

Iron, vitamins could affect physical fitness in adolescents

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Adolescence is an important time not only for growing but for acquiring healthy habits that will last a lifetime, such as choosing foods rich in vitamins and minerals, and adopting a regular exercise regimen.

Unfortunately, several studies have shown that adolescents' intake of important nutrients, as well as their performance on standard physical fitness tests, has fallen in recent years. Because nutrition and fitness are intertwined—for example, iron forms part of hemoglobin, which carries oxygen to muscles, and antioxidants such as vitamin C aid in rebuilding damage after intense training—these two findings could be related. In a new study, researchers have found that adolescents' blood levels of various micronutrients are correlated with how well they performed in certain physical fitness tests. Though these results don't prove causality, they suggest a new relationship between different measures of adolescent health.

The article is entitled "Iron and Vitamin Status Biomarkers and its Association with [Physical Fitness](#) in Adolescents. The HELENA Study." and is online at <http://bit.ly/Q2j6lJ>. It appears in the online edition of the *Journal of Applied Physiology*, a publication of the American Physiological Society.

Researcher Luis Gracia-Marco of the University of Zaragoza, Spain and his colleagues relied on data from a larger, long-term research project known as the Healthy Lifestyle in Europe by [Nutrition](#) in Adolescents Cross-Sectional Study, or HELENA-CSS. Part of this study, which involved thousands of volunteers between the ages of 12.5 and 17.5 in

cities scattered across Europe, gathered nutrition and physical fitness data. Blood samples taken in one third of the volunteers (n=1089) were tested for a variety of micronutrients, including hemoglobin, indicative of iron intake, soluble transferrin receptor, serum ferritin, retinol, vitamin C, beta-carotene, alpha-tocopherol, vitamin B6, cobalamin, holotranscobalamin, plasma folate, RCB folate and vitamin D. The volunteers' physical fitness was also assessed through a standing long jump test, which assesses lower-body muscular strength, and a 20 meter shuttle run test, which assesses cardiovascular fitness through maximal oxygen consumption (VO₂max). When looking for correlations between the micronutrient levels and physical fitness, they took into account the adolescents' age, time of year, latitude of the city they lived in, body mass index, age of menarche in females, and amount of regular physical activity (using accelerometers).

The researchers found that blood levels of certain micronutrients were intimately connected with the volunteers' performance on the physical fitness tests. For cardiorespiratory fitness, concentrations of hemoglobin, retinol, and vitamin C in males and beta-carotene and vitamin D in females was associated with VO₂max. For muscular fitness, concentrations of hemoglobin, beta-carotene, retinol, and alpha-tocopherol in males and beta-carotene and vitamin D in females was associated with performing better on the standing long jump test.

The authors suggest that studies connecting micronutrients, such as the ones they measured, with physical fitness in any population has been controversial and limited. This is especially true for adolescents, a group that's often difficult to gather information on. This new study, they say, is one of the first to find connections between micronutrients and physical fitness in this age group, with the strength of controlling the results for a complete set of relevant confounders. Yet, they note that more research still needs to be done.

"The associations between physical fitness and iron or [vitamin](#) status observed in this cross-sectional study in [adolescents](#) should be followed up by a study specifically designed to evaluate causal relationships," the authors write.

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