

Motor coordination as determinant of physical activity in children: A 4-year follow-up (6 to 10 years of age)

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Abstract

Purpose: To analyze the association between several variables related to children's physical activity (PA), and to test a structural equation model (SEM) where motor coordination (MC) is proposed as predicting children's PA.

Methods: 285 children from Azores, Portugal, were evaluated every year, from 6 to 10 years of age, in several characteristics: somatic growth (weight, height, skinfolds), PA (Godin and Sheppard questionnaire), MC (KTK), and physical fitness (PF) (Fitnessgram). A stepwise multiple regression was used to identify the variables at 6 years of age that showed to be associated with PA at 10 years of age. Two structural equation models (SEM), having MC as predictor of PA, were also tested. In the first model, MC has an influence both on PA in same year and in the subsequent years of evaluation; while in the second model, MC has an influence on PA only on the following years of evaluation.

Results: Only MC was retained as a significant predictor in the regression model ($F(1, 247) = 40.03, p < 0.001$, explaining 14.4% of the variance ($R=0.38$). There was no significant improvement when comparing the second with the first SEM ($\chi^2_{dif}(13) = 20.667, p < 0.05$). Fit indices values were similar for both models. First SEM: $\chi^2(159) = 592.290, p < 0.001$; RMSEA = 0.113, SRMR = 0.073, CFI = 0.803; second SEM: $\chi^2(159) = 571.623, p < 0.001$; RMSEA = 0.117, SRMR = 0.075, CFI = 0.801.

Conclusion: The regression equation model showed that, of all tested variables, MC was the only predictor of children's PA. Despite the fact that SEM fit indices were only moderate, it seems that MC plays an important role in children's PA level.

Introduction

Although there is an accumulating evidence that physical activity (PA) is an important factor for a good health, little is known about the predictors of PA behaviour.

Different pathways have been described that relate childhood and adolescent physical activity, fitness and health (Malina, 2001).

However, few longitudinal studies have been conducted during which indicators of health, fitness and PA have been observed during childhood. Several determinants or correlates of PA were identified (Dishman and Sallis, 1994; Sallis, Prochaska and Taylor, 2000). Nevertheless, the variance explained were low (20-30%), and most of the studies were not longitudinal.

Although the determinants of PA among children and adolescents are not well understood, one potential determinant may be the level of mastery movement skills that are used to participate in PA.

It is widely believed that fundamental movement skills and PA are related in childhood and adolescence (Fulton, 2001; Okely, 2001).

Motor coordination (MC) is an important factor in motor proficiency behaviour (movement skills and motor tasks). The pleasure in doing movement skills also resides in how well they are mastery.

We hypothesised that MC is a predictor of children PA.

Purpose

The purpose of this study was to analyze the association between several variables related to children's physical activity (PA), and to test a structural equation model (SEM) where motor coordination (MC) is proposed as predicting children's PA.

Sample

The subjects were 285 children from Azores islands (Portugal) of both genders (142 girls and 143 boys). They had 6 years at the first evaluation and they were followed during 4 years until 10 years of age.

Physical Activity

Physical activity was assessed with Godin and Shephard (Godin and Shephard 1985) questionnaire.

The questionnaire was administered in an interviewer-assisted format. Subjects reported the number of times in an average week that they spent more than 15 min in activities that are classified as mild (3 METs), moderate (5 METs), or strenuous (9 METs). A total score was derived by multiplying the frequency of each category by the MET value, and those products were summed.

Motor Coordination

Motor coordination was evaluated with body coordination test battery developed in Germany (Körperkoordination Test für Kinder – KTK) (Kiphard and Schilling 1974). The battery has four items (backward balance, jumping sideways, hopping on one leg, and shifting platforms), in each item the child has a number of points according to his performance. The final result, called motor quotient, is the sum of each item after adjusting for age and gender according the normative tables of the test battery. In the last year of measurements motor coordination was not assessed.

Physical Fitness

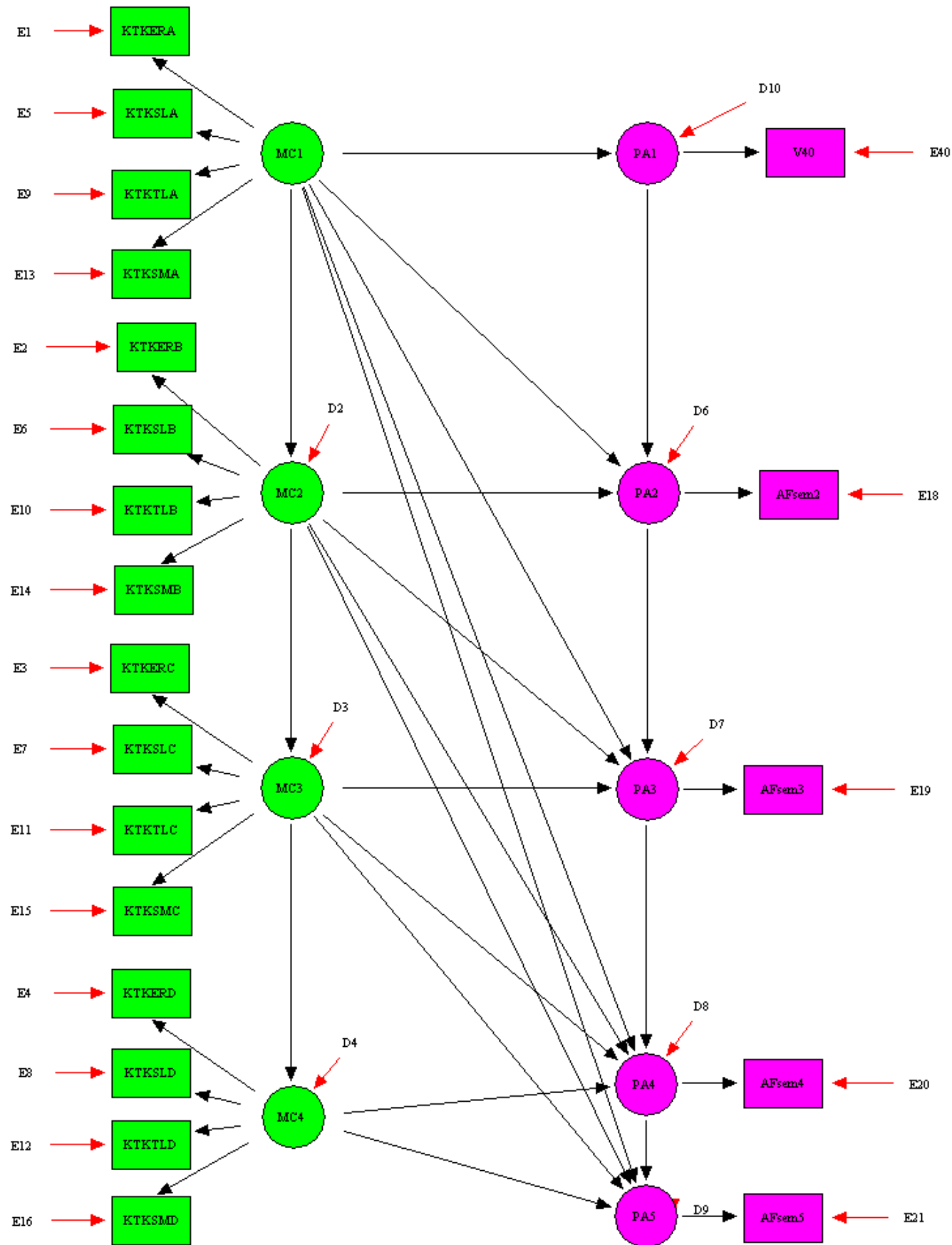
Physical fitness was assessed with the following normative tests: 50 yards running, one mile walk/run, 9 m shuttle running, standing long jump and handgrip.

Statistical analysis

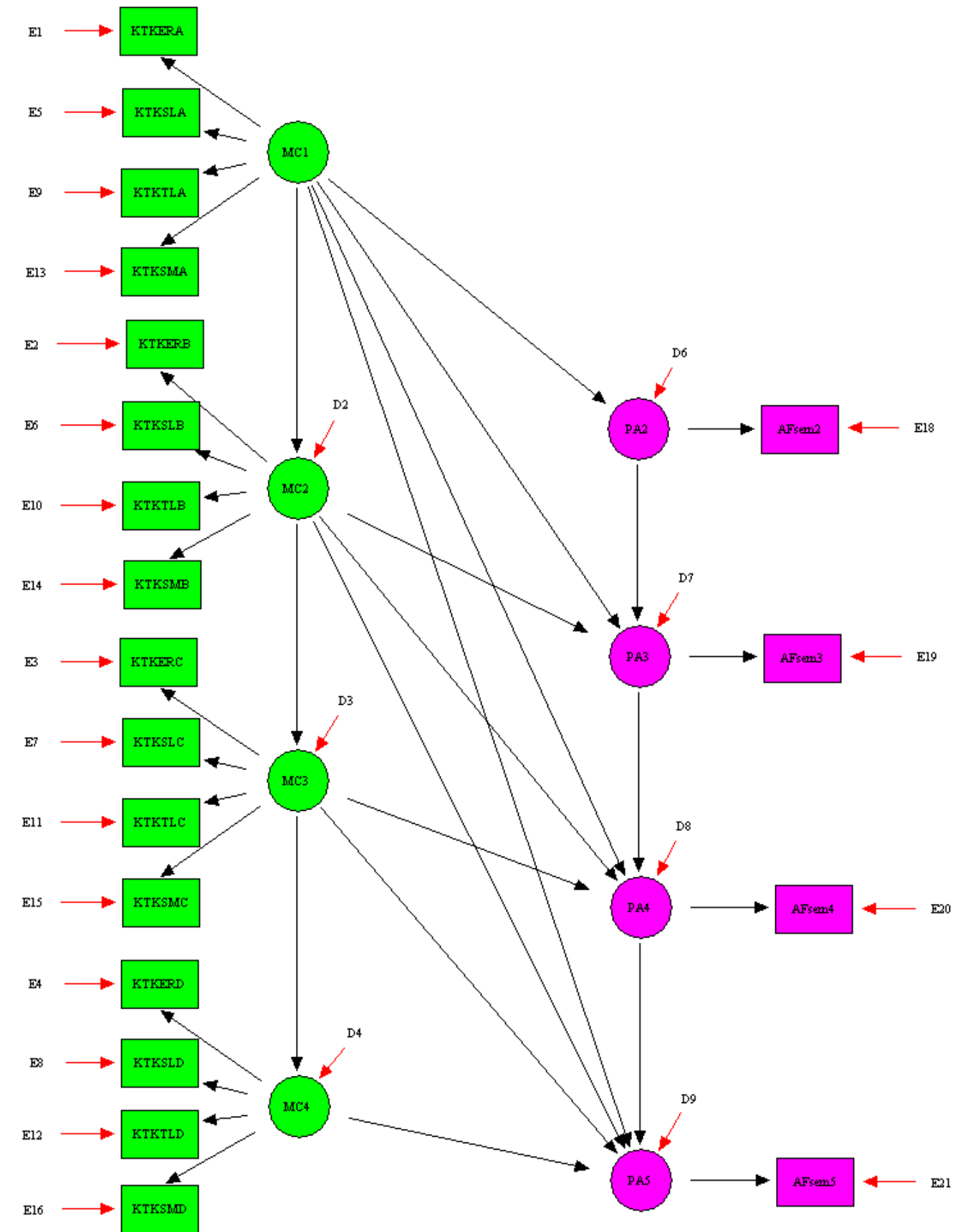
A stepwise multiple regression was used to identify the variables at 6 years of age that showed to be associated with PA at 10 years of age. Two structural equation models (SEM), having MC as predictor of PA, were also tested. In the first model, MC has an influence both on PA in same year and in the subsequent years of evaluation; while in the second model, MC has an influence on PA only on the following years of evaluation.

Structural Equations Models Tested

First Model



Second Model



Results

Stepwise multiple regression

Dependent variable: PA at 10 years of age

Predictors: weight, height, skinfolds, PA, MC, and PF at 6 years of age.

Only MC was retained as a significant predictor in the regression model:

($F(1, 247) = 40.03, p < 0.001$, explaining 14.4% of the variance ($R=0.38$).

$$PA = -14,1 + 0.639*MC$$

Structural Equation Modeling

There was no significant improvement when comparing the second with the first SEM ($\chi^2_{dif} (13) = 20.667, p < 0.05$). Fit indices values were similar for both models:

- First SEM: $\chi^2 (159) = 592.290, p < 0.001$; RMSEA = 0.113, SRMR = 0.073, CFI = 0.803;
- Second SEM: $\chi^2 (159) = 571.623, p < 0.001$; RMSEA = 0.117, SRMR = 0.075, CFI = 0.801.

This fit index indicate a poor adjustment of booth models.

Conclusion

- In conclusion:
The regression equation model showed that, of all tested variables, MC was the only predictor of children's PA. Despite the fact that SEM fit indices were only moderate to low, it seems that MC plays an important role in children's PA level.

References

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