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No-cost gym visits are associated with lower weight and blood pressure among non-Latino black and Latino participants with a diagnosis of hypertension in a multi-site demonstration project

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ABSTRACT

Well documented, persistent racial/ethnic health disparities in obesity and hypertension in the US demonstrate the continued need for interventions that focus on people of color who may be at higher risk.

We evaluated a demonstration project funded by the CDC's Racial/Ethnic Approaches to Community Health (REACH) program at four federally qualified health centers (FQHC) and YMCA fitness and wellness centers in Boston. No-cost YMCA memberships were offered from June 2014 to June 2015 to non-Latino black and Latino adults with a diagnosis of hypertension. YMCA visit data were merged with health data for 224 participants (n = 1265 health center visits). We assessed associations between gym visit frequency and weight, body mass index (BMI), systolic blood pressure (SBP), and diastolic blood pressure (DBP) using longitudinal time-varying linear fixed-effects models.

The total number of gym visits over the entire program duration was 5.5, while the conditional total number of visits (after the first gym visit has been made) was 17.3. Having visited the gym at least 10 times before an FQHC exam was, on average, associated with lower weight (1.19 kg, p = 0.01), lower BMI (0.43 kg/m^2, p = 0.01) and reductions in SBP (−3.20 mm Hg, p = 0.01) and DBP (−2.06 mm Hg p = 0.01). Having visited the gym an average of 1.4 times per month (study average) was associated with reductions in weight, BMI, and DBP.

No-cost gym visits were associated with improved weight and blood pressure in hypertensive non-Latino black and Latino adults in this program. Additional evaluation is necessary to assess the sustainability of these effects.

1. Introduction

Persistent racial/ethnic health disparities in the United States indicate that optimal health still remains out of reach for many people of color and highlights the need for continued policy, system, and environmental interventions aimed at reducing disease burden among vulnerable populations. Hypertension and obesity, leading modifiable risk factors for cardiovascular disease mortality, are among a host of health outcomes with consistently higher prevalence in some communities of color (Frieden, 2013; National Center for Health Statistics, 2016). Hypertension affects approximately 30% of the adult population in the US with the highest rate reported among the non-Latino black population (43.3%), and the lowest rates of controlled blood pressure reported among Latino (34.4%) and non-Latino black populations (42.5%) (National Center for Health Statistics, 2016; Yoon et al., 2010). Similarly, obesity affects over one-third of US adults with the highest rates found among non-Latino black adults (48.0%) followed by Latino adults (42.6%) and non-Latino white adults (34.6%) (National Center for Health Statistics, 2016; *CDC Adult Obesity Facts*, 2015; Ogden et al., 2014). The prevalence of hypertension progressively increases with body mass index (BMI) (Artham et al., 2009). In one study, the prevalence of hypertension increased from 15% to 42% in men and 15% to

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38% in women as BMI increased from healthy weight range to obese range (Brown et al., 2000). The same study also demonstrated that this relationship is more pronounced among black men and women (Brown et al., 2000).

Engaging in moderate to vigorous physical activity has been shown to lower risk of hypertension and obesity (Brown et al., 2000; Chobanian et al., 2003; Wallace, 2003; Whelton et al., 2002; Physical Activity Guidelines Advisory Committee Report, 2009; Sallis et al., 2012; Crump et al., 2016; Vuori et al., 2013; Jensen et al., 2013). Physical activity can effectively prevent and treat both conditions (Chobanian et al., 2003; Wallace, 2003; Whelton et al., 2002; Physical Activity Guidelines Advisory Committee Report, 2009; Sallis et al., 2012; Crump et al., 2016; Vuori et al., 2013; Jensen et al., 2013; Lavie et al., 2016). However, the majority of adults do not achieve the recommended levels of physical activity (Sallis et al., 2012; Bauman et al., 2012). In the US, levels of physical activity are lower among non-Latino black and Latino adults and among low-income populations, when compared to white adults and higher income groups, respectively, which contribute to higher prevalence of hypertension and obesity (Carlson et al., 2008; Saffer et al., 2013; *Facts About Physical Activity*, 2014). A complex set of cultural, social, and environmental challenges may interfere with achieving recommended levels of physical activity among communities of color and low-income populations (Van Duyn et al., 2007; Whitt-Glover et al., 2009; Liu et al., 2012; Kumanyika et al., 2014). In addition, there is a relative paucity of effective physical activity interventions designed to reach specific racial/ethnic groups (Bauman et al., 2012; Van Duyn et al., 2007; Whitt-Glover et al., 2009; Liu et al., 2012; Kumanyika et al., 2014).

Local partnerships involving public health agencies, healthcare providers, community-based organizations, and community members may be better suited to address the complex barriers to achieving recommended levels of physical activity (Auerbach, 2016). Equipped with experiences from a previous pilot project, the Boston Public Health Commission partnered with four community health care centers and the YMCA of Greater Boston, which is an international community-centered organization that focuses on strengthening communities and healthy living, to implement a physical activity intervention from June 2014 to June 2015. The project provided no-cost YMCA fitness and wellness center memberships to eligible patients referred from four federally-qualified health centers (FQHC) in Boston.

To evaluate this project, we linked existing information on subsidized membership and visits to the YMCA fitness and wellness center with electronic health record (EHR) data, and examined the association between YMCA fitness and wellness center membership and visit frequency with changes in weight, body mass index (BMI), systolic blood pressure (SBP) and diastolic blood pressure (DBP). We hypothesized that visits to the YMCA fitness and wellness center would be associated with reduced body mass index and blood pressure measurements.

2. Methods

We analyzed existing data to assess the association between YMCA utilization, and BMI and blood pressure outcomes among enrolled participants. The Boston University Medical Center Institutional Review Board granted this evaluation an exemption from human subjects research oversight because the analyses involved only secondary data and no contact with human subjects occurred.

2.1. Program setting and enrollment

The multi-site REACH demonstration project, “Get Active!,” was implemented at four local FQHC and YMCA sites in Boston, Massachusetts from June 15, 2014 to June 15, 2015. The FQHC were located in four Boston neighborhoods with disproportionately more non-Latino black and Latino residents. All non-Latino black and Latino adult patients (18 years or older) with an International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9 CM) diagnosis code for hypertension (401) served by the FQHC, regardless of blood pressure medication status, were eligible for a no-cost YMCA fitness and wellness center membership for up to one year. Primary recruitment methods included direct outreach to patients, recruitment from hypertension support groups within the FQHC, and direct referral from providers.

2.2. YMCA gym membership and visits

The YMCA of Greater Boston is an association of community-based service centers with 13 locations serving the Greater Boston metropolitan area. Each center has an indoor gym, a wellness center, an indoor pool (except one location), and offers group exercise classes. The REACH program participants were offered access to the YMCA's fitness and wellness centers in the form of a no-cost, three-month membership to the YMCA and were directed to visit one of four YMCA locations in order to activate their membership. After membership activation, participants could access any YMCA location within the Greater Boston network. Participants were offered an additional nine-month no-cost membership extension if they used the fitness and wellness center 14 times during the initial three-month membership period, although exceptions were made to these extension requirements on a case-by-case basis.

Visits to the YMCA fitness and wellness centers (hereafter referred to as gym visits) were tracked by an electronic centralized tracking system which required participants to physically swipe their membership cards at the facility entrance. This centralized tracking system generated a data set with the date (month, day, and year) for every gym visit by a participant.

2.3. Health outcomes

We assessed four health outcomes extracted from the EHR: weight (kg), BMI (kg/m^2), SBP (mm Hg), and DBP (mm Hg). Each health outcome was measured by trained clinical staff at the FQHC, except for BMI, which was computed from the clinically measured height and weight. Because case-wise deletion reduced power without altering the magnitude of the estimated coefficients, we used all available health outcome observations available.

2.4. Linked data sets

To assess the association of gym membership only and gym visit frequency with health outcomes, a limited set of health, demographic, and health insurance status data with clinic measurement dates was obtained from the FQHC for each participant from January 1, 2014 to June 15, 2015 – which includes a six-month period of time before the start of the intervention to ensure at least one clinical measurement prior to or at enrollment. There was a wide range in the number of clinical measurements per participant as well as intervals between clinical measurements as the program did not require clinical exams at specific intervals after enrollment. These data were merged with the gym visit data using random identifier, assigned to each individual by the FQHC, and the date of gym visit (year, month, and day). This resulted in a data set containing clinically measured health outcomes and electronically tracked gym visit records from January 1, 2014 to June 15, 2015.

2.5. Statistical methods and models

Taking advantage of the longitudinal data, we used time-varying linear fixed-effects model that assigned individual fixed-effects (i.e. fixed intercepts) to each patient to assess the association between no-cost gym visits with health outcomes. The linear fixed-effects model used here differs from a typical linear mixed-model that assigns random