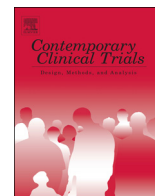




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## Habit formation intervention to prevent obesity in low-income preschoolers and their mothers: A randomized controlled trial protocol

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## ABSTRACT

**Background:** Low-income and racial/ethnic minority mothers and their young children are at increased risk for obesity. Lack of access to evidence-based obesity prevention and treatment services further contributes to these disparities.

**Methods:** This two-arm, parallel, randomized controlled trial (RCT) tests the effectiveness of a simple obesity intervention (HABITS) delivered as part of ongoing home visitation services, compared to the existing home visitation services without obesity-related content on mothers' and children's obesity risks. HABITS focuses on habit formation and modifications of food and activity cues in the home to support habit formation. Habit formation is focused on improving five behaviors: 1) fruits/vegetables, 2) fried foods, 3) sugar-sweetened beverages, 4) physical activity and 5) self-monitoring. Participants will be 298 mothers (> 50% African American; 100% low income) and their children (3-5yo at baseline) enrolled in a home visitation program in central Alabama. Home visitors will be randomly assigned to deliver the home visitation curriculum with or without HABITS as part of their weekly home visits for 9 months. Assessments of mothers (weight, waist circumference, and habit strength of targeted behaviors), children (rate of weight gain), and the food/activity household environment will be conducted at enrollment, post-intervention (9 month), and one year post-intervention follow-up.

**Discussion:** This research is poised to have a substantial impact because the delivery modalities of current obesity efforts disproportionately restrict the reach and engagement of underserved, low-income children and their caregivers who are most at-risk for health and obesity disparities.

## 1. Introduction

Economically disadvantaged families are disproportionately affected by obesity [1]. Maternal factors such as mothers' diet and feeding practices are instrumental in shaping children's health behaviors and weight outcomes [2–6]. Similarly, factors within the home environment (e.g., foods present in the home) have also been associated with children's dietary intake and weight status [7–9]. Even the most successful obesity reduction/prevention strategies have had limited impact among under-resourced families, partly because effective interventions are neither accessible nor tailored to address families' needs [10,11]. Also, conventional family-based obesity interventions comprehensively address nutritional, physical activity, and behavioral topics [12–14], although a handful of behaviors (e.g., self-monitoring of weight, consistent physical activity, regular eating patterns) have been consistently

associated with long-term weight management [15–19]. Thus, helping individuals develop healthy habits around a few key behaviors may be as effective and more efficient. A simplified, targeted approach may be particularly well-suited for under-resourced, overburdened families [20].

This approach is also consistent with a habit-formation paradigm [20–25], which focuses on frequently and consistently enacting a target behavior in response to a specific cue until the behavior reaches automaticity [20–25]. A handful of studies suggest that habit-formation interventions focused on select energy-balance behaviors are feasible and result in greater weight loss than usual care [20,21,26] and are effective in improving parental feeding practices for young children [27]. Since habit-formation and automaticity rely on the repetition of a behavior in response to consistent contextual cues, it is imperative to address cues in the household environment that are conducive to the

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**Table 1**  
 Logic model of habits.  
 Situation: Low-income and racial/ethnic minority mothers [1] and their young children [43–46] are especially at-risk for obesity and related diseases, and the lack of access to evidence-based obesity efforts further contributes to these disparities.

Inputs	Outputs	Outcomes
<ul style="list-style-type: none"> <li>Existing maternal-child health infrastructure</li> <li>Funding</li> <li>Input from childhood obesity experts</li> <li>Provision of health services (obesity intervention)</li> <li>Partnership between academia and maternal-child services</li> </ul>	<p>Activities</p> <ul style="list-style-type: none"> <li>Implementation of a targeted obesity intervention based on habit-formation and choice architecture of personal and household environment</li> <li>Focus on mother-child health behaviors, interactions and norms</li> <li>Participants</li> <li>Sociodemographic: underserved, low-income, predominantly African American mother-children enrolled in home visitation services</li> <li>Home visitation directors, staff and stakeholders</li> </ul>	<p>Short and medium term</p> <ul style="list-style-type: none"> <li>Increased access to obesity intervention</li> <li>Increase mothers' health literacy and empowerment over their personal and home environment</li> <li>Improved mother and child health behaviors and weight</li> </ul> <p>Long-term</p> <ul style="list-style-type: none"> <li>Decrease obesity and health disparities among underserved low-income mothers and children and reduce costs</li> </ul>
<p>Assumptions</p> <ul style="list-style-type: none"> <li>Conventional lifestyle programs often aimed at too many complex components that are too distal from the primary target (weight) to produce lasting changes.</li> <li>Sustained and repeated behavioral practice with corrective feedback is necessary to promote mastery and maintenance of healthy habits.</li> <li>Environmental cues can either support or interfere with healthy habits, and they need to be explicitly addressed through in the home environment to promote habit-formation.</li> </ul>	<p>External factors</p> <ul style="list-style-type: none"> <li>Modifying the food environment at the population level is a complex and long-term undertaking that requires changes in multiple systems of influence. Helping mothers modify their personal and household environments is more immediately feasible and empowering.</li> <li>Home visitation programs provide a scalable, sustainable, cost-effective delivery model for obesity interventions.</li> <li>Underserved families lack access to opportunities and resources that facilitate healthy behaviors.</li> </ul>	<p>Deliverables: Scientific/academic (journals and conferences) and non-academic outlets (online media; meeting with stakeholders). The intervention material will be included in a guidebook for implementers to promote nationwide uptake and optimize the public health impact of this research.</p>

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