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Background

Physical activity in young children during daily life is usually unstructured. Wristband activity trackers (accelerometers) could serve as instantaneous monitoring tool, to quantify physical activity over a longer time period in child's natural environment.

Methods

Setting: Healthy children from local primary school.
Device: Activity tracker (Fitbit Charge 2)
Recordings: Demographics, total number of daily steps and heart rate
 Questionnaire around daily physical routine and sportive activities

Results

Of 393 pupils, 302 (54.6% boys; median age 8.7 (6.8-11.6) years) participated our study between 5-9/2018. Monitoring with the accelerometer occurred for 11-15 days with a median wearing time of the device for approx.12.1 hours (IQR 9.4-13.9). Datasets of 298 children could be analyzed.

Overall, daily total step count was 12095. Boys' total number of daily steps was significantly higher than in girls (Figure 1.: 13015 vs 11305 steps/day; $p < 0.0001$). Overall step counts were significantly higher during the week, than on weekend days, with higher step scores on Saturdays than on Sundays. Total daily step count increased from 6 to approx. 8.5 years (1st and 2nd class of primary school), whereas children between 8.5-11.6 (3rd and 4th grade) had lower step counts than the younger children included in our study (Figure 3). Thus, there is no linearity in increase of total daily steps with age. Significant predictors for the daily step count were male gender (+1.324,9 steps, $p=0.0008$), mode of transport to school (walking, bicycle, scooter: +865,5 steps $p=0.049$), active membership in a sports club (+1.324,9 steps/day, $p=0.0008$), and number of structured units of physical exercise (+336,5/per 45', $p < 0,0001$).

In contrast, weight, BMI, full-day versus half-day attendance at school were not associated with the daily step count. However, severe obesity was associated with a significant reduction in total daily step count (-3037.7 steps/day, $p=0.015$). Monitored heart rate was 98/min (IQR 90-105/min), with no significant difference between girls and boys.

Figure 1

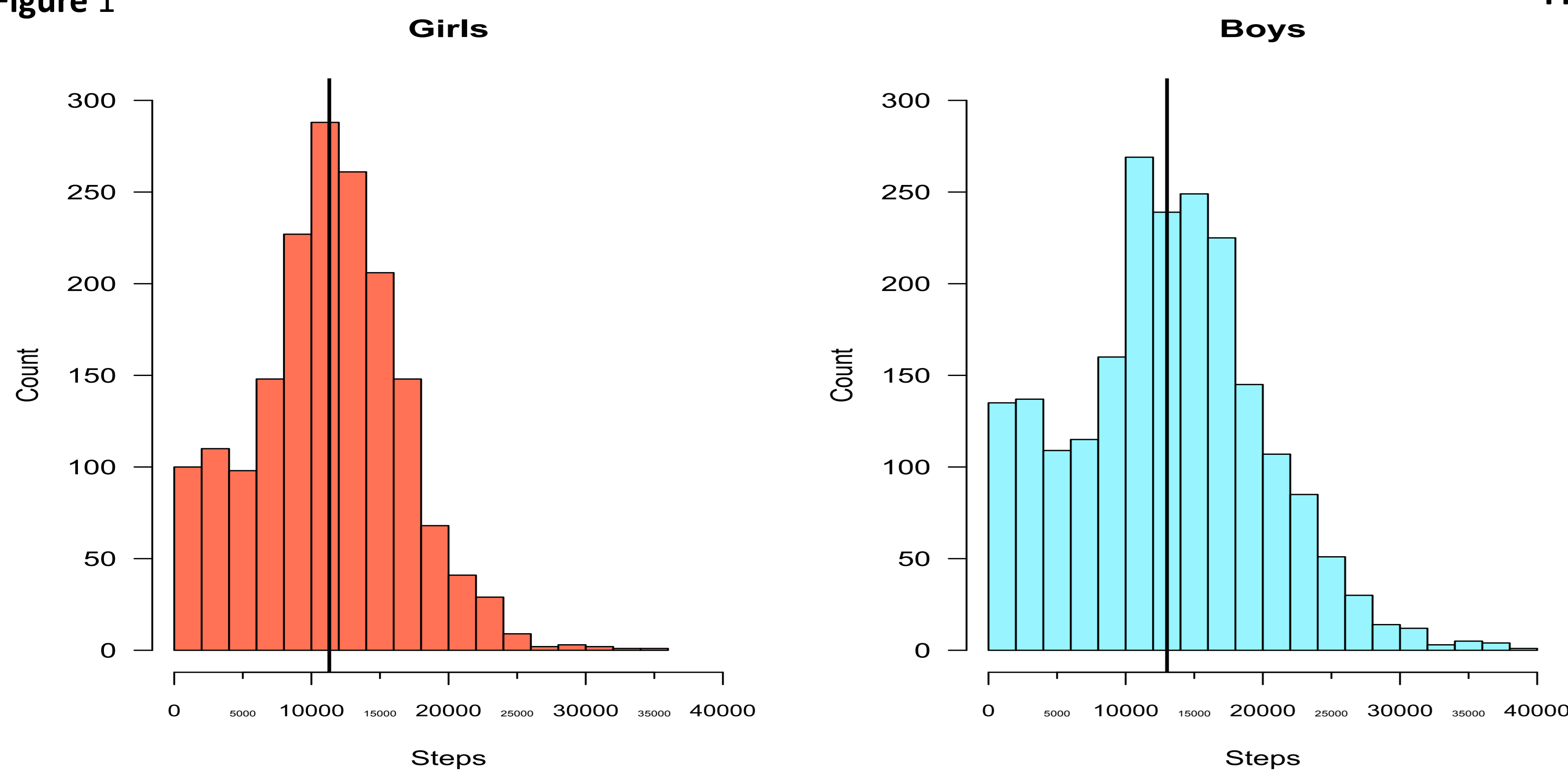


Figure 2

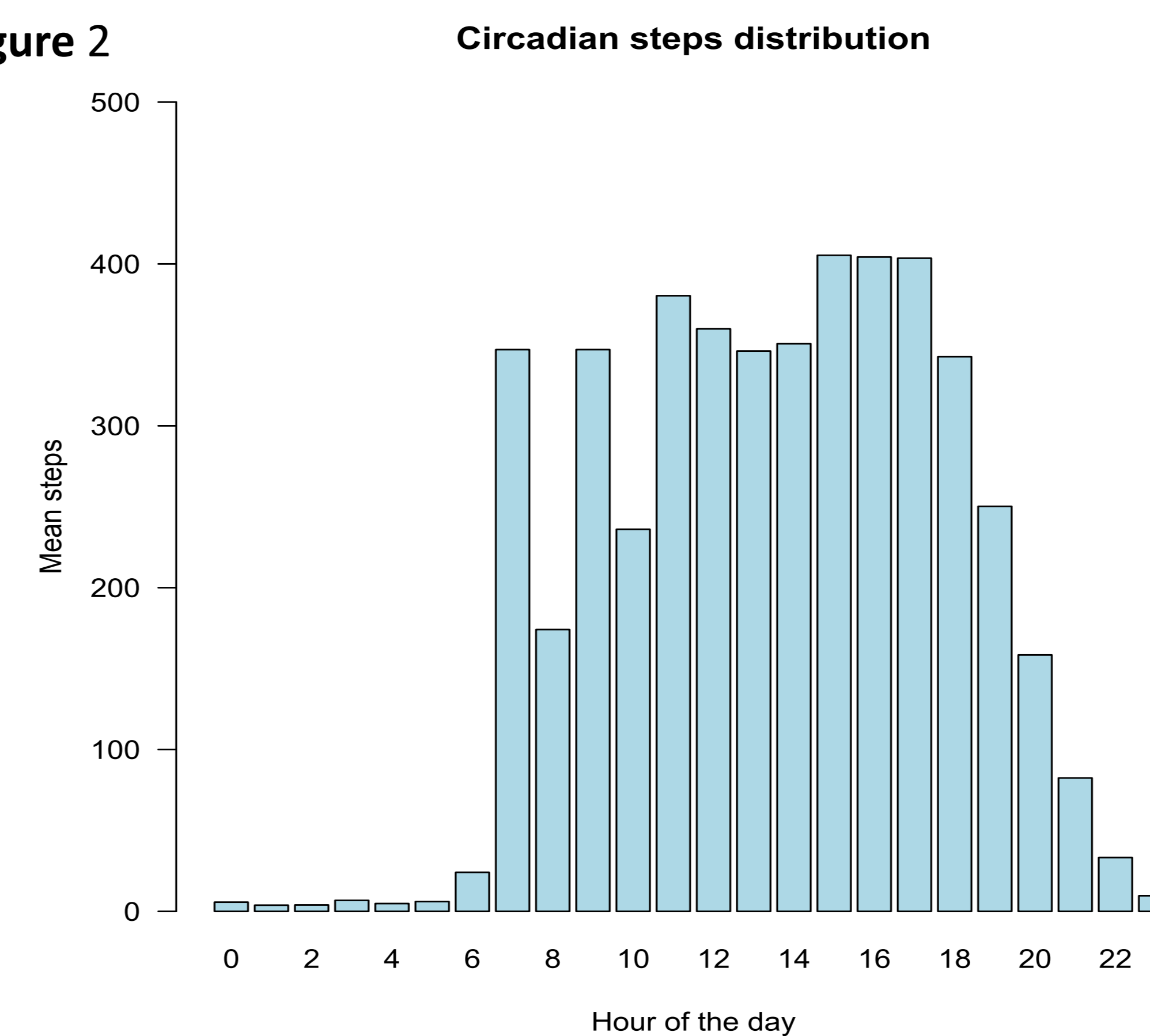
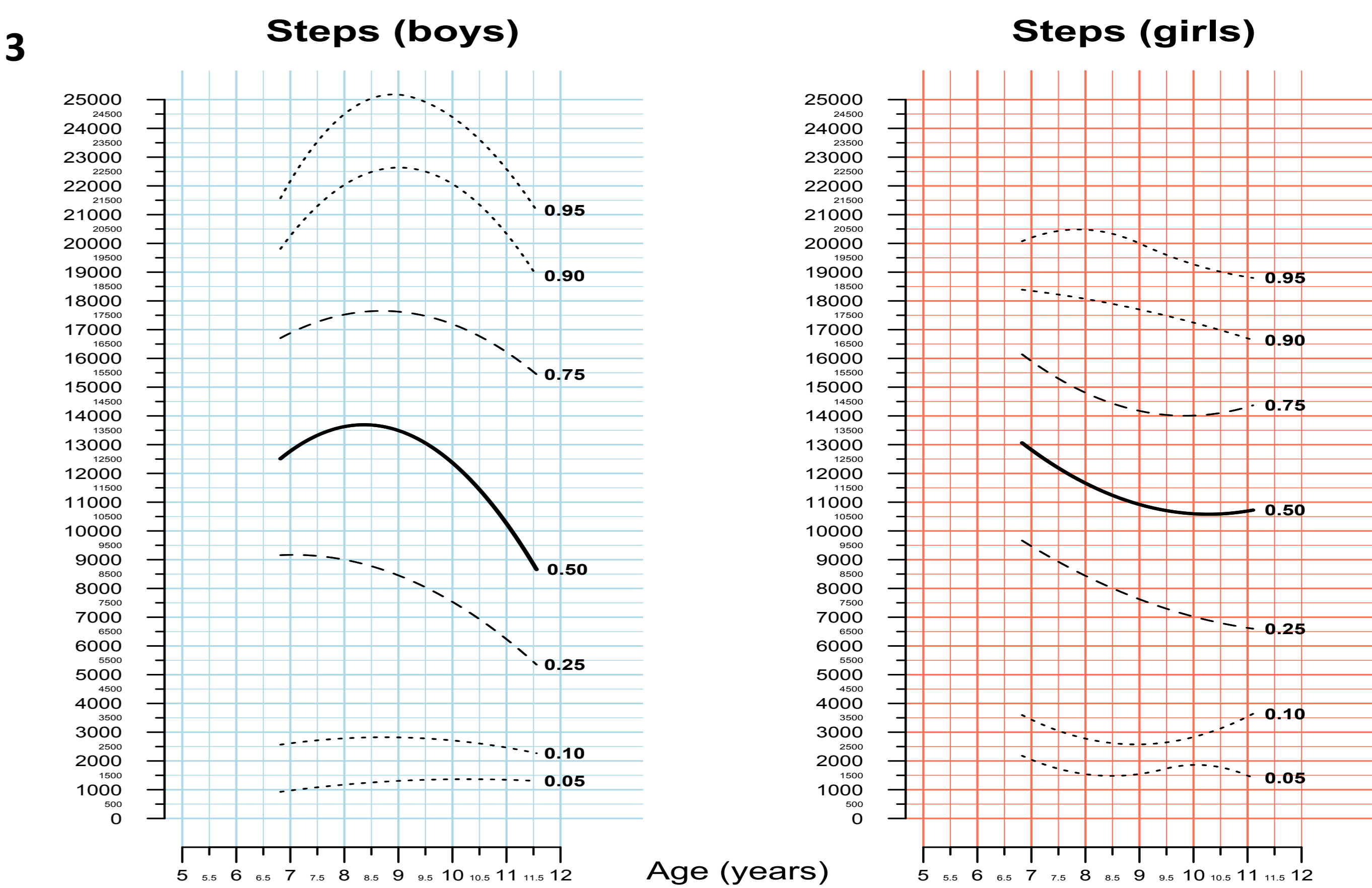


Figure 3



Conclusion

This cohort study of healthy pupils can serve as comparative normal data for children with a chronic disease, affecting physical exercise. This is helpful to judge the degree of physical limitation of patients compared to healthy peers. It is important to note that there is no linear increase with age. Remarkably an even lower total daily step count is reached in older primary school pupils, who did not appear to have similar activity levels compared to the levels seen in younger children.