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Environmental and genetic contributions to *device-based measures of physical activity in Swedish 9-year-olds.*

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Purpose

Physical activity (PA) levels among Swedish children are associated with familial socioeconomic status. However, it remains unclear what the driving determinant is: genes or environments.

This study aimed to investigate environmental and genetic contributions to proportion of time spent in sedentary behaviour (SED) and PA at low medium and vigorous intensities (LPA, MPA and VPA) in children.

Methods

We invited Swedish 9-year-old twins enrolled in the Swedish twin register to wear a GT3X accelerometer on their right hip for 7 days. A total of 465 twin pairs with known zygosity and 4-9 days of valid data were analysed. A univariate model was performed to estimate the relative contribution of genetic (a^2), shared environment (c^2), and unique environment (e^2) factors contributing to the variation in % of awake time spent at different intensities. OpenMx was used to perform the analyses and we used Wald-type confidence intervals.

Results

The twins spent on an average 63% of their awake time in SED, 9% in VPA, 7% in MPA and 20% in LPA. Boys spent a significantly higher % in VPA and MPA, but a lower % time in SED and LPA, compared to the girls. The contribution of genetic factors (heritability) was substantial (0.42 to 0.51) for all PA measures.

Table 1. Estimates and 95% confidence intervals (95% CI) of heritability (a^2), shared (c^2) and unique (e^2) environment contribution to each PA measure.

	%SED	%LPA	%MPA	%VPA
a^2	0.48	0.51	0.42	0.51
95% CI	(0.32, 0.64)	(0.33, 0.69)	(0.24, 0.60)	(0.35, 0.67)
c^2	0.36	0.28	0.34	0.31
95% CI	(0.20, 0.51)	(0.11-0.45)	(0.17, 0.50)	0.15, 0.46)
e^2	0.17	0.21	0.24	0.18
95% CI	(0.13, 0.20)	(0.17, 0.26)	(0.19, 0.29)	(0.14-0.22)

Conclusion

Device-based measures of PA were explained to a substantial extent by genetic factors in the Swedish 9-year-olds. Interactions with sex and parental education will be further explored. Multi-level interventions may successfully increase average PA, but often fail to reduce variance. Our findings suggest that interventions aiming to reduce inequalities in PA in young children will have to overcome not only environmental but also substantial hereditary predictors of this modifiable lifestyle factor.