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United States Government Accountability Office
Washington, DC 20548

December 6, 2006

The Honorable Bill Frist
Majority Leader
United States Senate

Subject: *Childhood Obesity: Factors Affecting Physical Activity*

Dear Senator Frist:

The latest data show continued increases in rates of childhood obesity.[1] For example, obesity rates for children 6 to 11 years old are estimated to have increased from 15.1 to 18.8 percent between 1999 and 2004.[2] The Department of Health and Human Services estimates that 20 percent of children and youth in the United States will be obese by 2010. There are numerous negative health outcomes and financial consequences related to childhood obesity. Researchers have found that childhood obesity is associated with a number of disorders including hypertension, insulin resistance, sleep apnea, menstrual abnormalities, and orthopedic problems. According to one estimate, insured children treated for obesity are approximately three times more expensive for the health system than the average insured child.[3]

Obesity results from an imbalance between the amount of energy consumed and the amount of energy expended. While there are many elements that affect the energy balance (for example, genetics, growth, and physiology), children and their parents can influence both energy consumed through diet and energy expended through physical activity. Some researchers have suggested that childhood obesity is largely the result of a decline in regular physical activity. In our October 2005 report,[4] we

[1]Some experts use the term obesity to refer to children and adolescents who have a body mass index (BMI) that is at or above the sex-specific 95th percentile for their age on the BMI charts developed by the Centers for Disease Control and Prevention (CDC) in 2000. CDC uses the term overweight, instead of obese, to describe children and adolescents with this BMI range.

[2]C.L Ogden, M.D. Carroll, L.R. Curtin, M.A. McDowell, C.J. Tabak, and K.M. Flegal, "Prevalence of Overweight and Obesity in the United States, 1999-2004," *JAMA*, vol. 295, no. 13 (2006). These data are for children at or above the 95th percentile of BMI for age and sex.

[3]Thomson Medstat, *Childhood Obesity: Costs, Treatment Patterns, Disparities in Care, and Prevalent Medical Conditions*, 2006, http://www.medtstat.com/pdfs/childhood_obesity.pdf, (downloaded Nov. 3, 2006). Thomson Medstat used medical claims to estimate total health care spending for children who receive a diagnosis of obesity.

[4]GAO, *Childhood Obesity: Most Experts Identified Physical Activity and the Use of Best Practices as Key to Successful Programs*, GAO-06-127R (Washington, D.C.: Oct. 7, 2005).

surveyed experts on the key strategies to include in the design or implementation of a program to prevent or reduce childhood obesity. The program strategy identified by experts as most important was "increasing physical activity."

You asked us to provide information on the factors affecting physical activity in children. Enclosure I contains the information we provided to your staff at our November 15, 2006, briefing.

To carry out our work, we conducted a literature review. We selected 53 articles that described work focused on factors affecting rates of physical activity for school-aged children, published from 2003 through 2006. Enclosure II is a bibliography of the materials we reviewed. To select the articles, we reviewed study abstracts identified in your request letter and conducted a literature search of five databases.[5] We focused on studies of children and adolescents and excluded studies of infants and preschool-aged children. For purposes of this report, we use the term obese to refer collectively to the terms obese and overweight, which were both used by authors. We supplemented the studies with information obtained from organizations that recently published information on childhood obesity including the Institute of Medicine and the Trust for America's Health. Our literature search was not exhaustive, and for this report we did not discuss all of the articles we reviewed, but instead highlighted selected articles to provide examples of findings. We conducted our work from August 2006 through November 2006 in accordance with generally accepted government auditing standards.

In summary, the articles we reviewed identified a number of factors affecting levels of physical activity in children. We categorized the factors presented in the articles we reviewed into three groups—demographic factors, cognitive and behavioral factors, and community factors. Demographic factors include socioeconomic status and race. Cognitive and behavioral factors include attitudes, beliefs, and perceptions and sedentary behaviors.[6] Community factors include the built environment[7] and school-based physical activity. The articles and additional materials we reviewed identified additional research needs, such as using objective measures of physical activity and sedentary time. The body of research we examined suggests that multiple factors that affect physical activity among children may contribute to childhood obesity.

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As we agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days after the date of this letter.

[5]We also contacted several experts in the field to help us identify relevant literature.

[6]Sedentary behaviors include, for example, television watching, video game playing, and computer use.

[7]The built environment is broadly defined to include land use patterns, the transportation system, and design features that together provide opportunities for travel and physical activity.

At that time, this report will be available at no charge on the GAO Web site at http://www.gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report.

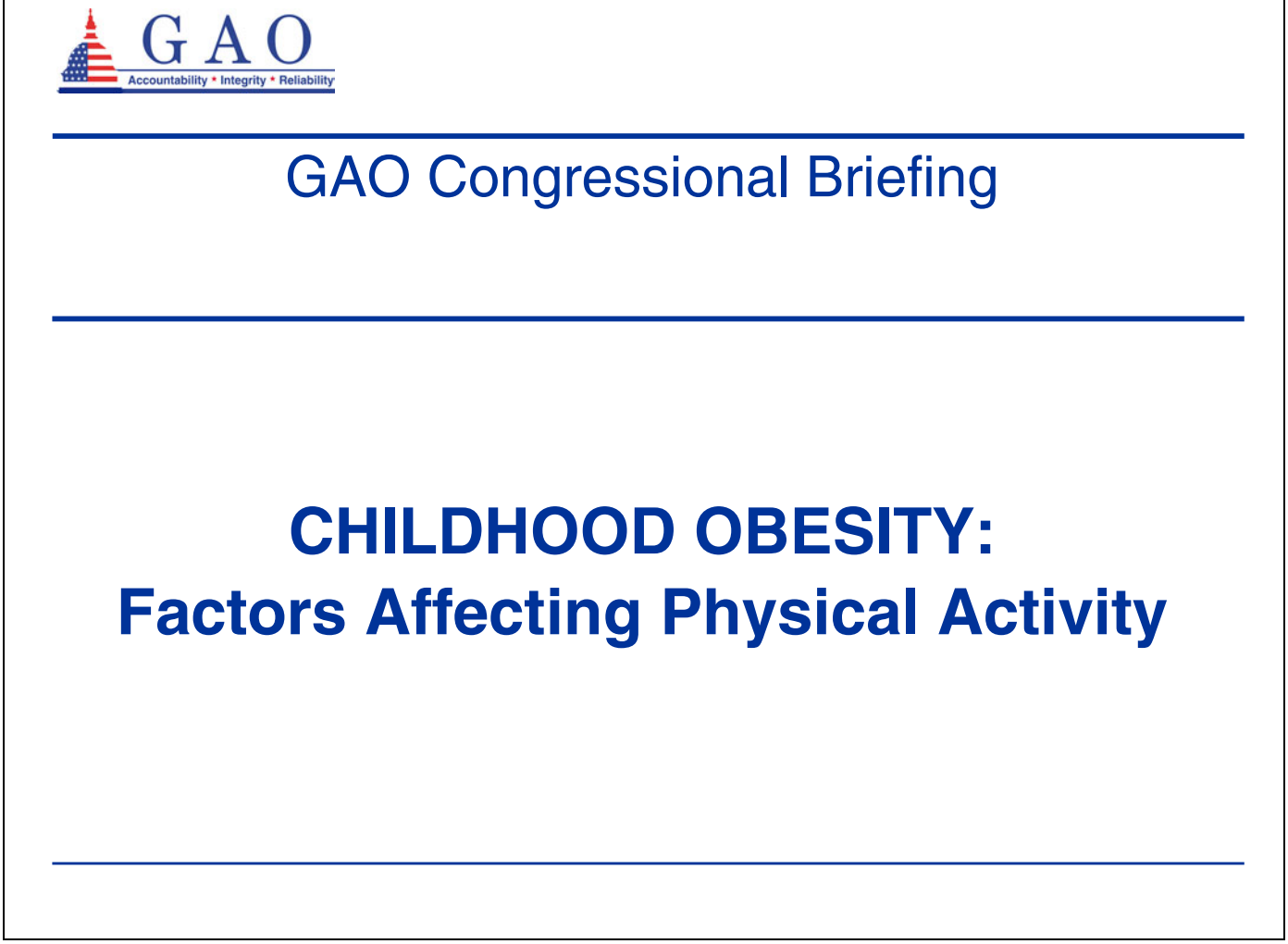
If you and your staff have any questions or need additional information, please contact me at (202) 512-7101, or bascettac@gao.gov. Major contributors to this report were Linda Kohn, Assistant Director; Shannon Slawter; and Julie Thomas.

Sincerely yours,

Cynthia A. Bascetta
Director, Health Care

Enclosures

Enclosure I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GAO Congressional Briefing
CHILDHOOD OBESITY:
Factors Affecting Physical Activity

Enclosure I

Briefing Outline

- Introduction
- Objective, scope, and methodology
- Factors affecting physical activity
- Additional research needs
- Concluding observations

Enclosure I

Introduction

- The latest data show continued increases in rates of childhood obesity.[1] HHS estimates that 20% of children and youth in the U.S. will be obese by 2010.
- There are numerous negative health outcomes and financial consequences related to childhood obesity.
- According to one estimate, total health care spending for children who receive a diagnosis of obesity is approximately $750 million per year.[2]
- Obesity results from an imbalance between the amount of energy consumed and the amount of energy expended.

[1]Some experts use the term obesity to refer to children and adolescents who have a body mass index (BMI) for age that is at or above the sex-specific 95th percentile of the BMI charts developed by the Centers for Disease Control and Prevention in 2000.

[2]Thomson Medstat used medical claims to estimate total health care spending for children who receive a diagnosis of obesity. Children who received a diagnosis of obesity are a small subset of the percentage of children who are considered obese. Thomson Medstat estimates that children treated for obesity are roughly three times more expensive for the health system than the average insured child.

Enclosure I

Introduction (cont.)

- Children and their parents can influence both energy consumed through diet and energy expended through physical activity.
- Some researchers have suggested that childhood obesity is largely the result of a decline in regular physical activity.
- For our October 2005 report, *Childhood Obesity: Most Experts Identified Physical Activity and the Use of Best Practices as Key to Successful Programs* (GAO-06-127R), we surveyed experts on the key strategies to include in the design or implementation of a program to prevent or reduce childhood obesity. The program strategy identified by experts as most important was "increasing physical activity."

Enclosure I

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Objective, Scope, and Methodology

- Our objective in this briefing is to summarize the relevant literature about the factors affecting levels of physical activity among children that may contribute to childhood obesity.[3] We will also discuss additional research needs identified in the literature.
- In our review of the literature, we did not examine research that addresses whether there have been decreases in the physical activity of children over time, a trend which some researchers dispute.

[3]For our literature review, we focused on studies of children and adolescents and excluded studies of infants and preschool-aged children. For purposes of this briefing, we use the term obese to refer collectively to obese and overweight children.

Enclosure I

Objective, Scope, and Methodology (cont.)

- We reviewed study abstracts identified in the request letter and conducted a literature search of five databases.[4]
- We selected 53 studies that described new work focused on factors affecting rates of physical activity for children, published from 2003 through 2006.
- We supplemented the studies with information obtained from organizations such as the Institute of Medicine (IOM), the Trust for America's Health, and The Robert Wood Johnson Foundation.
- We conducted our work from August 2006 through November 2006 in accordance with generally accepted government auditing standards.

[4]We also contacted several experts in the field to help us identify relevant literature.

Enclosure I

Objective, Scope, and Methodology (cont.)

- Limitations of our work
  - Literature search was not exhaustive.
  - We will not discuss all of the articles that we reviewed, but instead highlight selected articles to provide examples of findings.

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Factors Affecting Physical Activity

- **We grouped the factors affecting physical activity into three categories**:
  - Demographic factors
  - Cognitive and behavioral factors
  - Community factors

Enclosure I

Demographic Factors

- **Socioeconomic status (SES)**
  - Studies tied low SES to physical inactivity.
- **Race/ethnicity**
  - While several studies included race/ethnicity as a variable, they focused on other factors, which we will discuss later.

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Cognitive and Behavioral Factors

- **Attitudes, beliefs, and perceptions**
  - Among other factors, studies identified lack of motivation, self-consciousness, and concerns about not being good enough as contributing to reduced physical activity.
  - Studies found some differences between white and African-American girls in their attitudes and perceptions about physical activity.
  - Studies found that adolescents who were obese perceived more barriers to physical activity than adolescents who were not.
- **Family and social influences**
  - Studies found that parental and social support for physical activity was associated with increased physical activity.

Enclosure I

Cognitive and Behavioral Factors (cont.)

- **Sedentary behaviors**[5]
  - Studies differed in their findings on the relationship between sedentary behaviors and obesity, but not all of them explained the relationship between sedentary behaviors and physical activity.
  - Some studies found that increases in sedentary behaviors are associated with decreases in physical activity.
  - Studies reported differences in sedentary behavior patterns by gender and the influence of family on children's television viewing habits.

[5]Sedentary behaviors include, for example, television watching, video game playing, and computer use.

Enclosure I

Community Factors

- **General/safety**
  - One study found that adolescents in older suburban communities engage in more physical activity.
  - One study found that adolescents in unsafe neighborhoods engage in less physical activity.
- **Built environment**[6]
  - Studies found that environmental characteristics, such as lack of streetlights and the need to cross busy roads, were negatively related to children's physical activity, including walking and biking to school.

[6]The built environment is broadly defined to include land use patterns, the transportation system, and design features that together provide opportunities for travel and physical activity.

Enclosure I

Community Factors (cont.)

- **Availability of venues for physical activity**
  - One study found that lack of venue (e.g., sports areas, swimming pools, parks) was related to lower rates of physical activity.
  - Studies found that areas of low SES and high minority populations had fewer venues for physical activity.
- **School-based physical activity**
  - School-based physical education policies vary widely by state, school district, and school.

Enclosure I

Additional Research Needs

- **The literature we reviewed contained two commonly suggested themes for research improvement**
  - Study design
    - -longitudinal instead of cross-sectional
    - -venue affordability, quality, and usage instead of venue availability only
  - Measurement
    - -objective measures of physical activity and sedentary time
    - -other measures, such as health status

Enclosure I

Additional Research Needs (cont.)

- **IOM and the Transportation Research Board also identified additional needs, including**
  - Need for additional evaluations to provide evidence for new or modified programs or policies
  - Built environment:
    - -need to develop better ways to measure the built environment
    - -need to connect data on the built environment to data on health and physical activity

Enclosure I

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Concluding Observations

- Reversing trends in childhood obesity requires an understanding of the factors affecting children's energy imbalance, including their physical activity levels.
- The articles we reviewed identified a number of factors affecting levels of physical activity in children.
- The body of research we examined suggests that multiple factors that affect physical activity among children may contribute to childhood obesity.

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