Children’s Movement: Some Stability, Some Change, and a Sex Difference
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The Importance of Movement
As a core dimension of children’s temperament, activity level is linked to:
- parental care requirements (e.g., controlling the running toddler),
- behaviour problems (e.g., ADHD), and
- later personality characteristics (e.g., extraversion)

A general definition of children’s activity level is
- “customary energy expenditure through movement” (p. 174)
- excluding energy expenditure used for physical growth or system maintenance (Eaton, 1994).

The importance of change
- A recent cross-sectional study (Eaton, McKeen, & Campbell, in press) showed strong linear-curvilinear age differences with a peak sometime between 7 and 9 years of age
- An accurate description of children and adolescent’s movement and when it peaks has a number of important developmental implications (Eaton et al., in press) including:
  - the identification of normal versus abnormal levels of movement
  - a more informed expectations regarding the structuring of children’s environments (e.g., the scheduling of educational environments and activities)
  - a starting point to identify the implications for individual or group differences in the patterns and timing of movement levels across age

A longitudinal approach
- Cross-sectional studies represent age differences rather than age changes
- This 2-year longitudinal study provides
  - a more direct assessment of age-related changes in activity level, and
  - a more precise description of the developmental trajectory of motor activity across the 7-to 16-year age range

Our Method and Some Results
Recruitment and Participants
- We recruited children from several neighbourhoods via an information flyer delivered to the homes (Eaton, McKeen, & Campbell, in press).
- Approximately two years later, follow-up recruitment was conducted via letters and phone calls. Seventy-five percent of the families participated in the second phase of data collection.
- Complete data was available for 139 children and adolescents (74 boys)
- Ages ranged from 7 to 14 years at Time 1 (mean age of 10.5 years) and from 9 to 16 years at Time 2 (mean age of 12.6 years).

Actometer Activity Level Measure
- Each participant wore 4 small mechanical motion recorders (actometers) on their ankles and wrists for a 24-hour actometers period.
- With this data, we calculated a mean Movements per Hour score for each participant.

Stability
- Over the 2-year period, Movements per Hour scores showed moderate stability, r = .26, p<.002.

Repeated Measures ANOVA
- To examine sex differences, age differences, and age changes, a repeated measures analysis of variance was conducted.

A Sex Difference
- Although boys were more active than girls overall, F(1,135) = 7.72, p<.007,
  - this effect was largely due to a Time2 difference with a Time*Sex effect, F(1,135) = 4.18, p<.05.

More Results and a Few Suggestions
Age Differences
- Age differences emerged at both Time1 and Time2
  - Time 1 age differences reflected a significant linear decrease in activity level, F(1,135) = 9.09, p<.005.
  - Time 2 age differences showed significant linear, F(1,135) = 8.69, p<.004) and curvilinear, F(1,135) = 5.72, p<.02, decreases in movement.

Age Changes
- Changes in movement levels also displayed a curvilinear pattern of decline over time F(1,135) = 4.83, p<.03.
  - In other words, decreases in Movements per Hour over the 2 year period was larger among the older children than the younger children.

Discussion
- The linear and curvilinear pattern of age differences in activity level is similar to that found in a recent study (Eaton et al., in press).
- Unlike the earlier study, clear sex differences emerged in our older sample of children and adolescents consistent with an earlier meta-analysis of sex differences in activity level (Eaton & Enns, 1986).
- The Time by Sex interaction suggests that girls typical levels of movement begins declining before that of boys.
  - If these sex differences in activity level are, in part, due to differences in physical maturation, the well-established sex differences in physical maturation could account for the age-linked decline in movement levels.
- The curvilinear pattern of age-related decline identified in this longitudinal study suggests that
  - the very high levels of movement found among middle and late childhood begins to decline at an accelerating rate, and
  - middle adolescence (e.g., 14 years of age) may especially be a period of rapid decline in motor activity.

References