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Effect of Community Volunteering on Physical Activity:

A Randomized Clinical Trial

Vijay R. Varma, MPH^{1,2}, Erwin J. Tan, MD³, Alden L. Gross, PhD^{1,4}, Greg Harris, BA^{1,2}, William Romani, PhD⁵, Linda P. Fried, MD⁶, George W. Rebok, PhD^{1,2}, and Michelle C. Carlson, PhD^{1,2}

¹Johns Hopkins Center on Aging and Health, Baltimore, Maryland ²Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland ³The Corporation for National and Community Service, Washington, District of Columbia ⁴Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland ⁵AARP, Inc., Washington, District of Columbia ⁶Mailman School of Public Health, Columbia University, New York, New York

Abstract

Introduction—Older adults with a high number of chronic conditions and who live in environments that do not promote physical activity have great difficulty initiating and adhering to exercise programs. Novel lifestyle activity interventions that can effectively increase physical activity may address disparities in health in these populations. This study evaluates the effects of the Baltimore Experience Corps program, a community-based volunteer program, on walking activity in older adults.

Methods—The Baltimore Experience Corps Trial is a sex-stratified RCT that recruited participants from 2006 to 2009. Older adult participants aged ≥ 60 years ($n=123$) were from a nested objective physical activity trial within the larger Baltimore Experience Corps Trial. Participants randomized to the intervention group were placed as volunteers within the Baltimore public school system for 2 years. The primary study outcome was objectively measured total

Address correspondence to: Vijay R. Varma, MPH, Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, Hampton House 8th floor, 624 N. Broadway St., Baltimore MD 21205. vvarma1@jhu.edu..

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amount of walking activity measured in steps/day. Differences between intervention and control groups were measured at 12 and 24 months using linear mixed effects models. Data were analyzed in 2014.

Results—At 24 months, women, but not men, in the intervention group showed an increased amount of walking activity, averaging 1,500.3 (95% CI=77.6, 2,922.9) greater steps/day compared with the control group. Women in the control group declined by 1,191.6 (95% CI= – 2243.7, –139.5) steps/day at 24 months compared to baseline.

Conclusions—A community-based volunteer intervention increased walking activity among older women, who were at elevated risk for both inactivity and adverse health outcomes.

Introduction

Physical activity is associated with a lower risk of adverse health outcomes^{1–5}; however, only 20% of older adults meet U.S. physical activity guidelines.^{6–8} This particularly concerning for low-SES older adults who, compared with high-SES individuals, have lower baseline levels of physical activity and access to fewer physical activity–related facilities owing to restrictive neighborhood characteristics.^{7,9–12}

Experience Corps (EC), a community-based health promotion model, represents a novel approach to physical activity interventions. EC places older adults as volunteers within the public school system to simultaneously increase their physical, cognitive, and social activity, while improving the academic outcomes of children.^{13,14} EC was designed specifically to attract a diverse population of older adults who may not engage in typical exercise and other health promotion interventions.^{13,15}

Here, we report on the effectiveness of the long-term, 2-year EC intervention within the Brain Health Study (BHS), a substudy within the Baltimore EC Trial (BECT), to increase walking activity in an older cohort at elevated risk for cognitive and functional decline. We explored whether BHS participants randomized to the intervention, compared with controls, showed increased daily walking activity.

Methods

Participants

Participants were from the BHS,¹⁶ a nested objective physical activity and neuroimaging trial within the larger BECT, a sex-stratified, randomized controlled effectiveness trial to evaluate whether the intervention reduced mobility disability among older adults.¹⁷ Details on sex-stratified randomization, study design, sampling methodology, recruitment, and enrollment criteria are described elsewhere.^{16,17}

From 2006 to 2009, 702 participants were randomized to either EC or the low-activity control. Of those, 123 were also simultaneously enrolled in the BHS (Figure 1). Rationale for sample size has been described previously.¹⁷ The final sample in this study included 114 participants; reasons for exclusion are described in Figure 1. The study protocol was approved by the Johns Hopkins IRB and each participant provided written informed consent.

Study Design

Participants randomized to the intervention group were placed as volunteers in Baltimore City public elementary schools for 2 academic years.^{13,17} Details of the intervention as well as the low-intensity control conditions have been described previously.¹⁷

The BHS was designed to measure the effect of the intervention on levels and patterns of walking activity occurring outside the intervention. This was in response to evidence suggesting that physical activity often declines after interventions cease¹⁸ and recommendations to measure and better understand how daily civic engagement may impact the maintenance of physical activity.¹⁹ By design, the majority of participants were evaluated in the summer and early fall (prior to the academic year) in order to capture daily walking activity outside the intervention and to reduce seasonal bias.

Walking Activity Measure

Walking activity was measured using a Step Activity Monitor (SAM) at baseline and follow-up visits at 12 and 24 months. The SAM is an accelerometer that has been validated across a range of community-dwelling older adult populations with varying levels of function.^{20–22}

Participants were instructed to wear the SAM for up to 7 days while keeping a wear time/activity diary at approximately 1-hour intervals. The data cleaning protocol has been described previously.²³

The main outcome measure was daily walking activity, measured by the number of steps walked/day averaged across all valid surveyed days.

Statistical Analysis

All analytic methods considered initial treatment assignment, rather than treatment compliance, to evaluate the effect of the intervention; individuals who did not provide SAM data were excluded (Figure 1). All analyses were sex stratified a priori; the BHS was designed specifically to explore sex differences in intervention effects.²⁴ Linear mixed-effect models to account for subject-level clustering with random intercepts were adjusted for age at baseline and race. We additionally adjusted for BMI in women because of significant differences between baseline characteristics of study subjects (Appendix Table 1). Data were analyzed in 2014.

We estimated the following at 12 and 24 months: (1) intervention effect, intervention minus control group; and (2) change in walking activity relative to baseline for the intervention and control group. We additionally provided the mean and SD of steps walked/day for the intervention and control group at baseline and 12 and 24 months.

Results

Baseline characteristics and description of the at-risk study sample, as well as intervention adherence, are included in Appendix Table 1 and have been described previously.^{23,25}

Means and SDs of steps walked/day at baseline and 12 and 24 months are included in Table 1. In analyses of the sex-stratified groups (Table 1, Figure 2), at 12 months there were no significant intervention effects on walking activity in women. At 24 months, women in the intervention group averaged 1,500.3 (95% CI=77.6, 2922.9) greater steps/day than women in the control group. Over the duration of the study, women in the intervention group maintained levels of walking activity similar to baseline. Women in the control group declined by 1,191.6 (95% CI= - 2243.7, -139.5) steps/day at 24 months compared with baseline levels.

At 12 and 24 months, there were no significant intervention effects on walking activity in men, and intervention and control groups did not show significant declines in walking activity compared to baseline levels.

Discussion

Over a 24-month period, women, but not men, in the intervention showed increased walking activity compared to their sex-matched control groups. Additionally, although women in the intervention group maintained walking activity levels over 24 months, women in the control group declined significantly. The results of this study indicate that a community-based intervention that naturally integrates activity in urban areas may effectively increase physical activity. These findings provide a template for designing successful interventions to encourage physical activity and support those at highest risk for both inactivity and adverse cognitive and physical health outcomes.²⁶

Study results indicated that participating in EC increased walking activity in women outside of the school-based intervention. Prior research suggests that through a variety of mechanisms, EC may serve as a pathway to other productive social and civic activities; after joining EC, volunteers may start new work, volunteer, community, and educational activities.^{12,27,28} Therefore, increased walking activity measured in this study may be associated with those new activities. The lack of an intervention effect at 12 months may be expected, considering prior evidence suggesting that the rewards and benefits of the intervention may only occur after a period of acclimation to the school setting.^{16,29}

Positive intervention effects were found in women only. The high percentage of attrition among men—38.9% of men in the intervention group included in the analysis dropped out of the intervention prior to placement in the schools, compared with 12.2% of women—may explain these findings.

Limitations

This study has limitations. Although we were able to test the intervention effect in an RCT with a long follow-up, our sex-stratified sample size was small. Additionally, we describe intervention related change in daily walking activity, which represents a component of total physical activity. Finally, though the study sample represented at-risk segment of the older adult population, a volunteer service trial may select for more health-conscious community members.

Conclusions

EC Baltimore was designed to attract a diverse population of older adults at elevated risk for both inactivity and adverse health outcomes. This study provides evidence for a community-based model of health promotion that, through increasing walking activity, may address disparities in health in an at-risk population of older adults.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
CONSORT diagram summarizing flow of participants through the Brain Health Study.

Figure 2.
Average steps/day at baseline, 12 and 24 months for women by intervention status.

Table 1

Impact of the Experience Corps Intervention Versus Control on Walking Activity at 12 and 24 Months

	Women (n=78)			Men (n=36)		
	Baseline	12 month	24 month	Baseline	12 month	24 month
Steps/day: mean (SD)						
Intervention	7,501.5 (3,297.8)	7,003.0 (3,191.3)	8,179.1 (3,756.1)	7,882.6 (4,478.3)	6,573.4 (2,693.4)	7,222.2 (3,026.1)
Control	7,311.9 (2,596.7)	7,220.2 (2,956.8)	6,166.9 (2,775.6)	9,031.1 (4,492.4)	7,253.7 (2,997.7)	8,801.0 (3,711.1)
Steps/day: B (95% CI)						
Intervention effect: (Intervention - Control)	-	-302.3 (1,726.7; 1,122.2)	1,500.3 (77.6; 2,922.9)	-	- 1,539.7 (-3,993.1; 913.7)	- 2,367.0 (-4,983.5; 249.5)
Intervention: change from baseline	-	-598.3 (-1,610.0; 413.4)	292.3 (-688.0; 1,272.7)	-	- 1,255.6 (-2,770.4; 259.2)	- 802.3 (-2,583.4; 978.9)
Control: change from baseline	-	-279.6 (-1,289.6; 730.4)	-1,191.6 (-2,243.7; -139.5)	-	- 1,106.6 (-2,824.0; 610.9)	174.1 (-1,612.3; 1,960.5)

Note: Boldface indicates statistical significance ($p < 0.05$).

All models included covariates age at baseline and race; women-only model additionally included BMI at baseline.