on the transtheoretical model (TTM) of behavior change, it will be important to assess how participants are progressing through the stages of behavior change proposed by the model^{11,12}. At three, six, and 12 months, each participant's stage of change will be examined via a standard questionnaire and participant interview. Utilizing these methods of assessment have been shown to be reliable and valid reflections of behavior change^{11,12}.

The process of evaluating NC AW-SOME's impact on the community extends beyond the analysis of participant outcomes and satisfaction. Program evaluation

involves many key stakeholders that must be engaged throughout the process²⁰. For NC AW-SOME, this includes not only participants and their families, but also includes program staff, the owners of the facilities NC AW-SOME uses for its sessions, the religious organizations and media outlets that promote the program, and any community or government based supporters who help to fund or run the program in any way. For NC AW-SOME to be successful, the perspectives and goals of these stakeholders must be recognized and met²⁰. Their satisfaction with NC AW-SOME's progress should be assessed at multiple time points, ideally at 6 and 12 months, to make necessary changes in the program. NC AW-SOME's stakeholders should have the opportunity to have their opinions and visions for the program heard, while recognizing that it may be impossible to please everyone²⁰.

NC AW-SOME will work to maintain timely communication with necessary stakeholders providing them with a thorough description of the program, its methods, and its goals²⁰. It is imperative that the stakeholders have a clear understanding of the needs that the program aims to meet, how those needs are to be met, and what the expected outcomes are²⁰. Analysis of the outcome measures described above will generate the necessary data needed to evaluate program performance and effectiveness²⁰. Because behavior change does not happen overnight, it is important that stakeholders recognize that it may take time to see positive results. NC AW-SOME leadership will meet with stakeholders to discuss any needs and concerns that are not being met. Insights gained through the evaluation process and stakeholder feedback will be implemented to improve NC AW-SOME as it moves forward for all involved.

Conclusion

It's no great secret that obesity has become a significant problem in the United States. As of 2016, 40.1% of obese individuals in North Carolina were African American and more than half of these individuals are female, making this population the most obese in the state²¹. In North Carolina, African American women are more likely to die from cardiovascular disease and stroke, develop type 2 diabetes, and be diagnosed with hypertension and renal disease secondary to obesity than women of other ethnic groups^{22,23}. Obesity also has a significant economic impact as well; in 2008, it was estimated that the state of North Carolina spent 57.36 billion dollars on costs associated with obesity and its comorbidities²³. Something must be done to address this significant health concern and its widespread impact.

In working with this population of women, NC AW-SOME aims to not only better health outcomes through improved nutrition and physical activity, but reduce the economic burden that obesity places on the state of North Carolina through lowering healthcare costs. NC AW-SOME is structured on the socioecological and transtheoretical models of behavior change and will utilize peer support and discussion coupled with individualized educational materials and physical activity interventions to improve the health, wellness, and quality of life of participants. A number of outcome measures, including waist circumference and physical activity frequency questionnaires, will provide valuable insight into the programs success. It is the hope that participants will take the skills they learn in the program out into the larger community to positively impact those around them as they advocate for improved access to higher quality food and opportunities for increased physical activity.

References:

1. Parham GP, Scarinci IC. Strategies for achieving healthy energy balance among African Americans in the Mississippi Delta. *Prev Chronic Dis* 2007;4(4). Accessed 16 November 2017.
2. Agyemang P, Powell-Wiley TM. Obesity and Black Women: Special Considerations Related to Genesis and Therapeutic Approaches. *Current Cardiovascular Risk Reports*. 2013;7(5):378-386. doi:10.1007/s12170-013-0328-7. Accessed 16 November 2017.
3. Scarinci IC, Moore A, Wynn-Wallace T, Cherrington A, Fouad M, Li Y. A community-based, culturally relevant intervention to promote [healthy eating](#) and physical activity among middle-aged African American women in rural Alabama: Findings from a group randomized controlled trial. *Preventive Medicine*. 2014;69:13-20. doi:10.1016/j.ypmed.2014.08.016. Accessed 16 November 2017.
4. Keyserling TC, Samuel-Hodge CD, Ammerman AS, et al. A Randomized Trial of an Intervention to Improve Self-Care Behaviors of African-American Women With Type 2 Diabetes: Impact on physical activity. *Diabetes Care*. 2002;25(9):1576-1583. doi:10.2337/diacare.25.9.1576. Accessed 16 November 2017.
5. Agurs-Collins TD, Kumanyika SK, Have TRT, Adams-Campbell LL. A Randomized Controlled Trial of Weight Reduction and Exercise for [Diabetes Management](#) in Older African-American Subjects. *Diabetes Care*. 1997;20(10):1503-1511. doi:10.2337/diacare.20.10.1503. Accessed 16 October 2017.
6. Fleury J, Lee SM. The Social Ecological Model and Physical Activity in African American Women. *American Journal of Community Psychology*. 2006;37(1-2):141-154. doi:10.1007/s10464-005-9002-7. Accessed 16 November 2017.
7. Sallis JF, Owen N. Ecological Models of Health Behavior. In: Glanz K, Rimer, B, and Viswanath K. *Health Behavior: Theory, Research, and Practice*. 5th ed. Jossey-Bass; 2015:43-64. Accessed 16 November 2017.
8. Prohaska TR, Peters K, Warren JS. Sources of Attrition in a Church-Based Exercise Program for Older African-Americans. *American Journal of Health Promotion*. 2000;14(6):380-385. doi:10.4278/0890-1171-14.6.380. Accessed 16 November 2017.
9. Yearly KH, Cornell CE, Turner J, Moore P, Bursac Z, Prewitt TE, West DS. Feasibility of an evidence-based weight loss intervention for a faith-based, rural, African American population. *Prev Chronic Dis* 2011;8(6):A##. http://www.cdc.gov/pcd/issues/2011/nov/10_0194.htm. Accessed 16 November 2017.
10. Campbell MK, Motsinger BM, Ingram A, et al. The North Carolina Black Churches United for Better Health Project: Intervention and Process Evaluation. *Health Education & Behavior*. 2000;27(2):241-253. doi:10.1177/109019810002700210. Accessed 16 November 2017.
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 of*

- Systematic Reviews*. May 2014. doi:10.1002/14651858.cd008066.pub3. Accessed 16 November 2017.
12. Dallow CB, Anderson J. Using Self-Efficacy and a Transtheoretical Model to Develop a Physical Activity Intervention for Obese Women. *American Journal of Health Promotion*. 2003;17(6):373-381. doi:10.4278/0890-1171-17.6.373. Accessed 16 November 2017.
 13. Murrock CJ, Higgins PA, Killion C. Dance and Peer Support to Improve Diabetes Outcomes in African American Women. *The Diabetes Educator*. 2009;35(6):995-1003. doi:10.1177/0145721709343322. Accessed 16 November 2017.
 14. Shimamoto H, Adachi Y, Takahashi M, Tanaka K. Low Impact Aerobic Dance as a Useful Exercise Mode for Reducing Body Mass in Mildly Obese Middle-Aged Women. *APPLIED HUMAN SCIENCE Journal of Physiological Anthropology*. 1998;17(3):109-114. doi:10.2114/jpa.17.109. Accessed 16 November 2017.
 15. Kliemann N, Wardle J, Johnson F, Croker H. Reliability and validity of a revised version of the General Nutrition Knowledge Questionnaire. *European Journal of Clinical Nutrition*. 2016;70(10):1174-1180. doi:10.1038/ejcn.2016.87. Accessed 16 November 2017.
 16. O'Neill D. Measuring obesity in the absence of a gold standard. *Economics & Human Biology*. 2015;17:116-128. doi:10.1016/j.ehb.2015.02.002. Accessed 16 November 2017.
 17. Williamson DA, Bray GA, Ryan DH. Is 5% weight loss a satisfactory criterion to define clinically significant weight loss? *Obesity*. 2015;23(12):2319-2320. doi:10.1002/oby.21358. Accessed 3 December 2017.
 18. Rothberg AE, McEwen LN, Kraftson AT, et al. Impact of weight loss on waist circumference and the components of the metabolic syndrome. *BMJ Open Diabetes Research and Care*. 2017; 5:1-6 doi:10.1136/bmjdr-2016-000341. Accessed 3 December 2017.
 19. WHO (2008) Waist circumference and Waist-Hip Ratio: Report of a WHO Expert Consultation. Geneva, 8–11 December 2008. - Open Access Library. <http://www.oalib.com/references/11705327>. Accessed 3 December 2017.
 20. Centers for Disease Control and Prevention. Framework for program evaluation in public health. *MMWR* 1999;48(No.RR-11):1-42. Accessed 3 December 2017.
 21. State Center for Health Statistics. *North Carolina Resident Population Health Data by Race and Ethnicity 2011-2015*; 2017. Retrieved from: <http://www.schs.state.nc.us/data/minority.cfm>. Accessed 3 December 2017.
 22. Agyemang P, Powell-Wiley TM. Obesity and Black Women: Special Considerations Related to Genesis and Therapeutic Approaches. *Current Cardiovascular Risk Reports*. 2013;7(5):378-386. doi:10.1007/s12170-013-0328-7. Accessed 3 December 2017.
 23. *The Burden of Obesity in North Carolina*. North Carolina Department of Health and Human Services, Division of Public Health; 2009:21-77. Accessed 3 December 2017.