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## Childhood Obesity Prevention and Treatment Recommendations for Future Research

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### Abstract

This report summarizes the National Heart, Lung, and Blood Institute Working Group's recommendations on future research directions in childhood obesity prevention and treatment. The Working Group consisted of leaders and representatives from public and private academic and medical institutions with expertise in a variety of health specialties. They reviewed the literature and discussed the findings as well as their own experiences in the prevention and treatment of childhood obesity. The Working Group made recommendations that were based on scientific importance, the potential likelihood of public health impact, and the feasibility and timeliness for childhood obesity prevention and treatment research. These recommendations are intended to assist investigators in the development of research agendas to advance the knowledge of effective childhood obesity prevention and treatment.

### Introduction

Obesity during childhood is associated with numerous adverse health outcomes, including hypertension, dyslipidemia, left ventricular hypertrophy, atherosclerosis, metabolic syndrome, type 2 diabetes, sleep apnea, and non-alcoholic fatty liver disease, as well as psychological effects such as stigmatization, discrimination, depression, and emotional trauma.<sup>1–3</sup> Obesity in childhood also substantially increases the risk of being an obese adult.<sup>4</sup> In addition, adults who were obese during childhood have a higher risk of developing hypertension, dyslipidemia, metabolic syndrome, diabetes, and coronary heart disease than those who were not obese during childhood.<sup>4</sup>

The development of obesity in childhood and subsequently in adulthood involves interactions among multiple factors that are personal (e.g., dietary and physical activity patterns, taste and physical activity preferences); environmental (e.g., home, school, and community); societal (e.g., food advertising, social network, and peer influences); healthcare-related (e.g., access and provider counseling); and physiological (e.g., intrauterine and early life “programming,” appetite and satiety mechanisms, and genetic predisposition) that may shape daily diet and physical activity behaviors as well as increase obesity, cardiovascular disease risk, and chronic diseases.

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Concerned about the public health burdens associated with the childhood obesity epidemic along with a dearth of evidence-based approaches for prevention and treatment, and in response to the call by numerous health organizations for a collective effort to combat the problem from multiple fronts,<sup>5</sup> the National Heart, Lung, and Blood Institute (NHLBI), along with other NIH institutes, convened a Working Group meeting on August 21–22, 2007, to advise the institutes about which research areas to stimulate to advance knowledge about effective obesity prevention and treatment in childhood. The objective of the Working Group was to identify priorities for future research directions in childhood obesity prevention and treatment. The Working Group was organized into prevention and treatment panels chaired by the two non-NIH staff co-authors. Participants included leaders and representatives from public and private academic and medical institutions with expertise in a variety of health specialties, including pediatrics, preventive medicine, bariatric surgery, nutrition and diet therapy, physical activity, epidemiology, physiology, genetics, and research methodology, as well as staff from the NIH and the U.S. Department of Agriculture.

The prevention panel focused on research priorities to prevent excess weight gain in children and adolescents. The treatment panel focused on research priorities for the treatment of obesity that has already developed in children and adolescents. Panel members were charged to identify priorities for future research directions in childhood obesity prevention and treatment based on four criteria: the scientific importance of the research question, the potential likelihood of a public health impact, the likelihood of not being addressed by other funding entities, and feasibility and timeliness. Topics discussed included behavioral and lifestyle interventions for childhood obesity prevention and treatment; the pharmacologic and surgical treatment of severely obese youth; multilevel, multi-setting, and multicomponent interventions; opportunities to advance research on the effects of the built environment; the use of theoretical models and conceptual frameworks in the design of interventions; approaches for obesity prevention and weight-loss treatment interventions for low-SES and minority populations; design and methodologic approaches to make interventions more potent; and the translation of promising childhood obesity prevention and treatment research into both clinical and community settings. A full report of the discussions of these topics is available at [nhlbi.nih.gov/meetings/workshops/child-obesity/index.htm](http://nhlbi.nih.gov/meetings/workshops/child-obesity/index.htm). The recommendations from the Working Group are as follows:

## **Recommendations for Research in Childhood Obesity Prevention**

### **Enhanced Understanding of the Influences on Children's Diet, Physical Activity, and Obesity**

- Conduct observational and experimental research to test new ideas and develop new models of the factors influencing children's diet, physical activity, and obesity, including environmental; social (family and peer); psychological; biological; and genetic factors. Studies that integrate behavioral with biological and genetic factors or that identify the biological and behavioral mechanisms of obesity development, including gene–environment interactions, are particularly needed in light of many recent advances in this area in genetic and biological science.
- Identify specific, modifiable factors in children's built environment that can make a difference in children's ability to be more active.
- Identify environmental and policy determinants of obesity and health behaviors (characteristics of neighborhoods, schools, child-care centers, playgrounds; effects of fast food, fresh-food markets, TV and other electronic media, and food marketing), as well as factors related to the maintenance of a healthy weight over time.
- Identify critical periods for obesity development (e.g., factors associated with excess weight gain throughout childhood; cardiovascular disease-risk evaluation in the

transition from childhood obesity to adult cardiovascular disease in existing cohort studies).

- Increase the use of prospective and quasi-experimental designs to improve the understanding of environmental and societal variables.

### **Obesity-Prevention Interventions in Young Children**

- Test studies of family-based interventions (e.g., studies intervening on parenting style and on the home availability of healthful food and opportunities for physical activity).
- Test interventions with physicians and other healthcare providers combined with community involvement (e.g., train physicians to screen, nurses to be coaches, and healthcare settings to refer to community resources).
- Test the long-term effects of obesity-prevention interventions on weight and cardiovascular risk factors.
- Test the effects of having single and multiple behavioral targets (e.g., intervening on a targeted food [e.g., fructose] versus multiple foods; dietary interventions with and without modifications in physical activity and sedentary behaviors).
- Conduct studies that consider critical developmental periods of weight gain.
- Test interventions that use novel theories rather than the models that have dominated the literature in the past 20 years.
- Conduct interventions in a variety of settings (e.g., home; child-care; the U.S. Department of Agriculture's Special Supplemental Nutrition Program for Women, Infants, and Children [WIC]; and healthcare settings).

### **Multilevel, Multicomponent Interventions (Any Age)**

- Examine multilevel and multicomponent, community-based interventions in multiple settings (e.g., schools, health care, home, community, built environment, public policy, social marketing, diet, physical activity behaviors).
- Test a multilevel, comprehensive intervention that targets minority populations and low-income populations (e.g., culturally appropriate ways to reach Latino, African-American, Native American, and Asian/Pacific Islander children).
- Test interventions that use technology (e.g., the Internet, media, novel electronic approaches) to influence behavior change.
- Develop and test interventions that can be effectively incorporated into existing school and community infrastructures (e.g., curriculum, physical activity, school lunch programs) to maximize effectiveness and minimize cost.
- Conduct intervention studies that address issues related to the interface between individual behaviors and the environment.

### **Implementation, Dissemination, Translation, Evaluation**

- Identify and test approaches for community partnerships in the dissemination and implementation of evidence-based obesity-prevention programs.
- Evaluate the effectiveness of existing, promising programs.
- Identify and test food-marketing strategies.

## Recommendations for Research in Childhood Obesity Treatment

### Behavioral Approaches to Obesity Treatment in Children (Including the Severely Obese)

- Identify and test components of behavioral approaches for weight loss in obese children (e.g., self-monitoring, goal setting; individual versus group sessions; technology, including video games, telemedicine; parent, child, and/or family as intervention targets).
- Identify and test components of behavioral approaches for weight control or maintenance in obese children.
- Identify and test specific components of diet and physical activity programs for obese children (e.g., dietary and physical activity patterns, single dietary components such as fructose).
- Identify and test environmental and psychosocial influences on behavioral changes in obese children.

### Pharmacologic and Surgical Treatment of Severe Obesity in Children

- Compare pharmacologic agents, including off-label uses, or compare surgical procedures versus pharmacologic agents for weight loss with and without behavioral approaches.
- Test behavioral approaches to maximize the effectiveness and improve the safety of different surgical procedures and pharmacologic interventions for weight loss.
- Evaluate the safety of pharmacologic and surgical interventions in clinical settings.
- Test a stepped approach to obesity treatment (Expert Committee recommendations<sup>6</sup>).
- Identify the biologic mechanisms of severe obesity to develop better therapeutic targets (e.g., pharmacologic or surgical).
- Identify and test interventions in various settings for obesity treatment (e.g., primary care and community linkages).
- Identify psychosocial aspects of obesity among the most obese children in relationship to pharmacologic and surgical treatments.

### Health Systems and Primary Care Practices

- Identify and test models for delivering obesity care.
- Test approaches to changing behaviors and improving the case-management skills of healthcare practitioners.
- Identify and test approaches for the translation, dissemination, or both, of evidence-based therapies to primary care and specialty practices.
- Support research on macro-environment influences on healthcare delivery (e.g., health policy, business models for practice, insurance coverage).
- Evaluate the cost effectiveness of primary care interventions.

## Cross-Cutting Research Recommendations

### Methodology

- Support methodologic research on study designs and analytic approaches (identify optimal study designs and analytic approaches for various types of research questions [e.g., surgical treatments, pharmacologic treatments, or both; multicomponent and multilevel influences and interventions]).
- Use appropriate study designs and methods, including natural experiments, quasi-experimental designs, and randomized designs; develop time-sensitive funding mechanisms for natural experiments.
- Standardize the use of outcome measures to improve the comparability of studies.

### High-Risk Populations

- Study a diversity of high-risk and under-studied subgroups, including low-income families, ethnically and socioeconomically diverse populations, boys, and children in rural communities as well as immigrants.
- Examine differences in treatment approaches or effects by age, race/ethnicity, and SES.
- Conduct environmental and policy-intervention research to improve access to healthy foods and the opportunity for physical activity in low-income communities.

### Other Recommendations

- Support long-term studies (~10 years) as well as short-term “evidentiary” studies with intermediate outcomes.
- Support studies to develop novel technology and improve existing technologic approaches to prevent and treat obesity (e.g., bioengineering approaches, the Internet, video, and electronic medical records).
- Support translational research (basic research to clinical science research, clinical practice to community/dissemination research, and back-to-basics research).
- Analyze effectiveness–intervention studies for their cost effectiveness.
- Consider using networks, consortia, specialized centers of excellence, partnerships with clinical translational science institutes, or academic research centers.

## Conclusion

These recommendations are major themes from the evaluation of current evidence and the deliberations of extramural scientists and healthcare providers. Priorities for research include (1) obesity-prevention interventions in young children—including interventions that target high-risk populations such as minorities, children in low-income families, and children in rural communities—using multicomponent and multilevel approaches (e.g., home and school; community–school; home–community); (2) obesity-treatment interventions, including those that use behavioral approaches (e.g., self-monitoring, goal setting, social support, stimulus control, cognitive restructuring) with or without pharmacotherapy or surgical approaches, and include multicomponent, multilevel approaches (e.g., healthcare practice and home, healthcare practice and community, healthcare practice and school); (3) studies that test new models for delivering obesity prevention and treatment in the health systems and primary care practices to change the behaviors of health practitioners and to translate and/or disseminate evidence-based therapies to primary care practices.

These recommendations are intended to be useful to investigators and funding agencies in setting research agendas for childhood obesity prevention and treatment. There is an urgent need for research that would provide effective protocols for childhood obesity prevention and treatment as well as inform healthcare providers about treatment and prevention options. Concerted and collaborative efforts among funding agencies—federal and nonfederal partners (including foundations, nonprofit, and for-profit institutions [e.g., the food and sports industries])—are needed to provide resources for innovative and creative interventions. We at NHLBI (and other NIH institutes) encourage the scientific community to design epidemiologic and intervention studies that incorporate these recommendations.

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