

Research

Step N2 Life- A Pilot Investigation on the Benefits of Community-Developed Intervention to Reduce Hypertension in Mississippi

Bettye Tyler, MS¹
 Mangle Shanks, PhD^{2,3}
 Sandra Hill, BS³
 Ruby Gray, BSW, LSW
 Clifton Addison, PhD^{4,5}
 Brenda W. Campbell Jenkins, MPH, PhD^{4,5}
 Adrienne Clark MPH⁴
 Marty Fortenberry, MSW⁴
 Darcel Odom⁴
 Donna Antoine-LaVigne, PhD^{4,5}

¹Marvellous Works, Inc

²Sheets, Inc.,

³Community Health Advisory Network, Jackson Heart Study

⁴Jackson State University, Graduate Training and Education Center, Jackson Heart Study

⁵Center of Excellence in Minority Health and Health Disparities

Abstract

Step N2 Life is a health promotion/intervention program developed by a group of four local community members trained as Community Research Fellows to become partners with academic institutions to address research barriers and to empower minority communities to become a part of the research process. The goal of Step N2 Life is to assist women in the Virden Addition and Bailey Avenue communities surrounding the Jackson Medical Mall in reducing the prevalence of hypertension and to promote healthy lifestyle changes and to build protective safeguards to deter hypertension in the target population. African American women were recruited for this pilot study that utilized a pre-assessment and post-assessment. The paired t-test statistic was used. Participants were exposed to the “Step N2 Life” Intervention that included instruction, mentoring, community education about the importance of risk factor prevention, focusing on the major three modifiable lifestyle risk factors: tobacco use, unhealthy diet, and sedentary lifestyle. Knowledge of the participants increased significantly from the pre-assessment to the post-assessment in their understanding of the healthiest type of fat; symptoms of high cholesterol; organs affected when blood pressure is not controlled; risk factors for hypertension. Results

indicate that interventions, like Step N2 Life, developed and managed by community groups have benefits. They facilitate the development of health policy and the health research agenda can be successful if formulated with strong, active community input. Findings provided here can drive future research using larger samples and multiple communities with comparison groups that may highlight the importance of community-based groups in leading efforts to reduce the impact of cardiovascular disease in African American communities.

Introduction

In 1997, Cooper and Rotimi reported that the excess prevalence of hypertension among African Americans had been recognized as a major health disparity for decades and contributed to much of the negative health outcomes occurring in African American communities. In 2013, Go et al. (2013) reported no change in those statistics. According to their study, in the U.S., 41% of African Americans have high blood pressure, compared to 27% of whites. Compared with Caucasians, African Americans develop high blood pressure (BP) earlier in life, with much higher average BP and a 1.3-times greater rate of nonfatal stroke, a 1.8-times greater rate of fatal stroke, a 1.5-times greater rate of CVD mortality, and a 4.2-times greater rate of end-stage renal disease (ESRD). The World Health Organization (WHO) reported that cardiovascular disease was responsible for one-third of global deaths and is a major contributor to the global burden of disease (WHO, 2009; Lloyd-Jones et al., 2010). Hypertension is one of the major factors contributing to cardiovascular disease and is a major health concern worldwide.

The occurrence of high BP in African Americans could be due to genetic factors, environmental factors, and behavioral factors. Genetic influences result from the fact that people of African descent experience high rates of high BP. Other researchers believe that there is a relationship between genes, environment, job-related stress, racism, and other psychosocial factors and racial/ethnic disparities in the prevalence of hypertension (Redmond, Baer, & Hicks, 2011). Scientists believe that high blood pressure in African-Americans can be attributed to risk factors to which they are exposed in the environment.

African Americans in the United States respond differently to high BP drugs compared to other groups of people, and they are also believed to be more sensitive to salt, which increases the risk of developing high BP. In addition, some experts have concluded that social and economic factors, including discrimination and economic inequality are responsible for this difference.

It is generally accepted that high BP is preventable and can be attributed directly to lifestyle habits like inadequate dietary practices, sedentary lifestyle, and tobacco use (Sahli et al., 2016). African Americans in Mississippi have a hypertension and CVD prevalence that is among the highest in the world and is steadily increasing (Harmon et al., 2013). In the current study, the authors sought to determine whether receipt of and adherence to health behavior advice for hypertension control could result in an increase in knowledge and awareness and subsequent behavior change that would reduce the chances of developing hypertension, or controlling its effects.

The authors intended to assist women living in the Jackson Medical Mall area to adopt healthy lifestyle changes and build protective factors to deter hypertension and related risk factors. The Jackson Medical Mall Thad Cochran Center is a vibrant facility located on 53 acres at 350 West Woodrow Wilson Drive in Jackson, Mississippi, flanked on the east and west side by interstates 55 and 220, and on the north and south by Northside Drive and Woodrow Wilson Drive. In 1995, Dr. Aaron Shirley developed a plan to convert Mississippi's first retail mall into an up-to-date ambulatory health care facility, providing quality health care for the urban poor of Jackson, Mississippi. The Jackson Medical Mall (JMM) was redesigned into a modern medical complex, providing medical care and human services to those who are economically disadvantaged. Dr. Shirley teamed up with the University of Mississippi Medical Center, Tougaloo College and Jackson State University to develop and expand educational opportunities at the facility, including quality medical treatment and health and wellness education. Major tenants of the JMM are the University of Mississippi Medical Center primary and specialty clinics, Jackson State University's School of Public Health, Jackson Heart Study, and Mississippi State Department of Health clinics. The JMM is also home to other non-profit, human and health service, and retail providers. In addition to these services, the JMM offers three spaces for public and private events. The Community Meeting Room, Common Area, and Center Stage are available to accommodate neighborhood, business, and civic organizations in their outreach efforts in communities around the Metro-Jackson area. The Community Meeting Room at the JMM was selected as the location for the Step N2 Life intervention activities serving the Virden Addition and Bailey Avenue communities surrounding the Jackson Medical Mall.

Implementing interventions have proven to be effective strategies for health promotion and reducing the prevalence of cardiovascular disease. Little is known about interventions developed by community members and the impact they have on reducing health disparities. It was hypothesized that exposure to Step N2 Life, a structured intervention/prevention program, would result in improvements in knowledge and behaviors that could facilitate reduction in health risks.

Methods

In 2015, the Mississippi State Department of Health launched the first cohort of the Mississippi Community Research Fellows Training (CRFT) Program. This was a sixteen week training program that trained community members to become partners with academic institutions and public health professionals to address research barriers in minority communities and to empower minority communities to become involved in the research process. After graduating from the CRFT, community members, affiliated with the Jackson Heart Study Community (JHS) Outreach Center (CORC), implemented Step N2 Life as a health promotion research project.

Step N2 Life was initiated as a quasi-experimental study that sought to test the impact of a behavioral intervention for community members interested in BP control. The goal of Step N2 Life was to assist women in the study area in reducing the prevalence of hypertension and related risk factors. The overall objective was to promote healthy lifestyle changes and to build protective safeguards to deter hypertension in the target population. This study utilized a pre-assessment and post-assessment that were administered to participants who resided in the neighborhood surrounding the location of the Jackson Heart Study in Jackson, Mississippi.

Participants

A total of 25 African American women who resided in the communities surrounding the Jackson Medical Mall, a residential neighborhood that surrounded the official site of the Jackson Heart Study, participated in this study. The final study sample used for analysis purposes included 12 women because all twenty who had completed the pre-assessment were not present on the day the post-assessment was held due to other scheduling conflicts. The community residents agreed to participate in the study to test the practical interventions for improving hypertension control that we believed can be broadly implemented and can reduce high blood pressure and CVD risk.

Almost all of the participants were African Americans; all of them had a high school education and above; 25.0% of them had graduate school experience. Half of the participants were 60 years old and one-third of them was retired (see Table 1).

Table 1

Characteristics of Study Group

Characteristics	Frequency	Percent
Race		
African American	11	91.7
White	1	8.3
Education		
High School	2	16.7
College	6	50.0
Graduate School	3	25.0
Age		
Under 50	1	8.3
50-59	4	33.3
60 and above	6	50.0
Occupation		
Assembly		
Teacher	1	8.3
Retired	1	8.3
Clerical	4	33.3
House Supervisor	1	8.3
Disabled	1	8.3

The participants also provided information about their medical history (Table 2). Only one had taken an X-Ray or MRI in the last two years to facilitate a medical diagnosis. Over 83.0% of them indicated that they did not have any medical diagnoses done in the last two years. Most of the participants reported that high BP was prevalent in their family, and all of the participants reported that they had high BP. More than half of them revealed that high cholesterol was a problem with family members, and about 41.7% of them were tested as having elevated cholesterol. While 83.3% of them reported that diabetes was prevalent in their family, 58.3% of them tested positive for diabetes. In addition, 75.0% of the participants revealed that obesity was a problem in their family.

Table 2

Medical History of Study Participants

	Frequency	Percent
Medical or Diagnostic Taken in Past 2 Years		
X-Ray and MRI	1	8.3
Colonoscopy-Mammogram	1	8.3
None	10	83.4
Hypertension-Blood Pressure	12	100.0
High Blood Pressure in Family	10	90.9
Elevated Cholesterol	5	41.7
Elevated Cholesterol in Family	6	54.5
Diabetes-Abnormal Blood Sugar Tests	7	58.3
Diabetes in Family	10	83.3
Obesity in Family	9	75.0

Intervention Program

The intervention program was facilitated by the project team which was composed of four Jackson area community health workers with affiliation with the Jackson Heart Study (JHS) Community Outreach Center (CORC) and the community-based JHS Community Health Advisory Network (CHAN). The JHS CORC is one of the five centers that comprise the JHS and is one of the two JHS centers housed in the School of Public Health at Jackson State University. The focus of the JHS CORC is to perform community health education activities to disseminate health promotion and prevention messages in the Jackson community.

Twenty-five female residents from the Jackson Medical Mall area were selected to participate in this program. They were interviewed, they completed the application which

included the consent form, and they provided medical and health information. The participants were divided into four groups with an assigned team member and were given logs for documentation of activities and practices.

Pre-Assessment

Prior to beginning program activities and the intervention, the participants were exposed to health screenings, after which they were administered the Pre-assessment. The Mississippi Diabetes Foundation provided baseline health screenings, measuring kidney function, BMI, BP, glucose, and cholesterol. The participants recorded in their logs the measures provided by the Mississippi Diabetes Foundation for kidney function; BMI, BP, glucose, and cholesterol. Pre-tests were administered to assess the participants' current knowledge of hypertension and risk factors. The participants were asked to provide information on 20 items that related to risk behaviors for development of hypertension. These questions inquired about their consumption of fruits and vegetables, their knowledge of fat consumption and cholesterol, weight loss practices, measures of blood pressure, the impact of BP on the body, and warning signs of high BP. They were also asked a few questions about mental health.

Intervention

Participants were then exposed to five months of "Step N2 Life" Intervention that included sessions of instruction, mentoring, and heart healthy activities. The intervention lasted from August 2015 to December 2015 and consisted of community education about the importance of chronic disease prevention and risk factor prevention, focusing on the major three modifiable lifestyle risk factors: tobacco use, unhealthy diet, and sedentary lifestyle.

This team received expert support from JHS CORC staff, and collaborated with a variety of health care professionals including physicians, paramedics, nurses, technicians, and nutritionists. All facilitators were trained to deliver standardized educational preventive messages. To promote physical activity, participants received messages designed to help them incorporate more physical activity into everyday life. They also received information and training that promoted healthy eating. The program also provided risk factor screenings (obesity, hypertension, diabetes, cholesterol) and education for persons at risk.

Participants attended education sessions that included workshops, interactive discussions, physical activity sessions, and smoking cessation consultations. Education sessions on healthy diet, physical activity, and tobacco cessation were led by occupational physicians, nurses, and technicians who were trained to provide standardized educational messages. Topics related to healthy lifestyle strategies and also included discussions on balanced diet and sodium reduction.

Technicians took measures of blood pressure, weight, glucose, and cholesterol and a pre-test that examined their attitudes, behaviors, and practices regarding dietary practices, knowledge and awareness and general health status, and mental health.

During the instructional sessions, participants were exposed to expert lecturers who provided guidance on the importance of drinking water, the benefits of an exercise regimen, the value of eating healthy, the need for sustainability, the importance of the group staying together and working together, working with family members to improve health status, and changing patterns of behavior to improve health. The participants also learned about strategies to control blood pressure and how to minimize negative reactions to stressful situations.

The participants were also guided through the exercise segments by a registered nurse who was also an aerobic instructor. Physical activities included yoga and mindfulness, line dancing, and aerobics and were conducted for 1.5 hours each. Participants walked at their will and under the team leader's direction in the Jackson Medical Mall three (3) miles, three (3) times a week. They were also challenged to complete a round trip "virtual walk" from Jackson, Mississippi to New Orleans, Louisiana.

There were four (4) monthly wellness sessions conducted by a nutritionist that provided information on nutrition portion size, label reading, and healthy cooking. A group of experts, including a medical doctor, presented information on managing hypertension. They attended a lecture on "Know Your Numbers." All participants were responsible for tracking their physical activity and dietary habits on a daily basis.

In addition, a motivational speaker addressed women's mental health and empowerment. For the final session of the five month intervention program, healthy snacks were provided and a healthy lunch was served. All participants received T-shirts, pedometers and an insulated shopping bag with several items to compliment preparation of healthy foods.

Post-Assessment

At the end of the five month intervention, the post-test measures were taken. The participants were asked to provide information on same 20 items that they addressed in the pre-assessment phase that related to risk behaviors for development of hypertension. These questions inquired about their consumption of fruits and vegetables, their knowledge of fat consumption and cholesterol, weight loss practices, measures of BP, the impact of BP on the body, and warning signs of high BP. They were also asked a few questions about mental health. The Mississippi Diabetes Foundation provided follow-up (post) health screenings, measuring kidney function, BMI, BP, glucose, and cholesterol. Pre-tests and post-tests were administered to assess participants' current knowledge and knowledge gained of hypertension and risk factors, as well

as changes in the outcome measures (kidney function, BMI, BP, glucose, and cholesterol). The Step N2 Life Health Promotion evaluation examined the participants' perceptions about health promotion and awareness relating to hypertension and CVD.

Data Analyses

Statistical analysis was performed using SPSS 23.0 software (IBM, Armonk, NY, USA). Data are presented with frequencies, percentages, means, and standard deviations. The paired t-test statistic was used to compare means for the pre-assessment and the post-assessment. A 2-tailed p -value of < 0.05 was considered the threshold for statistical significance. The effect of intervention was measured by a comparison of pre-intervention and post-intervention measures.

Ethical Considerations

This study was undertaken with approval from the Institutional Review Board (IRB) at Jackson State University, Jackson, Mississippi, ensuring respect for the rights and integrity of the participants. Participants were informed that their involvement in the study was confidential, and they all signed an informed consent form.

Results

The effectiveness of the intervention was determined by examining the results of the paired t-test that was conducted to examine differences between the pre-assessment and the post assessment. Table 3 provides the details of the analyses computed. Knowledge of the participants increased significantly from the pre-assessment to the post-assessment in their answers to the following questions:

1. It would be better to eat a whole piece of fruit, than to drink a glass of 100% juice? ($p = .038$)
2. Which cholesterol is good for you? ($p = .015$)

No significant change was observed in the participants' responses to the other questions posed regarding their knowledge about hypertension and other risk factors for development of hypertension and CVD. The study shows evidence that participants' knowledge is malleable, to some degree, after a 5-month intervention program.

Table 3

Paired Samples t-test sample of pre-intervention and post-intervention knowledge of the study participants

Participants' Knowledge	Pre-Intervention	Post-Intervention	p-value
How many servings of fruit are suggested to eat each day?	1.9167 ± .51493	2.0000 ± .42640	.674
How many servings of vegetables are suggested to eat each day?	2.0000 ± .42640	2.0833 ± .28868	.586
Which of the following is the healthiest type of fat?	2.0000 ± .81650	1.8000 ± .63246	.168
It would be better to eat a whole piece of fruit, than to drink a glass of 100% juice?	1.3636 ± .50452	1.0000 ± .00000	.038
Which cholesterol is good for you?	1.5000 ± .52705	1.0000 ± .00000	.015
What are the symptoms of high cholesterol?	3.1000 ± .99443	3.4000 ± 1.07497	.081
What ethnic group is more at risk for high-cholesterol?	2.0909 ± .30151	2.0000 ± .00000	.341
What are the risk factors for high cholesterol?	2.3333 ± 1.30268	1.9167 ± 1.08362	.318
What is considered a high blood pressure	1.1818 ± .60302	1.0909 ± .30151	.676

Participants' Knowledge	Pre-Intervention	Post-Intervention	<i>p</i> -value
reading?			
What are the measures for reading high blood pressure?	1.0833 ± .28868	1.0000 ± .00000	.339
What organs can be affected when blood pressure is not controlled?	4.8333 ± 1.80067	4.8333 ± 1.64225	1.000
Which gender is mostly affected by high blood pressure?	1.2500 ± .45227	1.2500 ± .62158	.166
What are the risk factor for high blood pressure?	4.6667 ± .88763	4.2500 ± 1.21543	.096
What are the warning signs of high blood pressure?	3.7500 ± 1.71226	3.8333 ± 1.52753	.884

Values are mean ± SD

Conclusion

This study tested the effects of a behavioral intervention program for participants seeking to initiate BP control. Because community-based research is rare, this intervention program, Step N2 Life, was developed and implemented by a group of community health workers in collaboration with the Jackson Heart Study (JHS) Community Outreach Center (CORC). These community researchers assumed the responsibility for conducting a community-generated intervention to make a difference in the lives of community neighbors. In addition to observed changes between the pre- and the post- measures, participants gave testimonies about the value, impact, and the benefits that participating in this research had on their lives. Participants praised the Step N 2 Life coordinators for their foresight to take the steps to engage them in this life-saving endeavor. Programs and activities like Step N2 Life have great value in helping communities to adopt specific strategies to control blood pressure, stress, weight, and overall health. The results illustrate that intervention programs, like Step N2 Life can be effective in

assisting women living in the Jackson Medical Mall area to develop awareness that will enable them adopt healthy lifestyle changes and build protective factors to deter hypertension and related risk factors (Ferdinand, 2013)

Community-based strategies to prevent high blood pressure must emphasize lifestyle modification. This represents a strong and effective strategy to mitigate the rising health care costs and the burden of chronic diseases like hypertension (Laslet et al., 2012). The results of this study reveal that this type of intervention can have specific effect when conducted in neighborhoods and generated and managed by community-based groups. This is an effective way of improving people's lifestyles (King et al., 2015), emphasizing the importance of individual responsibility and individual self-care to ensure effective health management and reducing the impact of chronic diseases like hypertension (Booth, Prevost, & Guilliford, 2016; Kent et al., 2015). The most successful interventions are those that are created and managed by community-based groups that are willing to commit and make an investment in the well-being of their communities and that have a vested interest in the health and welfare of their families and their neighbors who will be impacted by their efforts.

The implementation of intervention programs like Step N2 Life involving community-based groups can lead to the development of health policy and a successful health research agenda if these intervention programs are formulated with strong, active community input. Success can be realized if this is viewed as a local public health issue and involves all stakeholders in order to fully address the health challenges that plague the African American community in Mississippi. These findings provide unique evidence of the benefits of interventions developed and managed by community groups. Most intervention programs are generally dominated by academic institutions. Findings provided here can drive future research using larger samples and multiple communities with comparison groups that may highlight the importance of community-based groups in leading efforts to reduce the impact of hypertension and cardiovascular disease in African American communities.

This was an exploratory study that was accompanied by some limitations. The authors did not use a comparison group to evaluate the benefits of the Step N2 Life intervention program against a control group. As a result, the improvements observed from the analyses could be attributed to factors other than the exposure to the intervention. This study involved a small group of community members. So, it is possible that the statistical analyses may be affected by the small sample size. To address this situation, future studies could test other communities with larger groups of participants using a control/intervention design. It is important that future research be conducted using larger numbers of participants and involving larger number of communities before we can generalize these findings to the larger African American

communities. Future research may want to explore what knowledge areas are most malleable and which intervention activities lead to the most change in participants' knowledge.

Acknowledgements

This research is supported by Sheets, Inc, Jackson MS; Mississippi State Department of Health; JHS Community Outreach Center (GTEC) NHLBI-NIH Contract HSN2682013000050C; JSU Center of Excellence of Minority Health and Health Disparities funded by the National Institute on Minority Health and Health Disparities of the National Institutes of Health under Award Number P20MD006899. The content is solely the responsibility of the authors.

Bettye Tyler, Mangle Shanks, Saundra Hill, and Ruby Gray community-based health workers, conceived, designed, and managed the intervention program. Jackson Heart Study Community Outreach Center staff provided technical assistance and writing expertise; Dr. Clifton Addison analyzed the data; all authors contributed to manuscript development and review.

Conflicts of Interest: There are no conflicts of interest.

References

- Booth, H. P., Prevost, A. T., Gulliford, M. C. (2016). Severity of obesity and management of Hypertension, hypercholesterolaemia and smoking in primary care: population-based cohort study. *J Hum Hypertens*, 30: 40–45.
- Cooper, R., & Rotimi, C. (1997). Hypertension in blacks. *American Journal of Hypertension*, 10, 804-812.
- Dickinson, H. O., Mason, J. M., Nicolson, D. J., Campbell, F., Beyer, F. R., Cook, J. V., ... & Ford, G. A. (2006). Lifestyle interventions to reduce raised blood pressure: a systematic review of randomized controlled trials. *Journal of Hypertension*, 24, 215-233.
- Gee, M. E., Pickett, W., Janssen, I., Johnson, J. A., Campbell, N.R.C. (2013). Health behaviors for hypertension management in people with and without coexisting diabetes. *The Journal of Clinical Hypertension*, 15, 389–396.
- Go, A. S., Mozaffarian, D., Roger, V. L., et al. (2013). On behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart Disease and Stroke Statistics–2013 Update: A Report from the American Heart Association. *Circulation*, 227: e6–e245.
- Ferdinand, K. C. (2013). Improving approaches to hypertension treatment in African Americans: Lessons learned from the Jackson Heart Study. *The Journal of Clinical Hypertension*, 15, 362–364.
- Harman, J., Walker, E. R., Charbonneau, V., Akylbekova, E. L., Nelson, C., Wyatt, S. B. (2013). Treatment of Hypertension among African Americans: The Jackson Heart Study. *The Journal of Clinical Hypertension*, 15, 367–374.

- Keenan, N.L., Rosendorf, K.A. (2011). Prevalence of hypertension and controlled hypertension – United States, 2005-2008. *MMWR Surveillance Summary*, 60(suppl):94–97.
- Kent, L. M., Morton, D. P., Rankin, P. M., Gobble, J. E., Diehl, H. A. (2015). Gender differences In effectiveness of the Complete Health Improvement Program (CHIP). *Journal of Nutrition Behavior and Education*, 47: 44–52.
- King, K., Meader, N., Wright, K., et al. (2015). Characteristics of interventions targeting Multiple lifestyle risk behaviors in adult populations: a systematic scoping review. *PLoS One*, 10: e0117015.
- Laslett, L. S., Alagona, P., Clark, B. A., et al. (2012). The worldwide environment of Cardiovascular disease: prevalence, diagnosis, therapy, and policy issues: a report from the American College of Cardiology. *Journal of the American College of Cardiology*, 60(Suppl): S1–S49.
- Lloyd-Jones, D., Adams, R. J., Brown, T. M., Carnethon, M., et al. (2010). American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Executive summary: heart disease and stroke statistics–2010 update: a report from the American Heart Association. Circulation*, 121:948–954.
- Redmond, N., Baer, H. J., & Hicks, L. S. (2011). Health behaviors and racial disparity in blood Pressure control in the National Health and Nutrition Examination Survey. *Hypertension*, 57:383–389.
- Sahli, J., Maatoug, J., Harrabi, I., Ben Fredj, S., Dendana, E., & Ghannem, H. (2016). Effectiveness of a community-based intervention program to reduce hypertension prevalence among adults: Results of a quasiexperimental study with control group in the region of Sousse, Tunisia. *Global Heart*, 11, 131–137.
- World Health Organization (WHO) (Ed.) (2009). *Global health risks: Mortality and burden of disease attributable to selected major risks*. WHO, Geneva, Switzerland.