Genetic and environmental influences on the diversity of leisure-time physical activity in adolescence

Abstract for the course *Analysis of Twin Data in Health Research*

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Background

Physical activity (PA) has an essential role in both prevention and treatment of several non-communicable and disability-causing diseases. The global PA guidelines recommend diversity of PA including both aerobic and muscle strengthening, as well as, balance/agility/flexibility-improving activities weekly. Unfortunately, the guidelines are met only by few and individuals' PA levels tend to erode with time especially in adolescence and in transition to adulthood, which has been related to the decrease in the number of participated sport activities. Furthermore, an increased risk of physical overstress and overuse injuries has been related to sports specialization, especially among adolescents. Evidence shows that both genetic and environmental factors, influence leisure-time PA levels. Yet, so far no heritability estimates of PA diversity have been published. Thus, my aim is to estimate genetic and environmental influences on the diversity of leisure-time PA in adolescence.

Methods

FinnTwin16 study is a nationwide longitudinal cohort study of the health behaviors of twins and their families and consists of Finnish twins (both mono- and dizygotic twin pairs) born in 1975-79. The first survey took place the month after the twins reached the age of 16 (mean 16.1, range 16.0-17.0). The following waves took place when the twins turned 17 years of age (mean 17.1, range 17.0-18.0), were 18 years old (18.6, 18.3-19.4), were young adults (24.5, 21.0-28.6), and in their mid-thirties (34.1, 31.9-37.4). This study focuses on the second wave that yielded a response rate of 95%. During the second wave, 4102 twins (48% males) reported participation in leisure-time PA at least once a month and at least one sport activity. Based on the number of different categories of leisure-time sport activities participated in, twins were divided in five groups: 1, 2, 3, 4, or ≥5 sport activities. Within-pair polychoric correlations were calculated for all 2214 twin pairs and separately for 713 monozygotic (MZ) twin pairs including 276 male (MMZ) and 437 female (FMZ) pairs, and for 1442 dizygotic (DZ) twin pairs including 346 male (MDZ), 364 female (FDZ), and 732 opposite-sex pairs (OSDZ).

Results

At the age of 17 male twins participated in on average 3.2 (SD 1.5) and female twins 3.2 (SD 1.4) sport activities, respectively. Within-pair correlations for the number of sports activities participated in were 0.42 for all twin pairs, 0.68 for MZ pairs, 0.46 for SSDZ and 0.18 for OSDZ pairs. Sex-specific correlations were 0.63 for MMZ and 0.72 FMZ pairs, whereas 0.33 for MDZ and 0.44 FDZ pairs.

Discussion

The preliminary within-pair analyses showed notably higher correlations for number of sport activities among MZ twin pairs compared to DZ twin pairs. Interestingly, the correlations were also higher among female twin pairs in comparison to male twin pairs, both among MZ and DZ pairs.

Further research requires estimation of genetic and environmental influences on the diversity of PA. However, this may be challenging, since the variable (number of sport activities) is ordinal with five categories. Of further interest would be bivariate analyses of number of sports activities with overall PA.