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## Does Television Cause Childhood Obesity?

The United States is experiencing an epidemic of childhood obesity. Although recent studies have documented rapidly increasing overweight among US children and adolescents,<sup>1</sup> there are few effective tools to combat this problem. Most available weight-control treatments yield only modest, unsustainable effects. Similarly, with a few exceptions, prevention programs targeting diet and activity changes have been relatively ineffective at altering body fatness.<sup>2</sup> As a result, there is a pressing need for innovative intervention approaches.

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See also p 938.

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Children and adolescents spend a substantial part of their lives in front of a television set. Extrapolation of current viewing data (Nielsen Media Research, Written Communication, February 1997) reveals that, between the ages of 2 and 17 years, US children spend an average of more than 3 years of their waking lives watching television, not including time spent watching videos, playing video games, or using a computer. It should not be surprising, therefore, that there has been widespread speculation that television viewing, as part of a sedentary lifestyle, is one of the most easily modifiable causes of obesity among children. This hypothesis has commonsense appeal but has been difficult to validate.

In this issue of the JOURNAL, Andersen and colleagues<sup>3</sup> add fuel to this fire. They report data on television viewing, vigorous physical activity, and body composition from a nationwide sample of 4063 children, aged 8 to 16 years, who com-

pleted a physical activity questionnaire and body measurements as part of National Health and Nutrition Examination Survey III, from 1988 through 1994. Because of oversampling, this sample is more representative of Mexican American and non-Hispanic black children than previous studies. Overall, about 80% of the children reported 3 or more episodes of vigorous physical activity per week. Even among 14- to 16-year old girls, the least active subgroup of the sample, 65% reported 3 or more episodes per week. Yet, despite this relatively high frequency of activity, 26% of the sample also reported watching 4 or more hours of television on the previous day, including 43% of the non-Hispanic black boys and girls. Counter to expectations, the amount of physical activity was not associated with either body mass index (BMI) or trunk skinfolds in girls, and increased vigorous activity was associated with greater BMI among boys. However, boys and girls with greater BMIs and trunk skinfolds were more likely to report watching more television on the previous day.

This is the fourth cross-sectional study from a national sample to demonstrate a statistically significant correlation between adiposity and television viewing among children.<sup>4-6</sup> Similar results have been reported from several regional samples,<sup>7-9</sup> while other studies have reported no significant association.<sup>10-13</sup> Despite a variety of different assessment methods and quite different samples, the correlations from most studies are remarkably consistent and small—whether statistically significant or not. However, it is possible that the weakness of these associations is the result of measurement error inherent in assessing these behaviors.

These cross-sectional studies ask the question: Do overweight children watch more television than normal-weight children? Cross-sectional studies cannot eliminate the possibility that the causal arrow is backward. If the amount of television viewing is measured at the same time or after body fatness is measured, watching more television could be the consequence of being overweight. On the other hand, for tele-

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vision viewing to be a true risk factor for childhood obesity, precedence must be established<sup>14</sup>—a greater amount of television viewing must precede the development of overweight. Risk-factor studies ask the question: Does television viewing predict future obesity? Of the 2 prospective studies examining this question, 1 found a weak but statistically significant association<sup>5</sup> and the other did not.<sup>11</sup>

While precedence is necessary, it is not sufficient to demonstrate causality. Even a prospective risk factor may not be a true cause. A causal relationship can only be demonstrated in an experimental trial, in which manipulation of the risk factor changes the outcome.<sup>14</sup> Given the difficulties in measuring television viewing and physical activity, and the need to identify causes of childhood obesity, experimental studies are needed. In the current environment, in which television viewing is already so prevalent, the question of greatest clinical, practical, and policy importance is: Will reducing television viewing prevent or reduce childhood obesity? Several ongoing experimental studies are attempting to answer this question.

Two primary mechanisms have been proposed to link television viewing and body fatness: reduced energy expenditure from displacement of physical activity, and increased dietary energy intake, either during viewing or in response to food advertising. The available data suggest that both may play a role. There is some evidence that children who watch more television are less physically active, although the associations are consistently weak.<sup>4,11,13</sup> Intriguing results also come from a treatment study of obese children and their parents, in which reinforcing decreased sedentary behaviors (including television viewing) led to greater weight loss than directly reinforcing increased exercise.<sup>15</sup> These findings might indicate that choice and perceived control over available time are more motivating than direct reinforcement for exercise. On the other side of the energy balance equation, there is evidence that adolescents who watch more television eat higher-fat diets<sup>12</sup> and that high-calorie food advertisements influence children's snack choices and consumption.<sup>16,17</sup>

Past experience suggests that it is unlikely that a simple solution to the problem of obesity will be found. As the study by Andersen and colleagues illustrates,<sup>3</sup> even the well-accepted association between physical activity and body fatness is difficult to confirm in epidemiological studies. The jury is still out on the question of whether television viewing is an important cause of overweight among children, although that

should not stop parents and children from substituting less sedentary activities for sitting in front of the television, videocassette recorder, computer, and video game. As with other epidemics, systematic, experimental research is likely to be the quickest path to real solutions. Additional prospective risk-factor studies and experimental trials are needed to help clarify the potential roles of television viewing and sedentary behavior in the development of childhood obesity, to better understand the mechanisms they may act through, and to identify effective interventions to help children become more active.

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