

Improving Cardiovascular Health Among African-Americans Through Mobile Health: the FAITH! App Pilot Study



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KEY WORDS: cardiovascular disease; community-based interventions; community-based participatory research (CBPR); disparities; health promotion; minority health.

Abbreviations

| | |
|---------|--|
| AA | African-American |
| AHA | American Heart Association |
| BMI | Body mass index |
| BP | Blood pressure |
| CBPR | Community-based participatory research |
| CV | Cardiovascular |
| FAITH! | Fostering African-American Improvement in Total Health |
| LS7 | Life's Simple 7 |
| mHealth | Mobile health |
| NHANES | National Health and Nutrition Examination Survey |
| PA | Physical activity |

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INTRODUCTION

African-Americans (AAs) have 82% lower odds than whites of meeting five or more ideal cardiovascular (CV) health components comprising the American Heart Association (AHA) Life's Simple 7 (LS7), an evidence-based metric of seven health-promoting behaviors and biologic factors that, at ideal levels, improve CV outcomes (diet, physical activity [PA], cigarette smoking, body mass index [BMI], blood pressure [BP], total cholesterol, fasting glucose).¹ Mobile health (mHealth) interventions are promising for promoting CV health within this population.² Culturally relevant health interventions delivered through community-based participatory research (CBPR) approaches have proven successful in substantially impacting specific CV

risk factors (e.g., hypertension) in AAs.³ However, to our knowledge, our study is the first mHealth intervention targeting multiple risk factors by promoting ideal CV health (LS7) for AAs. We hypothesized that an evidence-based, theory-informed, culturally relevant, community-based mHealth lifestyle intervention would improve CV health among AA adults.

METHODS

The study was approved by the Mayo Clinic Institutional Review Board and registered (clinicaltrials.gov [NCT03084822]); participants provided written informed consent. Details on study rationale, recruitment procedures, and participant inclusion/exclusion criteria have been described.⁴ Briefly, we collaborated with five predominately AA churches in Minnesota using a CBPR approach to co-design a CV health and wellness digital application-based program (Fostering African-American Improvement in Total Health [FAITH!] App) as a translation from a previous in-person intervention to promote CV health. We enrolled 50 AA adults from partnering churches with multiple CV risk factors into a single-group pilot study of a 10-week intervention through the FAITH! App. The FAITH! App included 10 core multimedia education modules with videos from health professionals on CV health, interactive diet/PA self-monitoring, and social networking through a discussion/sharing board. Baseline data were collected in July 2016 and follow-up data at 28 weeks postintervention (April 2017) by trained research nursing staff at in-person health assessments and by self-administered electronic surveys. The primary outcome was change in CV health biologic factors (BP, total cholesterol, fasting glucose) and behaviors (diet, PA, cigarette smoking, BMI) from baseline to postintervention (28 weeks). Our secondary outcome was change after 28 weeks in LS7 composite score (calculated by summing scores of LS7 components by AHA-defined criteria: 2 points, ideal; 1 point, intermediate; 0 points, poor [range, 0–14 points]; total score ≥ 9 , ideal).⁵ Paired outcomes were compared with Wilcoxon signed rank tests (ordinal or continuous variables) or McNemar tests

Prior Presentations Preliminary findings of this study were presented at the annual meeting of the American Heart Association Epidemiology and Prevention Lifestyle Scientific Sessions, New Orleans, LA, March 20–23, 2018.

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Table 1 Sample Baseline Characteristics (N = 50)

| Characteristic | No. (%) [*] |
|-------------------------------------|----------------------|
| Sex | |
| Male | 15 (30.0) |
| Female | 35 (70.0) |
| Age (years) | |
| Mean (SD) | 49.6 (12.7) |
| Relationship status | |
| Single | 9 (18.0) |
| Divorced | 7 (14.0) |
| Widowed | 2 (4.0) |
| Married or committed relationship | 32 (64.0) |
| Education level | |
| High school graduate or less | 6 (12.0) |
| Some college | 12 (24.0) |
| Technical or Associate's degree | 11 (22.0) |
| College graduate or higher | 21 (42.0) |
| Employment status | |
| Employed, at least part-time | 37 (74.0) |
| Unemployed | 9 (18.0) |
| Retired | 4 (8.0) |
| Annual household income | |
| < \$20,000 | 5 (11.1) |
| \$20,000–\$49,999 | 19 (42.2) |
| \$50,000–\$74,999 | 9 (20.0) |
| ≥ \$75,000 | 12 (26.7) |
| Chose not to disclose | 5 |
| Health insurance | 48 (96) |
| Regular health care provider visits | |
| Yes | 44 (88) |
| No | 6 (12) |
| Self-reported medical history | |
| Overweight/obese | 31 (62) |
| Hypertension | 27 (54) |
| Type 2 diabetes mellitus | 10 (20) |
| Hyperlipidemia | 8 (16) |

*Unless otherwise indicated

(categorical variables). All analyses were conducted in 2017 with SAS version 9.3 (SAS Institute Inc.).

RESULTS

Participants' demographic characteristics are presented in Table 1 (70% women [35/50]; mean [SD] age, 49.6 [12.7]

years; 58% < college-graduate education [29/50]). At baseline, 40% of participants had hypertension, 86% were overweight/obese, and over 70% had poor/intermediate diet or PA. Study retention at 28 weeks was 98% (49/50). At 28 weeks, substantial improvements occurred in some CV health biologic factors (systolic BP, 133.3 to 127.1 mmHg, $P = .002$; diastolic BP, 82.8 to 77.1 mmHg, $P < .001$) and behaviors (diet, 3.4 to 4.5 fruit/vegetable servings/day, $P < .001$; moderate-intensity PA, 35 to 75 min/week, $P = .04$). The LS7 composite score increased from 8.3 to 9.0 within the ideal CV health-score range ($P = .05$) (Table 2).

DISCUSSION

This small-scale, pre/post pilot study supports benefits of a culturally relevant, community-based mHealth lifestyle intervention for promoting CV health among AAs with high cardiometabolic risk. Recent analyses of National Health and Nutrition Examination Survey (NHANES) data show persistent CV health disparities by LS7 composite scores between whites and AAs and call for multifaceted, community-level interventions to curtail and eradicate these gaps.⁶ Our intervention, although a research prototype, offers an innovative medium to engage AA patients beyond office-based encounters through mobile technology with an overarching goal of diminishing CV disease risk and mortality.

Small sample size, no control group, relatively short study duration, and a convenience sample of predominantly women limit generalizability. Also, longitudinal data on health care utilization and medication adherence were not collected. However, our intervention had low attrition and several objectively measured positive outcomes for CV health, which are reflective of our formative work and prioritization of community engagement. A randomized controlled trial is planned to assess efficacy of the FAITH! App.

Table 2 Changes in Cardiovascular Health

| Variable [*] | Baseline | Postintervention | P value |
|--|------------------------|------------------------|---------|
| Cardiovascular health factors | | | |
| Systolic BP (mmHg) | 133.3 (18.9) | 127.1 (19.3) | .002 |
| Diastolic BP (mmHg) | 82.8 (10.3) | 77.1 (12.0) | < .001 |
| BP control | | | |
| BP < 140/90, no. (%), mmHg | 29 (59.2) [†] | 40 (81.6) [†] | .005 |
| BP < 130/80, no. (%), mmHg | 13 (26.5) [†] | 23 (46.9) [†] | .008 |
| Total cholesterol (mg/dL) | 182.8 (39.8) | 185.1 (44.2) | .21 |
| Fasting glucose (mg/dL) | 89.1 (34.2) | 86.4 (15.2) | .81 |
| Cardiovascular health behaviors | | | |
| Diet: fruit/vegetable intake, servings/day [‡] | 3.4 (1.4) | 4.5 (1.8) | < .001 |
| Physical activity: moderate intensity, minutes/week, median, IQR | 35 (0–110) | 75 (25–188) | .04 |
| Cigarette smoking status, current, no. (%) | 1 [§] (2.2) | 1 [§] (2.2) | 1.0 |
| BMI (kg/m ²) | 33.1 (7.3) | 33.0 (7.1) | .48 |
| Life's Simple 7 composite score | 8.3 (2.2) | 9.0 (2.1) | .05 |

BMI, body mass index; BP, blood pressure; IQR, interquartile range

*Mean (SD) unless otherwise indicated

[†]Data missing for 1 patient

[‡]Adapted definition of diet from American Heart Association–defined healthy 5-component dietary pattern

[§]Data missing for 5 patients

CONCLUSIONS

Culturally relevant, community-based mHealth interventions such as the FAITH! App may have potential to improve CV health among AAs.

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Compliance with Ethical Standards:

The study was approved by the Mayo Clinic Institutional Review Board and registered (clinicaltrials.gov [NCT03084822]); participants provided written informed consent.

Conflict of Interest: The authors declare that they do not have a conflict of interest.

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