Reviewer's report

Title: Relationship of physical fitness with memory and attention in preschoolers: A cross-sectional and longitudinal study ("Ballabeina")

Version: 1 Date: 15 December 2010

Reviewer: Phillip Daniel Tomporowski

Reviewer's report:

To the authors:
General Comments
The authors provide a very interesting study that describes the relation between multiple measures of young children’s physical activity behaviors and two measures of cognitive function. The data were gathered as part of a larger study conducted with a relatively large number of children. The data obtained address an important but understudied topic. The methods employed were well described. The results of the study are important and support general assumptions about the role of children’s level of physical activity on mental function/development.

Discretionary comments:
The authors have been careful to select tests that provide reliable measures of young children’s physical activity. The reliability of the Attentional task is acceptable; however, the test-retest reliability of the spatial working memory task is quite low (0.48). The authors may want address this shortcoming in the discussion section. It might be helpful for the authors to describe in greater detail the procedures that were used to prepare children to perform both tests of physical fitness and cognitive function. For example, it was useful to know how the shuttle run was conducted. How were the tests of cognitive function administered? In what environment were the tests administered? Who administered the tests?
It would probably assist the readership if the authors “streamlined” and condensed the Discussion section.

Major Compulsory Comments:
The authors state, “We therefore comprehensively assessed the cross sectional and longitudinal relationships of different measures of physical fitness (aerobic fitness, agility, dynamic balance)...”
The term “Physical Fitness” is typically defined in terms of four components: cardio- respiratory function, muscular strength, muscular endurance, and flexibility. Only one of the tests employed by the authors (shuttle run) reflects a component of physical fitness. As acknowledged by the authors, performance on
the agility test reflects the operations of both physical and cognitive components. Balance is not considered a measure of physical fitness. The readership may be given the misguided impression that children’s physical fitness was measured in this study, when in fact only three measures of children’s physical activity behavior/performance were obtained. The authors may need to reconsider the use of their terminology and how the scores on the three tests are related to cognitive function. Indeed their hypotheses “was that higher fitness in young children is related to better memory and attention at baseline and will also be related to their improvements over 9 month. We also hypothesized that the relationship varies according to the investigated fitness measures.” How might measures of “agility” be expected to be related to memory and attention? Likewise, measures of balance? Again, these are not traditional measures of physical fitness. Several reviewers have agreed that one of the reasons for the lack of agreement among studies in this field is probably due to task differences.

Given the authors’ view that the result of the study are important for policy makers, it will be important for researchers to identify those activities that are most strongly related to cognitive performance. The general classification of “physical fitness” may not be useful.

Minor compulsory comment:

#1) The first line of the conclusion section may be a bit strong, i.e., “Based on our results, high physical fitness in preschoolers was related to improved spatial working memory and attention.” The study did not provide indices of absolute levels of aerobic fitness; therefore it may be inappropriate to suggest that “high” physical fitness is related to cognition.

My congratulations to the authors for their efforts. I hope my comments will be found useful.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I declare that I have no competing interests