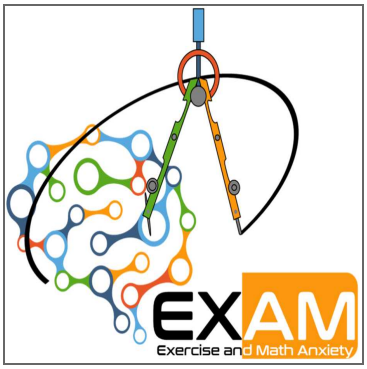

SEP 22, 2023

OPEN ACCESS

DOI:
dx.doi.org/10.17504/protocols.io.n2bvj39knlk5/v1

Protocol Citation: Felipe FC Barradas Cordeiro, João Bento-Torres 2023. Cognitive and Math Performance and Body Mass Index (BMI) Assessment in Children. **protocols.io** https://dx.doi.org/10.17504/protocols.io.n2bvj39knlk5/v1

Protocol status: Working
We use this protocol and it's working

Created: Sep 20, 2023

Cognitive and Math Performance and Body Mass Index (BMI) Assessment in Children

Felipe FC Barradas Cordeiro[1], João Bento-Torres[2]

[1]Universidade Federal do Pará; [2]Universidade Federa do Pará

Felipe FC Barradas Cordeiro
Universidade Federal do Pará

ABSTRACT

Summary of the Study

The assessment sessions took place during class hours in which the children usually study, in a schoolroom reserved for the study procedures, and under controlled temperature and lighting conditions and noise minimization. All participants were naive about the purposes of the study. Initially, weight and height measurements were performed, followed by five minutes of rest in a sitting position. Participants were asked to sit on a chair, positioned 50 cm away from a computer screen, which displayed a white background. After the rest period, participants performed the math performance test, and cognitive performance assessment (inhibitory control). The experimental session lasted an average of 25 minutes. The legal guardians of each child completed an anamnesis questionnaire informing the history of diagnosed pathologies, medication use, routine habits, and the child's diet.

Math Performance Test

The math performance test was displayed on a monitor (1366x768 pixels) with a gray background and composed by arithmetic equations of the type: x=ab-c, being necessarily: a≠b and c>0. For instance, participants were presented with equations such as "x=4*2-5", "x=8*3-2", and "x=5*2-1". The children were instructed to perform the mental calculation and answer aloud for recording by the researcher. The use of fingers was allowed as an aid to calculate the correct answer.

The test execution was limit up to 10 minutes, although the participants were not aware of this condition. Participants were instructed to solve as many questions and accurately as possible. Since performance effectiveness is often measured by accuracy, we adopted this metric to assess arithmetic performance in the current study.

Inhibitory Control Assessment

The Flanker test is a non-verbal test used to assess inhibitory control. Participants were instructed to respond as quickly and accurately as possible indicating the direction of the central arrow (target), and to ignore adjacent arrows that could be

Last Modified: Sep 22, 2023

PROTOCOL integer ID: 88087

Keywords: Executive Function, Childhood Obesity, Cognitive Performance, School Achievement

congruent (same direction) or incongruent (opposite directions) to the target. That is, if the central arrow is pointed to the right, the keyboard “Shift-right” button should be pressed, and if the central arrow pointed to the left, the “Shift-left” button on the keyboard should be pressed.

The test was semi-automated (Psychology Experiment Building Language software - PEBL) and displayed on a screen monitor (1366x768 pixels), located 50 cm in front of the child, initially showing a black background. The stimuli (white arrows with a size equivalent to 100 pixels) were displayed randomly for a maximum time of 800 ms or until the participant responded. The interval between stimuli was 1000 ms, configurad for 9 initial adaptation stimuli with immediate feedback and 200 evaluation stimuli for the analysis. After initial adaptation, the child was asked if they understood the task. If their response was negative, a new adaptation simulation was performed. The accuracy of responses to incongruent trials was used as the index of inhibitory control.

Classification by Body Adiposity Index – BMI

BMI is an index used by the World Health Organization, including for children. BMI is calculated by dividing body weight, in kilograms, by height, in meters squared. The child population, however, presents some particularities when dealing with this index, BMI reference values for children and adolescents are defined by percentiles according to age and sex. In this study, the World Health Organization recommendations were followed, and the children were classified as: Extreme Thinness (<3rd percentile); Thinness (3rd to 15th percentile); Normal Weight (15th to 84th percentile); Overweight (85th to 97th percentile); and Obesity (>97th percentile).

GUIDELINES

The overall goal of this study is to investigate the relationship between body mass index (BMI) and mathematical
performance in children, considering the role of inhibitory control.

MATERIALS

Scale for measuring weight
height measuring tape
Computer with monitor (1366x768 pixels)
Keyboard
Software Psychology Experiment Construction Language (PEBL)
Computer screen (1366x768 pixels)
Chair

SAFETY WARNINGS

BMI Measurement Safety:

- Ensure that BMI measurements are taken using safe and calibrated equipment. Follow established safety protocols for measuring weight and height.

Math Test Administration Safety:

- Maintain a quiet and distraction-free environment during math testing to ensure accurate results. Monitor children to prevent any discomfort or stress.

Inhibitory Control Test Safety:

- Ensure that the Flanker test is conducted in a controlled and safe setting. Monitor participants to prevent any adverse reactions.

Data Handling and Storage Safety:

- Specify secure data handling and storage procedures to protect the privacy and confidentiality of participants.

ETHICS STATEMENT

The legal guardians of each child completed an anamnesis questionnaire informing the history of diagnosed pathologies, medication use, routine habits, and the child's diet. The Research Ethics Committee approved this study (CAAE: 76887417.2.0000.0018).

Ethical Considerations:

- Highlight the importance of obtaining informed consent from legal guardians and assuring participants of data confidentiality and their right to withdraw from the study at any time.

Adherence to Research Ethics:

- Emphasize that the study has received approval from an ethics committee, indicating compliance with ethical standards and guidelines.

Children's Well-being:

- Stress the importance of considering the well-being of child participants and providing a supportive and respectful environment throughout the study.

Communication with Legal Guardians:

- Highlight the necessity of clear and open communication with the legal guardians, including informing them about the study's purpose, procedures, and any potential risks.

Assessment of BMI (Body Mass Index)

5m

1 Measure the height

2 Measure the weight

3 Calculate BMI by dividing body weight, in kilograms, by height, in meters squared.

4 Classify children according to BMI percentiles: Extremely Thin (<3rd percentile); Thin (3rd to 15th percentile); Normal Weight (15th to 84th percentile); Overweight (85th to 97th percentile); and Obesity (>97th percentile) according to WHO recommendations.

Mathematical Performance Test

12m

5 Display the math achievement test on a monitor with a gray background.

6 Present arithmetic equations of the type: x=ab-c, with the condition that a≠b and c>0.

7 Instruct children to perform the mental calculation and respond aloud for recording.

8 Allow the use of fingers as an aid in calculating the correct answer.

9 Limit the test to 10 minutes, without informing participants of this limit.

10 Evaluate performance based on accuracy of responses.

Assessment of Inhibitory Control (Flanker Test):

10m

11 Use Psychology Experiment Building Language (PEBL) software to perform the Flanker test on a computer monitor with a black background.

12 Set the arrow display time limit to 800 ms or until the participant responds.

13 Set a 1000 ms interval between stimuli.

14 Provide 9 initial adaptation stimuli with immediate feedback and 200 evaluation stimuli.

15 Check that the participant understands the task after adaptation.

16 Use response accuracy on incongruent trials as an index of inhibitory control.