Physical activity in childhood and the association with myopia in adolescence – The CHAMPS Eye Study

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Purpose

- To investigate the effect of physical activity (PA) on the development of myopia in a Danish cohort of schoolchildren.

Design and methods

- A prospective cohort study with 198 school children.

Baseline - August to October 2010

- PA assessed with GT3X-accelerometer (ActiGraph) worn at least 10 hours/day, minimum 4 days and 1 weekend day

- PA measure: mean counts/min

- Cut off-points for the PA intensity levels:
  - Sedentary (SED) ≤ 100 counts/min
  - Light (L) > 100 counts/min
  - Moderate (M) ≥ 2296 counts/min
  - Vigorous (V) ≥ 4012 counts/min

Follow-up - March to May 2015

- Examination at Department of Ophthalmology, Odense, Denmark, including:
  - Autorefraction in cycloplegia and Keratometry (Tonoref II, Nidek)
  - Biometry (axial length (AL)) (Lenstar LS 900, Haag Streit)

Results

- Results are calculated at follow-up

- Mean age was 15.5 years (range 14.2-17.5)
- 50% were male

- Mean axial length: 23.4±0.94mm

- Mean spherical refractive error (RE): +0.69±1.54 diopeter (D)
  - 11% were myopic (RE ≤ 0.5 D)
  - Mean spherical equivalent (SE): 0.5±1.50D
  - 15% were myopic (SE ≤ 0.5 D)

- 10% increment in M-PA-time was predictive of a decrease in AL of 1.2 mm (p<0.01) and an increase in SE of 1.50 (p<0.01)

- Each 10% increment in SED-PA prompt a 0.3 mm longer AL (P<0.05) and a -0.4D increment of the SE (P<0.05)

Conclusion

- Increased level of physical activity was associated with refractive error and a shorter axial length for sedentary and moderate physical activity, consistent with theory.

Background

- Myopia is the most frequent eye disease globally
- Caused by axial growth of the eye during childhood
- Lifestyle changes, reduced physical activity and time spent outdoors are thought to be the driving force behind the rapid increase of myopia worldwide
- This is a sub-study of the Childhood Health, Activity, and Motor Performance Study Denmark (CHAMPS)

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Commercial relationship

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Data are presented as the mean, SD, range or n(%). Right eye only.

*Refractive error.
**Spherical equivalent.
***Myopia: SE ≤ -0.50D.
****Mean time spent on PA for each activity level (%).

Figure 1-4: Prediction from linear regression analyses. Axial length (y-axis) by physical activity (x-axis). 1-4 shows increasing levels of physical activity from sedentary to vigorous. *Statistical significant.