School-Based Programs to Prevent Obesity Among K-6 Learners: Follow-up Analysis of What Works? What's Promising?

Ray Marks, EdD[1,2]
John P. Allegrante, PhD [2]

CUNY, York College[1]
Columbia University, Teachers College,[2]

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Background

- **Obesity**, which has reached epidemic proportions is currently a major contributor to the global burden of chronic disease and disability.

- Often coexisting with under-nutrition, **obesity** is a complex condition affecting virtually all groups [http://www.who.int/dietphysicalactivity/publications/facts/obesity/en/].

Childhood obesity

- Childhood **obesity**, already epidemic in some areas, is on the rise in others.
- An estimated 22 million children worldwide under 5 are estimated to be overweight.
- In the USA the number of overweight children has doubled and the number of overweight adolescents has tripled since 1980.

- In the last 15 years, obesity among children has increased dramatically (Mokdad et al., 1999).

- This situation presents a very pressing problem because obese children have higher rates of many health problems (Trent, 2002) and over 40% of obese children become obese adults (Himes & Dietz, 1994).

Figure Showing Increasing Prevalence of Overweight Among Youth, Ages 6-19 Years, between 1963-2006 in the United States [based on physical examinations of a sample of the civilian non-institutionalized population].

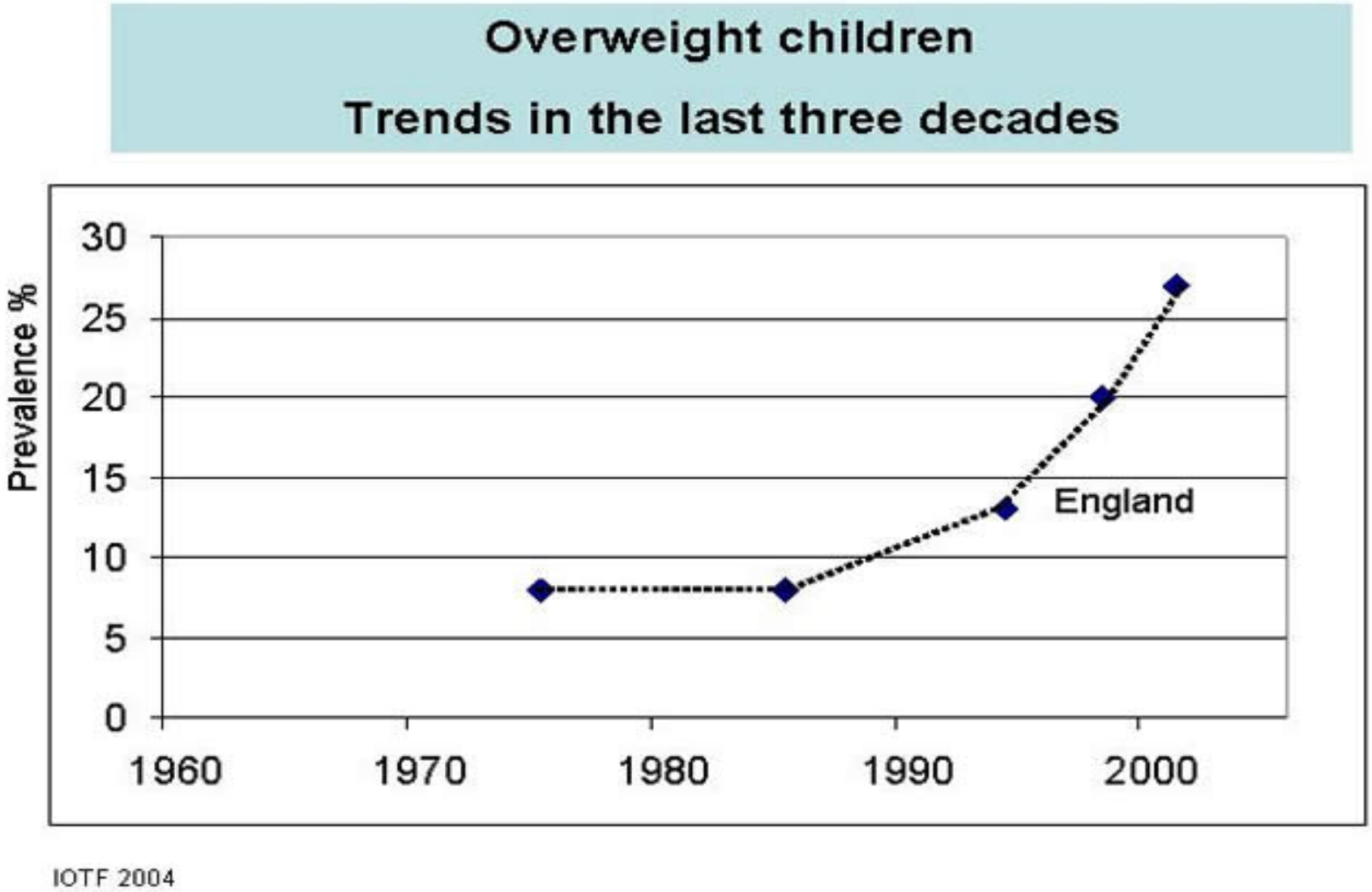
Age (years)[1]	*1963-65 1966-70*[2]	*1971-74*	*1976-80*	*1988-94*	*1999-2002*	2003-2006
6-11	4	4	6.5	11.3	15.8	17
12-19	5	6	5	10.5	16	17.6

[1]Excludes pregnant women starting with 1971-74. Pregnancy status not available for 1963-65 and 1966-70.
[2]Data for 1963-65 are for children 6-11 years of age; data for 1966-70 are for adolescents 12-17 years of age, not 12-19 years.

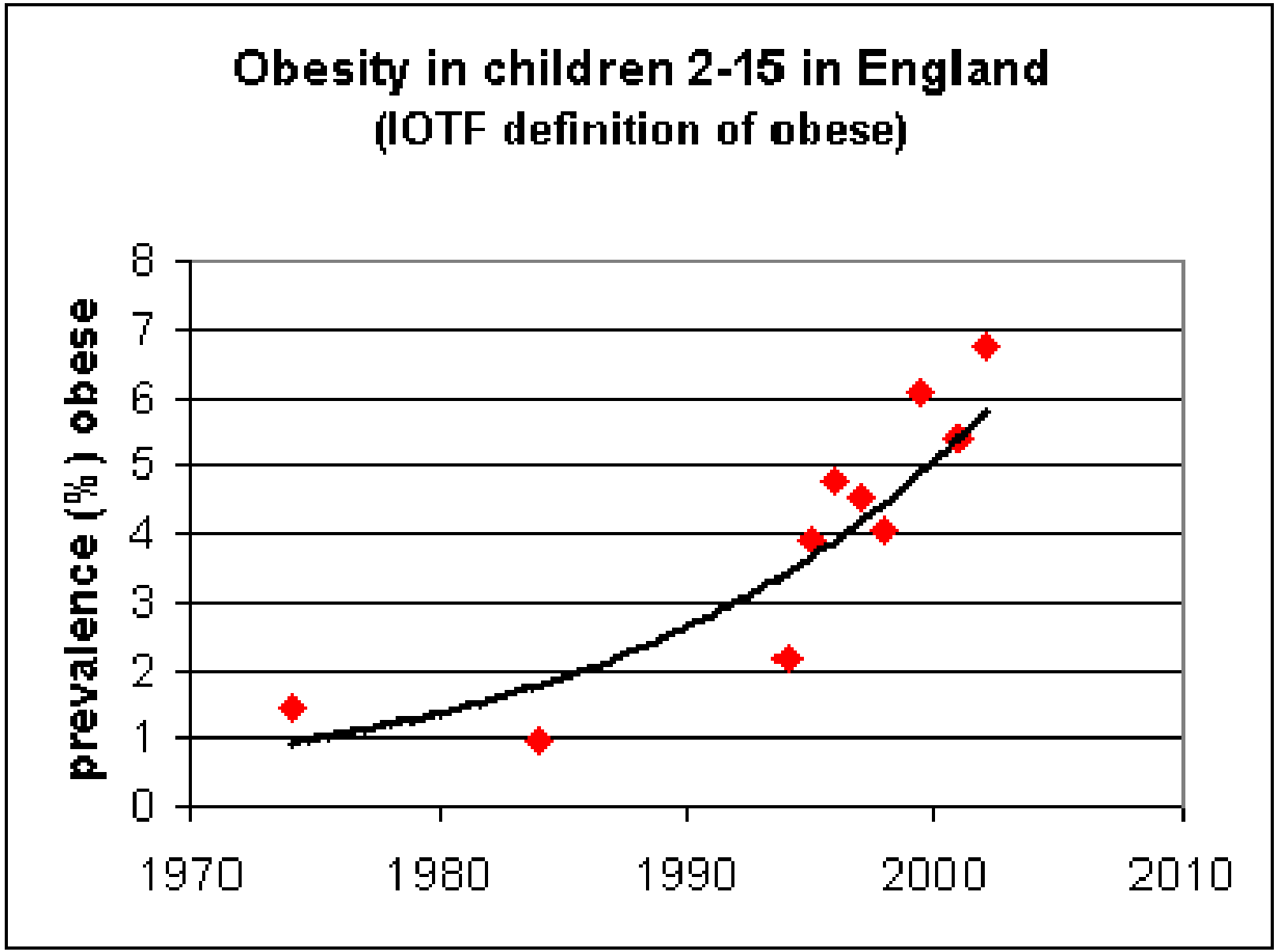
Source: National Center for Health Statistics, 2009.

Other data show:

- Childhood obesity is rapidly extending into the developing world; for example, **Thailand, where** obesity in 5-12 year olds children rose from 12.2%-15-6% in 2 years [http://www.thaizer.com/food/obesity-on-the-increase-in-thailand/].
- In **Canada**, 8%, or an estimated 500,000 children, were obese in 2004 [http://www.statcan.ca/Daily/English/050706/d050706a.htm].
- Obesity affects 6% of **Australian** children [http://www.mja.com.au/public/issues/178_09_050503/wat10857_fm-2.html].
- Overweight and obesity in children have escalated dramatically in **England** over the past 20 years [http://www.iotf.org/childhood/].



BRITISH TRENDS 1960-2000


Obesity in children 2-15 in England
(IOTF definition of obese)
prevalence (%) obese
0
1
2
3
4
5
6
7
8
1970
1980
1990
2000
2010

Consequences of Childhood Obesity

High risk for developing:

- Asthma
- Gall bladder disease (Trent, 2002)
- Hypertension
- Renal disease
- Orthopedic problems
- Sleep apnea
- Type 2 Diabetes and metabolic disease (Amschler, 2002)

- A variety of psychological problems (Cole, 2006)

- Premature disability and death

IN THE US COSTS FOR CHILDHOOD OBESITY HAVE INCREASED 3 FOLD in 20 YEARS

Obesity-associated annual hospital costs for children more than tripled between 1979 and 1999.

(Wang G, Dietz WH. Economic burden of obesity in youths aged 5 to 17 years: 1979-1999. Pediatrics 2002;109(5):E81-E86)

THE ROBERT WOOD JOHNSON FOUNDATION

American Heart Association. Learn and Live.

From the statistical sourcebook "A Nation at Risk: Obesity in the United States." To order, call 1-800-AHA-USA1 or email inquiries@heart.org

Contributing Factors

- **Diet and nutrition (Borra et al., 2003; O'Dea, 2002)***
- **Physical inactivity (Patrick et al., 2004)***
- **Television-watching (Robinson, 1999)***
- Family culture and lifestyle (Gottesman, 2003)
- Low socioeconomic status
- Stress
- Low literacy levels

*=KEY FACTORS

US CHILDREN NOW DRINK AS MUCH SODA AS MILK

In 1977-78, children ages 6-11 drank about four times as much milk as soda. In 2001-02, they drank about the same amounts of milk and soda.

(Cleveland L. U.S. Department of Agriculture; National Food Consumption Survey, 1977-78; What We Eat in America, NHANES 2001-02)

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RATES TV VIEWING AMONG CHILDREN ARE HIGH-44 hrs/wk

The typical American child spends about 44.5 hours per week using media outside of school.

(Generation M: Media in the Lives of 8-18 Year Olds. Menlo Park, Calif.: Kaiser Family Foundation, 2005)

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60% CHILDREN DO NOT PARTICIPATE IN PHYSICAL ACTIVITY

Six out of 10 children ages 9-13 don't participate in any kind of organized sports/physical activity program outside of school, and children whose parents have lower incomes and education levels are even less likely to participate. Nearly 23 percent don't engage in any free-time physical activity.

(Physical activity levels among children aged 9-13 years – United States, 2002. MMWR 2003;52[33]:75-8)

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Objective

- To provide an update of what school-based programs exist to address youth obesity among K-6 children-a very vulnerable population.
- To examine the reach, impact, and effectiveness of programs.
- To identify future goals and research directions for preventing childhood obesity.

Methods

- A literature review was conducted using CINAHL, COCHRANE, EMBASE, MEDLINE, and PUBMED databases to review 1999-2009 data.
- More specifically, all multi-component school-based obesity that focus on K-6 grade learners were located and systematically evaluated and graded for research quality and intervention effectiveness.
- Studies that did not meet the above criteria were not reviewed.
- Key words were: Schools, Obesity, Prevention

Results

- To date, very few school-based obesity prevention programs have specifically focused on K-6 learners.
- Most programs that do exist have been conducted since 2006; of the 14 reports retrieved, 3 were pilot studies only.
- Several randomized trials show effectiveness and promise.
- Creative engaging programs seem to work best.

Summary of 7 Controlled Studies Examining Multi-Dimensional Interventions

School-based Obesity Related Program	Research design	Intervention Components	Outcomes
Eat Well and Keep Moving (Gortmaker et al., 1999)	Quasi-experimental	Classroom, cafeteria, gym, home, community curricula components to improve behaviors, teacher training	Improved dietary intake girls, reduced TV viewing and obesity-girls not boys
SMART (Robinson, 1999), grades 3-4	7 month Randomized Controlled Trial [RCT]	192 3rd + 4th graders received an 18-lesson, 6-month classroom curriculum to reduce TV watching, videotape, and game use	Experimental subjects had decreased BMIs, decreased TV watching, meals in front of TV
Planet Health (Gortmaker et al., 1999), grades 6-7	2 year RCT	Health curriculum aimed at increasing physical activity, decreasing TV watching, fruit vegetable intake	Increased fruit + vegetable intake, decreased TV watching, decreased obesity girls
APPLES (Sohata et al., 2001)	RCT	634 children , 7-11 received one year of teacher training, physical education, school meal, playground activity improvements	Program impacted school, but not behavior. Body mass was not changed
KOPS (Muller et al., 2001)	RCT	Nutrition education, decreased television viewing, and structured sports were examined among 5-7 year olds in 6 German schools for 8 years	No body mass differences were found, even though knowledge increased, as did fruit and vegetable intake
Pathways (Cabellero et al., 2003)	RCT	1704 American Indian 3rd-5th grade students received curriculum, food services, physical activity, family modules	Knowledge increased more in intervention group, but weight loss did not occur
CATCH (Luepker, 2001;Coleman et al. 2005)	RCT	Education, nutrition and family activities; 3rd graders received diet, physical activity classroom lessons, physical activity, school food services modified, families involved	Reduced lunch fat intake and calories; rate of risk was lower in CATCH group

Summary of Other Studies Examining Multi-Dimensional Interventions

Program	Design	Intervention Components	Outcomes
Take 10 (Tsai et al., 2009)	Uncontrolled trial	Children from K-6th grade in one public school serving low income Hispanics implemented physical activity and nutrition lessons in conjunction with community and university and school agencies	Recommendations for these children were made based on the outcomes
JIFF (Cason & Logan, 2006)	RCT	4th graders in South Carolina were exposed to nutrition lessons and physical activity for 14 weeks	Food related knowledge and behaviors increased compared to controls
Hawley et al. (2006).	RCT	Grade 6 children were exposed to 5 40 minute sessions of physical activity combined with nutrition lessons. Family was included.	Self reports of physical activity increased, families had better health goals
Kain et al. (2004)	RCT	Children in grades 1-8 in 5 Chilean schools were exposed to nutrition education, physical activity, and parent related education was conducted	No body mass differences were noted, although waist circumference decreased in the experimental group
PLAY (Pangrazi et al., 2003)	RCT	4th graders in Arizona received one of 4 interventions for 12 weeks	There was no body mass difference between the groups after 12 weeks, even though children in play groups were more active than controls
Be Smart (Warren et al., 2003)	RCT	Children 5-y years of age were exposed to physical activity, nutrition, and decreased television time for 14 months	No significant body mass changes were found despite improvements in knowledge
(Wheling-Weepie & McCathy, 2002)	Uncontrolled trial	Nutrition education, physical education, media advocacy, fat measures taught to 4th-5th graders for 5 wks	Knowledge improved

What Works?

Multiple component approaches that include:

- Reducing television-watching (Robinson et al., 2003).**
- Increasing physical activity rates.*
- Improving diet and nutrition through education (O'Dea, 2002).
- Improving knowledge about healthy lifestyles.
- Self-regulatory approaches (Cole, 2006).
- School **environmental** and **policy** changes.
- Family education and involvement (Gottesman, 2003).
- Healthy lifestyle education (Cole, 2006).
- Use of non-threatening, culturally relevant and sensitive curricula and programs, that provide incentives to promote positive change (Cole, 2006).

Implications

- Public health professionals interested in preventing childhood obesity in the child's early formative years can apply these data to guide their efforts to address this problem, a very important public health issue, but one poorly addressed to date.

CDC Recommendations

- Add **obesity**-awareness and weight-reduction programs to school curricula.
- Include school-based nutrition standards, **obesity** programs, and physical education classes.
- More school lunchrooms must replace sugary drinks with healthful drinks, and report cards informing parents of the child's risk of overweight should not be ignored.

Other Recommendations:

- After-school activity programs (Yin et al., 2005).
- Behavior modification.
- Education conducted with supportive friends and family in familiar settings (Cole, 2006).
- Improving children's health literacy (Cole, 2006).

Conclusions

- **Obesity** that develops during childhood, can result in significant morbidity and mortality in adult life.
- Associated with decreased physical activity and poor diet, few comprehensive school-based intervention programs exist to prevent the onset of this condition.
- Evaluation studies of program impact/outcome have mixed outcomes, although some programs demonstrate modest and potentially promising results.

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