

# The Effect of Yoga on Preschool Aged Children's Executive Functions

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## Background and Significance

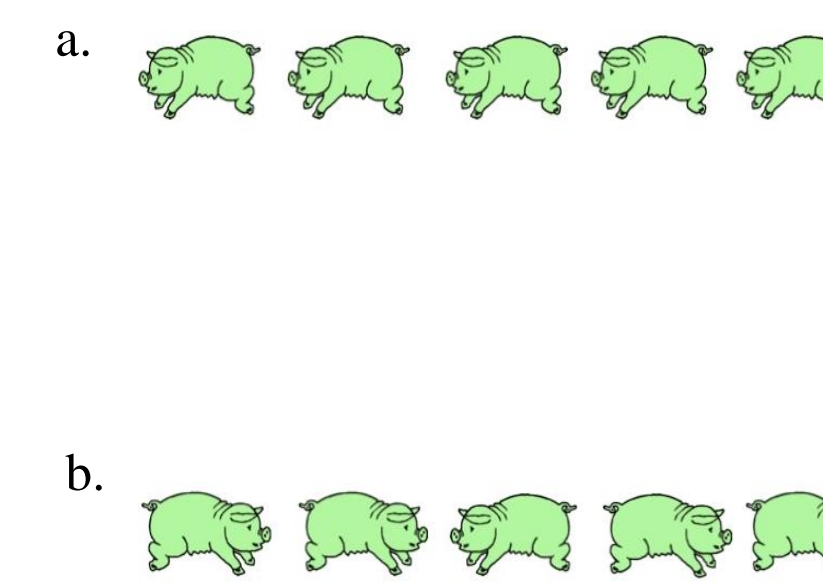
- Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common neurobehavioral disorders with 1 in 10 children between the ages of 4 and 17 being diagnosed (Center of Disease Control and Prevention (CDC), 2013).
- Children who are diagnosed with ADHD (especially young children) may be overprescribed medication as much as 10 to 40 percent of the time (Louv, 2008).
- Yoga is a type of practice that previous research has found to improve attention in adults and children (e.g. Abadi, Madgaonkar, & Venkatesan, 2008, Manjunath and Telles, 2004, Peck, Kahle, Bray, & Theodore, 2005).
- Previous research however is limited in regards to examining this relationship in preschoolers.
- Preschoolers are important to examine due to the fact that preschool-aged children's executive functioning is developing at a very rapid rate and these children tend to display lower levels of executive functioning in areas like attention, inhibition and working memory.
- Many previous studies done in this area are not experimental in nature and instead utilize correlational data (Chan & Woollacott, 2007; Harrison, Monacha, & Rubia, 2004; & Peck, Kehl, Bray, & Theodore, 2005), which does not make a case for causality.
- The current study will add to previous research by examining a typically-developing preschool-aged population.
- The current study will also utilize both parental questionnaires as well as behavioral measurements in an experimental design.

## Hypotheses

- Hypothesis 1: Preschool-aged children who participated in the yoga intervention will show greater improvements from pre to post tests in all three areas of executive functioning: spatial working memory, inhibition, and attention.
- Hypothesis 2: Parents of children who participate in the yoga intervention will report more positive behaviors and social and emotional development from pre to post to follow-up tests (measured by: Child Behavior Questionnaire, and the Devereux Early Childhood Assessment).

## Method

- Participants:** 24 Four-five year old children participated in the study. 12 were part of the yoga intervention group and 12 were part of the comparison reading group.
- Apparatus :** A large 29in x 42in (74cm x 107cm) liquid crystal display (LCD) computer monitor (Sharp, Inc). The monitor was tilted 15 degrees from horizontal. With a resolution of 1024 x 760 pixels. The LCD monitor has a touchscreen overlay (Smartboard) that will react to the touch of a stylus. The stylus was used by the children during the Spatial Memory task.
- Intervention:** Children in the experimental group participated in a 6-week yoga class that met for 30 minutes once a week. Children in the comparison group participated in 30 minutes of extra reading each week for a 6-week period.
- Procedure:** Children came in for two research sessions where each child then completed a flanker task, a continuous performance task, and a spatial working memory task. Parents filled out the Child Behavior Questionnaire and the Devereux Early Childhood Assessment.



Flanker Task (a) congruent trial (b) incongruent trial

## Results

- Spatial Memory Task, Continuous Performance Task (attention), Child-Behavior Questionnaire, and Devereux Early Childhood Assessment: No significant effects of intervention found.
- Flanker Task (inhibition) a marginally significant main effect of intervention was found for both correct congruent trials  $F(1,22)= 3.56, p=.07$  and correct incongruent trials  $F(1,22)= 4.07, p=.06$ .

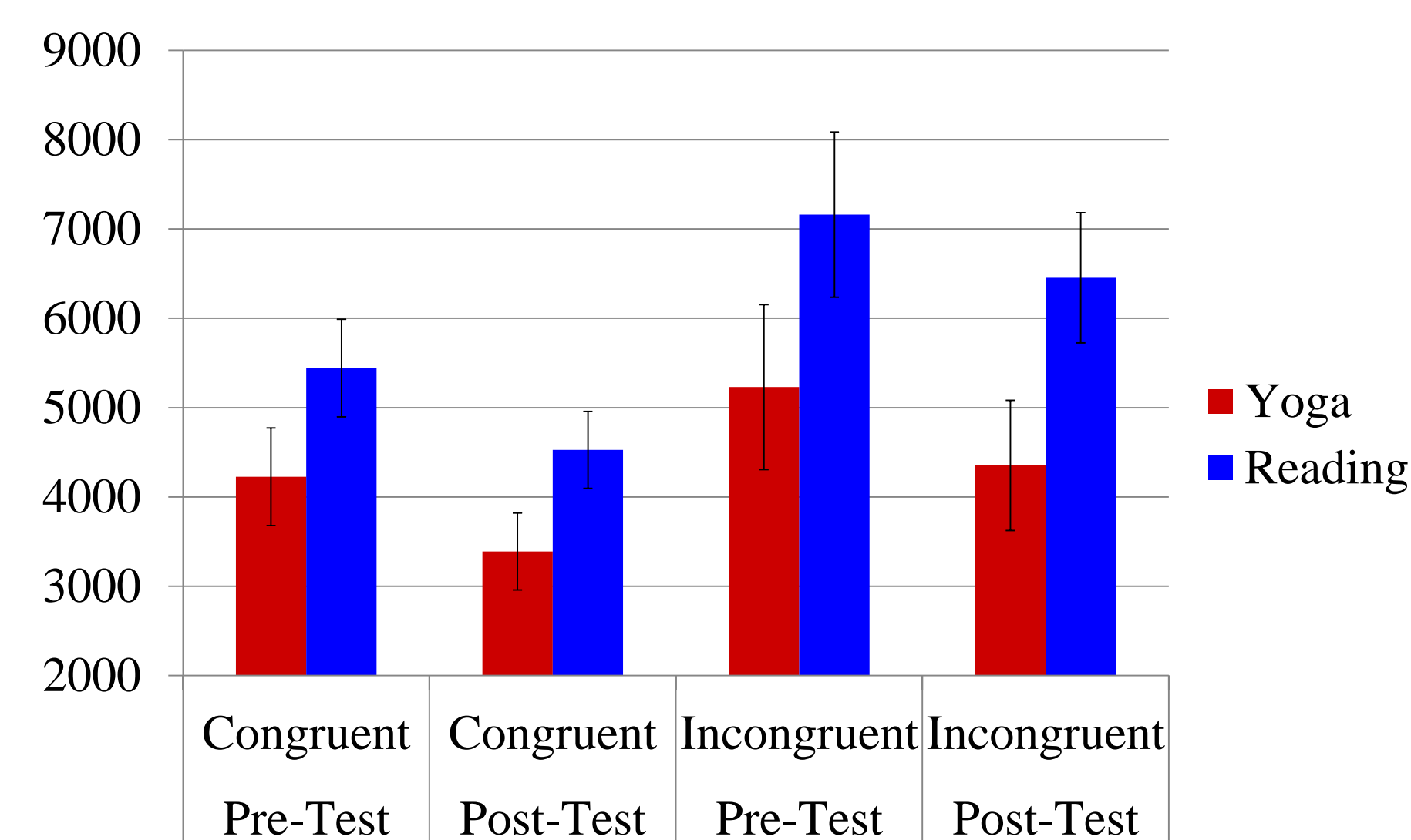


Figure 1. Mean reaction time (RT) in ms for both correct congruent and incongruent trials on the Flanker task. Error bars represent standard error.

## Discussion/Future Directions/Implication to Practice

- The current study found that there may be a marginal effect of participating in a yoga intervention on preschool-aged children's inhibition.
- Currently a school-age group of children are completing the yoga and reading interventions.
- This current research may have implications for a possible intervention strategy that could be used with children who display low levels of executive functioning.
- This research will provide educators, parents, and child care providers with alternative approaches to dealing with children who may suffer from attention disorders.

## References

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