



Treatment Interventions for Early Childhood Obesity: A Systematic Review

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ABSTRACT

CONTEXT: With 25% of preschool-age children in the United States being overweight or obese, effective interventions for these children would have significant public health implications. Randomized trials targeting this age group have been performed since the last systematic review.

OBJECTIVE: To systematically review the literature on treatment interventions for overweight or obesity in preschool-age children.

DATA SOURCES: Medline (1948–July 2014), the Cochrane Central Registry (1991–July 2014), CINAHL (1990–July 2014), and PAS abstracts (2000–2014).

STUDY SELECTION: Inclusion criteria were children aged 0 to 6 in the study and adiposity as an outcome. Exclusions were having normal-weight children in the trial and not having a comparison group.

DATA EXTRACTION: Data were extracted independently by 2 authors using a template.

RESULTS: The initial search yielded 1981 results, narrowed to 289 abstracts after initial review. Further analysis and cross-

referencing led to the selection of 6 randomized controlled trials representing 1222 children. Two studies used systems changes and motivational interviewing and showed no significant effect on adiposity. Two studies used an intensive, multidisciplinary approach over 6 months and demonstrated significant decreases in adiposity. One study tested parental coaching and showed a significant reduction in adiposity at 6 months. One study used education on a dairy-rich diet and showed a possible effect on adiposity.

LIMITATIONS: The study designs were too heterogeneous for meta-analysis; few ethnic minority subjects were included.

CONCLUSIONS: Multidisciplinary, intensive interventions have some evidence of efficacy in reducing adiposity in preschool children.

KEYWORDS: body mass index; child; health behavior; health promotion; obesity; overweight; preschool

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WHAT THIS SYSTEMATIC REVIEW ADDS

- This is the first systematic review of treatment interventions for obese 2- to 5-year-olds.
- Multidisciplinary, intensive approaches to treatment have the most evidence of efficacy.
- Evidence testing treatment interventions in minority populations is limited.

HOW TO USE THIS SYSTEMATIC REVIEW

- Investigation into the degree of intensity required for effective treatment is warranted.
- Treatment programs need evaluation in high-risk groups, particularly racial and ethnic minority groups.
- There is evidence supporting stage 3 interventions of obesity treatment; there is little evidence supporting the other stages in this age group.

DESPITE SOMEWHAT STABILIZED childhood obesity rates in the United States, 30% of children remain overweight

or obese, with racial and ethnic minorities at higher risk.¹ These trends are evident even in the youngest children, with 1 out of 10 children under the age of 6 being obese.¹ Although the 2- to 5-year-old age group experienced a slight decline in overweight prevalence (5.5%) from 2003–2004 through 2011–2012, all other age groups, including 0- to 2-year-olds, have shown no significant decreases.

Data show that early childhood weight status tracks into adolescence and adulthood,^{2,3} suggesting that successful earlier intervention and prevention may potentially be more clinically effective and cost-effective. Positive health behaviors developed early in life can also track into adolescence and adulthood. Understanding what interventions are effective among overweight and obese children aged 6 and under is critical to preventing overweight in later years and the subsequent associated complications.

Synthesizing and assessing the research in childhood obesity interventions among children aged 6 and under would provide critical direction for future programs and policies. However, recent systematic reviews of interventions

in childhood obesity have focused on school-age and adolescent children.^{4–6} Reviews of treatment interventions among younger children have included both normal and overweight children reducing the ability to identify effectiveness of treatment interventions exclusively as opposed to primary prevention⁷ or were completed before more recent clinical trials targeting this age group.^{8,9}

In this systematic review, we attempted to address this question: in children aged 0 to 6 years who are overweight or obese, what behavioral or clinical interventions have been shown to be effective in reducing adiposity using a clinical trial design? In asking this question, we aimed to characterize commonalities to success so as to best inform this rapidly developing area of research. Innovative aspects of this review include a focus on treatment interventions for overweight and obese children and an examination of intervention effectiveness among children 6 years and younger, a critical population for clinical and cost-effective interventions.

METHODS

REVIEW PROTOCOL

A detailed protocol was developed and is available by request from the corresponding author. A priori inclusion criteria were studies that enrolled children aged 0 to 6, included a measure of adiposity as an outcome, and had a specific strategy for addressing children aged 0 to 6 if other ages were included. Inclusion of normal-weight children was an exclusion criterion, as we chose to focus on intervention rather than primary prevention. We used 3 accepted definitions for overweight or obesity to evaluate this exclusion criterion: the US Centers for Disease Control and Prevention,¹⁰ the World Health Organization,¹¹ or the International Obesity Task Force.¹² A search of Medline (1946–July 2014), the Cochrane Central Registry (1991–July 2014), CINAHL (1990–July 2014), and PAS abstracts (2000–2014) was completed in July 2014. For the Medline search, terms used in the search were “obesity,” “overweight,” combined with “OR,” then the filters of children (aged 0–18 years) and clinical trial applied to the results. Results from the initial search were cross-referenced and liberally screened by title and abstract to ensure the study focused on children and overweight or obesity. Any lack of clarity on the study’s inclusion criteria or outcomes at this point led to a full-text review. For the second round, abstracts—and, as necessary, full articles—were screened using the inclusion and exclusion criteria by 2 authors independently (BF, PP). A hand search of the reference lists of all selected full text articles was done by 2 authors independently (BF, PP). Only clinical trials, and not observational studies, were included in this review.

PRIMARY OUTCOME

The primary outcome measure was a measure of adiposity in participants (children) using the longest available time point after the start of the intervention; no minimum follow-up was a priori set. Acceptable outcome measures for adiposity a priori included body mass index

(BMI), BMI percentile, or some iteration of percentage overweight or obese using height, weight, and waist circumference.

SECONDARY OUTCOMES

We collected secondary outcome data on any measure of behavioral change, measures of nutritional intake, activity, or feeding patterns in order to help elucidate potential mechanisms.

DATA COLLECTION

Data were collected using a standardized form that was piloted between 2 authors (BF, JF). The pilot process involved both authors extracting data from previously identified obesity intervention manuscripts and cross-comparing extracted data on intervention and outcomes; the only data process changed was including multiple measures of adiposity within a study. The data were extracted independently by 2 authors (BF, JF). Authors of primary studies were contacted as needed for clarification of results. For each study, we extracted data on the study date and duration; number, demographics, and age of participants enrolled and completed in each group; intervention methods; setting; exclusion criteria; the primary and secondary outcomes defined by this review and when data were collected.

HETEROGENEITY AND BIAS ASSESSMENT

For methodologic heterogeneity, we used a qualitative approach, with 2 authors (BF, ES) examining the studies for similarities in intervention, comparison, and population. We planned to use the I^2 statistic to test for statistical heterogeneity if there was sufficient methodologic similarity to combine studies in a meta-analysis.

Using the criteria proposed by the Cochrane group, random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, and selective reporting were assessed.¹³ These were graded for each individual study as low, high, or unclear risk of bias by 2 authors (BF, PP) independently. If an article had a high risk of bias, it was discussed for inclusion status. To assess bias across studies, we planned to use a funnel plot and assess for asymmetry.

RESULTS

SEARCH RESULTS

The initial search yielded 1981 results that were narrowed down to 289 abstracts after initial review of title and abstract for inclusion criteria (done by BF, JF, PP) (Figure). Further analysis of full articles and cross-referencing led to the selection of the 6 studies included in this review (BF, JF); any conflicts were resolved via discussion. Of the 289 articles, 81 were excluded as a result of an inability to analyze the 0- to 6-year-old age group independently of other age groups. For example, most studies only included 5-year-olds on the lower age range (eg, 5- to 11-year-olds), with very few 5-year-olds actually

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