

# Childhood obesity: successes and failures of preventive interventions

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*Despite progress toward assuring the health of today's young population, the 21<sup>st</sup> century began with an epidemic of childhood obesity. There is general agreement that the situation must be addressed by means of primary prevention, but relatively little is known about how to intervene effectively. The evidence behind the assumption that childhood obesity can be prevented was discussed critically in this roundtable symposium. Overall, there was general agreement that action is needed and that the worldwide epidemic itself is sufficient evidence for action. As the poet, writer, and scholar Wittner Bynner (1881–1968) wrote, "The biggest problem in the world could have been solved when it was small".*

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## INTRODUCTION

In the spirit of the quote above, many obesity researchers believe that preventing obesity in childhood is the key to addressing the global obesity epidemic. This report summarizes the main points of the session titled "Prevention of Childhood Obesity" held at the I World Congress of Public Health Nutrition, during which the evidence behind this assumption was discussed critically. The three speakers offered overviews on the general problem, described failures and successes, and discussed how to move forward.

## OVERVIEW OF THE PROBLEM

Despite steady progress over the past century toward assuring the health of today's young population, the 21<sup>st</sup> century began with a major setback – an epidemic of childhood obesity.<sup>1</sup> In the last two decades, for example, the percentage of 10-year-olds with obesity in Sweden nearly quadrupled, while the rate of overweight more than doubled.<sup>2</sup> In Denmark the prevalence of childhood

obesity has increased over 20-fold since World War II.<sup>3</sup> Viewed in a broader perspective, however, the rates of childhood obesity in Scandinavia remain lower than in other regions, such as the United States, where approximately 9 million schoolchildren are currently considered obese.<sup>4</sup> In cultures that stigmatize this condition, childhood obesity involves risks of serious psychosocial problems as well as immediate and long-term risks to physical health. In addition to personal burdens to obese children and their families, societies face considerable economic costs related to childhood obesity, and these will only escalate when today's children enter adulthood.

Children live in a world that has changed dramatically in the four decades of the obesity epidemic. As described elsewhere,<sup>4</sup> longer working hours of parents, changes in the school and preschool food environments, and more meals eaten outside the home – together with changes in physical activity patterns – often affect what children eat, where they eat, how much they eat, and the amount of energy they expend during the day. Other changes, such as the growing diversity of the population, influence cultural views and marketing patterns. Television viewing and the use of computers and video games

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*Key words:* childhood obesity, intervention, prevention

doi:10.1111/j.1753-4887.2009.00167.x

*Nutrition Reviews*® Vol. 67(Suppl. 1):S89–S93

often occupy a large percentage of children's leisure time. Many of the social and cultural characteristics that the population has accepted as a normal way of life may collectively contribute to the growing levels of childhood obesity. It is generally assumed that modifying the current social, cultural, and economic food contexts is essential for reducing childhood obesity.

### FAILURES IN CHILDHOOD OBESITY PREVENTION

Despite general agreement that childhood obesity must be addressed by means of primary prevention, in reality relatively little is known about how to intervene effectively. A Cochrane review of controlled preventive intervention studies in children, of which most were school based, concluded that only 3 of 22 (<15%) published trials had been effective when evaluated in terms of weight-for-height or body composition.<sup>5</sup> Moreover, the only long-term study of the three, in which the duration of the intervention lasted for >12 months, reported significant findings among girls but not boys (Table 1). Furthermore, none of the more recent interventions showed positive effects, and many of the studies with the highest quality in terms of design, sample size, response rate, intervention intensity, and diversity failed to show significant effects. For instance, the Pathways intervention in Native American schoolchildren showed no

effect on anthropometric indicators despite some indication of changed behaviors.<sup>6</sup> Many other interventions reported positive behavioral effects, i.e., in diet and physical activity, but no detectable influences on body weight; they concluded that a focus on short-term behavioral change is unlikely to be sustainable or effective in impacting the weight status of children.

Numerous prevention studies have been implemented over the past two to three decades, many of which have not been controlled, fewer randomized, and in all likelihood many whose results were never reported in the international peer-reviewed literature. The failure to acknowledge that, by far, most previous interventions have failed to show effects on preventing weight gain, along with the tendency to avoid publishing results unless they are positive, creates a false confidence in unproven interventions. This would not only seem unethical and a waste of money, but may also be an obstacle to the funding of future research looking for other ways of intervening to prevent the development of overweight and obesity.

### SUCCESSES IN CHILDHOOD OBESITY PREVENTION

In contrast to the above-mentioned Cochrane review, a more optimistic view was provided by Doak et al.,<sup>28</sup> who concluded that almost 70% (17 of 25) of published school-based interventions were in fact effective (Table 2). Although the available data could not clarify which types of interventions are most and least likely to be effective, there was some evidence from this review that interventions targeting both diet and physical activity were less effective than interventions focusing on a single behavior, e.g., reduction in TV viewing. Additionally, larger sample size, fewer number of participating schools, and shorter length of intervention were factors characterizing effective interventions.

One much-discussed example of an intervention that appeared to prevent obesity was Singapore's "Trim and Fit" program. This nationwide intervention program promoting healthier diets and improved physical fitness in primary and secondary schools reported positive results in anthropometric indicators. Specifically, the prevalence of obesity decreased from 16.6% to 14.6% in 11- to 12-year-olds, and from 15.5% to 13.1% in 15- to 16-year-olds. These results, summarized in a letter to the editor,<sup>43</sup> have not been published in detail. Interventions of this type, which do not have controls, may nonetheless provide potentially valuable information about which approaches work and which ones do not. However, uncontrolled studies are not typically included in systematic reviews.

**Table 1 Cochrane review of interventions for preventing obesity in children 1990–2005.**

Reference	Result
Flores (1995) <sup>6</sup>	+
Gortmaker et al. (1999) <sup>7</sup>	+
Mo-Suwan et al. (1998) <sup>8</sup>	+
Robinson (1999) <sup>9</sup>	+
Baranowski et al (2003) <sup>10</sup>	–
Beech et al. (2003) <sup>11</sup>	–
Caballero et al. (2003) <sup>12</sup>	–
Dennison et al. (2004) <sup>13</sup>	–
Donnelly et al. (1996) <sup>14</sup>	–
Epstein et al. (2001) <sup>15</sup>	–
Harvey-Berino et al. (2003) <sup>16</sup>	–
James et al. (2004) <sup>17</sup>	–
Kain et al. (2004) <sup>18</sup>	–
Muller et al. (2001) <sup>19</sup>	–
Neumark-Sztainer et al. (2003) <sup>20</sup>	–
Pangrazi et al. (2003) <sup>21</sup>	–
Robinson et al. (2003) <sup>22</sup>	–
Sahota et al. (2001) <sup>23</sup>	–
Sallis et al. (1993) <sup>24</sup>	–
Stolley et al. (1997) <sup>25</sup>	–
Story et al. (2003) <sup>26</sup>	–
Warren et al. (2003) <sup>27</sup>	–

*Symbol legend:* +, effective; –, ineffective.  
Adapted from Summerbell et al.<sup>5</sup>

**Table 2 Review of interventions for preventing obesity in schoolchildren.**

Reference	Result
Alexandrov et al. (1992) <sup>29</sup>	+
Dwyer et al. (1983) <sup>30</sup>	+
Flores (1995) <sup>6</sup>	+
Gortmaker et al. (1999) <sup>7</sup>	+
Harrell et al. (1996) <sup>31</sup>	+
Kain et al. (2004) <sup>18</sup>	+
Killen et al. (1988) <sup>32</sup>	+
Manios et al. (1998) <sup>33</sup>	+
McMurray et al. (2002) <sup>34</sup>	+
Muller et al. (2001) <sup>19</sup>	+
Robinson (1999) <sup>9</sup>	+
Rodgers et al. (2005) <sup>35</sup>	+
Sallis et al. (2003) <sup>36</sup>	+
Simonetti D'Arca et al. (1986) <sup>37</sup>	+
Tamir et al. (1990) <sup>38</sup>	+
Vandongen et al. (1995) <sup>39</sup>	+
James et al. (2004) <sup>17</sup>	+
Alexandrov et al. (1992) <sup>29</sup>	–
Bush et al. (1989) <sup>40</sup>	–
Caballero et al. (2003) <sup>12</sup>	–
Donnelly et al. (1996) <sup>14</sup>	–
Leupker et al. (1996) <sup>41</sup>	–
Sahota et al. (2001) <sup>23</sup>	–
Sallis et al. (1993) <sup>24</sup>	–
Walter et al. (1988) <sup>42</sup>	–

*Symbol legend:* +, effective; –, ineffective.

Adapted from Doak et al.<sup>28</sup>

Discrepancies between conclusions drawn in Tables 1 and 2 indicate different inclusion criteria for the two reviews as well as a certain lack of consensus as to what constitutes an effective intervention, but this discussion is not within the scope of the present summary paper and is presented elsewhere.<sup>44</sup>

## CONCLUSION

The speakers were in general agreement that action is needed in the area of childhood obesity prevention and that the worldwide epidemic itself is sufficient evidence for action. However, it was also acknowledged that we do not have sufficient evidence that proposed interventions are effective. Several related issues were raised in the discussion:

First, it was discussed whether evidence should be evaluated on the basis of outcomes or processes. It may be possible to change the determinants, but they are typically difficult to measure; thus, better methodologies for exposures are needed. Evidence-based medicine is generally considered the gold standard for identifying treatments that work. However, it has been argued more recently that primary prevention and health promotion initiatives should be evaluated in terms of their processes as well as

their outcomes, because the greater complexity of such interventions often precludes them from being delivered and accepted in standardized ways.<sup>45</sup> On the other hand, it is difficult to justify the implementation of prevention or treatment efforts unless there is knowledge about their beneficial as well as their adverse effects, including the risk of eating disorders or underweight. In addition, without such knowledge, the potential exists for money to be spent on ineffective programs instead of on other proven activities. It was also concluded that better methodologies are needed for evaluating outcomes, including measures of body composition, and that follow-up should be conducted over a longer period of time.

Discussions also addressed at which level future interventions should be designed within the International Obesity Task Force framework of universal/targeted/selected prevention.<sup>46</sup> Ecologic studies aiming to accomplish universal prevention by modifying physical environments to change energy balance are generally advocated as the ideal for preventing childhood obesity. However, evidence that these interventions are effective is almost completely lacking. Therefore, we should not forget targeted interventions towards children at high risk of becoming obese based on anthropometric and other known risk factors. Observational studies suggest that normal-weight children from families in which obesity is a problem, children from socially disadvantaged families, or children with high birth weights are at high risk of becoming obese, and targeting such groups for intervention may prove more valuable than targeting whole populations of children, in whom effects among high-risk individuals may be diluted. Such targeted approaches have been applied successfully in young adults,<sup>47</sup> but there is clearly a need for more prevention studies among young children.

The final topic addressed how we should move forward to prevent obesity in children. Important issues here include establishing a consensus on what constitutes a good, yet realistic, design and on how to maintain scientific standards in community interventions. It was agreed that the public health nutrition community needs to work harder to establish evidence that is strong enough to justify major structural and policy changes. To accomplish this, public health initiatives will need to be planned according to scientific principles and evaluated in terms of their outcomes as well as their processes. The lack of evidence on how to prevent obesity also implies that it is of utmost importance to continue to follow the current literature with respect to both positive and adverse consequences of interventions, and, whenever programs are instituted, to build the evidence by conducting initiatives according to strict scientific criteria. Finally, it is important that the results of all interventions be published, irrespective of the outcomes.

## Acknowledgment

The authors would like to thank Drs Philip James and Colleen Doak for their active contributions during the symposium.

*Declaration of interest.* The authors have no relevant interests to declare.

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