The Impact of a Child-Centered, Mastery Movement Program on Physical Activity Levels, Motor Skill Development, and Cognitive Function in Young Children

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The Impact of a Child-Centered, Mastery Movement Program on Physical Activity Levels, Motor Skill Development, and Cognitive Function in Young Children

Josh Anderson
KNS 497 Honors Research Thesis
Dr. Dawn Coe
April 19, 2016
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The Impact of a Child-Centered, Mastery Movement Program on Physical Activity Levels, Motor Skill Development, and Cognitive Function in Young Children

Joshua G. Anderson and Dawn P. Coe

The University of Tennessee, Knoxville
Department of Kinesiology, Recreation, and Sport Studies

Introduction: Physical activity can have tremendous positive benefits on physical and mental health, especially in young children. Being active reduces one’s risk for diseases, such as diabetes and cardiovascular disease, and can help elevate mood and facilitate learning. Furthermore, learning to be physically active at a young age increases the likelihood of staying active into adulthood. To become more physically active, children must first develop their fundamental motor skills, such as kicking, running, and jumping, without which they cannot progress to more complex, skill-related activities. Fundamental motor skill development is related to overall physical activity level and weight status. Children with more developed motor skills tend to be more active and are less likely to be overweight or obese. These same fundamental motor skills may also be related to cognitive function and perceived motor competence, with more developed skills correlating with high cognitive function and perceived competence. The interrelatedness of these variables prompted the investigation into associations that exist in young children. Purpose: To implement an intervention designed to facilitate the development of fundamental motor skills through age-appropriate activities and games in order to improve their mastery of several key fundamental motor skills in young children. An additional purpose of study was to determine associations among motor skill development, physical activity level, cognitive function, and perceived motor competence.

Methods: Participants were 18 pre-school children (3-5 years old) enrolled in a Head Start preschool program. Each participant completed a number of assessments. The Test of Gross Motor Development (TGMD-2) was used to measure fundamental motor skill development. This tool was used to assess both locomotor (gallop, hop, jump, leap, run, slide) and object control (catch, dribble, kick, roll, strike, throw) skills. The Corsi Block-Tapping test was used to measure cognitive function and working memory. It was performed on an iPad through the app Pathspan and required participants to watch a sequence of dots light up and then press them in the same order. The Pictorial Scale of Perceived Competence and Acceptance was used to measure perceived motor competence by asking participants to select their competence at various tasks on a pictorial 1 to 4 scale. Participants also wore Actigraph GT3X+ accelerometers during the school day for three days to objectively measure physical activity levels. Accelerometers were put on participants by the researchers in the morning and taken off by
the teacher in the afternoon. The Fit Kidz Intervention was an 8-week program designed to improve the participants’ motor skills through age-appropriate games facilitated twice a week for 30 minutes per session. After the 8 weeks, the same assessments were performed again on each participant to examine the effect of the intervention. Data were analyzed using Pearson correlations. Correlational analysis was performed due to the limited number of participants and because many of these participants lacked both pre- and post-intervention assessment data. **Results:** Children spent on average 87.4% of their monitored time in sedentary behaviors and 12.6% of the time physically active. The average number of taps correct was $10.1\pm9.8$ during the Corsi test. There was a significant correlation between the amount of physical activity the children engaged in and the number of taps correct ($r=0.61; p<0.05$). No significant correlations existed among any of the other variables assessed. **Conclusion:** Our findings indicate that the children in the Head Start preschool program are largely sedentary despite having daily outdoor recess time. The association between Corsi test scores and overall physical activity levels suggests that increased physical activity levels at school could lead to improved cognition and performance in the school setting. We recommend that program coordinators for the Head Start program revise the daily curriculum to allot more time to physical activity and the development of fundamental motor skills.
Methodology

TGMD2 Record Form

This form shows scoring criteria for each motor skill assessed in the TGMD2. The TGMD2 assessments were done by taking video of every participant performing each motor skill twice, for a total of 24 videos. The videos were then later reviewed and scored to determine their motor skill development.
### Section I. Identifying Information

**Name**

**School**

**Male** □ **Female** □ **Grade**

**Reason for Referral**

**Date of Testing**

**Date of Birth**

**Age**

**Examiner**

**Examiner’s Title**

### Section II. Record of Scores

#### First Testing

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Standard Score</th>
<th>Percentile</th>
<th>Age Equivalent</th>
</tr>
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<td></td>
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#### Second Testing

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<th>Percentile</th>
<th>Age Equivalent</th>
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<tbody>
<tr>
<td></td>
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</tbody>
</table>

#### Sum of Standard Scores

#### Gross Motor Quotient

### Section III. Testing Conditions

**A. Place Tested**

**Interfering**

<table>
<thead>
<tr>
<th>Interfering</th>
<th>Not Interfering</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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**B. Noise Level**

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**C. Interruptions**

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**D. Distractions**

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**E. Light**

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**F. Temperature**

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**G. Notes and other considerations**

### Section IV. Other Test Data

<table>
<thead>
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<th>Name of Test</th>
<th>Date</th>
<th>Standard Score</th>
<th>TGMD-2 Equivalent</th>
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### Section V. Profile of Standard Scores

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<tr>
<th>Standard Score</th>
<th>Locomotor Score</th>
<th>Object Control Score</th>
<th>Quotients</th>
<th>Gross Motor Quotient</th>
<th>Quotients</th>
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<td>1</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
</tbody>
</table>
### Section VI. Subtest Performance Record

#### Preferred Hand:
- Right [ ]
- Left [ ]
- Not Established [ ]

#### Preferred Foot:
- Right [ ]
- Left [ ]
- Not Established [ ]

#### Locomotor Subtest

<table>
<thead>
<tr>
<th>Skill</th>
<th>Materials</th>
<th>Directions</th>
<th>Performance Criteria</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Score</th>
</tr>
</thead>
</table>
| 1. Run  | 60 feet of clear space, and two cones                                    | Place two cones 50 feet apart. Make sure there is at least 8 to 10 feet of space beyond the second cone for a safe stopping distance. Tell the child to run as fast as he or she can from one cone to the other when you say “Go.” Repeat a second trial.                                                                 | 1. Arms move in opposition to legs, elbows bent  
2. Brief period where both feet are off the ground  
3. Narrow foot placement landing on heel or toe (i.e., not flat footed)  
4. Nonsupport leg bent approximately 90 degrees (i.e., close to buttocks) |        |        |       |
| 2. Gallop| 25 feet of clear space, and tape or two cones                             | Mark off a distance of 25 feet with two cones or tape. Tell the child to gallop from one cone to the other. Repeat a second trial by galloping back to the original cone.                                                                                                                             | 1. Arms bent and lifted to waist level at takeoff  
2. A step forward with the lead foot followed by a step with the trailing foot to a position adjacent to or behind the lead foot  
3. Brief period when both feet are off the floor  
4. Maintains a rhythmic pattern for four consecutive gallops |        |        |       |
| 3. Hop  | A minimum of 15 feet of clear space                                     | Tell the child to hop three times on his or her preferred foot (established before testing) and then three times on the other foot. Repeat a second trial.                                                                                                                                  | 1. Nonsupport leg swings forward in pendular fashion to produce force  
2. Foot of nonsupport leg remains behind body  
3. Arms flexed and swing forward to produce force  
4. Takes off and lands three consecutive times on preferred foot  
5. Takes off and lands three consecutive times on nonpreferred foot |        |        |       |
| 4. Leap | A minimum of 20 feet of clear space, a beanbag, and tape               | Place a beanbag on the floor. Attach a piece of tape on the floor so it is parallel to and 10 feet away from the beanbag. Have the child stand on the tape and run up and leap over the beanbag. Repeat a second trial.                                                                                             | 1. Take off on one foot and land on the opposite foot  
2. A period where both feet are off the ground longer than running  
3. Forward reach with the arm opposite the lead foot |        |        |       |
<table>
<thead>
<tr>
<th>Skill</th>
<th>Materials</th>
<th>Directions</th>
<th>Performance Criteria</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Horizontal Jump</td>
<td>A minimum of 10 feet of clear space and tape</td>
<td>Mark off a starting line on the floor. Have the child start behind the line. Tell the child to jump as far as he or she can. Repeat a second trial.</td>
<td>1. Preparatory movement includes flexion of both knees with arms extended behind body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Arms extend forcefully forward and upward reaching full extension above the head</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Take off and land on both feet simultaneously</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Arms are thrust downward during landing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Skill</th>
<th>Materials</th>
<th>Directions</th>
<th>Performance Criteria</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Slide</td>
<td>A minimum of 25 feet of clear space, a straight line, and two cones</td>
<td>Place the cones 25 feet apart on top of a line on the floor. Tell the child to slide from one cone to the other and back. Repeat a second trial.</td>
<td>1. Body turned sideways so shoulders are aligned with the line on the floor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. A step sideways with lead foot followed by a slide of the trailing foot to a point next to the lead foot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. A minimum of four continuous step-slide cycles to the right</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. A minimum of four continuous step-slide cycles to the left</td>
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<td></td>
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</tbody>
</table>

**Locomotor Subtest Raw Score (sum of the 6 skill scores)**

---

<table>
<thead>
<tr>
<th>Skill</th>
<th>Materials</th>
<th>Directions</th>
<th>Performance Criteria</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Striking a</td>
<td>A 4-inch lightweight ball, a plastic bat, and a batting tee</td>
<td>Place the ball on the batting tee at the child's belt level. Tell the child to hit the ball hard. Repeat a second trial.</td>
<td>1. Dominant hand grips bat above nondominant hand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stationary Ball</td>
<td></td>
<td></td>
<td>2. Nonpreferred side of body faces the imaginary toser with feet parallel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Hip and shoulder rotation during swing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Transfers body weight to front foot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Bat contacts ball</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Skill Score**

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<table>
<thead>
<tr>
<th>Skill</th>
<th>Materials</th>
<th>Directions</th>
<th>Performance Criteria</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Stationary Dribble</td>
<td>An 8- to 10-inch playground ball for children ages 3 to 5; a basketball for children ages 6 to 10; and a flat, hard surface</td>
<td>Tell the child to dribble the ball four times without moving his or her feet, using one hand, and then stop by catching the ball. Repeat a second trial.</td>
<td>1. Contacts ball with one hand at about belt level</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2. Pushes ball with fingertips (not a slap)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>3. Ball contacts surface in front of or to the outside of foot on the preferred side</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Maintains control of ball for four consecutive bounces without having to move the feet to retrieve it</td>
<td></td>
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</tbody>
</table>

**Skill Score**
<table>
<thead>
<tr>
<th>Skill</th>
<th>Materials</th>
<th>Directions</th>
<th>Performance Criteria</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Catch</td>
<td>A 4-inch plastic ball, 15 feet of clear space, and tape</td>
<td>Mark off two lines 15 feet apart. The child stands on one line and the tosser on the other. Toss the ball underhand directly to the child with a slight arc aiming for his or her chest. Tell the child to catch the ball with both hands. Only count those tosses that are between the child’s shoulders and belt. Repeat a second trial.</td>
<td>1. Preparation phase where hands are in front of the body and elbows are flexed</td>
<td>2. Arms extend while reaching for the ball as it arrives</td>
<td>3. Ball is caught by hands only</td>
<td></td>
</tr>
<tr>
<td>4. Kick</td>
<td>An 8- to 10-inch plastic, playground, or soccer ball; a beanbag; 30 feet of clear space; and tape</td>
<td>Mark off one line 30 feet away from a wall and another line 20 feet from the wall. Place the ball on top of the beanbag on the line nearest the wall. Tell the child to stand on the other line. Tell the child to run up and kick the ball hard toward the wall. Repeat a second trial.</td>
<td>1. Rapid continuous approach to the ball</td>
<td>2. An elongated stride or leap immediately prior to ball contact</td>
<td>3. Nonkicking foot placed even with or slightly in back of the ball</td>
<td>4. Kicks ball with instep of preferred foot (shoelaces) or toe</td>
</tr>
<tr>
<td>5. Overhand Throw</td>
<td>A tennis ball, a wall, tape, and 20 feet of clear space</td>
<td>Attach a piece of tape on the floor 20 feet from a wall. Have the child stand behind the 20-foot line facing the wall. Tell the child to throw the ball hard at the wall. Repeat a second trial.</td>
<td>1. Windup is initiated with downward movement of hand/arm</td>
<td>2. Rotates hip and shoulders to a point where the nonthrowing side faces the wall</td>
<td>3. Weight is transferred by stepping with the foot opposite the throwing hand</td>
<td>4. Follow-through beyond ball release diagonally across the body toward the nonpreferred side</td>
</tr>
<tr>
<td>6. Underhand Roll</td>
<td>A tennis ball for children ages 3 to 6; a softball for children ages 7 to 10; two cones; tape; and 25 feet of clear space</td>
<td>Place the two cones against a wall so they are 4 feet apart. Attach a piece of tape on the floor 20 feet from the wall. Tell the child to roll the ball hard so that it goes between the cones. Repeat a second trial.</td>
<td>1. Preferred hand swings down and back, reaching behind the trunk while chest faces cones</td>
<td>2. Strides forward with foot opposite the preferred hand toward the cones</td>
<td>3. Bends knees to lower body</td>
<td>4. Releases ball close to the floor so ball does not bounce more than 4 inches high</td>
</tr>
</tbody>
</table>

Object Control Subtest Raw Score (sum of the 6 skill scores)
The Corsi Test was performed on an iPad, and the screenshots below show how each session is set up, explained, and performed.

Figure 1 – Pathspan home screen

Figure 2 – Participant Information
Now we are going to play a COPYING game. You will see some buttons on the screen. The buttons are going to flash in a pattern.

You watch the pattern. When it is done, you copy the pattern by touching the same buttons and then press the "Done" button to show that you are finished copying. Try and copy the pattern in the same order that you saw.

I'll show you how to do it on the first one. Watch me watch the pattern and then copy it.

---

Figure 3 – Test Instructions

---

Figure 4 – Corsi Test screen
Perceived Motor Competence Test Manual and Score Sheet

This is an excerpt from the manual for administering the Pictorial Scale of Perceived Competence and Social Acceptance for Young Children. It includes instructions on how the test was administered, the specific questions that were asked, and the score sheet used for each participant.
Procedural Manual to Accompany:

THE PICTORIAL SCALE OF PERCEIVED COMPETENCE AND SOCIAL ACCEPTANCE FOR YOUNG CHILDREN

Susan Harter and Robin Pike
In Collaboration with
Carole Efron, Christine Chao, and Beth Ann Bierer
Illustrations by Debbie Kolbo

1983

UNIVERSITY of DENVER
ARTS, HUMANITIES & SOCIAL SCIENCES
Department of Psychology
INSTRUCTIONS

The child is given a sample item at the beginning of the booklet and instructed as follows:

I have something here that's kind of like a picture game and it's called WHICH BOY IS THE MOST LIKE ME. I'm going to tell you about what each of the boys in the picture is doing.

Sample: In this one (examiner then points to picture on the left), this boy is usually kind of happy, and this boy (examiner points to the picture on the right) is usually kind of sad. Now, I want you to tell me which of these boys is the most like (Child's Name).

After the child has pointed to the picture appropriate for him, the examiner points to the circles directly below that picture and emphasizes the key qualifying words to help the child refine his choice further. The examiner should always start with the extreme (larger) circle and proceed to the smaller circle. Thus, if the child points to the happy picture in response to the question concerning which is most like him, the examiner would say:

Are you always happy? (pointing to the larger circle)
Or are you usually happy? (pointing to smaller circle)

Occasionally a child will point to the middle of the two pictures and say that both are like him. The examiner should then say: Yes, sometimes we do feel both ways, but if you had to pick, which one of these boys is the way you are most of the time, which one would you choose?

The number value corresponding to the child's choice should be recorded on the Scoring Sheet for Individual Child Responses. Any comments should be recorded in the space provided at the bottom of the sheet.

The examiner continues for each plate, reading the descriptions, verbatim, as she/he points to the picture accompanying each description. In some pictures there is a target child central to the description, designated by an arrow pointing to that child. Be certain that on these items you point to that particular child.
SAMPLE QUESTION

This girl is usually kind of happy. Are you:

Always happy OR Usually happy

4 3

This girl is usually kind of sad. Are you:

Usually sad OR Always sad

2 1
ITEM 3

This girl isn't very good at swinging by herself. Are you:

- Not too good 1
- OR
- Sort of good 2

This girl is pretty good at swinging by herself. Are you:

- Pretty good 3
- OR
- Really good 4
ITEM 7

This girl isn't very good at climbing. Are you:

1. Not very good at climbing

OR

2. Sort of good

OR

3. Pretty good

OR

4. Really good at climbing
ITEM 11

This girl isn't very good at tying her shoes. Can you:

- Not tie them at all
- Not too good
- Pretty good
- Really good at tying shoes

Are you:

- 1
- 2
- 3
- 4
ITEM 15

This girl is pretty good at skipping. Are you:

Really good at skipping

OR

Pretty good

This girl isn't very good at skipping. Are you:

Sort of good

OR

Not too good at skipping

4

3

2

1
ITEM 19

This girl can't run very fast. Are you:

Not very fast OR Sort of fast

1 2

This girl can run pretty fast. Are you:

Pretty fast OR Really fast

3 4
ITEM 23

This girl is pretty good at hopping on one foot. Are you:

<table>
<thead>
<tr>
<th>Really good at hopping</th>
<th>OR</th>
<th>Pretty good</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

This girl has trouble hopping on one foot. Can you:

<table>
<thead>
<tr>
<th>Not too good</th>
<th>OR</th>
<th>Not hop at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
Perceived Physical Competence

Name: ______________________
Grade: _____  Age: _____  Gender: M F  Date: ________

Sample Question - Happy

Item 3 – Swinging

Item 7 – Climbing

Item 11 – Ball bouncing

Item 15 – Skipping

Item 19 – Running

Item 23 – Jump Rope
Introduction
The GT3X+ based activity monitors provide objective measurements of human activity and are used in many research and clinical applications. They include both a micro-electro-mechanical system (MEMS) based accelerometer and an ambient light sensor. The GT3X+ can also be ordered with a wireless option, wGT3X+, further extending the capabilities of the device.

<table>
<thead>
<tr>
<th>Model</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>GT3X+</td>
<td>Activity, lux, programmable sample rate, water resistant housing, high speed USB</td>
</tr>
<tr>
<td>wGT3X+</td>
<td>Activity, lux, programmable sample rate, water resistant housing, high speed USB, heart rate, wireless interface (ANT+™)</td>
</tr>
</tbody>
</table>

Specifications and Functionality of the GT3X+

Sensors
The GT3X+ and wGT3X+ include both an acceleration sensor and an ambient light sensor.

Acceleration
The acceleration sensor yields the following product specifications:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axis</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>3</td>
<td>mg/LSB</td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>+/- 6</td>
<td>G</td>
</tr>
</tbody>
</table>

The acceleration data is sampled by a 12 bit analog to digital converter at rates ranging from 30 Hz to 100 Hz (user selectable) and stored in a raw, non-filtered/accumulated format in the units of gravity (G’s). This data is stored directly into non-volatile flash memory.
Fit Kidz Intervention Program

Fit Kidz Intervention Lesson Plans

For the 8-week intervention program, I designed daily lesson plans comprised of games and activities appropriate for preschool children. Each lesson plan (3 total) included games and activities that focused on 4-5 specific skills, many of which were the same ones assessed by the TGMD-2. The lesson plans were done in sequential order and repeated so as to provide equal and adequate instruction time for all of the skills. The lesson plans were based off of the Intervention Daily Log template designed and provided by Dr. Robinson.
Lesson Plan 1

Skill 1 - Throw

Key Phrases: Point to where you are throwing. Big step forward. Arm goes down and back. Big throw!

1. Cornhole

Equipment: Cornhole boards
Beanbags

Players: 2-3 per board

Details: The object is to throw the beanbags into the hole or onto the board. Have the kids stand in line with the board about 3 steps away and take turns throwing. Increase distance as they improve.

2. Target Practice

Equipment: Cones
Tape
Hula-hoops
Beanbags/Balls

Players: 2-3 per target/station

Details: The object is to throw the beanbags or balls and hit the targets. Set up hula-hoops, cones (upside down), or tape targets (vertical on the wall). Have the kids stand about 3 steps away and take turns throwing. Increase distance as they improve.

3. Question/Name Game

Equipment: Beanbags/Balls

Players: No maximum

Details: The object is to throw the beanbag/ball to each other or the student/teacher. Divide the kids into small groups of 3-5 and have them stand in a circle. The student/teacher may ask one of the kids a question and throw the object to them. The kid then answers the question and throws the object back or to the next kid. The kids may also toss the object between themselves, saying their name before throwing to that person.
Skill 2 - Catch

**Key Phrases:** Use your fingertips. Bend your elbows. Keep your eye on the ball. Catch the ball using just your fingertips.

1. **Scarf Toss**

   **Equipment:** Scarves/fabric

   **Players:** 1-2 per scarf/fabric

   **Details:** The object is to catch the scarf as it falls down. Have the kids throw the scarf into the air and catch it as it floats down. Start by catching with the same hand as it was thrown with, and then try catching with the opposite hand. Kids can be partnered up to practice throwing and catching with one another.

2. **Catching King**

   **Equipment:** Beanbags/Balls
   Scarves/fabric

   **Players:** No maximum

   **Details:** The object is to catch the thrown object from increasing distances. Have the kids form a line, with the kid in front catching first. Start by throwing the object from a few steps away. If the kid successfully catches the object, they move to the back of the line. After all kids have caught the object, take a step back and throw the object to every kid from the new distance. If a kid drops or misses the ball, they are out. Have the kids that are out practice throwing and catching an object to one another until there’s only 1 kid left (the “Catching King”).

3. **Question/Name Game**

   **Equipment:** Beanbags/Balls

   **Players:** No maximum

   **Details:** The object is to throw the beanbag/ball to each other or the student/teacher. Divide the kids into small groups of 3-5 and have them stand in a circle. The student/teacher may ask one of the kids a question and throw the object to them. The kid then answers the question and throws the object back or to the next kid. The kids may also toss the object between themselves, saying their name before throwing to that person.
Skill 3 - Run

Key Phrases: Run on your toes. Pump your arms to help you run quickly.

1. Follow the Leader (also other skills if desired)
   
   Equipment: None (*can’t do under porch, so must be good weather)
   
   Players: No maximum, but best with <10
   
   Details: The object is to keep the kids moving with minimal walking/breaks. Start by leading the kids throughout the playground, open space, and porch areas. Try to keep them running the whole time, but incorporate weaving, hopping, climbing, etc. to keep it interesting. After a minute, pick one of the kids to be the new leader for the next minute. Change leaders every minute until everyone has had a turn.

2. Cone Zone

   Equipment: Cones
   
   Players: No maximum
   
   Details: The object is to get the kids running. The cones may be set up in different ways for different runs and to keep it interesting – two lines (start & finish), zig-zag, four corners of the playground/open space, suicide style. Have the kid or group of kids run the course outlined by the cones. If there are lots of kids, send them in smaller groups. The different runs can also be set up together (i.e. – run one line straight, the next line zig-zag, the next line suicide style, then stop).

3. Relays (also other skills if desired)

   Equipment: Cones
   
   Others (if incorporating other skills)
   
   Players: No maximum
   
   Details: The object is to get all of the kids running and to push them by putting them into relay teams. Other skills can also be incorporated by adding new relay legs. Divide the kids into two or three relay teams. Set up cones to mark the relay course (which can also incorporate playground equipment). Have first kid run the course and come back to tag the next runner’s hand. Go until everyone has gone (once or twice) or for a time limit (5 minutes).
4. **Red Light Green Light** (also other skills if desired)

Equipment: None

Players: No maximum

Details: The object is to follow directions given by the “police officer” to run, walk, jump, etc. Line the kids up side by side on one end of the playground/open space and the student/teacher stands on the other end facing them. Green light means run as fast as they can; yellow light is walk; red light is stop. Other colors can be used to do other skills, such as blue light for jump and purple light for slide. The student/teacher keeps calling out different color lights until all the kids have reached the other end.
Skill 4 - Jump

**Key Phrases:** Bend knees. Swing arms back. Take off on both feet. Swing arms up to “explode” off ground. Land on both feet.

1. **Tree Cookies**

   **Equipment:** Tree cookies on playground
   
   **Players:** No maximum
   
   **Details:** The object is to jump from cookie to cookie without falling off, or alternatively, to jump over the cookies. Set up the tree cookies with space in between each one for the kids to jump over. Have them form a line and start jumping from cookie to cookie one kid at a time. The cookies can also be arranged so that the distance between them varies, or so that the kids have to jump over the cookies onto the ground between them.

2. **Jumping King**

   **Equipment:** Jump ropes
   
   **Players:** No maximum
   
   **Details:** The object is to challenge the kids to jump farther each time but still maintain form. Set up 2 jump ropes or spots with a small space in between. Have the kids go one at a time, trying to jump from one object to the other with correct form. If they don’t make it all the way, send them to a station to the side to practice jumping over other ropes/spots or challenge their friends. Once all the kids have gone, increase the distance and repeat until one kid remains (the “Jumping King”).
Skill 5 - Slide

Key Phrases: “When I slide I step to the side!”

1. Side Sliders

   Equipment: Jump ropes
              Cones

   Players: 3-4 per team, 2 or more teams

   Details: The object is to work as a team to slide from one cone to the other while all holding onto the jump rope. Set up start and finish lines with cones or extra jump ropes and divide the kids into teams of no more than 4 each. Each team gets one jump rope, and each team member has to hold onto it with both hands. The rope must stay tight the whole way across and can’t touch the ground. Tip: Have the kids of each team face each other so that their feet don’t collide while sliding. After saying go, the first team to reach the finish line wins.

   Others: see Run games, but modify for sliding
Skill 1 - Kick


4. Animal Kicks

Equipment:  Balls of different sizes and weights

Players:  3-5 kids per group

Details:  The object is to kick the ball to one another accurately. Divide the kids into groups of 3-5 and get them in a circle. One kid first says the name of an animal and then kicks the ball to another kid. After a few rounds, switch the type of ball or increase the distance between the kids to make it more challenging.

5. Cone in the Middle

Equipment:  Balls
Cones/Bottles

Players:  3-5 kids per group

Details:  The object is to kick the ball and knock down the cone/bottle in the middle of the circle. Divide the kids into groups of 3-5 and get them in a circle. Place a cone/bottle in the middle of the circle and have them practice kicking and aiming for the target. Reset the cone/bottle after it falls down and continue.

6. Between the Spots

Equipment:  Spots/cones
Balls

Players:  Pairs of kids, no maximum number of pairs

Details:  The object is to aim and kick the ball to the other partner between the spots/cones. Divide the kids into pairs and have the partners face each other about 10 feet apart. For each pair, set up two spots/cones in the middle of them to aim their kicks through. Practice kicking a ball back and forth through the two spots/cones, increasing the distance every minute or so.
Skill 2 - Skip

Key Phrases: “All a skip is… is a step and hop”.

1. Skipping Down the Path

Equipment: Cones
Players: No maximum
Details: The object is to continually skip down the length of the path. Set up cones as shown below and have the kids line up at the start. Start them one at a time down the path towards the end. Once they reach the other end, have them line up to go back the opposite direction or have them return to the start and go again.

2. Skip Tag

Equipment: None
Players: No maximum
Details: The object is to keep them moving only by skipping. Kids will play normal Tag, but they can only move by skipping.
Skill 3 - Hop

Key phrases: Bend one leg and put foot behind body. Hop on one foot.

1. Hopping onto Hula-hoops

Equipment: Hula-hoops

Players: No maximum

Details: The object is to make it through the path by hopping and without setting down the raised foot. Set up a hula-hoop path. Have the kids hop on one foot down the path then switch legs to come back.

2. Hopping King

Equipment: Spots
Jump ropes

Players: No maximum

Details: The object is to challenge the kids to hop farther each time while maintaining form. Set up 2 jump ropes or spots with a small space in between. Have the kids go one at a time, trying to hop from one object to the other with correct form. If they don’t make it all the way, send them to a station to the side to practice hopping over other ropes/spots or challenge their friends. Once all the kids have gone, increase the distance and repeat until one kid remains (the “Hopping King”).

3. Over and Back

Equipment: Jump ropes

Players: No maximum

Details: The object is to hop back and forth over the jump ropes all the way to the end. Line the jump ropes up on the ground. Have the kids hop back and forth over the rope, sliding to the other side as they hop. When they reach the end, they start again using the other leg.
Skill 4 - Leap

Key phrases: Take off on one foot and land on the other foot.

1. Spot to Spot

Equipment: Spots
Players: No maximum
Details: The object is to leap over each spot successfully. Position poly spots in a line or in a path, about two steps apart from each other. Have the one at a time, leap over the poly spots down the path and return to the start or wait on the opposite end to return the opposite direction.

2. Leaping King

Equipment: Jump ropes
Players: No maximum
Details: The object is to challenge the kids to leap farther each time but still maintain form. Set up 2 jump ropes or spots with a small space in between. Have the kids go one at a time, trying to leap from one object to the other with correct form. If they don’t make it all the way, send them to a station to the side to practice leaping over other ropes/spots or challenge their friends. Once all the kids have gone, increase the distance and repeat until one kid remains (the “Leaping King”).

3. Tree Cookies

Equipment: Tree cookies on playground
Players: No maximum
Details: The object is to leap from cookie to cookie without falling off, or alternatively, to leap over the cookies. Set up the tree cookies with space in between each one for the kids to leap over. Have them form a line and start leaping from cookie to cookie one kid at a time. The cookies can also be arranged so that the distance between them varies, or so that the kids have to leap over the cookies onto the ground between them.
Skill 5 - Dribble

Key phrases: Use your fingertips. Keep your eye on the ball. Let the ball bounce up to waist high.

1. Dribble Dribble Pass

Equipment: Balls
Players: Up to 3 kids per group
Details: The object is to dribble the ball continuously for several bounces with each hand. Divide the kids into groups of no more than 3. Have them dribble three times with each hand and then pass the ball to a friend.

2. Dribbling along the jump rope

Equipment: Balls
Jump rope
Players: 6-8 kids per group
Details: The object is to maintain a dribble while moving down a path/line. Place a jump rope on the floor and half of the kids in line on each side. The kids have to dribble the ball always close to the rope path. When the kid crosses all the rope, they hand the ball to the next one and go to the end of the line.

3. Around the World

Equipment: Poly spots
Balls
Players: No maximum
Details: The object is to dribble and control the ball form one spot to the next. Place spots on the floor in a large circle (approximately 10 spots). Have the kids dribble the ball X times (start with 3) at each spot before moving onto the next one. At first let them continue even if they mess up, but as they improve start requiring them to start over from the beginning if they mess up. See who can dribble all the way “around the world” without messing up.
Lesson Plan 3

Skill 1 - Strike

Key Phrases: Eye on the ball, belly button towards ball, front hand on top, back hand on bottom, twist, strike a ball!

1. Bat the Balloon

Equipment: Bat
            Balloons

Players: 2 per bat

Details: The object is for one partner to pitch the balloon and the other to strike it. Divide the kids into partners, one pitching and the other striking. The one pitching must run and grab the next balloon immediately after throwing the first balloon up to avoid being hit by the bat.

2. Piñata

Equipment: Bat
            Tennis ball on string

Players: As many as the number of bats and balls

Details: The object is to strike the hanging ball when it’s not moving/swinging. Attach the string to a rafter or roof to hang the ball at the proper level. Have one kid at a time bat the ball. Make sure the ball has stopped moving before they bat again.

3. Gallop Baseball

Equipment: Bat
            Balls
            Spots

Players: 6 at a time

Details: Just like a baseball game but every strike allows 2 free base runs and a run should be done in gallop. This activity should be done after some strike and gallop practices. If one of them is not good enough yet the gallop can be changed for any other locomotors motor skill and the strike could be changed for kick.
Skill 2 - Roll

Key Phrases: Big step forward, bend knees to lower body, big circle with your arm, roll the ball on the ground.

1. Score a goal

Equipment: Cones
           Balls

Players: 2-3 per goal

Details: The object is to aim and roll the ball between the two objects. With a line guiding to the middle of the goal the kid will aim for a goal made with 2 cones. As soon as it gets easy change the size of the goal and the distance from the goal. This activity can be done under the porch in case of bad weather.

2. Freeze Tag

Equipment: Tennis balls

Players: No maximum (preferably everyone)

Details: The object is to roll the balls between the “frozen” kids’ legs. Regular tag but if one gets caught this kid should freeze with legs opened. In order to unfreeze someone has to roll a ball between his/her legs. Change the tagger after a few minutes.

3. Bowling

Equipment: Balls
           Plastic bottles

Players: 4 per game

Details: The object is to knock down all of the bottles by rolling the ball. Have kids take turns bowling down the bottles, and quickly reset them so they get as many rolls as possible.
Skill 3 - Toss

Key Phrases: Point to where you are going, big step forward, make a big circle with your arm

1. Corn Hole

Equipment: Corn hole
Beanbags

Players: 4 per corn hole game

Details: The object is to throw the beanbags into the hole or onto the board. Have the kids stand in line with the board about 3 steps away and take turns throwing. Increase distance as they improve.

2. Target Practice

Equipment: Bean bags/balls
Cones

Players: 4 per game

Details: The object is to throw the beanbags or balls and hit the targets. Set up hula-hoops, cones (upside down), or tape targets (vertical on the wall). Have the kids stand about 3 steps away and take turns throwing. Increase distance as they improve.

3. Everyone Toss

Equipment: Bean bags
Balls (different sizes and weights)

Players: 2 per ball/bean bag

Details: The object is to toss the objects according to what the teacher/student says. Divide the kids into partners and give each pair a ball/beanbag. Everyone should follow the commands the teacher/student calls like: Get closer, Step back, toss higher…
Skill 4 - Gallop

**Key Phrases:** Play chase with your feet but don’t let them touch or cross. Your back foot tries to catch your back foot but your back foot runs away.

1. **Gallop Down the Path**

   **Equipment:** Cones
   
   **Players:** No maximum
   
   **Details:** The object is to follow a leader galloping down the path made by cones/spots. Have the kids line up and send them one at a time to gallop down the path through the playground/porch. Use this activity to look for kids having problems with gallop and correct using the Key Phrases.

2. **Drag a Hula-hoop**

   **Equipment:** Hula-hoop
   
   **Players:** 3 per hula hoop
   
   **Details:** The object is to gallop the hula-hoop to one another, like a relay. Facing each other the practice starts with 2 on one extremity and one on the other. Drag the hula-hoop to the next friend with the back leg performing a gallop. The hula-hoop will prevent them to cross legs. Instead of bringing the hula-hoop to a partner another option is a path around a cone.

3. **Gallop Baseball**

   **Equipment:** Bat
   Balls
   
   **Players:** 6 at a time
   
   **Details:** Just like a baseball game but every strike allows 2 free base runs and a run should be done in gallop. This activity should be done after some strike and gallop practices. If one of them is not good enough yet the gallop can be changed for any other locomotors motor skill and the strike could be changed for kick.
Fit Kidz Intervention Daily Logs

The daily logs were used during the 8-week intervention to keep track of the total number of minutes of instructional time, the observers or facilitators present, and which skills were emphasized. The template for the daily log was designed and provided by Dr. Robinson.
<table>
<thead>
<tr>
<th>Start Time</th>
<th>Stop Time</th>
<th>Total Attendance</th>
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</thead>
<tbody>
<tr>
<td>11:00</td>
<td>11:35</td>
<td>11</td>
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</tbody>
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**Observers**

- Josh Anderson
- Camila Silveira

**Games Played**

- Cornhole
  - Throw 1, 2
  - Catch 1
  - Run 2, 4

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### Skills

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Throw</th>
<th>Catch</th>
<th>Run</th>
<th>Jump</th>
<th>Slide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Windup with downward movement of arm</td>
<td>- Prep phase with hands in front of body with elbows bent</td>
<td>- Arms move in opposition to legs</td>
<td>- Prep phase (arms and knees)</td>
<td>- Body is turned sideways (shoulder align with floor)</td>
</tr>
<tr>
<td></td>
<td>- Rotate hips and shoulder</td>
<td>- Arms extend, reaching forward</td>
<td>- Flight phase</td>
<td>- Arms extend upwards during jump</td>
<td>- A lateral step with lead foot and a slide with trailing foot where both feet come off ground</td>
</tr>
<tr>
<td></td>
<td>- Contralateral step/weight transfer</td>
<td>- Object is caught by hands only</td>
<td>- Narrow foot placement</td>
<td>- Feet take off and land simultaneously</td>
<td>- 4 continuous slides to each side</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Bean Bags</th>
<th>Tapes/Jump Rope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bean Bags</td>
<td>Yarn Balls</td>
<td>Cones</td>
</tr>
<tr>
<td>Targets</td>
<td>Scarves</td>
<td>Poly Spots</td>
</tr>
<tr>
<td>Tape/Jump Rope</td>
<td>Bean Bags</td>
<td>Hula hoops</td>
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<tr>
<td>Jump Ropes</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Mastery Climate</th>
<th>Vary distances to target</th>
<th>Different items to catch (i.e. yarn balls vs scarves)</th>
<th>Varying distances between targets</th>
<th>With props (i.e. hand holding or noodles) and without props</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Teaching phrase</th>
<th>Point to where you’re throwing, big step forward, arms goes down and back, big throw!</th>
<th>Use your fingertips! Bend your elbows, keep eye on ball, catch the ball using just your fingertips</th>
<th>Run on your toes, pump your arms to help you run quickly</th>
<th>Bend knees, swing arms back, take off on both feet, swing arms up to “explode” off ground, land on both feet</th>
<th>“When I slide, I step to the side!”</th>
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### Date: 5-20-15

<table>
<thead>
<tr>
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<th>Stop Time</th>
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<td>9:41</td>
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**Observers:**
- Josh Anderson
- Camila Silveira
- Cristiano Rodriguez

**Games Played:**
- Kick 1, 3
- Skip 1
- Hop 1, 3

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### Skills

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Kick</th>
<th>Skip</th>
<th>Hop</th>
<th>Leap</th>
<th>Dribble</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-Rapid approach to ball kick</td>
<td>-a step forward followed by a hop on the same foot and arms moving in opposition</td>
<td>-Non-support leg remains bent</td>
<td>-Take off and land on opposite foot</td>
<td>-Maintains control of ball with fingertips</td>
</tr>
<tr>
<td></td>
<td>-Non-kicking foot placed slightly behind the ball -kick with instep</td>
<td>-Step-hop cycle for at least 4 consecutive skips</td>
<td>-Non-support leg and arm opposite to it move in pendular fashion to propel the body forward -Hop at least 3 consecutive times</td>
<td>-Flight phase longer than a run</td>
<td>-Ball stays to the front or outside the preferred side</td>
</tr>
<tr>
<td></td>
<td>Plastic bottles</td>
<td>Cones</td>
<td>Cones</td>
<td>Poly Spots</td>
<td>Playground balls</td>
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<tr>
<td></td>
<td>Poly Spots</td>
<td>Jump Ropes</td>
<td>Jump Ropes</td>
<td>Hula hoops</td>
<td>Poly spots</td>
</tr>
<tr>
<td></td>
<td>Vary distances to target</td>
<td>Varying distances</td>
<td>Ball sizes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run up, plant foot, kick with instep</td>
<td>“All a skip is.... Is a step and hop”</td>
<td>Bend one leg and put foot behind body. Hop on one foot.</td>
<td>Take off on one foot and land on the other foot</td>
<td>Use your fingertips. Keep your eye on the ball. Let the ball bounce up to waist high.</td>
</tr>
<tr>
<td>Date: 5-29-2015</td>
<td>Location: ___ Playground  ___ Porch  ___ Both</td>
<td></td>
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<td>----------------</td>
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<td></td>
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<tr>
<td>Start Time</td>
<td>9:35</td>
<td></td>
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</tr>
<tr>
<td>Observers</td>
<td>Josh A. Camila S. Cristiano R.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop Time</td>
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<tr>
<td>Total Attendance</td>
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<tr>
<td>Games Played</td>
<td>Strike 2</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Roll 1, 2</td>
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</tr>
<tr>
<td></td>
<td>Toss 2</td>
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<table>
<thead>
<tr>
<th>Skills</th>
<th>Strike</th>
<th>Roll</th>
<th>Toss</th>
<th>Gallop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria</td>
<td>-Feet parallel to pitcher -Dominant hand on top -Hip, trunk and shoulder rotation during swing -Hits the ball</td>
<td>-A step forward with opposite foot -Bends knees to lower body to ground -Arm with ball swings down and back -Ball does not bounce more than 4 inches off the ground</td>
<td>-A contralateral step forward -Arm follows through to shoulder height -Ball hits wall</td>
<td>-A step forward with the lead foot followed by the other foot -A brief period of time when both feet are off the ground -Feet do no touch or cross -Maintains gallops for 4 consecutive gallops</td>
</tr>
<tr>
<td>Equipment</td>
<td>Cones Play balls Cones Poly spots Bean bags Poly Spots Jump ropes Hula hoops noodles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastery Climate</td>
<td>Stationary or being pitched the ball Varying distances to goal Vary distances to goal.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching phrase</td>
<td>Eye on ball, belly button towards ball, front hand on top, back hand on bottom, twist, and strike ball. Big step forward, bend knees to lower body, big circle with your arm, roll the ball on the ground. Point to where you are going, big step forward, make a big circle with your arm</td>
<td></td>
<td>Play chase with your feet but don’t let them touch or cross. Your back foot tries to catch your back foot but your back foot runs away</td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td>Throw</td>
<td>Catch</td>
<td>Run</td>
<td>Jump</td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
<td>-------</td>
<td>-----</td>
<td>------</td>
</tr>
<tr>
<td>Windup with downward movement of arm</td>
<td>-Prep phase with hands in front of body with elbows bent</td>
<td>-Arms move in opposition to legs</td>
<td>-Prep phase (arms and knees)</td>
<td>-Body is turned sideways (shoulder align with floor)</td>
</tr>
<tr>
<td>Rotate hips and shoulder</td>
<td>-Arms extend, reaching forward</td>
<td>-Flight phase</td>
<td>-Arms extend upwards during jump</td>
<td>-A lateral step with lead foot and a slide with trailing foot where both feet come off ground</td>
</tr>
<tr>
<td>Contralateral step/weight transfer</td>
<td>-Object is caught by hands only</td>
<td>-Narrow foot placement</td>
<td>-Feet take off and land simultaneously</td>
<td>-4 continuous slides to each side</td>
</tr>
<tr>
<td>Follow through</td>
<td>Bean Bags</td>
<td>Yarn Balls</td>
<td>Cones</td>
<td>Poly Spots</td>
</tr>
<tr>
<td>Targets</td>
<td>Scarves</td>
<td>Bean Bags</td>
<td>Jump Ropes</td>
<td>Hula hoops</td>
</tr>
<tr>
<td>Tape/Jump Rope</td>
<td></td>
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<table>
<thead>
<tr>
<th>Mastery</th>
<th>Vary distances to target</th>
<th>Different items to catch (i.e. yarn balls vs scarves)</th>
<th>Varying distances between targets</th>
<th>With props (i.e. hand holding or noodles) and without props</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Teaching phrase</th>
<th>Point to where you’re throwing, big step forward, arms goes down and back, big throw!</th>
<th>Use your fingertips! Bend your elbows, keep eye on ball, catch the ball using just your fingertips</th>
<th>Run on your toes, pump your arms to help you run quickly</th>
<th>Bend knees, swing arms back, take off on both feet, swing arms up to “explode” off ground, land on both feet</th>
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<table>
<thead>
<tr>
<th>Date:</th>
<th>4 - 1 - 15</th>
<th>Location:</th>
<th>Playground</th>
<th>Porch</th>
<th>Both</th>
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<tbody>
<tr>
<td>Start Time</td>
<td>9:29</td>
<td>Stop Time</td>
<td>10:02</td>
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<td>10</td>
</tr>
<tr>
<td>Observers</td>
<td>Josh A. Camila S. Cristiano R.</td>
<td>Games Played</td>
<td>Throw 2</td>
<td>Catch 3</td>
<td>Run 1</td>
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<tr>
<td>Date: 6-5-15</td>
<td>Location: Playground Porch Both</td>
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<tr>
<td>-------------</td>
<td>--------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start Time</td>
<td>9:30</td>
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<tr>
<td>Stop Time</td>
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<tr>
<td>Total Attendance</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Observers</td>
<td>Josh A. Camila S. Cristiano R.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Games Played</td>
<td>Kick 3 Skip 1 Hop 1 Dribble 2</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Skills</th>
<th>Kick</th>
<th>Skip</th>
<th>Hop</th>
<th>Leap</th>
<th>Dribble</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria</td>
<td>- Rapid approach to ball - elongated step prior to kick - non-kicking foot placed slightly behind the ball - kick with instep</td>
<td>- a step forward followed by a hop on the same foot - arms moving in opposition - Step-hop cycle for at least 4 consecutive skips</td>
<td>- Non-support leg remains bent - Non-support leg and arm opposite to it move in pendular fashion to propel the body forward - Hop at least 3 consecutive times</td>
<td>- Take off and land on opposite foot - Flight phase longer than a run - Opposite arm reaches forward</td>
<td>- Maintains control of ball with fingertips - Ball stays to the front or outside the preferred side - Maintains control for 4 bounces</td>
</tr>
<tr>
<td>Equipment</td>
<td>Plastic bottles Poly Spots</td>
<td>Cones Jump Ropes</td>
<td>Cones Jump Ropes</td>
<td>Poly Spots Hula hoops Jump Ropes</td>
<td>Playground balls Poly spots</td>
</tr>
<tr>
<td>Mastery Climate</td>
<td>Vary distances to target</td>
<td>Varying distances</td>
<td>Ball sizes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching phrase</td>
<td>Run up, plant foot, kick with instep</td>
<td>“All a skip is... Is a step and hop”</td>
<td>Bend one leg and put foot behind body. Hop on one foot.</td>
<td>Take off on one foot and land on the other foot</td>
<td>Use your fingertips. Keep your eye on the ball. Let the ball bounce up to waist high.</td>
</tr>
<tr>
<td>Date: 6-8-15</td>
<td>Location: Playground □ Porch □ Both □ Both</td>
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<td></td>
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<td></td>
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<tr>
<td>--------------</td>
<td>-----------------------------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Start Time</td>
<td>9:30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop Time</td>
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<td>Total Attendance</td>
<td>60</td>
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<td>Observers</td>
<td>Josh A. Camilo S. Cristiano R.</td>
<td></td>
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</tr>
<tr>
<td>Games Played</td>
<td>Strike 2 Toss 1,2 Gallop 1,2 relay</td>
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<table>
<thead>
<tr>
<th>Skills</th>
<th>Strike</th>
<th>Roll</th>
<th>Toss</th>
<th>Gallop</th>
</tr>
</thead>
</table>
| Criteria | - Feet parallel to pitcher  
- Dominant hand on top  
- Hip, trunk and shoulder rotation during swing  
- Hits the ball | - A step forward with opposite foot  
- Bends knees to lower body to ground  
- Arm with ball swings down and back  
- Ball does not bounce more than 4 inches off the ground  
- A contralateral step forward  
- Arm follows through to shoulder height  
- Ball hits wall | - A step forward with the lead foot followed by the other foot  
- A brief period of time when both feet are off the ground  
- Feet do not touch or cross  
- Maintains gallops for 4 consecutive gallops. | - Jump ropes  
- Hula hoops  
- Noodles |
| Equipment | Cones  
Noodles  
Yarn Balls | Play balls  
Cones  
Poly spots | Bean bags  
Poly Spots | |
| Mastery Climate | Stationary or being pitched the ball  
Varying distances to goal | Vary distances to goal. | Props or no props | |
| Teaching phrase | Eye on ball, belly button towards ball, front hand on top, back hand on bottom, twist, and strike ball.  
Big step forward, bend knees to lower body, big circle with your arm, roll the ball on the ground.  
Point to where you are going, big step forward, make a big circle with your arm  
Play chase with your feet but don’t let them touch or cross. Your back foot tries to catch your back foot but your back foot runs away |
<table>
<thead>
<tr>
<th>Start Time</th>
<th>Games Played</th>
<th>Location</th>
<th>Total Attendance</th>
<th>Criteria</th>
<th>Equipment</th>
<th>Climate</th>
<th>Master</th>
<th>Teaching</th>
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<tbody>
<tr>
<td>9:25</td>
<td>10:00</td>
<td>Playground</td>
<td>Porch</td>
<td>Both</td>
<td>11</td>
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<tr>
<td>Date</td>
<td></td>
<td>6 - 11 - 15</td>
<td>Josh A</td>
<td>Camila R</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Throw**
- Windup with downward movement of arm movement of arm
- Contralateral step/weight transfer
- Follow through
- Bean Bags
- Tape/Jump Rope
- Vary distances to target
- Point to where you're throwing, big step forward, arms goes down and back, big throw!

**Catch**
- Prep phase with hands in front of body with elbows bent
- Arms extend, reaching forward
- Object is caught by hands only
- Yarn Balls
- Scarves
- Bean Bags
- Different items to catch (i.e. yarn balls vs scarves)
- Use your fingertips! Bend your elbows, keep eye on ball, catch the ball using just your fingertips

**Run**
- Arms move in opposition to legs
- Flight phase
- Arms extend up and back
- Non-support legs bend about 90°
- Cones
- Jump Ropes
- Varying distances between targets
- Bend knees, swing arms back, take off on both feet, swing arms up to explode off ground, land on both feet

**Jump**
- Prep phase (arms and knees)
- Arms extend up and back
- Feet take off and land simultaneously
- Arms thrust down during landing
- Poly Spots
- Hula hoops
- Jump Ropes
- With props (i.e. hand holding or noodles) and without props
- "When I slide, I step to the side!"

**Slide**
- Body is turned sideways (shoulder align with floor)
- A lateral step with lead foot and trail slide with trailing foot where both feet come off ground
- Jump Ropes
- Noodles
- Continuous slides to each side

**Skills**
- Jump
- Run
- Catch
- Throw
<table>
<thead>
<tr>
<th>Date:</th>
<th>6-15-15</th>
<th>3</th>
<th>Location:</th>
<th>Playground</th>
<th>Porch</th>
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<tr>
<td>Start Time</td>
<td>9:25</td>
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<td>Stop Time</td>
<td>9:58</td>
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<tr>
<td>Observers</td>
<td></td>
<td></td>
<td>Games Played</td>
<td>Kick 2, 3</td>
<td>Dribble 1, 3</td>
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### Skills

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Kick</th>
<th>Skip</th>
<th>Hop</th>
<th>Leap</th>
<th>Dribble</th>
</tr>
</thead>
</table>
| - Rapid approach to ball  
- Elongated step prior to kick  
- Non-kicking foot placed slightly behind the ball  
- Kick with instep | - A step forward followed by a hop on the same foot  
- Arms moving in opposition  
- Step-hop cycle for at least 4 consecutive skips | - Non-support leg remains bent  
- Non-support leg and arm opposite to it move in pendular fashion to propel the body forward  
- Hop at least 3 consecutive times | Take off and land on opposite foot  
- Flight phase longer than a run  
- Opposite arm reaches forward | - Maintains control of ball with fingertips  
- Ball stays to the front or outside the preferred side  
- Maintains control for 4 bounces |

| Equipment | Plastic bottles  
Poly Spots | Cones  
Jump Ropes | Cones  
Jump Ropes | Poly Spots  
Hula hoops  
Jump Ropes | Playground balls  
Poly spots |

| Mastery Climate | Vary distances to target | Varying distances | Ball sizes |

| Teaching phrase | Run up, plant foot, kick with instep  
“All a skip is…. Is a step and hop” | Bend one leg and put foot behind body. Hop on one foot. | Take off on one foot and land on the other foot | Use your fingertips. Keep your eye on the ball. Let the ball bounce up to waist high. |
<table>
<thead>
<tr>
<th>Date: 6-19-15</th>
<th>Location: ___ Playground ___ Porch __Both</th>
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</thead>
<tbody>
<tr>
<td>Start Time</td>
<td>9:15</td>
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<tr>
<td>Stop Time</td>
<td>9:45 30min</td>
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<tr>
<td>Total Attendance</td>
<td>12</td>
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<tr>
<td>Observers</td>
<td>Dawn Coe  Camila S  Cristian R</td>
</tr>
<tr>
<td>Games Played</td>
<td>Cornhole Toss 1/2  Strike 2  Toss 1 &amp; Strike Roll 3</td>
</tr>
</tbody>
</table>

### Skills

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Strike</th>
<th>Roll</th>
<th>Toss</th>
<th>Gallop</th>
</tr>
</thead>
</table>
| - Feet parallel to pitcher  
- Dominant hand on top  
- Hip, trunk and shoulder rotation during swing  
- Hits the ball | -A step forward with opposite foot  
- Bends knees to lower body to ground  
- Arm with ball swings down and back  
- Ball does not bounce more than 4 inches off the ground | -A contralateral step forward  
- Arm follows through to shoulder height  
- Ball hits wall | -A step forward with the lead foot followed by the other foot  
- A brief period of time when both feet are off the ground  
- Feet do no touch or cross  
- Maintains gallops for 4 consecutive gallops |
| Equipment | Cones  
Noodles  
Yarn Balls | Play balls  
Cones  
Poly spots | Bean bags  
Poly Spots | Jump ropes  
Hula hoops  
noodles |
| Mastery Climate | Stationary or being pitched the ball  
Varying distances to goal | Vary distances to goal. | Props or no props |
| Teaching phrase | Eye on ball, belly button towards ball, front hand on top, back hand on bottom, twist, and strike ball. | Big step forward, bend knees to lower body, big circle with your arm, roll the ball on the ground. | Point to where you are going, big step forward, make a big circle with your arm | Play chase with your feet but don’t let them touch or cross. Your back foot tries to catch your back foot but your back foot runs away |
**Date:** 6-22-15  
**Location:** ___ Playground  ___ Porch  ___ Both

<table>
<thead>
<tr>
<th>Start Time</th>
<th>9:24</th>
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<tbody>
<tr>
<td>Stop Time</td>
<td>9:58</td>
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<tr>
<td>Total Attendance</td>
<td>12</td>
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</table>

**Observers**
- Dara C.
- Camila S.
- Cristian R.

**Games Played**
- Jumping Tree Cookie Catch
- Off-Rooster Hula Hoop/Cones
- Relay Race
- Run around the playground
- Ring around the Rosey
- Basketball Slide Drill

<table>
<thead>
<tr>
<th><strong>Criteria</strong></th>
<th><strong>Throw</strong></th>
<th><strong>Catch</strong></th>
<th><strong>Run</strong></th>
<th><strong>Jump</strong></th>
<th><strong>Slide</strong></th>
</tr>
</thead>
</table>
|              | -Windup with downward movement of arm  
- Rotate hips and shoulder  
- Contralateral step/weight transfer  
- Follow through | -Prep phase with hands in front of body with elbows bent  
- Arms extend, reaching forward  
- Object is caught by hands only | -Arms move in opposition to legs  
- Flight phase  
- Narrow foot placement  
- Non-support legs bends about 90° | -Prep phase (arms and knees)  
- Arms extend upwards during jump  
- Feet take off and land simultaneously  
- Arms thrust down during landing | - Body is turned sideways (shoulder align with floor)  
- A lateral step with lead foot and a slide with trailing foot where both feet come off ground  
- 4 continuous slides to each side |

| **Equipment** | **Bean Bags**  
**Targets**  
**Tape/Jump Rope** | **Yarn Balls**  
**Scarves**  
**Bean Bags** | **Cones**  
**Jump Ropes** | **Poly Spots**  
**Hula hoops**  
**Jump Ropes** | **Jump Ropes**  
**Noodles** |

| **Mastery Climate** | Vary distances to target  
Different items to catch (i.e. yarn balls vs scarves) | Varying distances between targets | With props (i.e. hand holding or noodles) and without props |

| **Teaching Phrase** | Point to where you’re throwing, big step forward, arms goes down and back, big throw!  
Use your fingertips! Bend your elbows, keep eye on ball, catch the ball using just your fingertips | Run on your toes, pump your arms to help you run quickly | Bend knees, swing arms back, take off on both feet, swing arms up to “explode” off ground, land on both feet | “When I slide, I step to the side!” |
**Date:** 6/26/15  
**Location:** ___ Playground  ___ Porch  □ Both

<table>
<thead>
<tr>
<th>Start Time</th>
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<th>Total Attendance</th>
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</thead>
<tbody>
<tr>
<td>9:32</td>
<td>10:02</td>
<td>15</td>
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</tbody>
</table>

**Observers:** Dawn  Camille  Kari  cris  

**Games Played:**  
- Dribbling  
- Shoot  
- Baskets  
- Kick to each other  
- Kick into buckets

---

**Skills**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Kick</th>
<th>Skip</th>
<th>Hop</th>
<th>Leap</th>
<th>Dribble</th>
</tr>
</thead>
</table>
|          | -Rapid approach to ball  
- elongated step prior to kick  
- non-kicking foot placed slightly behind the ball  
- kick with instep | -a step forward followed by a hop on the same foot  
- arms moving in opposition  
- Step-hop cycle for at least 4 consecutive skips | -Non-support leg remains bent  
- Non-support leg and arm opposite to it move in pendular fashion to propel the body forward  
- Hop at least 3 consecutive times | -Take off and land on opposite foot  
- Flight phase longer than a run  
- Opposite arm reaches forward | -Maintains control of ball with fingertips  
- Ball stays to the front or outside the preferred side  
- Maintains control for 4 bounces |

| Equipment | Plastic bottles  
Poly Spots | Cones  
Jump Ropes | Cones  
Jump Ropes | Poly Spots  
Hula hoops  
Jump Ropes | Playground balls  
Poly spots |

| Mastery Climate | Vary distances to target | Varying distances | Ball sizes |

| Teaching Phrase | Run up, plant foot, kick with instep | “All a skip is... is a step and hop” | Bend one leg and put foot behind body. Hop on one foot. | Take off on one foot and land on the other foot | Use your fingertips. Keep your eye on the ball. Let the ball bounce up to waist high. |
### Date: 06/29/15  
Location: Playground  

<table>
<thead>
<tr>
<th>Start Time</th>
<th>Stop Time</th>
<th>Total Attendance</th>
<th>Observers</th>
<th>Games Played</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:29</td>
<td>9:59</td>
<td>12</td>
<td>Camila</td>
<td>Gallop 1, 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chris</td>
<td>Strike 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Emily</td>
<td>Throw / Toss</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lag (rolling the ball)</td>
</tr>
</tbody>
</table>

### Skills

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Strike</th>
<th>Roll</th>
<th>Toss</th>
<th>Gallop</th>
</tr>
</thead>
</table>
|          | - Feet parallel to pitcher  
|          | - Dominant hand on top  
|          | - Hip, trunk and shoulder rotation during swing  
|          | - Hits the ball  
|          | - A step forward with opposite foot  
|          | - Bends knees to lower body to ground  
|          | - Arm with ball swings down and back  
|          | - Ball does not bounce more than 4 inches off the ground  
|          | - A contralateral step forward  
|          | - Arm follows through to shoulder height  
|          | - Ball hits wall  
|          | - A step forward with the lead foot followed by the other foot  
|          | - A brief period of time when both feet are off the ground  
|          | - Feet do no touch or cross  
|          | - Maintains gallops for 4 consecutive gallops.  

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Cones</th>
<th>Play balls</th>
<th>Cones</th>
<th>Bean bags</th>
<th>Jump ropes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Noodles</td>
<td>Poly spots</td>
<td>Poly spots</td>
<td>Bean bags</td>
<td>Hula hoops</td>
</tr>
<tr>
<td></td>
<td>Yarn Balls</td>
<td>Poly spots</td>
<td>Poly spots</td>
<td>Poly spots</td>
<td>Noodles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mastery Climate</th>
<th>Stationary or being pitched the ball</th>
<th>Varying distances to goal</th>
<th>Vary distances to goal.</th>
<th>Props or no props</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching phrase</td>
<td>Eye on ball, belly button towards ball, front hand on top, back hand on bottom, twist, and strike ball.</td>
<td>Big step forward, bend knees to lower body, big circle with your arm, roll the ball on the ground.</td>
<td>Point to where you are going, big step forward, make a big circle with your arm</td>
<td>Play chase with your feet but don’t let them touch or cross. Your back foot tries to catch your back foot but your back foot runs away</td>
</tr>
</tbody>
</table>
**Date:** 7/11/15

**Location:** ___ Playground ___ Porch ___Both

<table>
<thead>
<tr>
<th>Start Time</th>
<th>Stop Time</th>
<th>Total Attendance</th>
<th>Observers</th>
<th>Games Played</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:40</td>
<td>10:00</td>
<td>9</td>
<td>Josh</td>
<td>Throw 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Camila</td>
<td>Run 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cristiano</td>
<td>Jump 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Slide 1</td>
</tr>
</tbody>
</table>

**Skills**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Throw</th>
<th>Catch</th>
<th>Run</th>
<th>Jump</th>
<th>Slide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-Windup with downward movement of arm</td>
<td>-Prep phase with hands in front of body with elbows bent</td>
<td>-Arms move in opposition to legs</td>
<td>-Prep phase (arms and knees)</td>
<td>- Body is turned sideways (shoulder align with floor)</td>
</tr>
<tr>
<td></td>
<td>-Rotate hips and shoulder</td>
<td>-Arms extend, reaching forward</td>
<td>-Flight phase</td>
<td>-Arms extend upwards during jump</td>
<td>-A lateral step with lead foot and a slide with trailing foot where both feet come off ground</td>
</tr>
<tr>
<td></td>
<td>-Contralateral step/weight transfer</td>
<td>-Object is caught by hands only</td>
<td>-Narrow foot placement</td>
<td>-Feet take off and land simultaneously</td>
<td>-4 continuous slides to each side</td>
</tr>
<tr>
<td></td>
<td>-Follow through</td>
<td></td>
<td>-Non-support legs bends about 90°</td>
<td>-Arms thrust down during landing</td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>Bean Bags</td>
<td>Yarn Balls</td>
<td>Cones</td>
<td>Poly Spots</td>
<td>Jump Ropes</td>
</tr>
<tr>
<td></td>
<td>Targets</td>
<td>Scarves</td>
<td>Jump Ropes</td>
<td>Hula hoops</td>
<td>Noodles</td>
</tr>
<tr>
<td></td>
<td>Tape/Jump Rope</td>
<td>Bean Bags</td>
<td>Jump Ropes</td>
<td>Jump Ropes</td>
<td></td>
</tr>
<tr>
<td>Mastery Climate</td>
<td>Vary distances to target</td>
<td>Different items to catch (i.e. yarn balls vs scarves)</td>
<td>Varying distances between targets</td>
<td>With props (i.e. hand holding or noodles) and without props</td>
<td></td>
</tr>
<tr>
<td>Teaching phrase</td>
<td>Point to where you’re throwing, big step forward, arms goes down and back, big throw!</td>
<td>Use your fingertips! Bend your elbows, keep eye on ball, catch the ball using just your fingertips</td>
<td>Run on your toes, pump your arms to help you run quickly</td>
<td>Bend knees, swing arms back, take off on both feet, swing arms up to “explode” off ground, land on both feet</td>
<td>“When I slide, I step to the side!”</td>
</tr>
<tr>
<td>Start Time</td>
<td>9:20</td>
<td>Stop Time</td>
<td>9:53</td>
<td>Total Attendance</td>
<td>12</td>
</tr>
<tr>
<td>------------</td>
<td>------</td>
<td>-----------</td>
<td>------</td>
<td>------------------</td>
<td>----</td>
</tr>
</tbody>
</table>
| Observers  | Emily Root  
Camila Rocha  
Ibrahima Sadiq | Games Played | Kicking dribble |

### Skills

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Kick</th>
<th>Skip</th>
<th>Hop</th>
<th>Leap</th>
<th>Dribble</th>
</tr>
</thead>
</table>
|          | -Rapid approach to ball  
elongated step prior to kick  
non-kicking foot placed slightly behind the ball  
kick with instep | -a step forward followed by a hop on the same foot  
arms moving in opposition  
Step-hop cycle for at least 4 consecutive skips | -Non-support leg remains bent  
Non-support leg and arm opposite to it move in pendular fashion to propel the body forward  
Hop at least 3 consecutive times | -Take off and land on opposite foot  
Flight phase longer than a run  
Opposite arm reaches forward | -Maintains control of ball with fingertips  
Ball stays to the front or outside the preferred side  
Maintains control for 4 bounces |
| Equipment | Plastic bottles  
Poly Spots | Cones  
Jump Ropes | Cones  
Jump Ropes | Poly Spots  
Hula hoops  
Jump Ropes | Playground balls  
Poly spots |
| Mastery Climate | Vary distances to target | Varying distances | Ball sizes |
| Teaching phrase | Run up, plant foot, kick with instep | "All a skip is... is a step and hop" | Bend one leg and put foot behind body. Hop on one foot. | Take off on one foot and land on the other foot | Use your fingertips. Keep your eye on the ball. Let the ball bounce up to waist high. |
**Date:** 07/17/15  
**Location:** ___ Playground  ____ Porch  ____ Both

| Start Time | 9:35 | Stop Time | 10:05 | Total Attendance | 12 |

<table>
<thead>
<tr>
<th>Observers</th>
<th>Games Played</th>
<th>Strike 2</th>
<th>Roll to a partner</th>
<th>Toss 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pamela Rocha</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cristiano Rodriguez</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Andrew Brennenman</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ibrahim Sadiq</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Skills

<table>
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<tr>
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<th>Strike</th>
<th>Roll</th>
<th>Toss</th>
<th>Gallop</th>
</tr>
</thead>
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<tr>
<td>- Feet parallel to pitcher</td>
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<td>- A contralateral step forward</td>
<td>- A step forward with the lead foot followed by the other foot</td>
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<td>- Dominant hand on top</td>
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<td>- A brief period of time when both feet are off the ground.</td>
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<td>- Hip, trunk and shoulder rotation during swing</td>
<td>- Arm with ball swings down and back</td>
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<td>- Feet do no touch or cross</td>
<td></td>
</tr>
<tr>
<td>- Hits the ball</td>
<td>- Ball does not bounce more than 4 inches off the ground</td>
<td></td>
<td>- Maintains gallops for 4 consecutive gallops.</td>
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<td>noodles</td>
</tr>
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| Mastery Climate          | Stationary or being pitched the ball                                 | Varying distances to goal                 | Vary distances to goal.                     | Props or no props                          |

| Teaching phrase          | Eye on ball, belly button towards ball, front hand on top, back hand on bottom, twist, and strike ball. | Big step forward, bend knees to lower body, big circle with your arm, roll the ball on the ground. | Point to where you are going, big step forward, make a big circle with your arm | Play chase with your feet but don't let them touch or cross. Your back foot tries to catch your back foot but your back foot runs away |
On August 25, 2015 I presented my work in progress in the UT Discovery Day, an opportunity for undergraduate students to showcase their research from the spring and summer months.

**Purpose:** To implement an intervention designed to instruct young children on fundamental motor skills through age-appropriate activities and games in order to improve their mastery of several key fundamental motor skills. An additional purpose of the intervention was to examine the impact of this program on motor skill development, physical activity level, cognitive function, and perceived motor competence. **Methods:** Participants were pre-school children enrolled in a Head Start program. Each participant completed a number of assessments including the Test of Gross Motor Development (TGMD-2) to measure fundamental motor skill development, accelerometers to objectively measure their physical activity levels, the Corsi test to measure cognitive function, and the Pictorial Scale of Perceived Competence and Acceptance to measure perceived motor competence. The Fit Kidz Intervention was an 8-week program designed to improve the participants’ motor skills through age-appropriate games facilitated twice a week for 30 minutes per session. After the 8 weeks, the same tests were performed again on each participant to examine the effect the intervention had. Data analyses are currently in progress.
The Impact of a Child-centered, Mastery Movement Program on Physical Activity Levels, Motor Skill Development and Cognitive Function in Young Children.

J. Anderson and D.P. Coe
Department of Kinesiology, Recreation, & Sport Studies. The University of Tennessee, Knoxville TN

Abstract

**Purpose**
To implement an intervention designed to instruct young children on fundamental motor skills through age-appropriate activities and games in order to improve their mastery of seven key fundamental motor skills. An additional purpose of the intervention was to examine the impact of this program on motor skill development, physical activity level, cognitive function and perceived motor competence.

**Methods**
Participants were pre-school children enrolled in the Head Start preschool program. Each participant completed a number of assessments including the Test of Gross Motor Development (TGMD-2) to measure fundamental motor skill development, physical activity level, cognitive function, and perceived motor competence.

Sample
Approximately 100 children ages 3-5 years old enrolled in the Knoxville Head Start Preschool program.

Procedures
Each participant completes the following assessments before the intervention:
1. Anthropometric Assessment: Height and weight are measured using a stadiometer and a digital scale.
2. PMC Assessment: Participants complete the Pictorial Scale of Perceived Competence and Acceptance. This self-report uses 2 side-by-side pictures and the child will select the picture that is most like him/her in terms of their physical ability.
3. Motor Skill Assessment: Participants are assessed using the Test of Gross Motor Development – 2nd edition, a quantitative assessment of fundamental motor skill competence in children 3-10.11 years of age. The TGMD2 assesses both locomotor and object-control skills, and the assessments will be recorded for analysis.
4. Physical Activity Assessment: Physical activity level is measured using the Actigraph GT3X+ accelerometer, which will be worn for three consecutive days while at the Head Start. Teachers and student research assistants will ensure proper placement each morning.
5. Cognitive Function Assessment: Participants’ working memory will be assessed using an iPad version of the Corsi Block tapping test on the app Pathspan. Participants will watch a sequence of dots light up and must tap them in the same order.

The Treatment group then participates in the Fit Kidz Intervention, an eight-week program designed to improve the participants’ mastery of several key fundamental motor skills. The program is conducted twice a week for 30 minutes per session during the participants’ already scheduled outdoor playground time.

After completion of the Fit Kidz Intervention, all participants from the Control and Treatment groups are reassessed using the same five assessments as before.

Background
- Physical activity can have tremendous physical and mental benefits, and while these relationships have been thoroughly studied in adult populations, the research regarding children is not as substantial.
- As children progress through early childhood, they slowly develop gross motor skills in their larger muscles, allowing them to do things such as jump, run, or throw. With more developed gross motor skills also comes more complex movement skills and increased physical activity level.
- In 2008, the North American Association for the Study of Obesity published an article linking childhood motor skill development to their overall physical activity level, stating that more developed skills allowed for more movement and activity (Williams et al.).
- In addition to physical benefits, other studies have shown positive mental effects of physical activity in children. One such study found that aerobic exercise improved children’s cognitive creativity and flexibility more than traditional physical education (Tuckman & Hinkle), while another identified these cognitive functions and others as predictors of academic performance (Gathercole et al.).
- For reasons both practical and educational, pediatric exercise science is certainly an area of research on which to focus.

Purpose
The purpose of the proposed study is to implement an intervention designed to instruct young children on fundamental motor skills through age-appropriate activities and games in order to improve their mastery of several key fundamental motor skills, and then to examine the impact of this program on motor skill development, physical activity level, cognitive function, and perceived motor competence.

Hypotheses:
1. The treatment group will participate in more physical activity (moderate to vigorous physical activity) than the control during the students’ planned movement period throughout the intervention.
2. The treatment group will exhibit significantly better motor skills (object control and locomotor skills) than the control group at the end of the intervention.
3. The treatment group will demonstrate higher levels of cognitive function compared with the control group.

Statistical Analyses
- Descriptive univariate statistics will be conducted.
- Inferential statistics will examine the effects of the movement programs (Treatment and Control groups) on motor skill competence, physical activity participation, and cognitive measures.
- A2-Group (treatment; control) x 2 Time (pre;post-) ANOVA with repeated measures will examine the interactions.
- If significant, post-hoc analysis: a) Tukey analysis (for group) and b) Paired sample t-tests for within each group (pre;post-) will be conducted.

References

![Figure 1](image1.png) – The GT3X+ accelerometer  
![Figure 2](image2.png) – The Test of Gross Motor Development – 2nd edition (TGMD2)  
![Figure 3](image3.png) – The Pictorial Scale of Perceived Competence and Acceptance  
![Figure 4](image4.png) – The Corsi Block tapping test on the iPad app Pathspan
Purpose: To determine the association between physical activity and cognition in preschool children. Methods: Participants were 18 young children (3–5 years old) enrolled in a Head Start preschool program. Physical activity was assessed using an Actigraph accelerometer placed on the child’s hip. The device was worn at school for at least three hours on three separate days during the week. Accelerometer data were categorized as sedentary or active (light, moderate, and vigorous intensity). Cognitive function, specifically working memory, was assessed using the Corsi Block-Tapping Test. The number of buttons in the sequence that were correctly pressed (taps correct) was used to determine working memory. Data were analyzed using Pearson correlations. Results: Children spent on average 87.4% of their monitored time in sedentary behaviors and 12.6% of the time physically active. The average number of taps correct was 10.1±9.8 during the Corsi test. There was a significant correlation between the amount of physical activity the children engaged in and the number of taps correct (r=0.51; p>0.05). Conclusion: This association suggests that increased physical activity levels at school could lead to improved cognition and performance in the school setting.
The Impact of a Child-Centered, Mastery Movement Program on Physical Activity Levels, Motor Skill Development and Cognitive Function in Young Children.

J. Anderson and D.P. Coe

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Background

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• In 2008, the North American Association for the Study of Obesity published an article linking childhood motor development to their overall physical activity level, stating that more developed skills allowed for more movement and activity (Williams et al.).
• In addition to physical benefits, other studies have shown positive mental effects of physical activity in children. One such study found that aerobic exercise improved children’s cognitive creativity and flexibility more than traditional physical education (Tuckman & Hinke), while another identified these cognitive functions and others as predictors of academic performance (Gathercole et al.).

Purpose

The purpose of the proposed study is to determine the associations among motor skill development, physical activity level, cognitive function, and perceived motor competence in preschool children.

Methods

Sample

Participants were 18 children ages 3-5 years old enrolled in the Knoxville Head Start Preschool program.

Procedures

Each participant completed the following assessments before the intervention:

1. Anthropometric Assessment: Height and weight were measured using a stadiometer and a digital scale.
2. Physical Activity Assessment: Physical activity level was measured using the Actigraph GT3X+ accelerometer (Figure 1), which was worn for three consecutive days while at the Head Start (from 9:30am to 12:30pm). Teachers and student research assistants ensured proper placement each morning.
3. Motor Skill Assessment: Participants were assessed using the Test of Gross Motor Development – 2nd edition, a quantitative assessment of fundamental motor-skill competence in children 3-10 years of age (Figure 2). The TGMD2 assesses both locomotor and object-control skills, and the assessments were recorded for analysis.
4. PMC Assessment: Participants completed the Pictorial Scale of Perceived Competence and Acceptance (Figure 3). This self-report uses 2 side-by-side pictures and the child selects the picture that is most like him/her in terms of their physical ability.
5. Cognitive Function Assessment: Participants’ working memory was assessed using an iPad version of the Corsi Block tapping test on the app Pathspan (Figure 4). Participants watched a sequence of dots light up and was asked to tap them in the same order.

Results

• Children spent on average 87.4% of their monitored time in sedentary behaviors and 12.6% of the time physically active.
• The average number of taps correct was 10.1 ± 9.8 during the Corsi test.
• There was a significant correlation between the amount of physical activity the children engaged in and the number of taps correct (r=0.51; p<0.05).
• No significant correlations were found among physical activity, perceived motor competence, and motor skill development.

Conclusion

• Children engaged in very little total physical activity during the school day.
• There was little variation in perceived motor competence scores, which may have led to a lack of an association between physical activity, perceived motor competence, and motor skill development.
• Prior research has shown that higher levels of vigorous physical activity contributes to increased motor skill development. In the current study, the children spent approximately 2% of their time in vigorous physical activity.
• Therefore, there may be a threshold of physical activity intensity to elicit an improvement in motor skill development.
• This association suggests that increased physical activity levels at school could lead to improved cognition and performance in the school setting.
Reflection

First off I would like to acknowledge and thank my project advisor Dr. Coe. I know that as an undergraduate I don’t have near the amount of experience in major research projects as graduate students do, but she was kind and patient enough to overcome this by teaching me and mentoring me every step of the way. Without her help I would not have been able to conduct such a fun, enlightening, challenging study. I would also like to thank Camila and Cristiano, two of my fellow undergraduates, who helped me collect data and facilitate games during the intervention. “Obrigado, amigos. Nós estamos con saudade de vocês!”

This project has benefitted me in so many ways and challenged me in many others. Being able to work with kids has always been something I’ve enjoyed, so designing and conducting a study with preschool children was very motivating for me. On top of that, the intervention portion of the study capitalized on my skills as a youth swim team coach and trainer. I designed the games we used in the 8-week intervention myself, pulling ideas and exercises from the out-of-water workouts I give my swimmers. This study also pushed my creativity, leadership, and time management skills. Some days it seemed as if the kids in the study had left their attention spans at home, so I had to constantly keep them interested with new twists or rules for the games we were playing. My leadership certainly grew from having to coordinate schedules with other undergraduate students and the Head Start program, and time management became a priority and well-cultivated skill after watching and scoring each kid’s TGMD videos.

Although we weren’t able to perform the analyses we’d originally planned, our findings did confirm several things that previous studies have indicated: physical activity is beneficial to children’s cognitive functioning! As a future physician, and potentially a future pediatrician, this is the type of information I want to teach my patients and their families. Exercise is beneficial to so much more than muscles, no matter one’s age, and getting kids to exercise and in the habit of being physically active from a young age will only help them stay active as they grow and develop into adulthood. I would love to conduct similar studies in the future, either in medical school or as a practicing physician, to investigate how exercise and physical activity levels affect the development of endocrine disorders, specifically the age of onset for Type I diabetes.
-IRB Approval and Parental Permission-

The following documents are the original IRB approval letter and the permission form signed by parents of participants in the study.
October 16, 2014

Dawn Podulka Coe,
UTK - Exer Spt & Leis Studies
338 Health, Physical Education, and Recreation Building
1914 Andy Holt Avenue
Knoxville, TN 37996-2700

Re: UTK IRB-14-09612 B

Study Title: The impact of a child-centered, mastery movement program on physical activity levels, motor skill development and cognitive function in young children

Dear Dr. Coe:

The Administrative Section of the UTK Institutional Review Board (IRB) reviewed your application for the above referenced project. It determined that your application is eligible for expedited review under 45 CFR 46.110(b)(1), category/ies (5) and (7). The use of children as subjects is approved under 45 CFR 46.404, in that it involves no more than minimal risk. The IRB has reviewed these materials and determined that they do comply with proper consideration for the rights and welfare of human subjects and the regulatory requirements for the protection of human subjects. Therefore, this letter constitutes full approval by the IRB of your application as submitted. Approval of this study will be valid from October 16, 2014 to October 15, 2015.

In the event that subjects are to be recruited using solicitation materials, such as brochures, posters, web-based advertisements, etc., these materials must receive prior approval of the IRB. Any revisions in the approved application must also be submitted to and approved by the IRB prior to implementation. In addition, you are responsible for reporting any unanticipated serious adverse events or other problems involving risks to subjects or others in the manner required by the local IRB policy.

Finally, re-approval of your project is required by the IRB in accord with the conditions specified above. You may not continue the research study beyond the time or other limits specified unless you obtain prior written approval of the IRB.

Sincerely,

Colleen P. Gilrane, Ph.D.
IRB Chair

Colleen P. Gilrane, Ph.D.
IRB Chair
Permission for Child to Take Part in a Research Study

**Title:** The impact of a child-centered, mastery movement program on physical activity levels, motor skill development and cognitive function in young children.

**Principal Investigator:** Dawn P. Coe, Ph.D.

Your permission is required for your child to take part in a research study. This consent form explains the purpose and requirements of the study. Please read this form carefully. You will be given a chance to ask questions. If you decide to permit your child to be in the study, you will be given a copy of this form.

If you do not permit your child to take part in the study, it will not affect your child’s rights to care or services. If you do permit your child to take part, you are also free to remove your child from this study at any time without penalty.

**Why is this study being done?**
We are conducting this study in order to determine the impact of a developmentally appropriate movement and physical activity program during outdoor play time on cognitive function, motor skill performance, and physical activity levels. The study activities will take place on the current Head Start playground.

**How long will the study last?**
Your child’s participation will last approximately nine months.

**How many people will be in the study?**
About 100 children enrolled in the preschool classrooms at the Northridge Crossing Head Start will be participating in this study.

**What will my child do during the study?**
All measurements were be completed prior to and after the physical activity program. During the study, your child’s height and weight will be assessed and s/he will be fitted with a physical activity monitor. The physical activity monitor is a small box, the size of a small pager that is worn on a belt around the waist for seven days before and after the physical activity program. During outside play Dr. Coe will observe and record your child’s play patterns. You child will also have the following measures completed. Motor skill development will be assessed using tests of gross and fine motor skills. Your child will be videotaped during outside play and motor skill development portions of the study. Your child’s perceived motor competence will also be assessed using a picture scale. Your child will also complete two cognitive assessments. You will also be asked to provide your child’s home address in order for the researchers to determine the proximity of food and physical activity resources to your child.

**What are the risks to my child as a participant in the study?**
Risks associated with this study are minimal. Risks include falling down, which may result in a scrape or bruise while playing on the playground. These risks are similar to what your child

_________ (parent initial)
would experience during a typical school day. Additionally, your child may experience mild skin irritation from the belt that contains the activity monitor rubbing on the skin. If that happens, the teacher will adjust the belt or, if necessary, remove it.

**Are there benefits to my child for taking part in the study?**
Your child will benefit from receiving a high quality movement and/or physical activity program designed to enhance health and physical fitness. Although, the highest quality instruction will be provided, there is no guarantee that your child will receive any or all benefits. There are no direct benefits to your child from this study.

**What happens if my child gets hurt?**
In the event that your child becomes injured as a result of participating in this study, immediate treatment will be available (First Aid and/or CPR). However, you must assume responsibility for all medically necessary treatment. It is important that you tell the researcher, Dawn Coe, Ph.D. if you feel that your child has been injured in this study. You can tell the researcher in person or call her at 865-974-0294.

**Who do I call if I have questions about the study?**
Questions about the study should be directed to Dawn Coe, Ph.D: 865-974-0294 (Phone #), dcoe@utk.edu (E-mail) and if needed, a meeting can be set up. Questions about your child’s rights as a research participant should be directed to the University of Tennessee, Knoxville, Office of Research Compliance Officer at 865-974-7697.

**Will anyone know my child is in the study and how is my child’s identity being protected?**
A record of your child’s participation in the study will be kept private and all data will be kept in a confidential file in a locked cabinet in a locked University of Tennessee faculty office for 3 years following completion of the study. After that, your child’s data will be destroyed. Only the co-investigators will have access to your child’s data. If you agree to allow the co-investigators to access previous assessment scores for your child, the data that will not contain identifiable information and will be placed in a folder containing a randomized identification number. Study results may be prepared for presentation at professional meetings and for publication in journals. However, none of your child’s personal information will be revealed. Therefore, your child’s identity will be protected.

**What if my child does not want to be in the study?**
If your child does not wish to participate or becomes upset on one of the testing days, we will attempt to console and comfort your child and allow your child to return to the classroom. We will try to collect data on an additional day. If your child does not wish to participate or becomes upset again on the additional day, your child will be removed from the study. If your child decides that s/he no longer wants to participate in the study, we will return your child to the classroom and will remove your child from the study.

_________ (parent initial)
PERMISSION OF PARENT OR GUARDIAN:
I have read or have had read to me the description of the research study. The investigator or her representative has explained the study to me and has answered all of the questions I have at this time. I have been told of the potential risks, discomforts and side effects as well as the possible benefits (if any) of the study. I freely permit my child to take part in this study.

______________________________________
Child’s Printed Name

Printed Name of Parent/Guardian  Signature of Parent/Guardian  Date

Printed name of Investigator  Signature of Investigator  Date

Home Address:

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________________________________________________________________________

IRB NUMBER: UTK IRB-14-09612-XP
IRB APPROVAL DATE: 10/15/2015
IRB EXPIRATION DATE: 10/14/2016