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Competency Based Approach to Community Health (COACH): The methods of a family-centered, community-based, individually adaptive obesity randomized trial for pre-school child-parent pairs

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ABSTRACT

Competency-Based Approaches to Community Health (COACH) is a randomized controlled trial of a family-centered, community-based, and individually-tailored behavioral intervention for childhood obesity among Latino pre-school children. COACH focuses on improving personal agency for health behavior change by tailoring content to overcome contextual barriers. The intervention focuses on diet, physical activity, sleep, media use, and engaged parenting. The content is individually adapted based on routine assessments of competency in specific health behaviors using a mobile health platform and novel measurement tools developed by our team. In response to these regular assessments, health coaches provide tailored health behavior change strategies to help families focus on the areas where they decide to improve the most. The intervention consists of a 15-week group-based intensive phase, with weekly sessions delivered by health coaches in community centers. Following weekly sessions, a 3-month maintenance phase of the intervention consists of twice monthly coaching calls for participants to focus on individual health goals for their families.

The primary outcome of the trial is child body mass index trajectory over 1 year. Secondary outcomes include parent body mass index change, child waist circumference, child diet, child physical activity, and other psychosocial mediators of child health behavior change. The control arm consists of a school readiness intervention, delivered by the Nashville Public Library.

By applying a personalized approach to child behavior change, in the setting of both family and community, COACH aims to develop sustainable solutions for childhood obesity by supporting healthy childhood growth in low-income, minority preschool children.

1. Introduction

In the last 20 years there have been over 300 health-behavior interventions tested in randomized controlled trials to prevent or treat childhood obesity [1,2]. These trials often result in heterogeneous, disappointing, and short-lived results [3–8]. While it is widely accepted that there are multiple interacting determinants of childhood obesity, including macro-level influences (e.g., poverty, social norms, etc.) and micro-level influences (e.g., genetics, satiety set-point, etc.), the optimal approach for intervening across these multiple levels remains a topic ripe for further investigation [9].

One challenge to the implementation of behavioral interventions for childhood obesity is the persistent reliance on an evaluation methodology that has its underpinnings in drug trials. Namely, behavioral interventions to reduce childhood obesity have often applied the same "dose" of the intervention to each participant, regardless of their pre-existing competency with health behaviors like healthy diet and physical activity. Furthermore, it is imperative that attempts to support healthy childhood growth consider the foundational contribution of a person's context (i.e., culture, environment) to their health behaviors, especially as children from traditionally underserved minorities are often hardest hit by obesity [10]. Thus, one potential contributor to the

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modest results of behavioral obesity trials is a one-sized-fits-all approach that hardly fits anyone.

The paradigm of personalized medicine considers how best to tailor treatment options to meet the unique needs of individuals. But, recognizing which treatments work best and for whom should not be limited to pharmacology or genetics. In order to operationalize a personalized childhood obesity intervention we developed an individually-adaptable curriculum using a trans-disciplinary approach that builds on theoretical and practical lessons from the learning sciences.

For decades, experts in learning theory have recognized that reducing variation in learning outcomes requires increasing variation in instruction (i.e., a personalized approach) [11]. In the context of childhood obesity, competency-based learning theory posits that an individual gains proficiency in health behaviors (e.g., diet and physical activity) by gaining mastery over specific skills and knowledge relevant to the health behavior in question. For example, in order to become proficient at eating healthy snacks, an individual must integrate several competencies (e.g., calorie-counting, successful navigation of grocery shopping, avoiding unplanned snacks) that are often learned in a non-linear manner and require contextualization.

The Competency-Based Approaches to Community Health (COACH) randomized controlled trial (RCT) tests a novel multi-level behavioral intervention for childhood obesity prevention and treatment, designed to be a personalized intervention that still leverages the power of community and individual contextual factors. This paper describes the design, methodology, and proposed evaluation of COACH. This intervention builds on best practices from childhood obesity interventions, including 1) focusing on group-based therapy to build social connections, 2) targeting both parents and children simultaneously, 3) leveraging the strengths of the built environment to facilitate physical activity, and 4) implementing behavior change strategies (i.e., goal setting, self-monitoring, and problem solving) in the context of health behaviors (i.e., diet, physical activity, sleep, media use, and engaged parenting) [12–14]. The main advancement of the COACH intervention is the way a personalized behavior change intervention is operationalized in this community and group-based context.

One of the primary goals of this intervention is to reduce health inequity through tailored content that addresses important socio-cultural barriers in a historically underserved community with high rates of childhood obesity. Consequently, the participants included in the COACH intervention are from the Hispanic/Latino community, where childhood obesity prevalence approaches 22% [10,15]. There are several ways that this intervention accounts for cultural differences: 1) the intervention was developed with community input using participatory approaches to research design; 2) the intervention is delivered by a native Spanish speaking health coach; 3) the intervention uses recipes that are consistent with typical food choices for the local Hispanic/Latino community; and 4) the intervention specifically addresses barriers to healthy behavior that are timely and relevant to immigrant and minority populations.

Making a sustainable improvement in childhood obesity will require the research community to push the envelope of existing paradigms and move beyond what has already been tried. By creating a personalized behavioral intervention for childhood obesity that engages families from underserved communities, the COACH RCT steps into new territory by considering which aspects of behavioral interventions work best for whom.

2. Materials and methods

2.1. Study aims

The primary aim of COACH is to evaluate the effectiveness of a novel personalized obesity intervention to prevent or treat childhood obesity at 1-year follow-up among children ages 3–5 at the time of study enrollment. The trial involves a 6-month intervention with 6 months of additional follow-up. We hypothesize that children in the intervention arm will demonstrate healthier body mass index (BMI) trajectories compared to the control arm over the 12-month trial period. We also hypothesize that both parents and children in the intervention arm will demonstrate improvements in health-related behavioral competencies (diet, physical activity, sleep, media use, and engaged parenting) compared to the control arm at 3 months, 9 months, and 12 months of follow-up. A secondary aim of COACH is to evaluate the effectiveness of the intervention using qualitative methodology, including focus groups and key informant interviews to investigate which components of the intervention supported sustainable health behavior change.

2.2. Theoretical framework and conceptual model

Personalized approaches to medicine consider how to best account for social, cultural, environmental, and individual variants. Our work aims to develop efficacious and dynamic methods to meet the unique needs of community members so as to prevent and treat pediatric obesity. This work draws on the synergies, as well as the unique contributions, between the theoretical positions of both health sciences and learning sciences [16]. We employ theoretical frameworks from health sciences to develop a multi-level understanding of the determinants of childhood obesity (Fig. 1), drawing on 1) self-determination theory, which articulates how competence, autonomy, and relatedness support motivation [17] and 2) social cognitive theory, which frames learning as a reciprocal interaction between individual, environment, and behaviors [18,19]. We also draw on theoretical frameworks from the

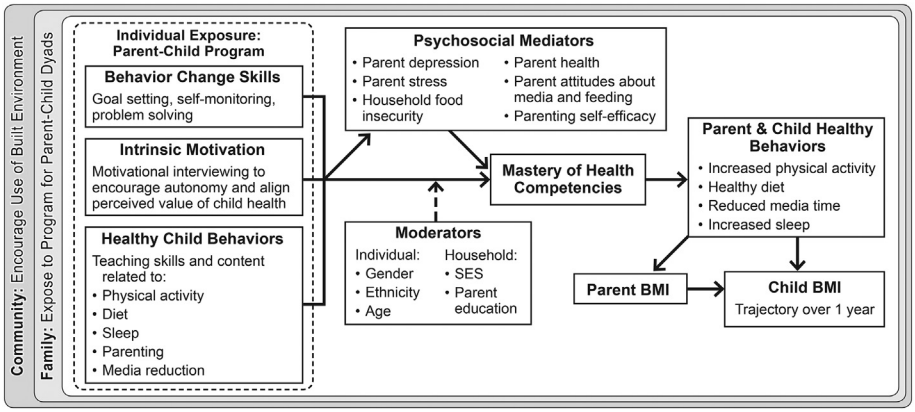

Fig. 1. A multi-level model for child obesity, recognizing the importance individual, family, and community influences on child health behaviors. This model shows the operationalized intervention constructs of the COACH intervention and the relationships between key mediators of child BMI.