

Physical activity and dietary counselling slows down the development of insulin resistance in children

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A new study from the University of Eastern Finland shows that individualized and family-based physical activity and dietary counseling

considerably slows down the development of insulin resistance, which is a precursor of type 2 diabetes, in 6–9-year-old children. Published in *Diabetologia*, the study focused on predominantly normal-weight children.

Insulin resistance refers to the body's weakened metabolic response to insulin in the target tissues, i.e. in skeletal muscles, adipose tissue and the liver. Insulin resistance is usually the first sign of disturbed glucose metabolism, developing much earlier than abnormalities in pancreatic insulin secretion, elevated glucose levels and, eventually, type 2 diabetes. Earlier studies have shown that physical [activity](#) and dietary counseling reduces insulin resistance in overweight and obese children. This new study from the University of Eastern Finland is significant not only scientifically, but also in terms of public health and clinical practice, because it is the first to show that a combination of physical activity and dietary counseling can be used to slow down the long-term development of insulin resistance in children who were predominantly normal-weight at baseline.

More than 500 Finnish children aged between six and nine years at baseline participated in the Physical Activity and Nutrition in Children (PANIC) study ongoing at the University of Eastern Finland. Children and their caregivers in the intervention group were given individualized and family-based physical activity and dietary counseling over a period of two years. Children and their caregivers in the control group, on the other hand, were given instructions on [physical exercise](#) and nutrition as per the national guidelines, but no actual lifestyle counseling. At baseline and two years later, the researchers analyzed children's physical activity and sedentary behavior using the Actiheart sensor that measures heart rate and [body movements](#). Physical activity was also assessed by the PANIC Physical Activity Questionnaire, and dietary factors were assessed by a 4-day food record over four days. Children's body fat percentage and lean body mass were measured by dual-energy X-ray

absorptiometry, DXA. Fasting serum insulin and HOMA-IR were used as indicators of insulin resistance.

The study showed that during the two-year follow-up, increase of insulin resistance was roughly 35% lower in the group that was given individualized and family-based physical activity and dietary counseling than in the control group. The attenuating effect of counseling on insulin resistance was explained especially by changes in physical activity and sedentary behavior, and slightly less by changes in overall dietary quality and in the consumption of high-fat spreads. Counseling did not have an effect on body fat percentage or lean body mass, i.e. changes in body composition did not mediate the beneficial effect of intervention on [insulin](#) resistance.



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"This is an interesting finding. The attenuating effect of physical activity and dietary counseling on [insulin resistance](#) in children is likely caused by the fact that physical activity and a healthy diet boost metabolism in skeletal muscles, adipose tissue and in the liver, and not so much by a lower body fat percentage or [lean body mass](#)," Professor Timo Lakka, the lead author of the study, says.

Although type 2 diabetes usually develops in adulthood, research suggests that its prevention is best begun already in childhood.

"Increasing physical activity, reducing sedentary behavior and eating food of better quality should be a priority for all children, not just for those who are overweight," Professor Lakka points out.

Professor Lakka points out that in addition to [body](#) composition measurements, all children should also be asked about their [physical activity](#), sedentary behavior and diet when they visit a child health clinic or a school nurse.

"Identifying children who have unhealthy lifestyle habits and who are at an increased risk of type 2 diabetes in adulthood would allow a better targeting of measures that are geared towards preventing type 2 diabetes. The best way to collect lifestyle-related data is to use scientifically validated, well-proven digital applications. This would allow the data to be optimally used for promoting [children](#)'s health and well-being, and for making scientifically informed decisions," Professor Lakka says.

More information: Timo A. Lakka et al. A 2 year physical activity and dietary intervention attenuates the increase in insulin resistance in a general population of children: the PANIC study, *Diabetologia* (2020). [DOI: 10.1007/s00125-020-05250-0](https://doi.org/10.1007/s00125-020-05250-0)

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