

METHODS: 114 young children (71 boys) aged 3-6 years were recruited from 3 kindergartens. They were instructed to wear an activPAL™ for 24-hour over 7 consecutive days to determine PA, ST, sleep duration, and sit-to-stand transitions. For each participant, 7 pairs of sleep → PA/ST/transitions were generated, representing unique rows of sleep duration the preceding evening (e.g., Monday) and PA/ST/transitions the following day (e.g., Tuesday). To account for total waking hours, the outcomes were presented in relative values (e.g., PA/waking hour). Linear mixed models were performed to determine the associations of nighttime sleep duration with PA, ST, and sit-to-stand transitions the following days, adjusting for age, sex, body weight status, parental educational attainment, and number of wear days. The repeated outcomes of sleep duration and activity patterns the following day nested within participants were treated as random effect.

RESULTS: Seventy children provided valid data of PA, ST, and sleep. On average, the children accumulated 2.37 hours of PA a day (SD 0.45) and slept for 9.72 hours per night (SD 0.97). Sleep duration in the preceding night was positively associated with daytime PA ($b = 0.007$; 95% CI, 0.002 to 0.012; $p = 0.011$) and sit-to-stand transitions ($b = 0.573$; 95% CI, 0.336 to 0.810; $p < 0.001$), while was negatively associated with ST ($b = -0.016$; 95% CI, -0.028 to -0.004; $p = 0.008$) the following day.

CONCLUSIONS: Longer nocturnal sleep duration was associated with more PA, frequent posture transitions, and less sitting time in the following day for preschool children. More work is needed to investigate how sleep parameters other than duration affect daytime activity behaviors.

This study was supported by Health and Medical Research Fund Research Fellowship Scheme from Food and Health Bureau, the Government of the Hong Kong Special Administrative Region of the PRC (#02160127).

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An Extended Twin-pedigree Study Of Voluntary Exercise Behavior In The Netherlands

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(No relationships reported)

PURPOSE: In the current research we investigated the heritability of voluntary regular exercise behavior using extended pedigrees, this allowed us to estimate the contribution of shared household effects in the presence of non-additive genetic effects, in contrast to much of the earlier work based on twin data. In addition, rather than assessing the total volume of exercise behavior as a unitary construct we have separated this across three domains: time spent on (1) any voluntary exercise and sports, (2) solitary exercise and sports, or (3) team-based exercise and sports.

METHODS: For the participants in the Netherlands Twin Register (NTR) we constructed the extended pedigrees which specify all relations among nuclear and larger twin families in the register. A total of 253,015 subjects from 58,645 families were linked to each other, to the degree that we had information on the relations among participants. For 56,161 adolescent and adult NTR participants in 20,897 families data were available on harmonized scores for total weekly MET hours, and the six domains. We analyzed these data in the Mendel software package to estimate the contributions of additive and non-additive genetic factors.

RESULTS: The estimated broad-sense heritability of total weekly MET hours spent on (1) any voluntary exercise and sports was 41% (26% additive genetic effects (A), and 15% non-additive genetic effects (D)). A shared household effect explained 24% and unique environmental factors explained the remaining 35% of the variance. For weekly MET hours spent on team-based exercise non-additive (dominance) genetic factors (28%) were a larger contributor compared to additive genetic factors (19%), while in solitary exercise these results were reversed (12% and 22% respectively).

CONCLUSIONS: In concordance with previous literature, our results suggest that exercise is a heritable trait, however our varying results in the various domains of exercise suggest that, at least in behavioral genetics, splitting exercise over domains rather than treating it as a unitary construct may be preferable.

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Diurnal and Circannual Variation in Body Temperature: Implications for Heat Illness Protocols

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As warm-season temperatures continue to rise, the incidence of heat illness is likely to increase. Although preventive protocols currently consider environmental risk factors, there may be reason to emphasize

diurnal and seasonal influences. Data supporting seasonal fluctuation in body temperature are abundant in animals but limited in humans.

PURPOSE: To examine circannual and diurnal patterns of body temperature in a patient population.

METHODS: We analyzed 2,184 men and women admitted to a major hospital in Indiana over 3 years. Demographic, anthropometric, and cardiometabolic variables were collected along with season, month, and time of admission. The National Centers for Environmental Information's National Climate Report was used to generate month-by-month ambient temperature data; there were clearly defined cold (October through April) and warm (May through September) periods. All patients received oral temperatures. We used t-tests and ANOVAs to detect differences in body temperature by time conditions; we used linear regression to test the effect of chronological variables on body temperature, holding all measured confounders constant.

RESULTS: Mean body temperature was $98.16 \pm 0.73^\circ\text{F}$. The warmest period of the day was 6:00 to 10:00pm (98.27°F). The coldest period was 2:00 to 6:00am (98.05°F ; $p < 0.001$). ANOVA revealed differences in body temperature by month ($F = 2.525$; $p = 0.004$) and by season ($F = 3.656$; $p = 0.012$). The strongest comparison was the cold vs. warm period ($T = -3.835$; $p < 0.001$). Patients admitted during the cold period ($N = 1,139$) had a temperature of $98.10 \pm 0.81^\circ\text{F}$ while patients admitted during the warm period ($N = 1,045$) had a temperature of $98.22 \pm 0.63^\circ\text{F}$ ($p < 0.001$). Lower temperatures were also found among patients ≥ 65 years ($p < 0.001$) and those with a positive blood alcohol test ($p = 0.004$). Holding all measured confounders constant, being admitted during the warmer months predicted an elevation in body temperature of 0.13°F ($p < 0.001$).

CONCLUSION: These findings support diurnal and circannual variations in humans. Coaches and athletic trainers may consider this when designing and monitoring practice conditions. Athletes will likely require closer observation along with updated prevention protocols when practicing outdoors to minimize the risk of a heat-related event.

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Compliance with Physical Activity Guidelines and Associations with Physical Literacy Among Future Physical Educators

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(No relationships reported)

PURPOSE: To examine the relationship between pre-professional physical educators meeting the U.S. Physical Activity Guidelines and steps per week and physical literacy.

METHODS: Twenty-five physical education teacher education (PETE) undergraduate majors (19 males, 6 females, aged 19-24 years) participated in assessments of Physical Literacy using the Canadian Assessment of Physical Literacy and wore GTX3+ accelerometers on their waist for a week. Freedman 1998 cut-points were used for determining moderate-to-vigorous physical activity (MVPA). Descriptive statistics were calculated for all variables. Correlations were calculated to examine the relationships between measured MVPA, measured steps, Physical Literacy, self-reported PA and sedentary time, and physical competence.

RESULTS: 16% were compliant with MVPA guidelines, 4% were compliant with both MVPA and 10,000 steps recommendations, 56% met MVPA but were considered low active steps, and 24% did not meet any recommendations. Participants' physical literacy considered below that of a proficient 12-year old. Significant relationships existed between self-reported PA and Physical Competence ($r=0.40$, $p \leq .05$), and MVPA and Physical Literacy ($r=0.42$, $p \leq .05$); however, no other relationships existed.

CONCLUSIONS: These findings suggest that while PETE students may meet the minimum guidelines for physical activity, more work needs to be done to address their Physical Literacy.