



Effects of a structural intervention and implementation on physical activity among youth in residential children's homes



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ARTICLE INFO

Article history:

Received 16 December 2013

Received in revised form 21 May 2014

Accepted 26 May 2014

Available online 4 June 2014

Keywords:

Physical activity

Foster youth

Implementation monitoring

Process evaluation

ABSTRACT

This study reports the effects of a structural intervention, ENRICH (Environmental Interventions in Children's Homes) which targeted the physical and social environment within residential children's homes (RCHs) to increase physical activity (PA) among residents ($n = 799$). Participating RCHs ($n = 29$) were randomized to Early ($n = 17$) or Delayed ($n = 12$) groups from 2004 to 2006 and 2006 to 2008, respectively. Children's PA was measured at three time periods (2004, 2006, 2008). Intent-to-treat analysis revealed no intervention impact on PA. Subsequent analyses used process evaluation data to group organizations into high and low PA-promoting RCHs to compare PA level, controlling for assignment to condition. Organizations with high PA-promoting environments were found to have more active youth. Utility of a comprehensive implementation monitoring plan and the need for formative assessment of organizational capacity is discussed.

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1. Introduction

Health behaviors including physical activity (PA) are typically reinforced within settings that provide supportive structures and opportunities (Booth et al., 2001; Craddock, Melly, Allen, Morris, & Gortmaker, 2007; Elder et al., 2007; Gay et al., 2011; Giles-Corti & Donovan, 2002; Pate et al., 2005; Roemmich et al., 2006; Sallis et al., 2003). Structural interventions target influencing factors within physical and social environments that are beyond individual control (Blankenship, Friedman, Dworkin, & Mantell, 2006; Booth et al., 2001; Cohen, Scribner, & Farley, 2000; Koplan, Liverman, & Kraak, 2005; Matson-Koffman, Brownstein, Neiner, & Greaney, 2005; McLeroy, Bibeau, Steckler, & Glanz, 1988). The structural ecologic model (SEM) identifies four structural factors of environmental influences (availability of products and services, characteristics of available opportunities, social structures and

policies, and media/cultural messages) which have the capacity to impact population-level health outcomes (Cohen et al., 2000).

Structural interventions are situated in "real world" settings, entail working extensively with stakeholders, focus on change in higher order units (e.g. organization or community versus individual) with inherent variability, and are subject to strong contextual influences (Chen, 2004; Shadish, Cook, & Campbell, 2001). It is important to consider natural variations within the implementation setting as part of structural intervention design (Poland, Krupa, & McCall, 2009). This may be achieved in part by conceptualizing these approaches as "complex" interventions, defined as interventions that interact with the setting during implementation (Chen, 2004; Cohen et al., 2000; Foster-Fishman, Nowell, & Yang, 2007; Hawe, Shiell, & Riley, 2004). Structural interventions that aim to change social and physical environments with the aid of local change agents present implementation challenges that necessitate a comprehensive approach to program evaluation and implementation monitoring (Medical Research Council, 2008; Durlak & Dupre, 2008; Saunders, Ward, Felton, Dowda, & Pate, 2006). Programs lacking implementation assessment cannot ascertain the effectiveness of program implementation and how outcome data should be interpreted (Durlak & Dupre,

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2008). Furthermore, inadequate assessment of implementation coupled with the assumption that an intervention is implemented homogeneously across diverse organizational settings can result in a “Type III error” where a program is found to be ineffective, when actually it was not completely and/or properly implemented (Durlak & Dupre, 2008; Harachi, Abbott, Catalano, Haggerty, & Fleming, 1999; Linnan & Steckler, 2002; McGraw et al., 1996; Pate et al., 2007; Saunders, Evans, & Joshi, 2005).

Process evaluation data can be useful in determining several facets of implementation including, the extent to which a program is implemented as planned (i.e. fidelity), level of satisfaction and/or confidence of program change-agents to deliver program components (dose-received), and the extent to which all program components were completed (i.e. dose-delivered) (Saunders et al., 2005). For example, McGraw and colleagues (1996) used process data to examine the relationship between implementation of classroom-based health education and diet self-efficacy (i.e. confidence) for The Child and Adolescent Trial for Cardiovascular Health (CATCH) intervention. Implementation of classroom activities was monitored through random teaching observations and teacher self-report surveys, including self-efficacy to deliver the CATCH education curriculum. Results determined that greater implementation of CATCH health education significantly predicted student outcomes.

Because physical activity is performed in specific settings and is influenced by contextual factors within the physical and social environment (Watts, Phillips, Petticrew, Harden, & Renton, 2011) structural interventions should examine the complex ecological influences within organizational settings which provide services to vulnerable youth. Residential children’s homes (RCHs), or residential group homes, are facilities that provide onsite residential care and treatment services to children who have been removed from their biological families. Although the mission of RCHs are similar regarding the well-being of foster children, individual organizations can differ in the number of residential foster youth served, organization size (e.g. number of RCH staff), and types of services provided (Curtis, Alexander, & Lunghofer, 2001).

In 2010, over 400,000 American children were placed into foster care (Children’s Defense Fund, 2013) due to abuse, neglect, or child’s behavioral or emotional problems (United States Department of Health and Human Services, 2005). In North and South Carolina, nearly 18,000 children were placed into either foster family care or residential group homes in 2010 (Children’s Defense Fund, 2013). Though a child’s length of stay in foster care is typically less than two years, the long-term health implications from this experience increases a child’s odds for a myriad of negative social, mental, and physical health outcomes (James, Landsverk, Slymen, & Leslie, 2004; Viner & Taylor, 2005; Zlotnick, Tam, & Soman, 2012). A recent study found adults placed into foster care as children were more likely to have extended gaps in employment, suffer from asthma, Type 2 diabetes, hypertension, stroke, and heart disease compared to adults who had never been placed into foster care (Zlotnick et al., 2012). This finding warrants preemptive intervention efforts that promote healthy lifestyles that can track into adulthood. Structural interventions targeting environmental change may be an ideal approach for improving health among vulnerable youth who are at greater risk for multiple negative social and health outcomes. To date, this is the first study to report on youth physical activity outcomes and implementation from a structural intervention targeting RCHs in North and South Carolina.

The purpose of this paper is to report the effect of a group randomized intervention, Environmental Interventions in Children’s Homes (ENRICH), on youth PA. It was hypothesized that a greater percentage of children in the early-intervention group would report 2+ blocks of moderate-to-vigorous physical activity

(MVPA) and Total MET-weighted blocks at post-test (2006), compared to those in the delayed-intervention group (i.e. control-group). Furthermore, it was hypothesized that intervention effects would be greater in RCHs with documented higher levels of intervention implementation.

2. Methods

2.1. Participants

There were 63 potential participant RCH organizations in North and South Carolina affiliated with The Duke Endowment at the beginning of the study. Nine of these declined participation (most commonly because the program was “not needed”). Of the remaining 54 RCHs, 29 were eligible to participate based on the criteria of having a relatively stable population of children requiring low-to-moderate management with no restrictions on PA.

Assignment to condition was done at the organizational level. Eligible RCHs were matched on organizational characteristics and randomly assigned to Early (treatment) or Delayed (control) intervention groups; using a randomized crossover design, the Early and Delayed groups received the intervention from 2004 to 2006 and 2006 to 2008, respectively. Matching criteria included location (SC or NC), complex versus simple organizational structure based on number of locations and services provided, participation in National Breakfast and Lunch Program, state accreditation, and existing PA programs. At baseline, it was discovered that one North Carolina RCH organization randomly assigned to the Early intervention group was situated across five regional locations. It was ultimately considered to be six separate RCHs, resulting in 18 Early intervention (or treatment) RCHs. One Early intervention RCH dropped out during the first year, leaving 17 treatment and 12 Delayed RCHs in the final organizational sample.

Individual participants were 799 children residing in 24 of the 29 RCHs that had at least 10 children in residence at the time of measurement; eight and 15 RCHs were located in North Carolina and South Carolina, respectively. Children were recruited if they were 11–18 years of age and could complete questionnaires with minimal assistance. Due to the transient nature of this population (average length of stay was less than one year), we used a cross-sectional study design to assess intervention impact on PA at the individual level; data were collected across three measurement waves in 2004, 2006, and 2008. Because of the wide distribution of RCHs across two states, RCH staff helped recruit children using materials that were developed by the research team. Children who participated received a small item valued at \$1 (e.g. cologne, lotion, airplane glider, cards). This study was approved by the Institutional Review Board of the University of South Carolina. Before data collection, written informed consent from a parent/guardian or authorized case worker from the department of social services and signed assent forms from children were obtained. Trained data collectors measured children’s height and weight with a stadiometer (Shorr Productions, Olney, MD) and digital scale (Seca 880/881, Seca Corporation, Hanover, MD), respectively and administered self-report questionnaires to children at each participating organization. Descriptive variables included age (mean \pm SD); years in current RCH residence (mean \pm SD); gender (male/female); race (White/Black/Other); weight (normal/overweight/obese); and body mass index (BMI) score (mean \pm SD).

2.2. ENRICH intervention

At the initial 2004 planning meeting, ENRICH staff and advisory board committee members facilitated small discussion groups

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