



Promoting Physical Activity in Low Income African Americans: Project LAPS

Journal of Health Disparities Research and Practice

Volume 3 | Issue 2

Article 7

© Center for Health Disparities Research, School of Public Health, University of Nevada, Las Vegas

2009

Promoting Physical Activity in Low Income African Americans: Project LAPS

Dorothy W. Pekmezi , *University of Alabama at Birmingham*

Brooke L. Barbera , *Louisiana State University*

Jamie S. Bodenlos , *Hobart and William Smith Colleges*

See next page for additional authors

Follow this and additional works at: <https://digitalscholarship.unlv.edu/jhdrp>



Part of the [Community-Based Research Commons](#), [Demography, Population, and Ecology Commons](#), [Educational Sociology Commons](#), [Inequality and Stratification Commons](#), [Place and Environment Commons](#), [Public Health Commons](#), and the [Race and Ethnicity Commons](#)

Recommended Citation

Pekmezi, Dorothy W.; Barbera, Brooke L.; Bodenlos, Jamie S.; Jones, Glenn N.; and Brantley, Phillip J. (2009) "Promoting Physical Activity in Low Income African Americans: Project LAPS," *Journal of Health Disparities Research and Practice*: Vol. 3: Iss. 2, Article 7.

Available at: <https://digitalscholarship.unlv.edu/jhdrp/vol3/iss2/7>

This Article is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Article in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Article has been accepted for inclusion in Journal of Health Disparities Research and Practice by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact digitalscholarship@unlv.edu.

Promoting Physical Activity in Low Income African Americans: Project LAPS

Abstract

Low income African Americans are at increased risk for physical inactivity and related chronic illnesses. Thus, effective interventions are needed to address these health disparities. The current study examined the efficacy of a home-based physical activity intervention among a low income African American sample with high rates of chronic illnesses (obesity, hypertension, diabetes, high cholesterol). Participants (n=214) were randomly assigned to either the home-based physical activity intervention (self-help print materials, five monthly newsletters, two telephone counseling sessions) or an attention control condition, which promoted healthy diet. Results indicated that the intervention did not produce significantly greater increases in physical activity from baseline to six months than the control group. Lessons learned from the current study include the importance of using proactive retention strategies with low income African American participants and taking into consideration the cultural relevance of the intervention.

Keywords

African Americans; Exercise; Health disparities; Physical activity; Poor; Social status – Health aspects

Authors

Dorothy W. Pekmezi, Brooke L. Barbera, Jamie S. Bodenlos, Glenn N. Jones, and Phillip J. Brantley



Promoting Physical Activity in Low Income African Americans: Project LAPS

Dorothy W. Pekmezi, University of Alabama at Birmingham

Brooke L. Barbera, Louisiana State University

Jamie S. Bodenlos, Hobart and William Smith Colleges

Glenn N. Jones, Louisiana State University Health Sciences Center

Phillip J. Brantley, Pennington Biomedical Research Center

ABSTRACT

Low income African Americans are at increased risk for physical inactivity and related chronic illnesses. Thus, effective interventions are needed to address these health disparities. The current study examined the efficacy of a home-based physical activity intervention among a low income African American sample with high rates of chronic illnesses (obesity, hypertension, diabetes, high cholesterol). Participants (n=214) were randomly assigned to either the home-based physical activity intervention (self-help print materials, five monthly newsletters, two telephone counseling sessions) or an attention control condition, which promoted healthy diet. Results indicated that the intervention did not produce significantly greater increases in physical activity from baseline to six months than the control group. Lessons learned from the current study include the importance of using proactive retention strategies with low income African American participants and taking into consideration the cultural relevance of the intervention.

Key words: health disparities; physical activity; African Americans

INTRODUCTION

Participation in regular physical activity is associated with numerous health benefits, including lower risk of coronary heart disease, stroke, high blood pressure, adverse blood lipid profile, type II diabetes, metabolic syndrome, colon cancer, breast cancer, and early death (U.S. Department of

Health and Human Services, 2008). In addition, an active lifestyle can help prevent weight gain and falls, reduce depression, and even result in better cognitive function (U.S. Department of Health and Human Services, 2008). Despite these health benefits, most Americans do not engage in regular physical activity (National Center for Health Statistics, 2007). And, certain subgroups of the U.S. population, such as African Americans and individuals living below the poverty level, report particularly high rates of sedentary behavior (54.6% and 56%, respectively), relative to Non-Hispanic Whites (35.5%) and individuals living at 200% or more of the poverty level (33.6%).

There are also disparities in terms of chronic diseases related to inactivity. For example, African Americans suffer higher death rates from heart disease, diabetes, and stroke than Non-Hispanic Whites (National Center for Health Statistics, 2007). Individuals living below poverty level report higher rates of obesity and hypertension than individuals living at 200% or more of poverty level (National Center for Health Statistics, 2007). Such health disparities may be due to the numerous barriers low income individuals and African Americans face in terms of engaging in physical activity. For example, low income individuals may have transportation difficulties or inflexible work schedules. In addition, African Americans frequently cite child care and monetary costs as barriers to participating in physical activity (Richter, Wilcox, Greaney, Henderson, & Ainsworth, 2002).

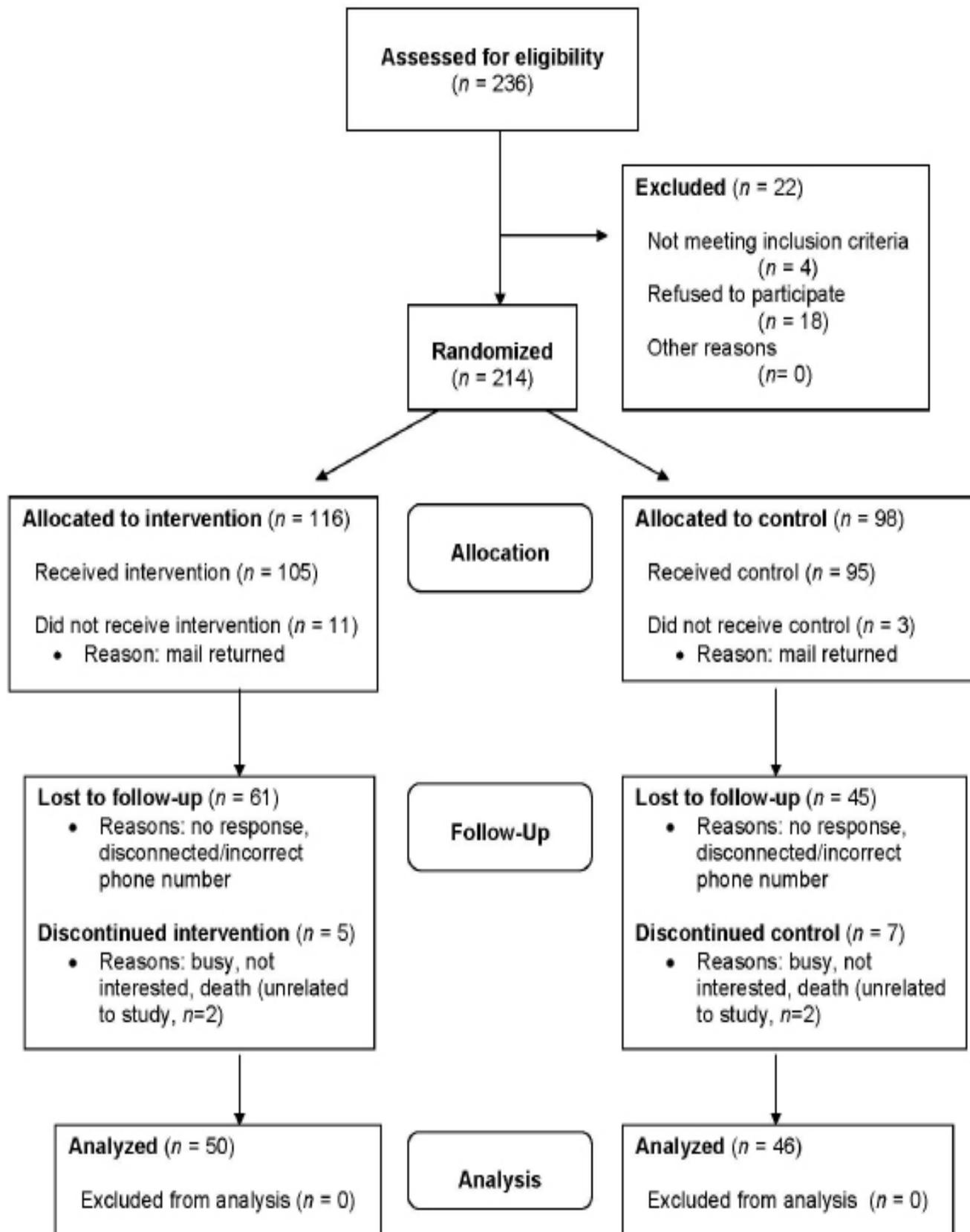
Home-based physical activity interventions have the potential to overcome such barriers by not requiring clinic visits. In fact, several studies examining theory-based interventions delivered by mail, telephone, and Internet have already demonstrated promising results in predominantly middle income White samples (Marcus et al., 2007a; Marcus et al., 2007b; Marcus et al., 1998a; Marcus et al., 1998b). However, little research has been conducted in this area among low income African Americans. Results from a recent pilot study indicated that one mailing of theory-based (Social Cognitive Theory, Transtheoretical Model), self-help print materials produced short term (one-month) increases in physical activity in a predominantly African American low income sample (Whitehead, Bodenlos, Cowles, Jones, & Brantley, 2007). However, gains had attenuated by six months. We hypothesized that this intervention may not have been sufficiently reinforced over the follow-up period. Thus, in the current study, we conducted a randomized controlled trial of an enhanced home-based intervention with additional contacts (self-help print materials plus newsletters and telephone counseling). Our hypotheses were that the enhanced intervention would produce significantly greater increases in self report physical activity and related process variables than an attention control in a low income African American sample. Secondary aims included assessing the physical activity intervention preferences of this target population.

METHODS

Participants

Following approval from Institutional Review Board, participants were recruited from the waiting rooms of 2 outpatient primary care clinics at a public teaching hospital (see Figure 1). Eligibility requirements included being African American, at least 18 years old, and able to walk unassisted. Participants also had to read at 9th grade level as determined by Passage Comprehension subtest of Woodcock Johnson Tests of Achievement (Woodcock, McGrew, & Mather, 2001), have telephone access, and provide an address where they would be residing for 6 months.

Figure 1. Participation flow chart



Intervention

The intervention included one mailing of self-help print materials, which were delivered in a full-color, personalized letter format and modeled after manuals developed by Marcus and colleagues (2007a, 2007b). The content was based on well-established theories of behavior change, including the Social Cognitive Theory (Bandura, 1986) and Transtheoretical Model (or stages of change theory; Prochaska & DiClemente, 1983). The Transtheoretical Model argues against a one-size-fits-all approach to behavior change and suggests that interventions be matched to the individual's motivational readiness for change. The Social Cognitive Theory posits that behavior is influenced by personal (e.g., thoughts, feelings) and environmental factors. Thus, messages were tailored to the participant's motivational readiness for behavior change and focused on behavioral strategies such as setting physical activity goals, self-monitoring, rewarding progress towards goals, fostering social support, problem solving barriers, and relapse prevention.

In addition, participants received two brief telephone counseling sessions based on motivational interviewing techniques. Motivational interviewing (MI) focuses on increasing the importance of behavior change from the client's perspective by expressing empathy, rolling with resistance, developing discrepancy, and supporting self-efficacy. These sessions were conducted by a masters level therapist with training in MI techniques [e.g., completed an eight-hour workshop, read Miller and Rollnick (2002) textbook]. To promote treatment integrity, telephone calls were scripted, audio-taped, and reviewed by a clinical supervisor. Scripts were based on intervention content previously developed for African Americans and focused on increasing the importance of adopting and maintaining an active lifestyle from the participant's perspective (Resnicow et al., 2002). For example, the script began with probes regarding personal motivational barriers to physical activity by asking "On a scale of 0-10, how interested are you in increasing your physical activity?" and "Assuming you wanted to, how confident are you that you could increase your physical activity?" Open-ended follow up questions included "Why not a lower number, like a 1 or 0? Why not a higher number?" And then, participants engaged in a values clarification exercise, in which they selected three important values/goals (e.g., being a good parent/Christian) and described why those values/goals were important to them and how increasing their physical activity could help them achieve those values/goal.

Finally, intervention messages were further reinforced over the follow-up period by monthly newsletters. Content highlighted low-cost local physical activity resources and opportunities, such as state parks, publicly accessible pools, and pictures of scenic local places to walk, as well as tips on working extra steps into daily activities and stretching.

Measures

Participants completed a demographic questionnaire regarding age, gender, race, marital status, income, and educational level. Medical charts were reviewed for height, weight, and chronic disease status.

Self-report physical activity was measured by the Weekly Leisure-Time Exercise Questionnaire (WLTEQ), which asks participants to recall the number of times they engaged in more than 15 minutes of strenuous, moderate, and mild physical activity during the past week and provides an exercise metabolic equivalent. The measure has acceptable 2-week test-retest reliability ($r = 0.74$), concurrent validity with 7-Day Physical Activity Recall ($r = 0.40$, $p < 0.001$), and convergent validity (r 's = 0.24 and 0.13) with VO₂max and body fat percentage (Godin & Shephard, 1985).

We also measured several theoretical constructs (stage of change, self-efficacy, decisional balance) from the Social Cognitive Theory and Transtheoretical Model at baseline and six months,

as improvement on these process variables often serves as an early indicator of behavior change. Furthermore, baseline stage of change data was used to tailor physical activity information to individual levels of motivational readiness for the intervention group participants. The four-item stage of change measure categorized participants into one of the five stages of change (precontemplation, contemplation, preparation, action, and maintenance) and has demonstrated two-week test-retest reliability (Kappa = 0.78; intra-class correlation $r = 0.84$) as well as shown acceptable concurrent validity with measures of self-efficacy and current activity levels (Marcus et al., 1992a).

The five-item self-efficacy scale (Marcus et al., 1992b) measured confidence in one's ability to persist with exercising in various situations, such as when feeling fatigued or encountering inclement weather, and has good two-week test-retest reliability ($r = 0.90$, $n=20$) and internal consistency ($r = .82$).

Decisional balance for physical activity was assessed using a ten-item questionnaire with two subscales concerning perceived advantages ("pros") and disadvantages ("cons") to engaging in physical activity (Plotnikoff, Blanchard, Hotz, & Rhodes, 2001). Both the pros and cons subscales showed good internal consistency (α 's = 0.69-0.83), two-week test-retest reliability (r 's = 0.74-0.84), and concurrent validity with self-efficacy and behavioral intention for physical activity (Plotnikoff et al., 2001).

Finally, several items regarding intervention preferences were administered at six months, as there has been little research in the area of home-based physical activity interventions conducted among low income African Americans.

Procedure

After providing informed consent, participants completed the demographic questionnaire, WLTEQ, and questionnaires regarding stage of change, self-efficacy, and decisional balance. Research assistants then randomly assigned participants to intervention or attention control group using a table of random numbers. Intervention participants were mailed physical activity self-help print materials. Attention control participants were mailed information on healthy diet. At two and four months post-baseline, a masters level therapist provided physical activity counseling to intervention participants and dietary counseling to control participants via telephone. Finally, all participants received five monthly newsletters on group-appropriate (physical activity or diet) topics over the follow-up period.

Measures were re-administered by telephone at six months, along with several items regarding intervention preferences. The interviewers were blind to group status and made four attempts at contacting participants by telephone before considering them lost to follow-up.

Analyses

A 2 x 2 MANOVA was conducted to assess differential treatment effects on physical activity, self-efficacy, and decisional balance between groups. Data were analyzed by intention to treat. Baseline scores were carried forward in cases of missing six-month data. To explore the influence of missing data, analyses were repeated including only participants with complete six-month data. Movement through physical activity stages of change from baseline to six months was examined by McNemar's chi-square analyses.

RESULTS

The sample (n=214) was comprised of low income, African American women (91%) with high rates of chronic diseases (see Table 1). The mean age was 47.25 (SD=13.26). The average level of education was a high school diploma (M years = 12.04, SD=2.07). Reviews of 156 available medical charts indicated that 67% were diagnosed with hypertension, 37% with diabetes mellitus, 33% with hyperlipidemia, and 60% were obese (BMI>30). There were no significant differences between groups in terms of demographic characteristics or baseline levels of physical activity.

Table 1. Demographic characteristics of participants (n=214)

Characteristic	n	%
Female	194	90.7%
African American	214	100%
Monthly Household Income		
\$0-1000	127	59.3%
\$1000-2000	71	33.2%
\$2000+	16	7.5%
BMI Category		
Underweight	2	1.2%
Normal	25	16.1%
Overweight	35	22.6%
Obese	93	60%
Medical Diagnoses		
Hypertension	105	67.3%
Hyperlipidemia	52	33.3%
Diabetes Mellitus	57	36.5%
Marital Status		
Divorced	31	14.5%
Married	54	25.2%
Single	102	47.7%
Separated	11	5.1%
Widowed	16	7.5%

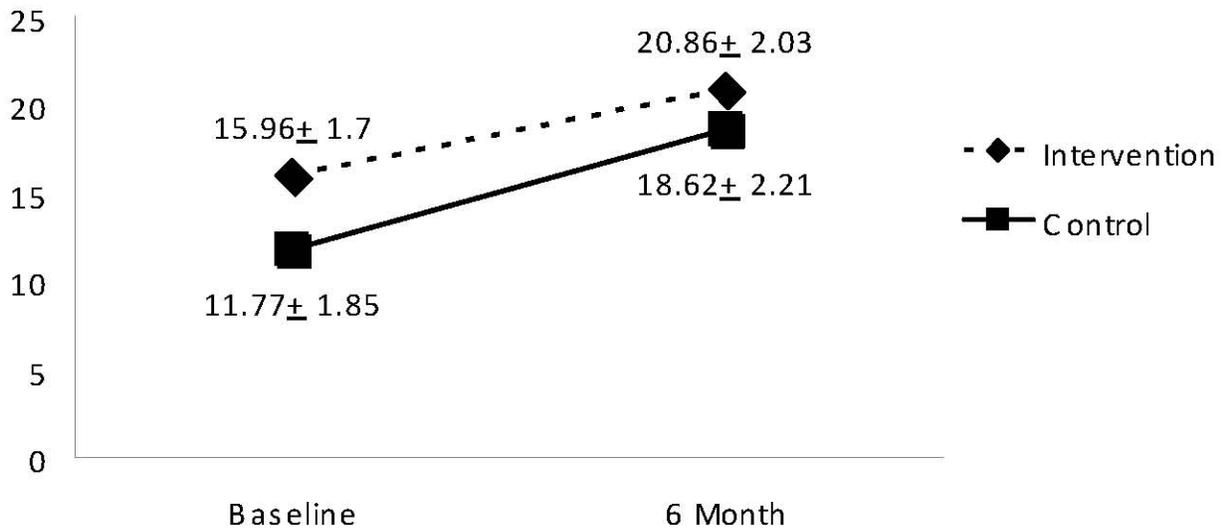
*Mean age= 47.25 years (SD=13.26)

Researchers were able to contact 96 participants (44.86%) for follow-up data at six months. While individuals who completed 6 months follow-up (M=49.8, SD= 13.01) were significantly older than non-completers (M= 45.17, SD=13.16), [t(212) = 2.57, p < 0.01], there were no other significant differences in terms of demographic indices or baseline levels of physical activity.

A repeated-measures MANOVA indicated no significant group differences regarding changes in physical activity, self-efficacy, and decisional balance from baseline to 6 months, $F(3, 206) = .43$, $p < .73$. An analysis of complete data ($n = 86$) revealed similar findings, $F(3, 82) = 1.07$, $p < .37$. Overall, participants reported increases in physical activity from baseline to 6 months of 5-6 WLTEQ points, which is roughly equivalent to an additional 15-minute brisk walk per week (see Figure 2).

Figure 2. Changes in physical activity from baseline to six months

Mean WLTEQ Scores



There were no significant changes in motivational readiness for physical activity in either group. Overall, 40.6% ($n=39$) progressed in physical activity stage of change from baseline to six months, whereas 29.2% ($n=28$) maintained and 30.2% ($n=29$) regressed.

As there has been little research in the area of home-based physical activity interventions conducted among low income African Americans, several items were administered during the six month interviews to gauge the intervention preferences of our target population. Of the participants who responded ($n=91$), 90.1% reported preferring to receive physical activity information through the mail whereas few participants expressed interest in telephone- ($n=1$) or Internet-based ($n=4$) approaches. The lack of interest in Internet-based approaches may reflect the low levels of computer access among the current sample (29.7%).

DISCUSSION

Home-based physical activity interventions have great potential for reaching low income African American participants, but there has been little research conducted in this area thus far. Results from the current study indicated that home-based physical activity interventions did not produce significant changes in activity levels and associated process variables in this sample of low income African Americans with high rates of chronic illnesses, relative to an attention control condition.

Our findings are consistent with results from two past studies examining more intensive home-based programs in African American samples, which indicated overall improvements in physical activity without significant group differences (Wilbur et al., 2008; Newton et al., 2004). For example,

in a study (n=281) testing a home-based walking intervention targeted to African American women and consisting of 4 workshops followed by weekly tailored telephone calls over 24 weeks relative to a minimal intervention condition, Wilbur and colleagues (2008) found an overall increase in the proportion of women who met the recommended physical activity level, but no significant group differences. Another study (n=60) examined 3 home-based programs: standard behavioral counseling, culturally sensitive counseling, and physician advice (Newton et al., 2004). While 7-Day Physical Activity Recall data indicated no significant group differences, participants in the culturally sensitive and standard behavioral groups significantly increased their days per week of walking from baseline to 6 months, unlike the physician advice group. More sensitive instruments may be needed to detect differences between treatment groups in this target population. Additionally, studies examining the impact of crime and perceived neighborhood safety on physical activity in minority populations (Van Duyn et al., 2007; McDonald, 2008) suggest that supplementing these motivation-enhancing home-based approaches with environmental and policy changes may be beneficial in terms of producing more substantial improvements in the physical activity.

Strengths of the current study include the randomized controlled research design and focus on an underserved population. Limitations to the current study include reliance upon self-report data and the representativeness of the sample. Participants were solely recruited from waiting rooms at primary care clinics, so these findings may not generalize to other groups (e.g., individuals not actively seeking medical care). Furthermore, rates of attrition (55%) at six months were high. There were various reasons for follow-up assessments not being completed, but research assistants reported frequently encountering disconnected telephone numbers.

Given that low-income individuals may not always have reliable ways of being contacted as the result of moving or having phones disconnected, researchers should address this challenge during recruitment. For instance, collecting contact information for participants' friends and relatives at the beginning of the study can greatly facilitate contacting these participants for follow-up assessments six months later. Also, while budget limitations precluded offering incentives for participation in the current study, future researchers may wish to consider providing low income African American participants with pre-paid calling cards, cellular telephones, bus tokens, and/or gasoline vouchers to minimize these barriers to completing assessments.

Additional recommendations include holding focus groups with the target population before starting the study to learn more about the barriers participants might experience in terms of engaging in a clinical trial. This formative research can help researchers troubleshoot issues such as lack of childcare and transportation before these barriers lead to attrition. Once the trial is ongoing, researchers can conduct regular process evaluations to assess satisfaction with the program and adjust the program accordingly to meet the changing needs of the participants. Also, exit interviews can be held with participants who dropped out to ascertain how such attrition can be avoided in the future.

Another potential contributor to the high rates of attrition in this study could have been the cultural relevance of the intervention. While most participants in this study reported preferring to receive physical activity information through mail-delivered print materials, as opposed to telephone or Internet, the current print intervention was developed and tested among middle income White samples and may not be appropriate for use among other groups.

Studies indicate that there are cultural differences regarding physical activity. For example, African American women described different reasons for not being active (lacking safe place to walk) than White (too tired, self-conscious) and Hispanic (lacked time, too tired) women (Heesch, Brown, & Blanton, 2000). In addition, studies have reported unique attitudes regarding body image, concerns

about neighborhood safety, burden of redoing hair, and lack of time due to extensive family and church commitments (Resnicow et al., 2002). Effective health interventions must be consistent with the beliefs, values, and practices of the target population. Therefore, future researchers should consider conducting formative research with low income African Americans to learn how to improve the cultural relevance and appeal of physical activity promotion programs. Multi-level interventions addressing personal motivation along with environmental and policy barriers to active lifestyles (Van Duyn et al., 2007; McDonald, 2008) may be required to eliminate existing health disparities

CONCLUSION

Low income African Americans report high rates of sedentary behavior and related chronic illnesses and thus are in need of intervention. While results from the current study indicate that the physical activity intervention, relative to a control condition, was ineffective in this target population, many lessons were learned. Low income African Americans face many barriers to participation in physical activity and can often be challenging to reach and retain in clinical trials. Thus, future researchers are encouraged to take a proactive approach towards retention of low income African American participants and consider the cultural relevance of the health promotion program. Intervention on multiple levels (environmental, organizational, policy) may be necessary to address the underlying social etiologies of these health disparities.

REFERENCES

- Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Godin, G., & Shephard, R. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences*, 10, 141- 146.
- Heesch, K.C., Brown, D.R., & Blanton, C.J. (2000). Perceived barriers to exercise and stage of exercise adoption in older women of different racial/ethnic groups. *Women and Health*, 30(4), 61-76.
- Marcus, B.H., Bock, B.C., Pinto, B.M., Forsyth, L.H., Roberts, M.B., & Traficante, R.M. (1998a). Efficacy of an individualized, motivationally-tailored physical activity intervention. *Annals of Behavioral Medicine*, 20(3), 174-180.
- Marcus, B.H., Emmons, K.M., Simkin-Silverman, L.R., Linnan, L.A., Taylor, E.R., Bock, B.C., et al. (1998b). Evaluation of motivationally tailored vs. standard self help physical activity interventions at the workplace. *American Journal of Health Promotion*, 12, 246-253.
- Marcus, B.H., Lewis, B.A., Williams, D.M., Dunsiger, S., Jakicic, J.M., Whiteley, J.A., et al. (2007a). A comparison of Internet and print-based physical activity interventions. *Archives of Internal Medicine*, 167(9), 944-949.
- Marcus, B.H., Napolitano, M.A., King, A.C., Lewis, B.A., Whiteley, J.A., Albrecht, A., et al. (2007b). Telephone versus print delivery of an individualized motivationally tailored physical activity intervention: Project STRIDE. *Health Psychology*, 26(4), 401-409.
- Marcus, B.H., Rossi, J.S., Selby, V.C., Niaura, R.S., & Abrams, D.B. (1992a). The stages and processes of exercise adoption and maintenance in a worksite sample. *Health Psychology*, 11(6), 386-395.
- Marcus, B.H., Selby, V.C., Niaura, R.S., & Rossi, J.S. (1992b). Self-efficacy and the stages of exercise behavior change. *Research quarterly for exercise and sport*, 63(1), 60-66.

- McDonald, N.C. (2008). The effect of objectively measured crime on walking in minority adults. *American Journal of Health Promotion*, 22, 433-436.
- Miller, W.R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people for change* (2nd ed.). New York: Guilford Press.
- National Center for Health Statistics (2007). *Health, United States, 2007 With Chartbook on Trends in the Health of Americans*. Hyattsville, Maryland.
- Newton, R.L., & Perri, M.G. (2004). A randomized pilot trial of exercise promotion in sedentary African-American adults. *Ethnicity & Disease*, 14, 548-557.
- Plotnikoff, R.C., Blanchard, C., Hotz, S.B., & Rhodes, R. (2001). Validation of the Decisional Balance Scales in the Exercise Domain from the Transtheoretical Model: A longitudinal test. *Measurement in Physical Education and Exercise Science*, 5(4), 191-206.
- Prochaska, J.O., & DiClemente, C.C. (1983). Stages and processes of self change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, 51, 390-395.
- Resnicow, K., Jackson, A., Braithwaite, R., Dilorio, C., Blisset, D., Rahotep, S., et al. (2002). Healthy Body/ Healthy Spirit: Design and evaluation of a church based nutrition and PA intervention using motivational interviewing. *Health Education Research*, 17, 562-573.
- Richter, D.L., Wilcox, S., Greaney, M.L., Henderson, K.A., & Ainsworth, B.E. (2002). Environmental, policy, and cultural factors related to physical activity in African American women. *Women's Health*, 36(2), 91-109.
- U.S. Department of Health and Human Services (2008). *2008 Physical Activity Guidelines for Americans*. Washington, DC: U.S. Department of Health and Human Services.
- Van Duyn, M.S., McCrae, T., Wingrove, B.K., Henderson, K.M., Boyd, J.K., Kagawa-Singer, M., et al. (2007). Adapting evidence-based strategies to increase physical activity among African Americans, Hispanics, Hmong, and Native Hawaiians: A social marketing approach. *Preventing Chronic Disease*, 4. http://www.cdc.gov/pcd/issues/2007/oct/07_0025.htm.
- Whitehead, D., Bodenlos, J.S., Jones, G.N., Cowles, M., & Brantley, P.J. (2007). A stage targeted physical activity intervention among a predominantly low income African American primary care population. *American Journal of Health Promotion*, 21, 160-163.
- Wilbur, J., McDevitt, J.H., Wang, E., Dancy, B.L., Miller, A.M., Briller, J., et al. (2008). Outcomes of a home-based walking program for African-American women. *American Journal of Health Promotion*, 22(5), 307-317.
- Woodcock, R.W., McGrew, K.S., & Mather, N. (2001). *Woodcock-Johnson III Tests of Achievement*. Itasca, IL: Riverside Publishing.

Dorothy W. Pekmezi, Ph.D., University of Alabama at Birmingham

Brooke L. Barbera, Louisiana State University

Jamie S. Bodenlos, Ph.D., Hobart and William Smith Colleges

Glenn N. Jones, Ph.D., Louisiana State University Health Sciences Center

Phillip J. Brantley, Ph.D., Pennington Biomedical Research Center