

Research Project

Sportcheck Follow-up: Physical fitness, cardiovascular and psychosocial health in primary school children

Third-party funded project

Project title Sportcheck Follow-up: Physical fitness, cardiovascular and psychosocial health in primary school children

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Status Completed

Cardiovascular disease (CVD) is one of the most frequent causes of death worldwide. CV risk factors such as hypertension or obesity oftentimes manifest during childhood. The prevalence of high blood pressure and body mass index (BMI) in childhood continues to rise. Both these cardiovascular risk factors have been shown to track into adulthood with higher cardiovascular morbidity and mortality rates later in life. Alterations of vascular structure and function can be validated by use of non-invasive measurements of vascular biomarkers. Retinal vessel diameters are valid and sensitive microvascular biomarkers that have been shown to be associated with CVD in adulthood and CV risk factors in childhood. In adults, narrower arteriolar and wider venular diameters have been shown to be predictive of future hypertension, coronary artery disease and stroke. Few studies have demonstrated similar findings in young children, indicating that retinal vessel alterations correlate with high blood pressure and unfavourable body composition early in life. To date, no data is available on the associations between retinal vessel diameters and the development of high blood pressure over a longer period during childhood years. Our study aims to fill this research gap and to investigate further the long-term influence of physical activity and fitness on retinal vessel diameters, blood pressure, BMI and psychosocial health in children. We hypothesise that narrower retinal arteries are associated with the development of higher blood pressure during a four-year follow-up in children. Furthermore, children who show an increase in physical fitness during the follow-up are postulated to have favourable retinal vessel diameter changes, lower blood pressure and BMI as well as lower levels of perceived psychosocial stress compared to their peers that remained on the same physical fitness level.

The study is designed as a population-based prospective cohort study, the baseline of which was performed four years previously. In 2014, 1255 primary school children of the Canton Basel-Stadt took part in physical fitness tests and BMI measurements during physical education lessons. 340 first-grader (7.3 years (SD 0.4)) were allowed by their parents to take part in the additional medical tests. Assessments included retinal vessel analysis, blood pressure, BMI, psychosocial health, proxy-reported questionnaires and physical fitness tests. In 2018, the children will again participate in the same setting. For the fitness tests and BMI measurements, approximately 1000 are expected to have complete data from 2014 and 2018. With respect to the medical tests, at least 250 of the previous 340 children are expected to have complete data from baseline and the four-year follow-up. Our timeline will enable us to perform all mea-

surements and data collection of the follow-up in 2018, allow for data entry and cleaning, data merging and retinal image analysis in 2019 and to publish and disseminate the results in 2020.

A multiple linear regression analysis using blood pressure at follow-up as outcome will be conducted to analyse the associations between retinal vessel diameters and the development of high blood pressure. To analyse whether changes in physical activity and fitness during the four-year follow-up are associated with retinal vessel diameters, BMI, blood pressure and psychosocial health, linear mixed regression models will be calculated using school as random effect. For a sample size of 250 children with complete data, using the estimated effect size and residual standard deviation of the 2014 baseline data, the power is estimated to be around 95%.

The study offers a unique integral concept that aims to set the grounds for a healthy and active lifestyle approach during childhood. It has the potential to deliver clinically relevant missing longer-term data to improve primary cardiovascular prevention in childhood. It will help to optimize cardiovascular risk stratification in childhood to identify those at risk of disease progression later in life. In collaboration with the Cantonal Office of Sport and the Department of Education of the City of Basel the results of the study will be directly embedded into prevention strategies for additional physical activity programs in and around school.

Financed by

Swiss National Science Foundation (SNSF)

Add publication

Published results

3396313, Imhof, Katharina; Zahner, Lukas; Schmidt-Trucks'ass, Arno; Hanssen, Henner, Association of body composition and blood pressure categories with retinal vessel diameters in primary school children., 1348-4214, Hypertension research : official journal of the Japanese Society of Hypertension, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

3396324, Imhof, K; Zahner, L; Schmidt-Trucks'ass, A; Faude, O; Hanssen, H, Influence of physical fitness and activity behavior on retinal vessel diameters in primary schoolchildren., 1600-0838, Scandinavian journal of medicine & science in sports, Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

4513832, K'ochli, Sabrina; Endes, Katharina; Steiner, Ramona; Engler, Luca; Infanger, Denis; Schmidt-Trucks'ass, Arno; Zahner, Lukas; Hanssen, Henner, Obesity, High Blood Pressure, and Physical Activity Determine Vascular Phenotype in Young Children., 1524-4563, Hypertension (Dallas, Tex. : 1979), Publication: JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

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Specify cooperation partners