Increased adiposity and reduced physical activity in children: Cause or effect?

March 18 2014

Increased adiposity is likely to cause reduced physical activity in children, according to research published in this week's *PLOS Medicine*. The results of the study, conducted by Rebecca Richmond and colleagues from the MRC Integrative Epidemiology Unit at the University of Bristol, UK, suggest that promoting weight loss in overweight and obese children might also increase childhood activity levels.

Previous studies have shown an association between low physical activity and higher body mass index (BMI) in children but were not able to determine whether childhood adiposity influences physical activity levels . To address this question, the authors analyzed a panel of genes reliably associated with adiposity to examine whether children with a genetic predisposition for increased BMI were more likely to have lower rates of physical activity, which would imply a causal effect.

Because there are no common genetic variants known to be linked to reduced physical activity, the researchers could not investigate whether the reverse is also true, namely that genetic predisposition to lower physical activity might also cause higher BMI.

They studied a group of children from the Avon Longitudinal Study of Parents and Children (Children of the 90s/ALSPAC) and measured their BMI and total body fat. A small movement-counting device also recorded the total daily activity of 5,595 of the children. In addition, the researchers examined the children's genetic make-up for the presence of

variants known to be linked to obesity. By applying Mendelian randomization, a method of using measured variation in genes of known function to assess the causal effect of a modifiable exposure on disease, the authors showed that greater BMI is likely to be causally associated with lower daily activity. Specifically, the analysis demonstrated that for every 3.3 kg/m2 increase in BMI, the children recorded ~2.8 less minutes per day of moderate-to-vigorous-intensity activity.

The findings show that obese children have a propensity to reduced levels of physical activity, which may in turn lead to further weight gain, and support targeting weight reduction in efforts to increase childhood activity levels. According to the authors,

"The study illustrates how genetics can be used to help find causal relationships in complex networks of observational measurements. It is intuitive to think of and observe relationships between factors such as obesity and activity in the population, however it is less clear in which direction these associations lie, whether they are causal or whether it is worth allocating considerable resources to assessing the impact of potential interventions."

More information: Richmond RC, Smith GD, Ness AR, Hoed Md, McMahon G, et al. (2014) Assessing Causality in the Association between Child Adiposity and Physical Activity Levels: A Mendelian Randomization Analysis. *PLoS Med* 11(3): e1001618. DOI: 10.1371/journal.pmed.1001618

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