

Building AMI's Research Capacity: The Montessori Global Outcomes Project

Steven J. Hughes PhD, ABPdN
Chair, Global Research Group

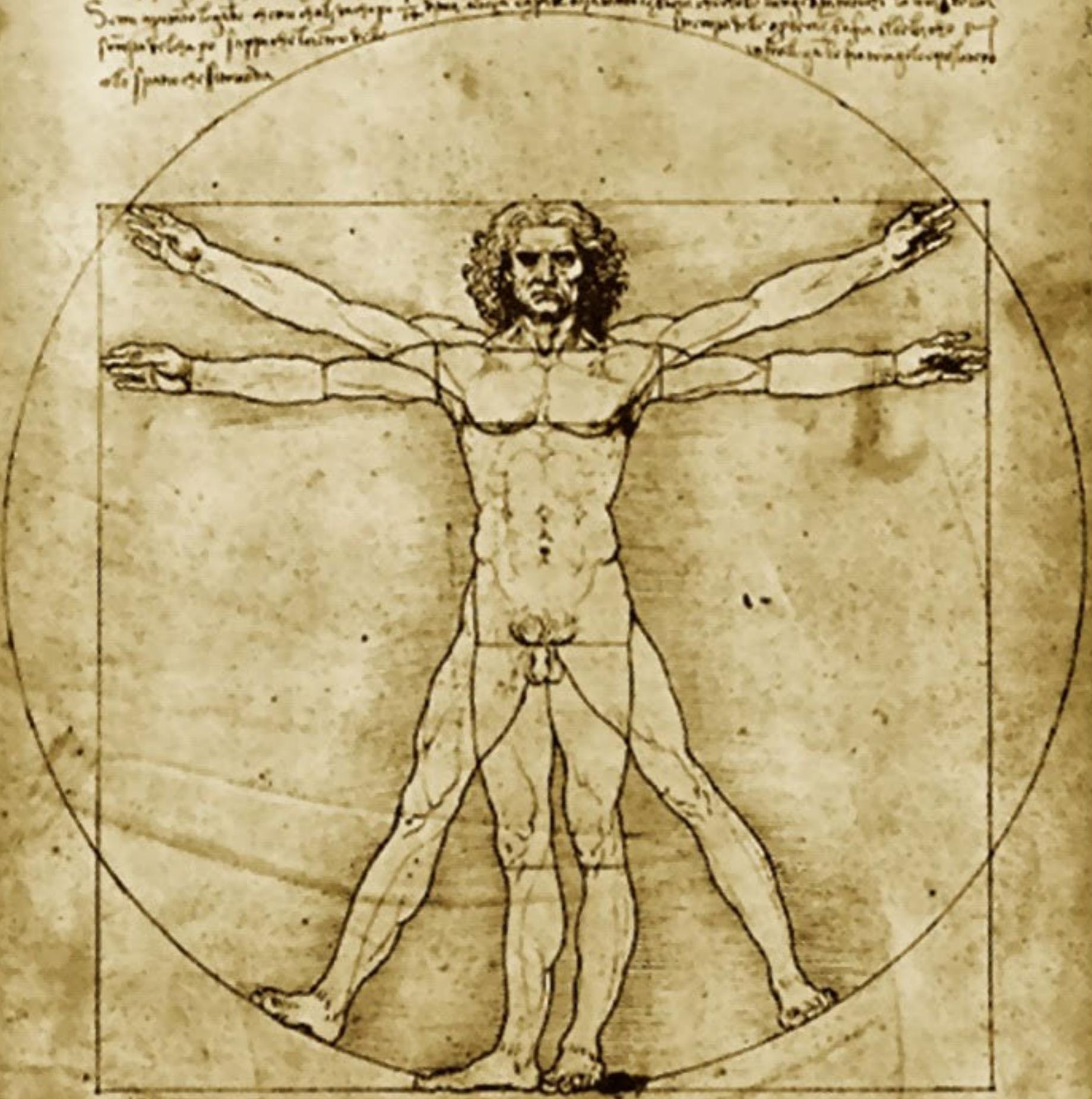








Si un uomo è legato a una croce...
...e un altro è legato a una croce...
...e un altro è legato a una croce...



...e un altro è legato a una croce...
...e un altro è legato a una croce...
...e un altro è legato a una croce...

Leonardo Da Vinci



- Constructs a sensory-motor model of the world
- Processes sensory input
- Matches sensorial patterns
- Remembers sequences
- Make predictions about the future
- Detects anomalies

Look around, figure out what needs to be done, and do it.

Perceive the environment
Evaluate sensorial information
Anticipate outcomes
Select an appropriate behavior
Take action

Perceive the environment

~~Evaluate consocial information~~

~~Anticipate outcomes~~

~~Select an appropriate behavior~~

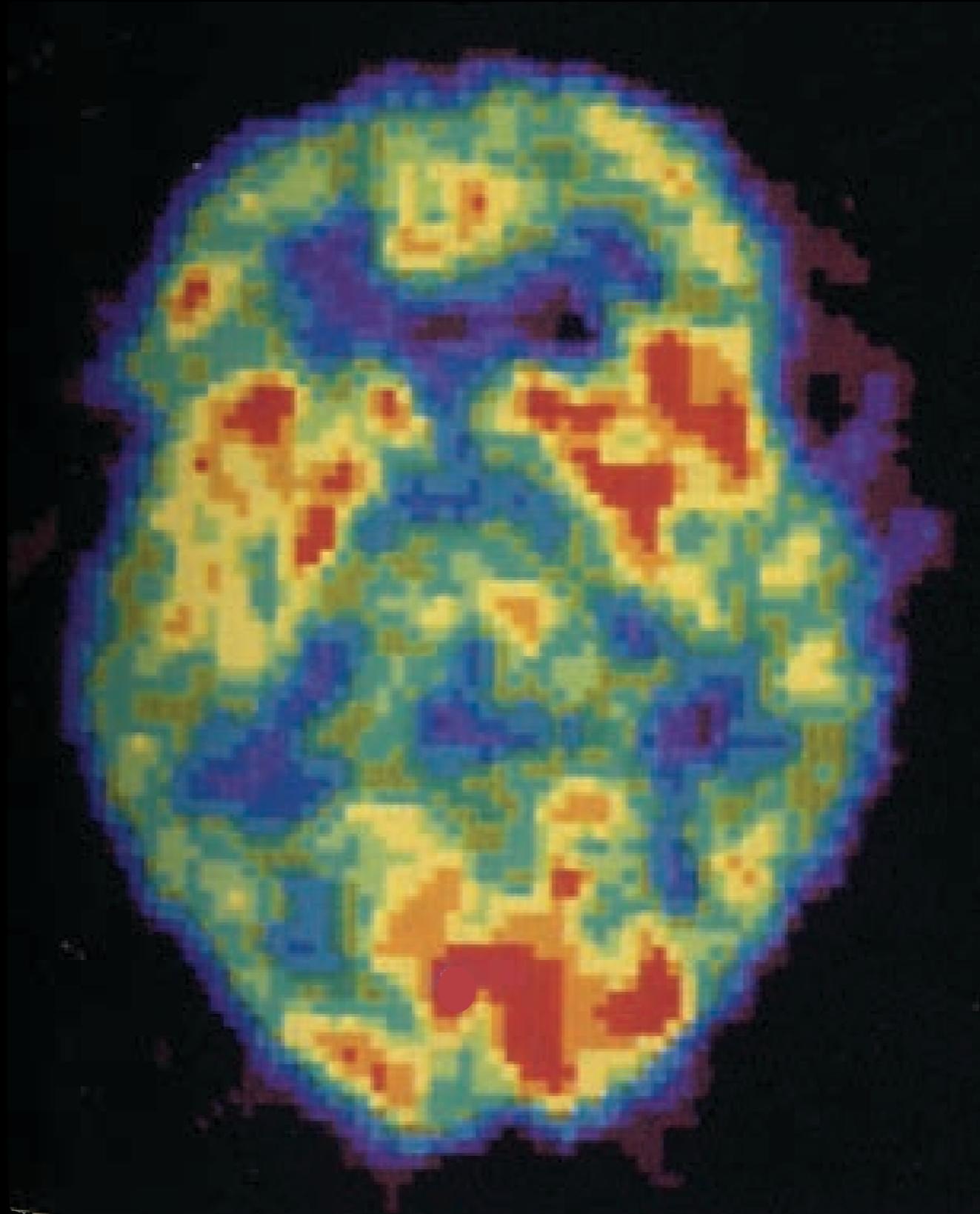
Take action

Do it without having to think about
how to do it.

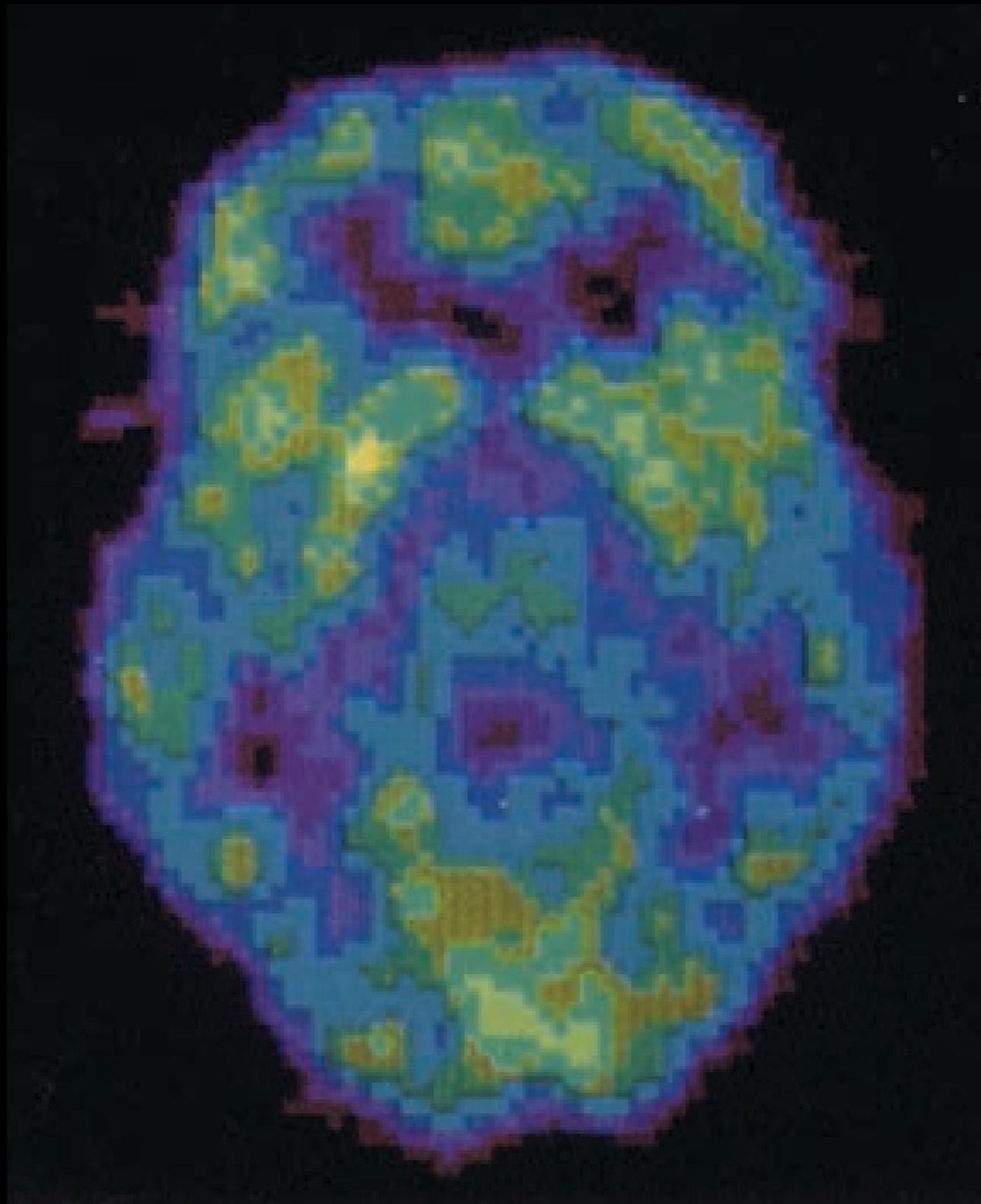
Efficiency

Automaticity





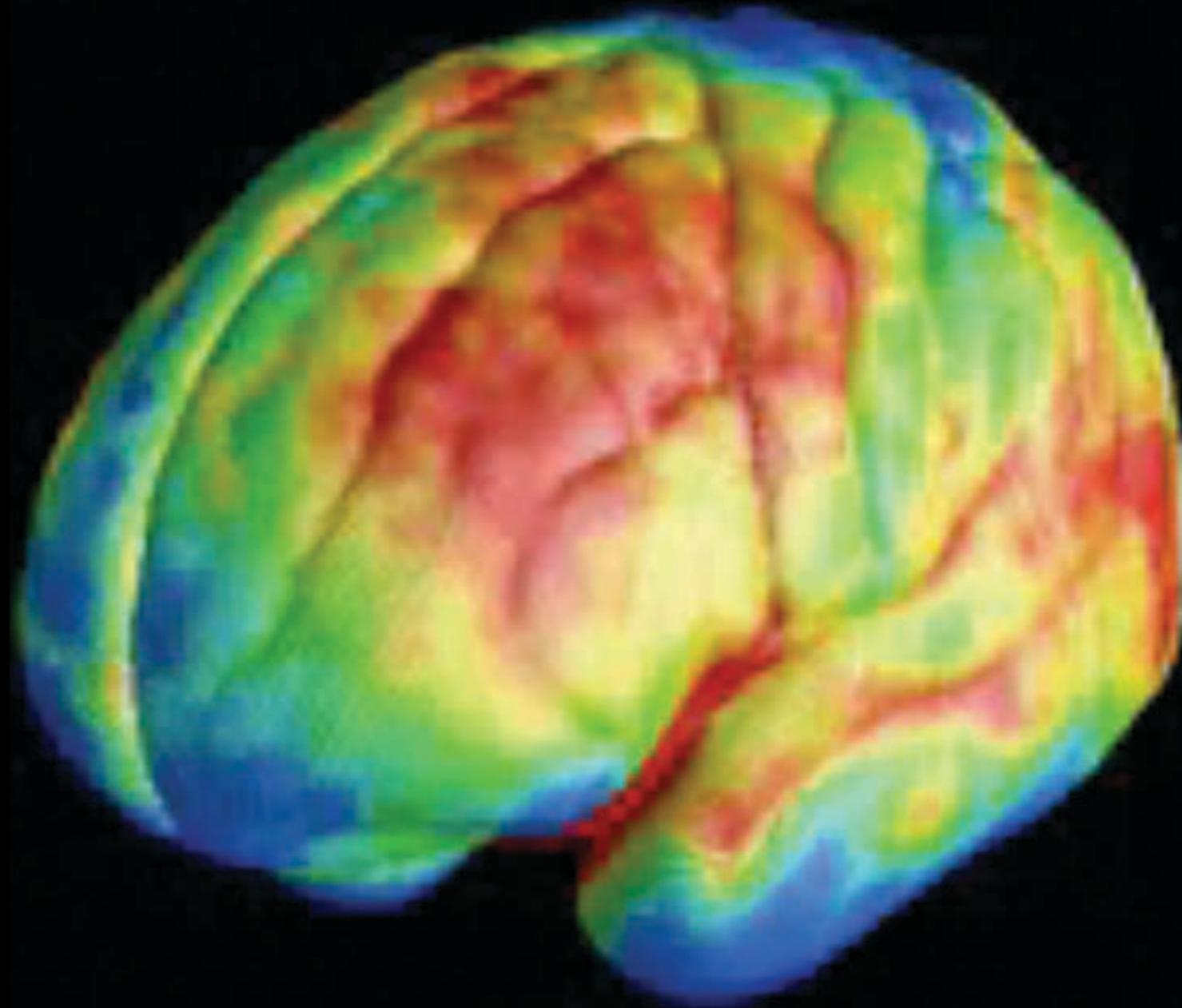
Haier, R.J., Siegel, B.V., MacLachlan, A., Soderling, E., Lottenberg, S., Buchsbaum, M.S. (1991). Regional glucose metabolic changes after learning a complex visuospatial/motor task: a positron emission tomographic study. *Brain Research*, 570, P 134-143.



Haier, R.J., Siegel, B.V., MacLachlan, A., Soderling, E., Lottenberg, S., Buchsbaum, M.S. (1991). Regional glucose metabolic changes after learning a complex visuospatial/motor task: a positron emission tomographic study. *Brain Research*, 570, P 134-143.

How to Win at Tetris

1. Learn all the shapes
2. Figure out how to move the shapes
3. Learn the patterns: “*What to do when...*”
4. Figure out how to match the shapes (**stimuli**) with the best movements (**behaviors**)
5. Master all the best **stimulus – behavior** patterns
6. Go to the pub and win bets



Gotey et a., (2007). Dynamic mapping of human cortical development during childhood through early adulthood. PNAS May 25, 2004 vol. 101 no. 21 8174-8179.







"Deliberate practice"

Repeated...

Trial and error...

experimental
interactions with the
environment.

How to Win at Tetris

1. Learn all the shapes
2. Figure out how to move the shapes
3. Learn the patterns: “*What to do when...*”
4. Figure out how to match the shapes (**stimuli**) with the best movements (**behaviors**)
5. Master all the best **stimulus – behavior** patterns
6. Go to the pub and win bets

How to Win at LIFE

1. Learn the relevant stimuli (situations) in the environment
2. Figure out how to do things (behaviors)
3. Learn the patterns: “What to do when...”
4. Figure out how to match situations with the best behaviors
5. Master all the best situation – behavior patterns
6. Prosper

Automaticity





Vision Statement

The vision of Association Montessori Internationale (AMI) is to support the natural development of human beings from birth to maturity, enabling them to become the transforming agents in society leading to a more harmonious and peaceful world.

Mission Statement

AMI will use its internationally recognised authoritative voice regarding the unique nature of childhood and natural human development to advocate for the rights of children and adults to have access to nurturing, developmentally appropriate, educational environments. AMI will do this by preserving the legacy of Maria Montessori's vision whilst continuing to innovate and increase the impact and reach of Montessori principles and practice. We will continue to uphold AMI quality standards whilst reaching out to collaborate and partner with individuals, communities and organisations who share our vision.

About AMI

[Our Mission](#)

[What We Do](#)

[AM's Capacity](#)

[Global Outreach](#)

[Publications](#)

[AMI Board](#)

[Affiliated Societies](#)

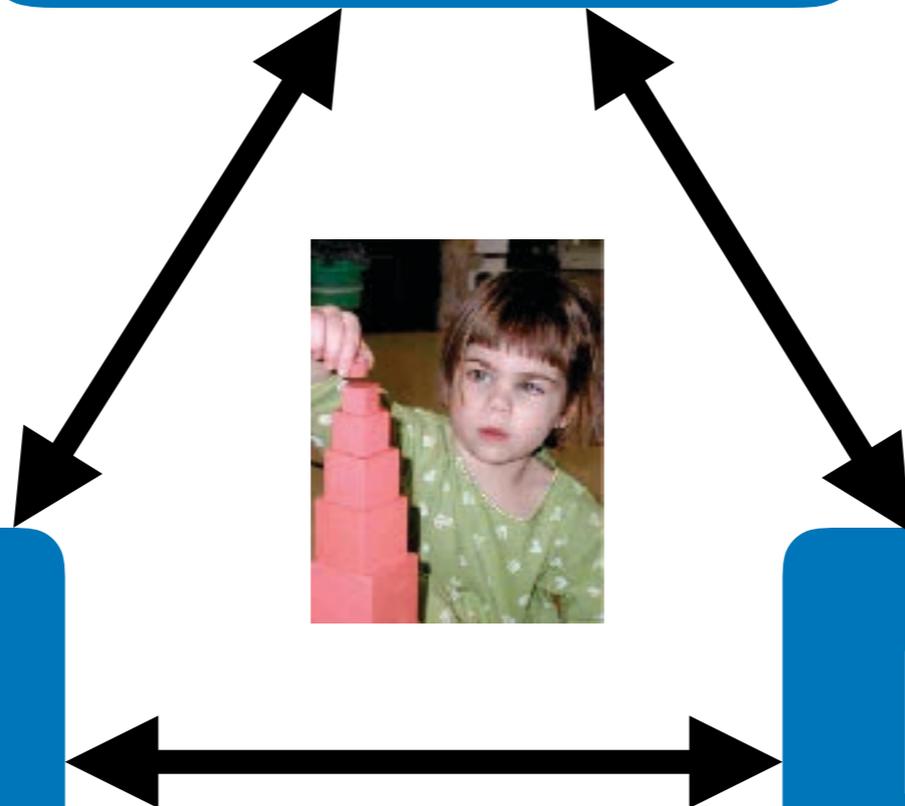
AMI's Mission

AMI will use its internationally recognised **authoritative voice** regarding the unique nature of childhood and natural human development to advocate for the rights of children and adults to have access to **nurturing, developmentally appropriate, educational environments**. AMI will do this by preserving the **legacy** of Maria Montessori's vision whilst continuing to **innovate and increase the impact and reach of Montessori principles and practice**. We will continue to uphold AMI quality **standards** whilst reaching out to **collaborate** and partner with individuals, communities and organisations who share our vision.

Research

Policy

Practice



Research

What role does internal research play in AMI's mission?

What is the right kind of research for AMI to conduct?

How can we support others in conducting high quality research on Montessori education?

Research goals

Improve the quality of teacher practice and training

Build bridges by linking Montessori to similar concepts

Document the value of Montessori education

Promote wider understanding of Montessori pedagogy

Promote excellence in Montessori training and practice

Levels of evidence

Assertion

Anecdote

Compiled Anecdotes

Summary Statistics

Randomized Controlled Trial ✓

Replicated Randomized Controlled Trial ✓

Hostile Randomized Controlled Trial

**“Closing the Gap:
Montessori Outcomes
Across Language, Region,
Culture, and Need”**

The Montessori Global Outcomes Project

	High Need	Typical Need	Low Need
Style of Practice	?	?	?
Style of Practice	?	?	?
Style of Practice	?	?	?

*“If you do Montessori **at least this well**, you consistently, reliably, predictably get these kind of results, regardless of the child’s family background or social conditions.*

We have a large catalog of programs that do this.

*We see it across culture, language, region, and economic status. **It is a predictable, reliable result that we see over, and over, and over.**”*

Implementation

- Global / Regional
- Doable / Useful
- Attract attention and interest of wider research community collaborators
- Worthwhile and attractive for organizations to participate
- Relatively easy and cheap to implement (time, staff material costs)

Regional Research Centers

- Grassroots, global, parallel, networked organization of organizations
- Organize a consortium of schools in a catchment area
- Provide some organizational support, host meetings and trainings
- Partner with local university for collaborative research
- Augment international protocol as possible with local/regional tools
- At minimum: Implement our Standard Protocol



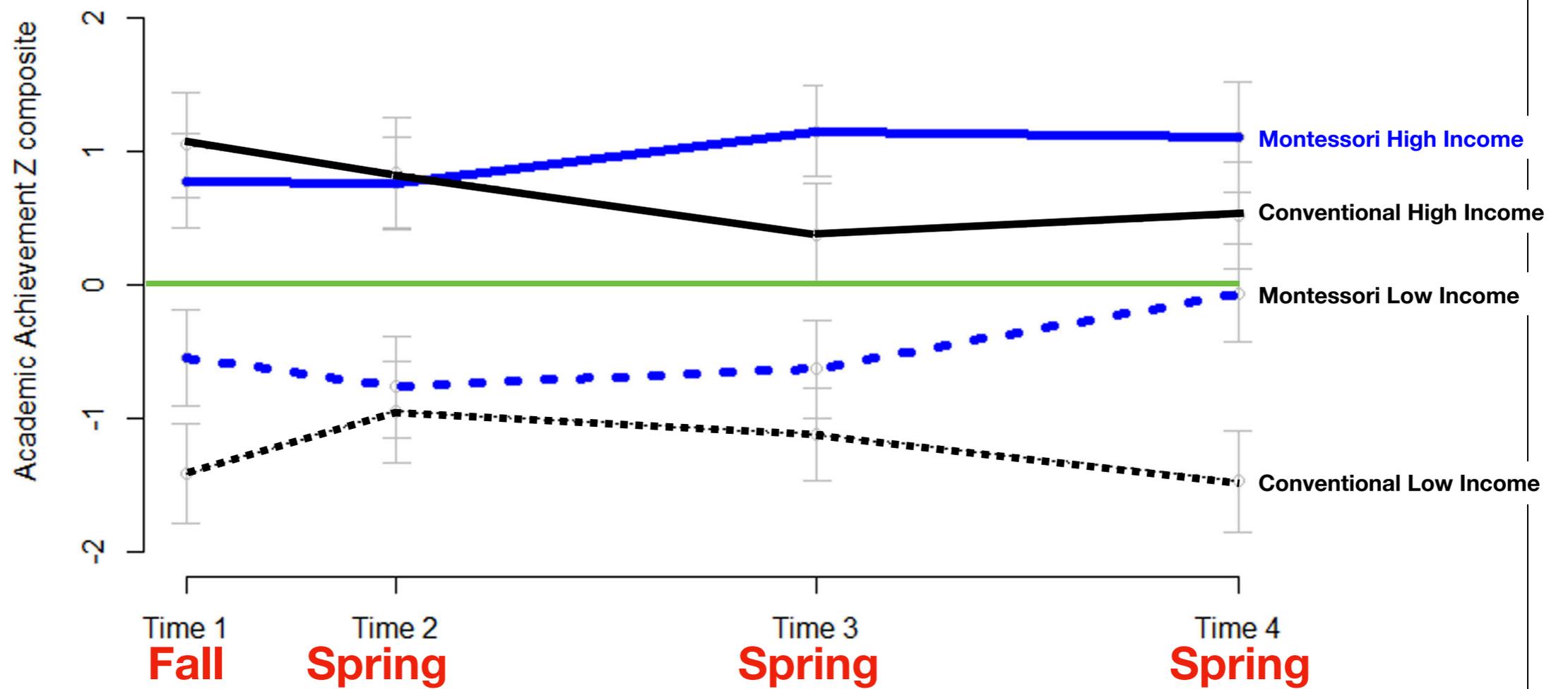


FIGURE 5 | Academic achievement across four time points by school condition and income group. Although equal to the lower income control children at Time 1, by Time 4 the lower income children in Montessori showed a strong positive trajectory towards closing the achievement gap with the higher income children in control and Montessori schools. Standard error bars are shown.

Fall

DERS

MEFS

Teacher Style
questionnaire

Receiving
Teacher
Survey

Graduate
Parent
Survey

Winter

DERS

Spring

DERS

MEFS

Teacher Style
questionnaire

Evaluating an Assessment Tool for Montessori Fidelity: Preliminary Findings II

Angela Murray, PhD and Carolyn Daoust, PhD



Introduction

Despite an increase in Montessori research in recent years, rigorous evidence of the method's effectiveness is still extremely limited. Robust research is needed to establish a strong evidence base for the method. A high quality, efficient fidelity instrument would potentially improve the quality of future Montessori research.

Background

To draw conclusions Montessori researchers must establish the authenticity of the environments they study. Doing so is essential given research showing higher fidelity programs are associated with better student outcomes¹.

Montessori fidelity in research typically is established using in-person observations^{2,3}. For most projects, a less labor-intensive method would be valuable. While Montessori organizations agree on the essential elements for successful programs^{3,4}, no widely accepted instrument exists for assessing these elements. This questionnaire represents the first step in creating such an instrument.

The purpose of this study was to examine the suitability and validity of items included in an instrument assessing Montessori early childhood and elementary teachers' classroom practices.

Research Questions

1. How consistent are teachers' reported practices with those deemed both *critical* as well as *detrimental* by Montessori experts to high fidelity implementation?
2. Is there expert consensus on most practices? If not, how consistent are teacher's practices with items lacking expert consensus?

Methods

Participants

	Early Childhood	Elementary
Expert Panelists	N = 10	N = 13
Montessori Teachers	N = 134	N = 117
AMS Credentialed	67%	73%
AMI Credentialed	14%	10%
MA or above	45%	93%
Public School	26%	53%

Procedure

Montessori expert panelist electronically sorted survey items into 5 categories: **Critical, Very important, Nice to have, Not important/possibly detrimental, Detrimental.**

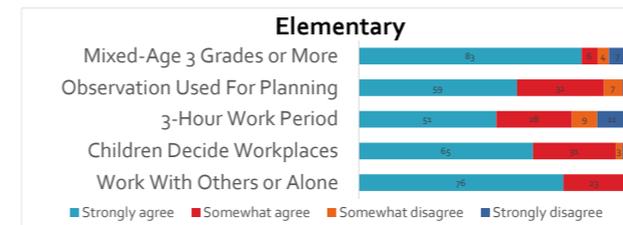
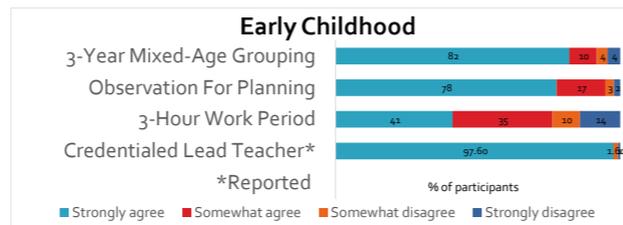
Survey participants completed the Teacher Questionnaire of Classroom Practices (TQ), and their responses were ranked according to perceived importance. Teacher responses were then compared to those of Montessori expert panelists.

Instrument

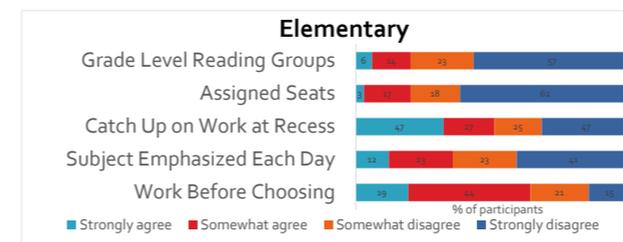
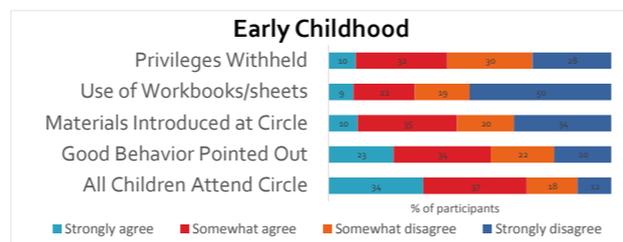
1. **Survey Questions:** Based on Montessori/Montessori expert writings and prior Montessori research
2. Feedback from experienced psychometricians
3. **Items:** 39 EC, 48 EL rated on a 4-pt Likert scale
4. Administered through Qualtrics survey platform; 15-20 minutes to complete

Results

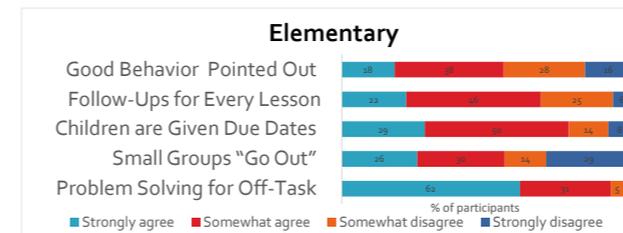
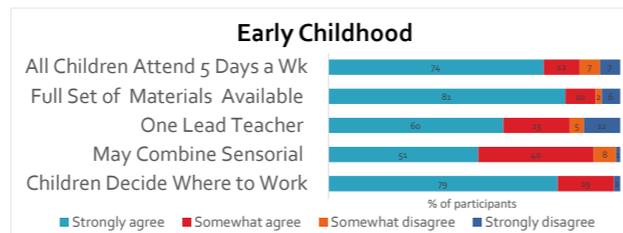
Practices Experts Deem *Critical* to High Fidelity Montessori And Teachers' Reported Practices



Practices Experts Deem *Detrimental* to High Fidelity Montessori And Teachers' Reported Practices



Practices with a Lack of Expert Consensus* and Teachers' Reported Practices



* Practices experts classified into 4 categories

Note: The early childhood item "28-35 children in each classroom" lacked expert consensus across all 5 levels (ranging from *critical* to *detrimental*), and was not included as an agreement question in the survey. Instead, teachers were asked for their class size. The average class size was 22 children ($sd=5.020$), with 88% indicating there were less than 28 children typically in their classrooms.

Discussion

Teachers participating in this pilot study reported a range of agreement on questions about their classroom practices deemed both critical and detrimental to high fidelity Montessori by the panel of experts selected for this project. Of the critical practices, the 3-hour work period was least consistent for both age groups. Of the practices considered detrimental, all EC children attending circle time and elementary children completing required work before choosing their own showed least consistency.

In the areas where experts lacked consensus, teacher practices were fairly consistent at the early childhood level. At the elementary level, however, teachers were also inconsistent in their practices except in the area of implementing problem solving strategies to address off-task behavior.

Lack of expert consensus on the number of children per classroom and the small percentage of teachers (12%) who reported meeting this goal suggests that there are either obstacles to implementation or disagreement on the benefits of this practice.

Future Directions

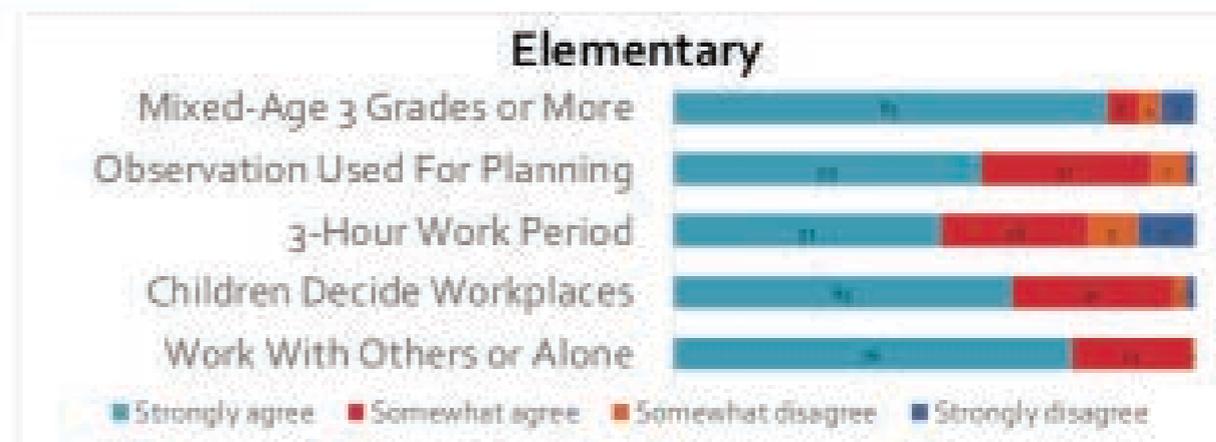
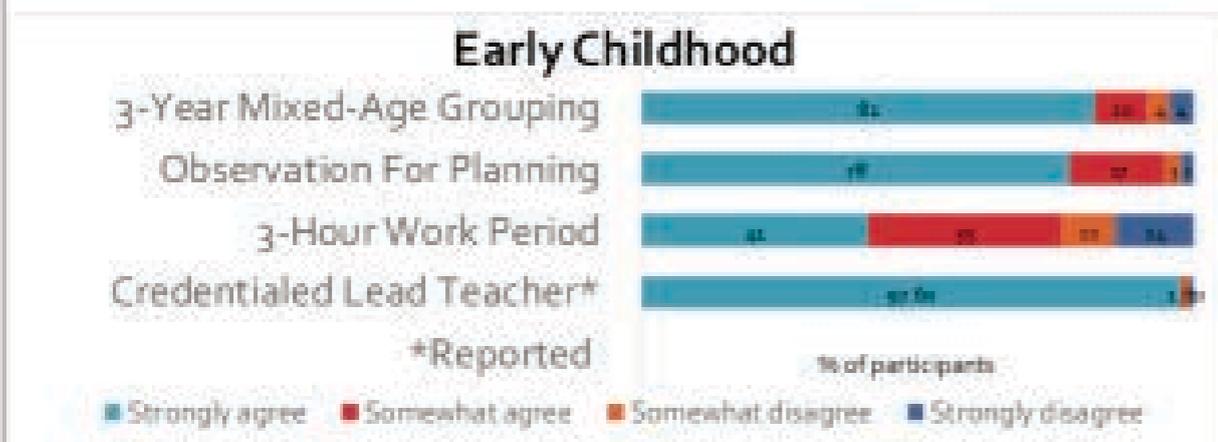
This instrument is currently being pilot tested with another group of teachers after revisions based on initial Rasch analysis. Continued analysis with experts in the field and psychometricians from the national research working group and KU Center for Montessori Research are planned before designing a final version for use in research and evaluation projects.

References

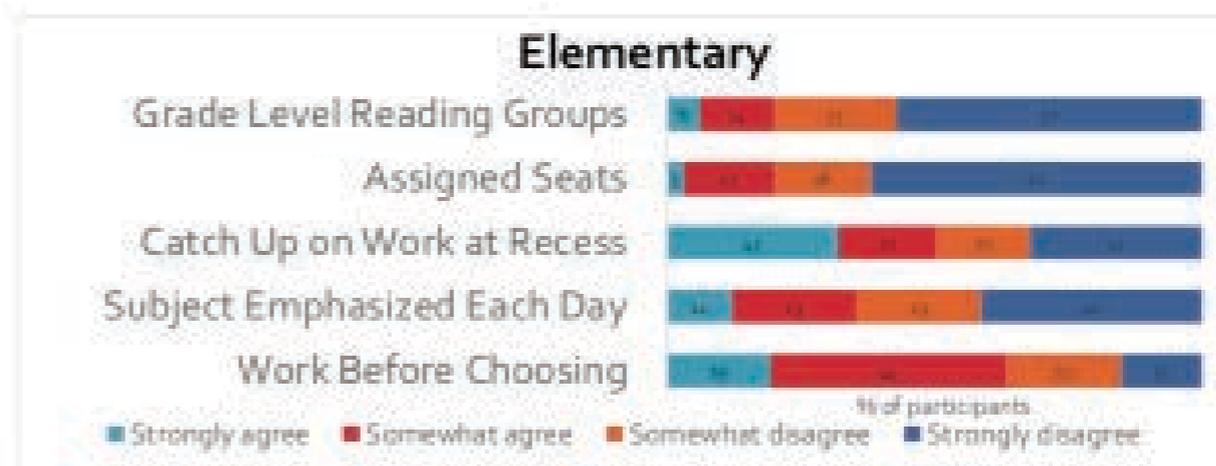
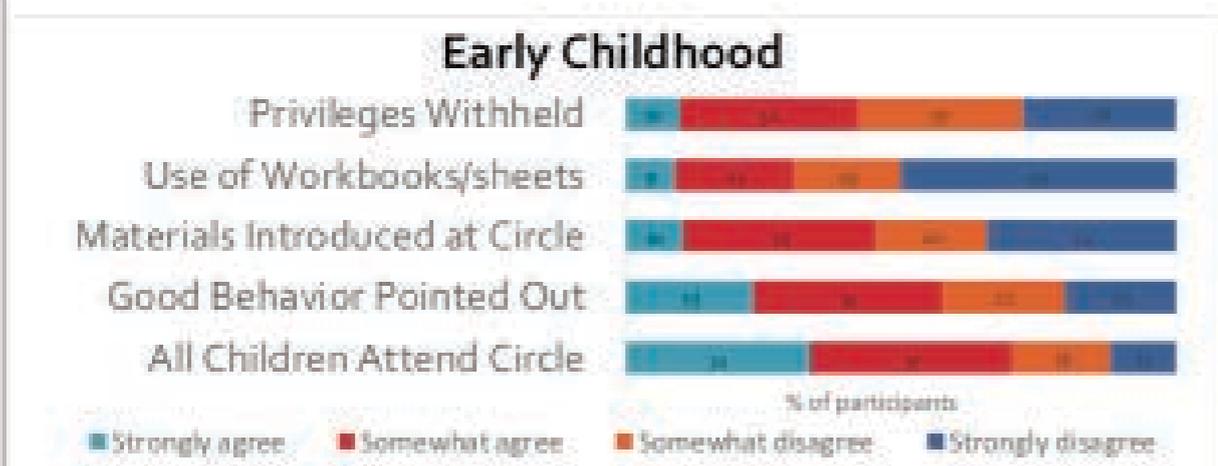
1. Lillard, A. S. (2012). Preschool children's development in classic Montessori, supplemented Montessori, and conventional programs. *Journal of School Psychology, 50*, 379-401.
2. Riley Institute for Education Policy. (2016). The S.C. Public Montessori Study: Classroom Observation Data.
3. National Center for Montessori in the Public Sector (n.d.). Essential elements of successful Montessori schools in the public sector.
4. Montessori Public Policy Initiative. (2015). Montessori essentials. Retrieved October 10, 2016, from <http://www.montessoripublicpolicy.org/resources>

Contact: Angela K. Murray, PhD at akmurray@ku.edu

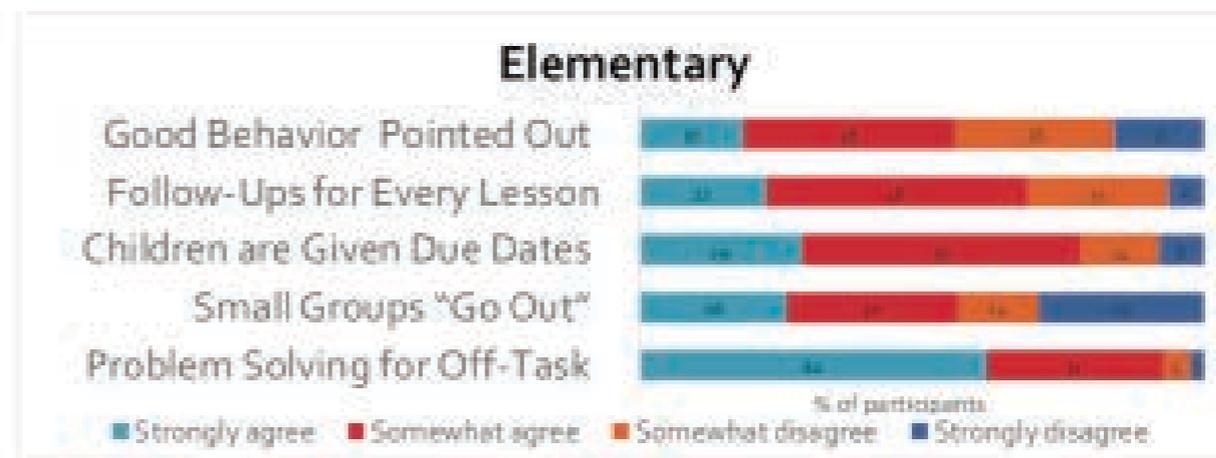
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59:44

Magnitude Attributes

CHILD

ADULT

ENVIRONMENT

Child sized

Cleanliness

Uninterrupted
workMaterials ready
for useMixed age
grouping

Natural materials

Multisensory

Language rich

click here once you complete the observation
FINISH OBSERVATION

Level 4

[Home](#)

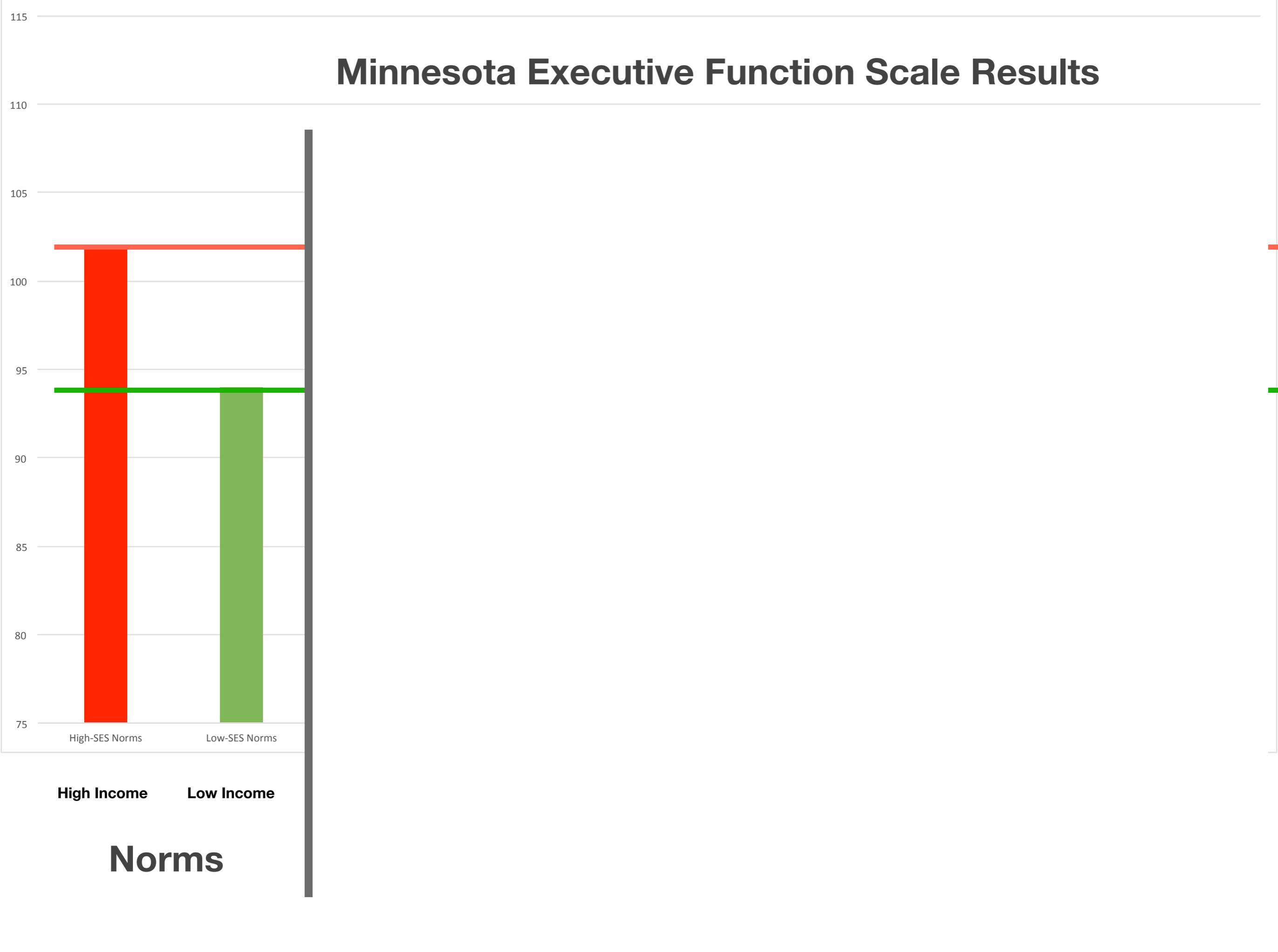
Look, I have these boxes here. This one is orange and this one is green. This is the color game. In the color game, all the orange ones go here and all the green ones go here. (tap + button)



COR9999

Level 4 Demonstration

Minnesota Executive Function Scale Results

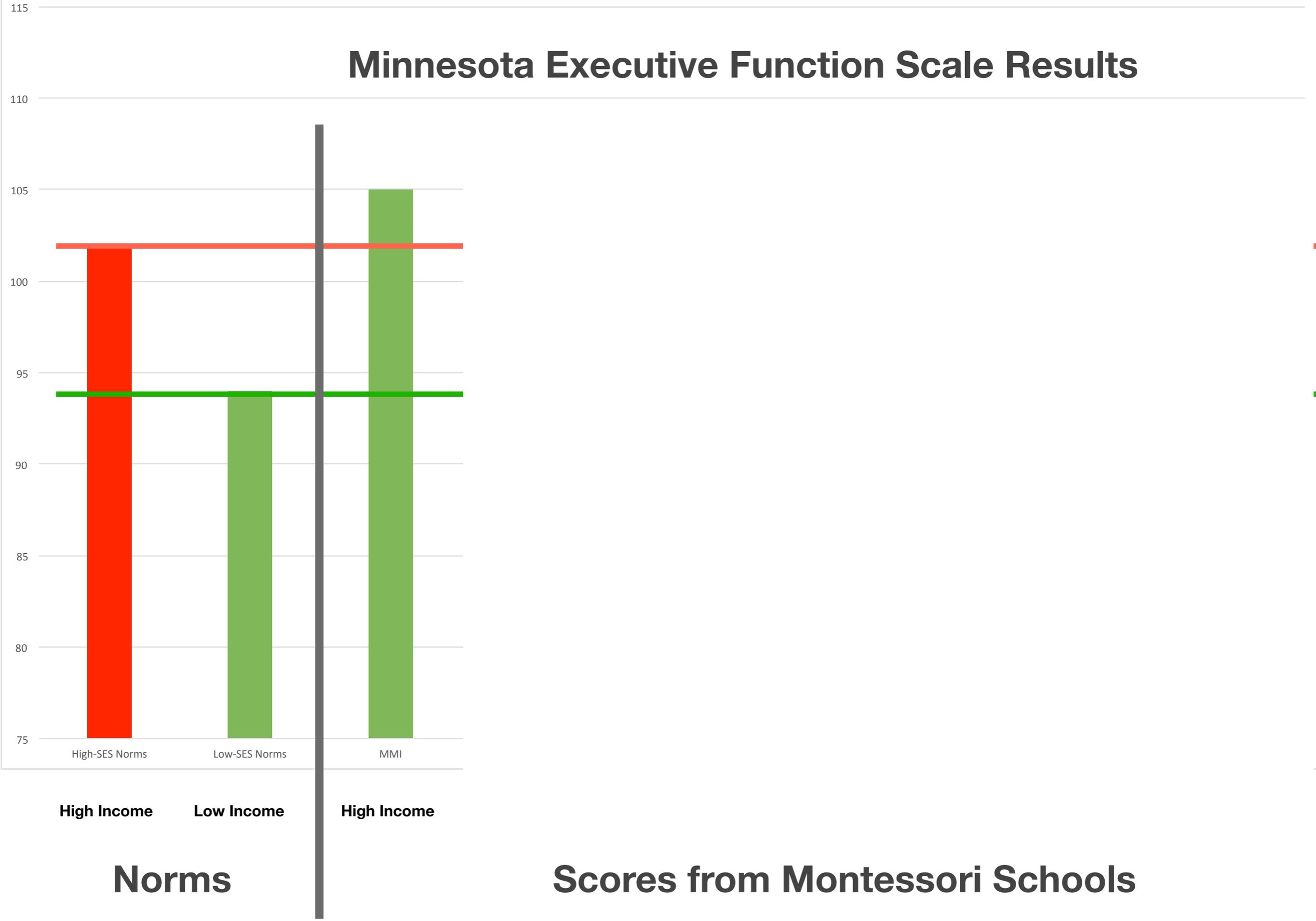


High Income

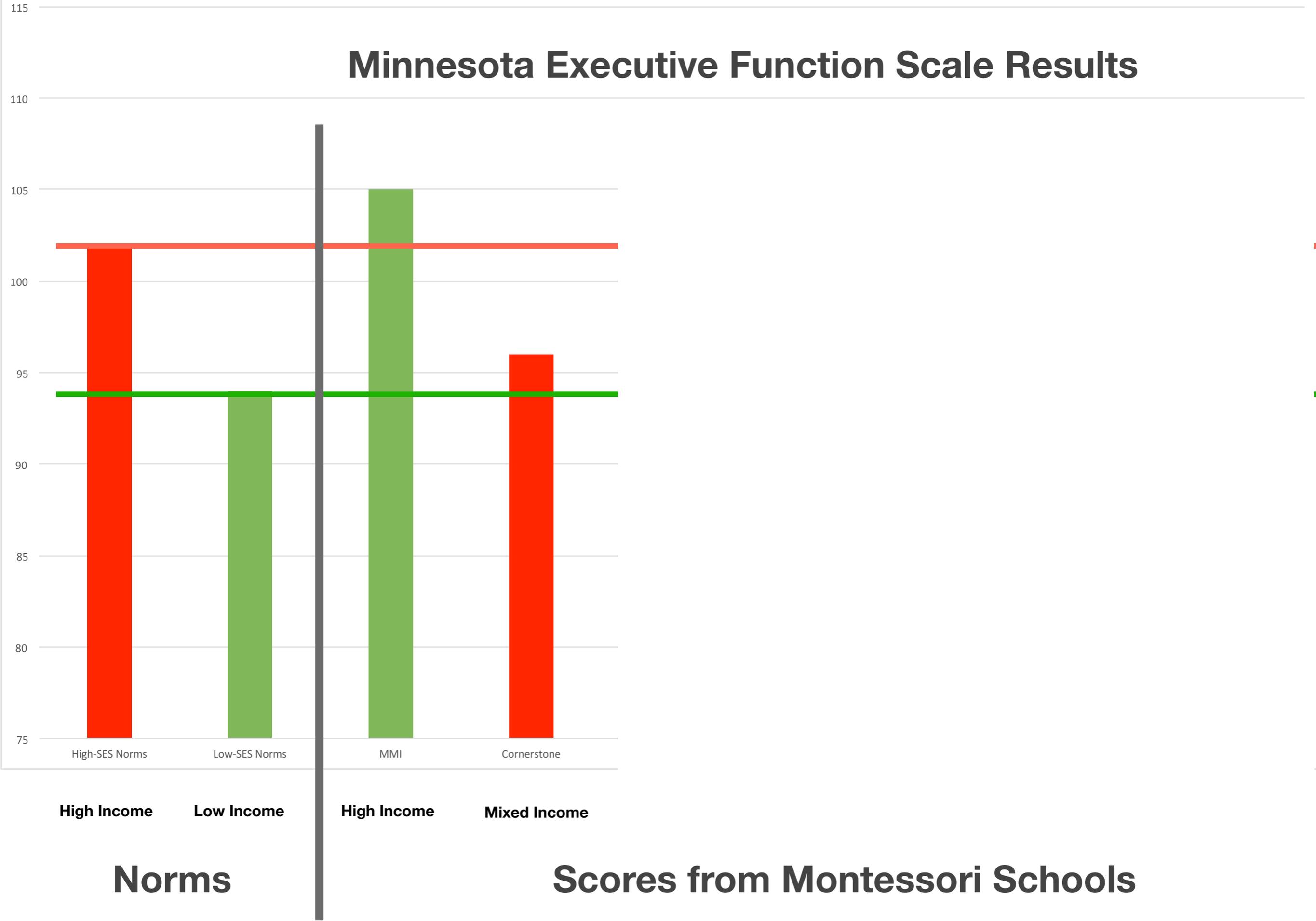
Low Income

Norms

Minnesota Executive Function Scale Results



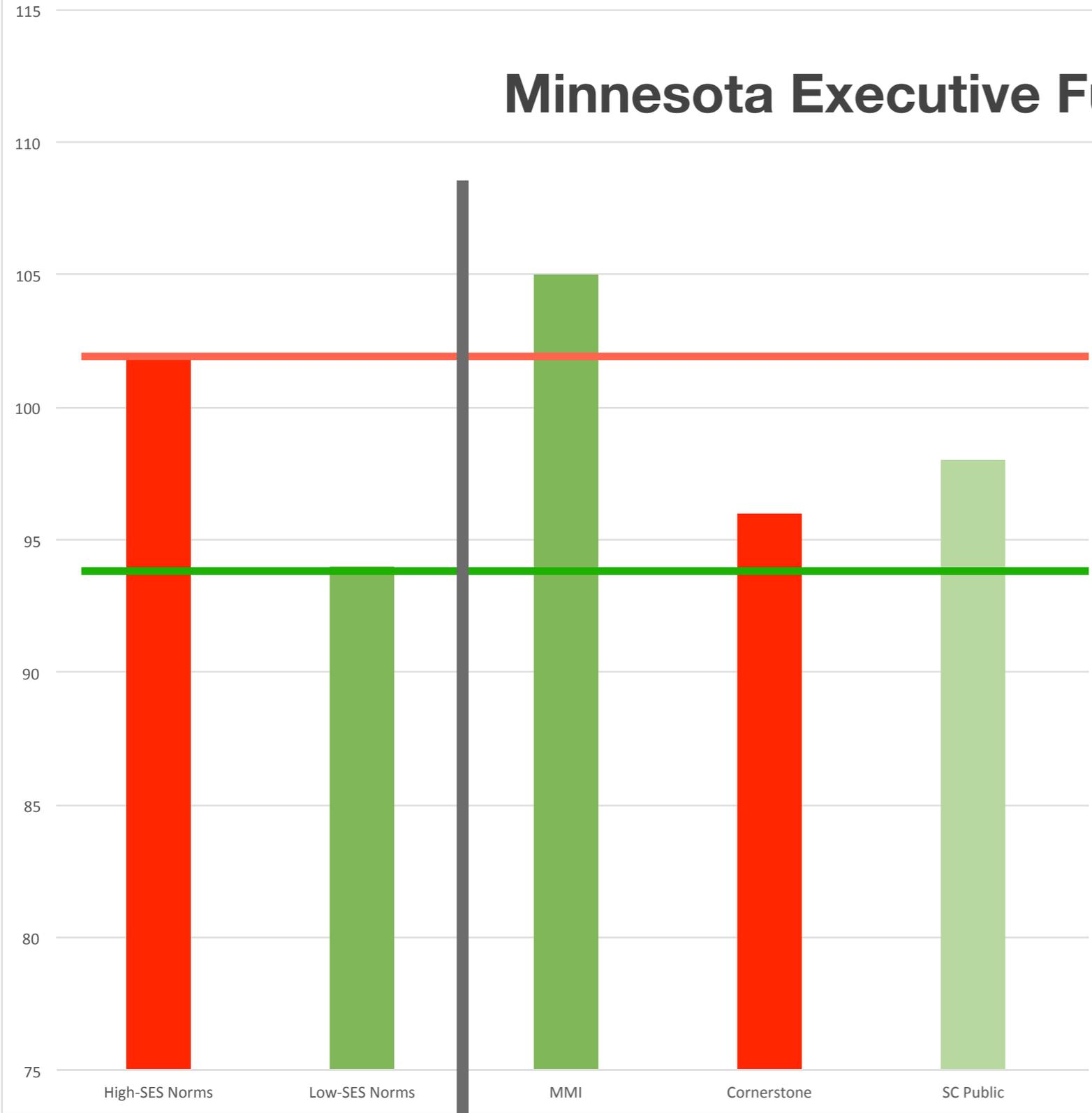
Minnesota Executive Function Scale Results



Norms

Scores from Montessori Schools

Minnesota Executive Function Scale Results



High Income

Low Income

High Income

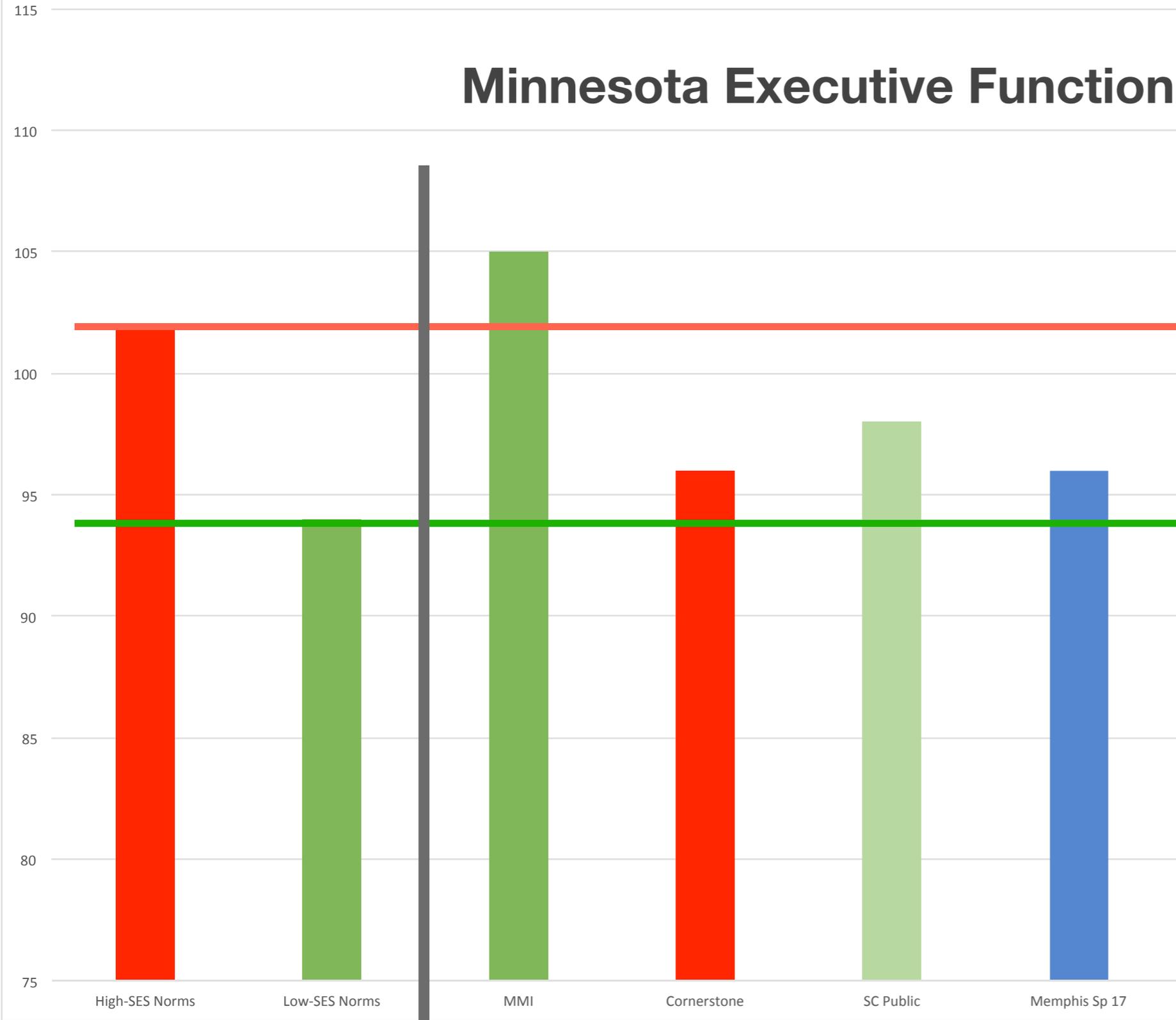
Mixed Income

Mixed Income

Norms

Scores from Montessori Schools

Minnesota Executive Function Scale Results



High Income

Low Income

High Income

Mixed Income

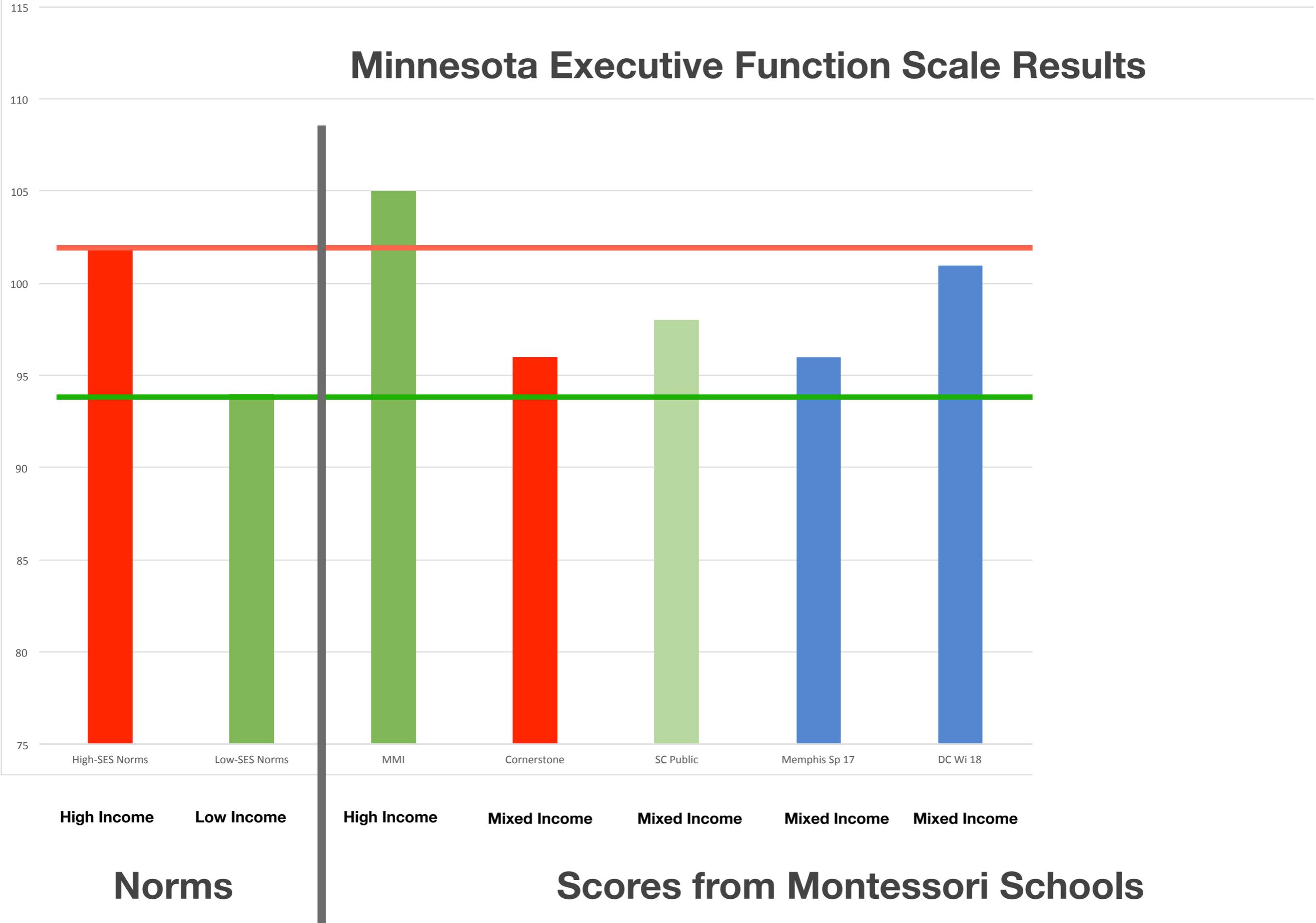
Mixed Income

Mixed Income

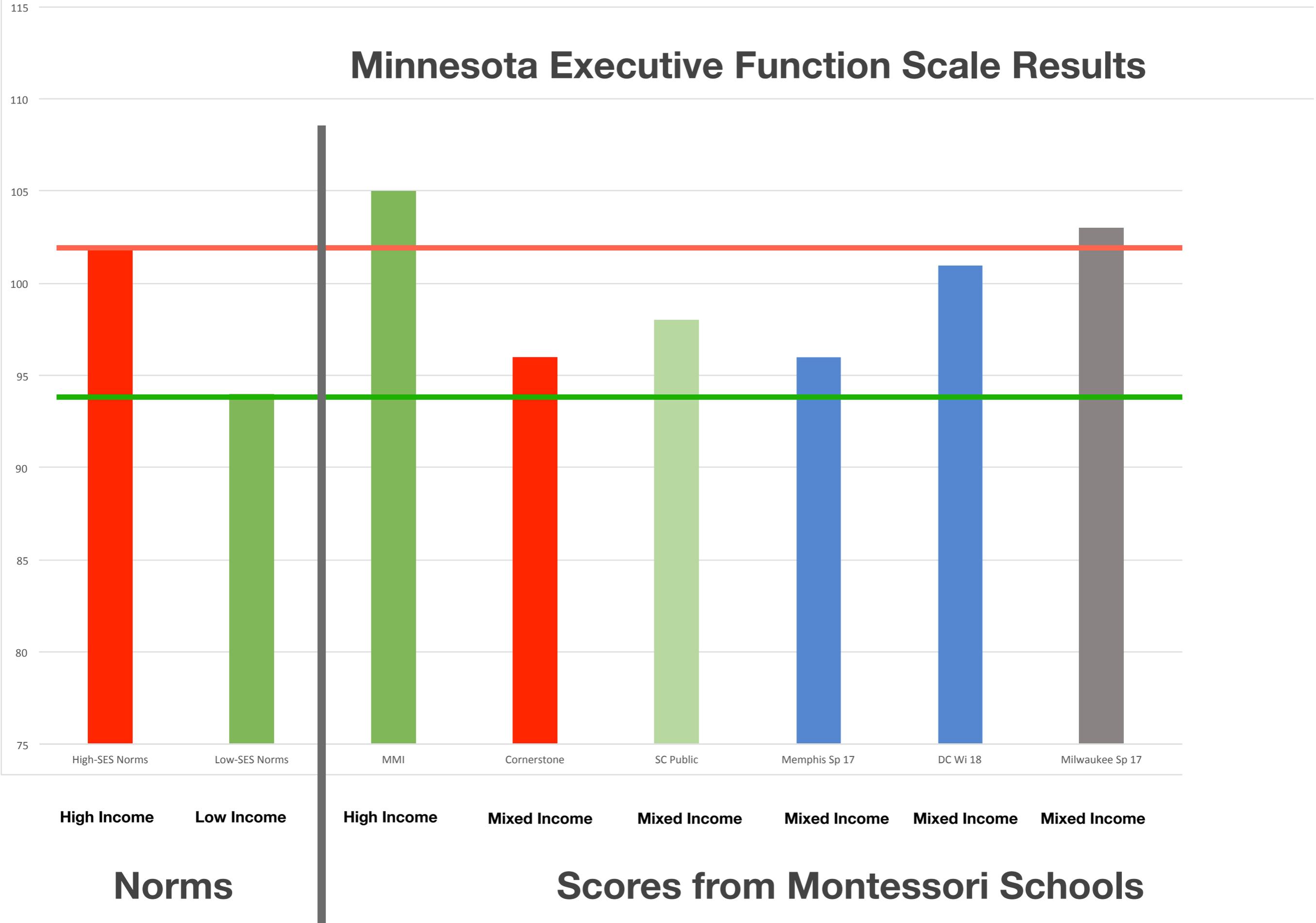
Norms

Scores from Montessori Schools

Minnesota Executive Function Scale Results



Minnesota Executive Function Scale Results



High Income

Low Income

High Income

Mixed Income

Mixed Income

Mixed Income

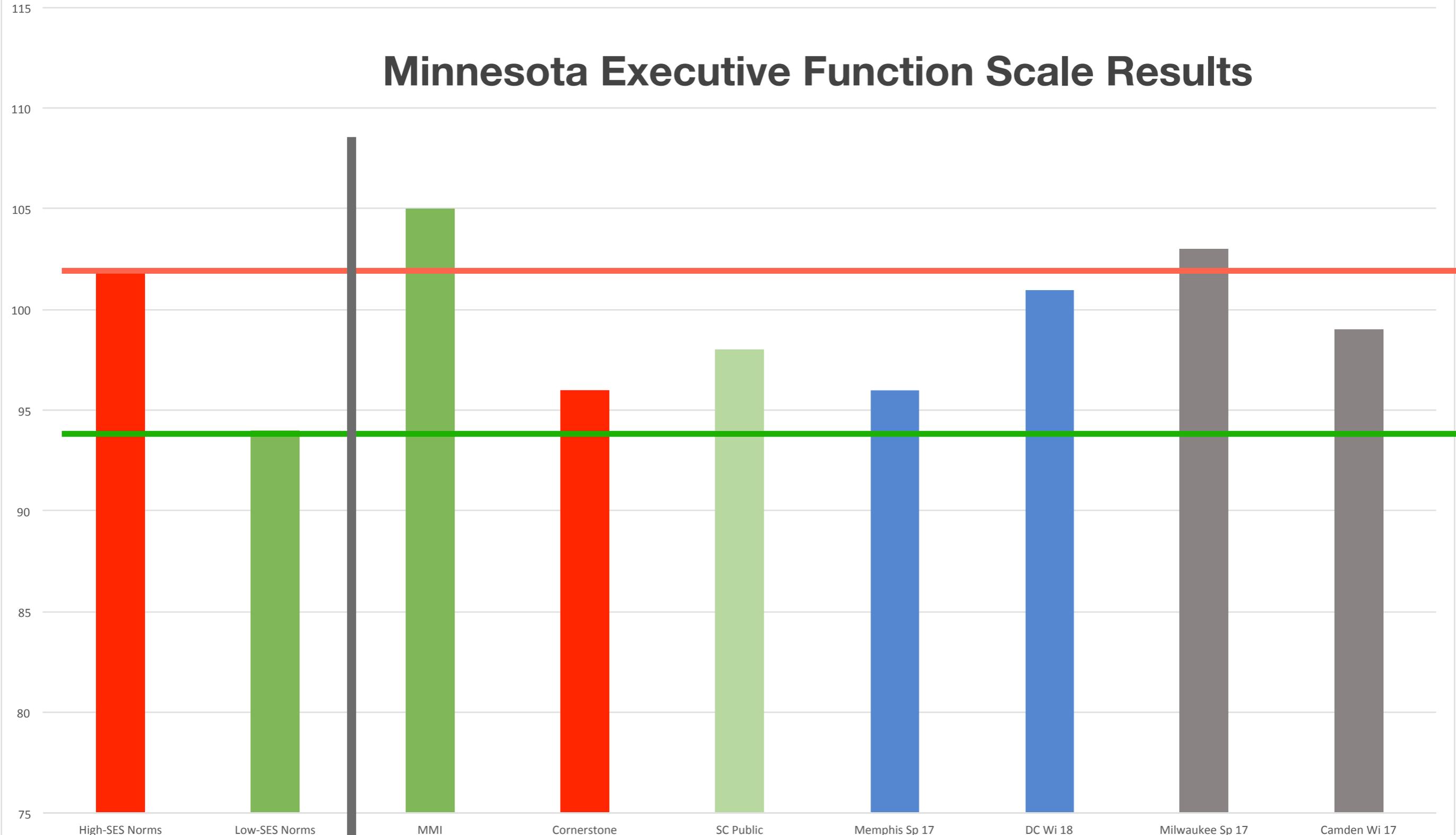
Mixed Income

Mixed Income

Norms

Scores from Montessori Schools

Minnesota Executive Function Scale Results



High Income Low Income

High Income Mixed Income Mixed Income Mixed Income Mixed Income Mixed Income Low Income

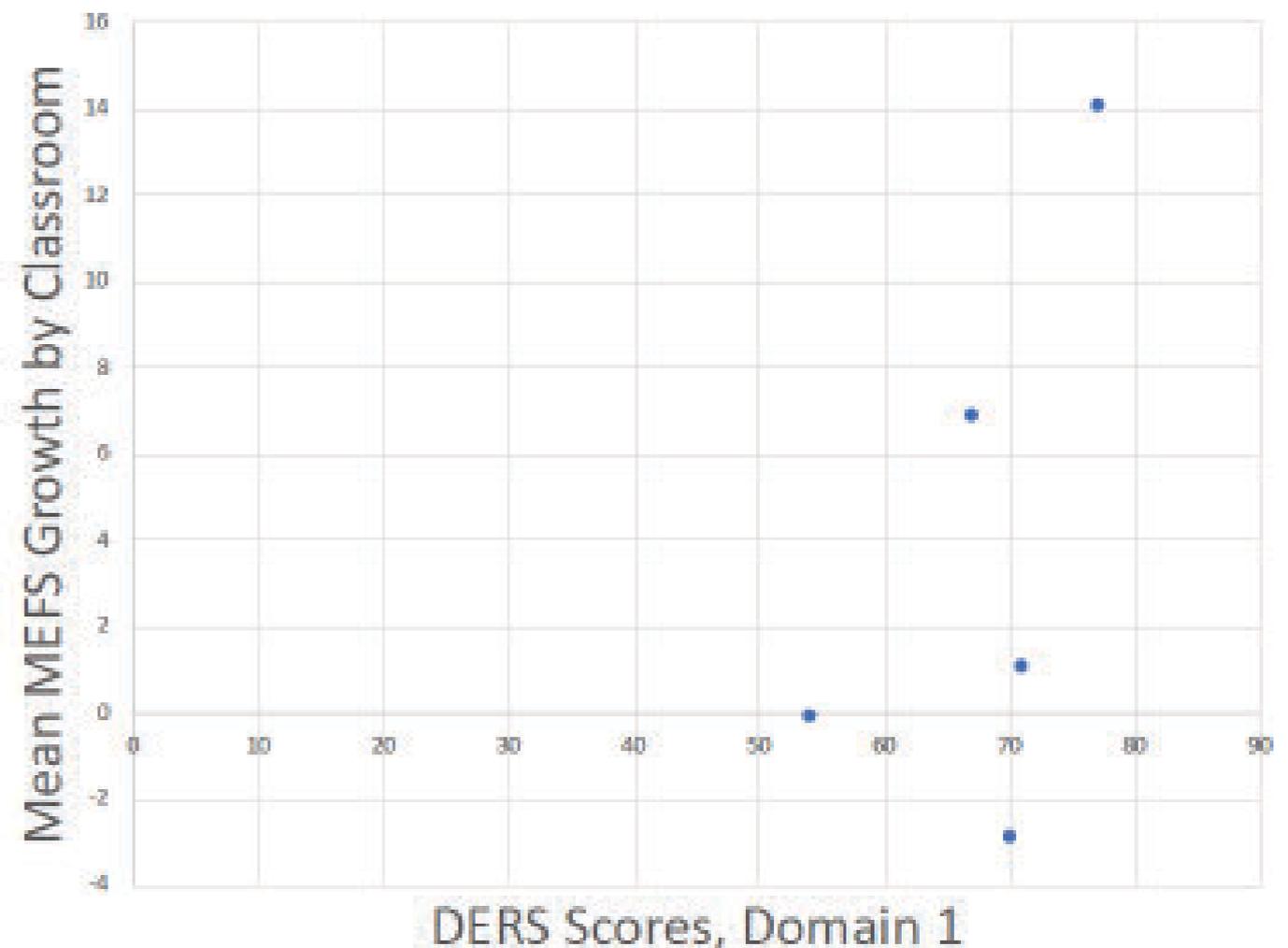
Income Norms

Scores from Montessori Schools

MEFS & DERS

- Correlations between DERS and MEFS growth in DC were moderate
- $r=.52$ (Domain 5) to $r=.58$ (Domain 4)

MEFS Growth and DERS Score,
Domain 1: Initiation & Concentration



Fall

DERS

MEFS

Teacher Style
questionnaire

Receiving
Teacher
Survey

Graduate
Parent
Survey

Winter

DERS

Spring

DERS

MEFS

Teacher Style
questionnaire

Goal

At least 15,000 children

At least 500 schools

At least 50 countries

Diversity of Montessori practice

Diversity of backgrounds

The future

Academic skills
Motor development
General development
Social skills
Sense of well-being
Creativity

Long term outcomes - Montessori
Student Registry

Adolescents: Moral reasoning

Defining Issues Test

Heinz and the Drug

A woman was near death from a special kind of cancer. There was one drug that doctors thought might save her. A druggist in the same town had recently discovered it, but was charging ten times what the drug cost to make. He paid \$200 for the raw materials and charged \$2,000 for a small dose of the drug. The sick woman's husband, Heinz, went to everyone he knew to borrow money, but he could only get together about \$1,000, half of what it cost. He told the druggist that his wife was dying, and asked him to sell it cheaper or let him pay later. But the druggist said, "No. I discovered the drug and I'm going to make money from it." So Heinz got desperate and started thinking about breaking into the man's store to steal the drug for his wife. **Should Heinz steal the drug?**

“What is the right thing to do?”

“*Why* is that the right thing to do?”

Rate these issues in terms of importance:

1. Whether a community's laws are going to be upheld.
2. Isn't it only natural for a loving husband to care so much for his wife that he'd steal?
3. Is Heinz willing to risk going to jail for the chance that stealing the drug might help?
4. Whether Heinz is stealing the drug for himself or to help someone else.
5. Whether the druggist's rights to his invention have to be respected.
6. What values are going to be the basis for governing how people act towards each other.
7. Whether the druggist is going to be allowed to hide behind a worthless law which only protects the rich anyhow.
8. Whether the law in is getting in the way of the most basic claim of any member of society.
9. Whether the druggist deserves to be robbed for being so greedy and cruel.
10. Would stealing in such a case bring about more total good for the whole society or not.

Which is most important? Second most? Third most?

Infant-Toddler: General development

Ages & Stages Questionnaires

The ASQ-3™ Age Intervals

21 Questionnaire intervals:

- 2, 4, 6, 8, 9, 10, 12, 14, 16, 18, 20, 22, 24 months (spaced 2 months apart)
- 27, 30, 33, 36 months (spaced 3 months apart)
- 42, 48, 54, 60 months (spaced 6 months apart)

Corrected date of birth used for children born more than 3 weeks premature for up to 2 years of age

ASQ-3™ Age Calculator (www.agesandstages.com/age-calculator/) helps select correct interval

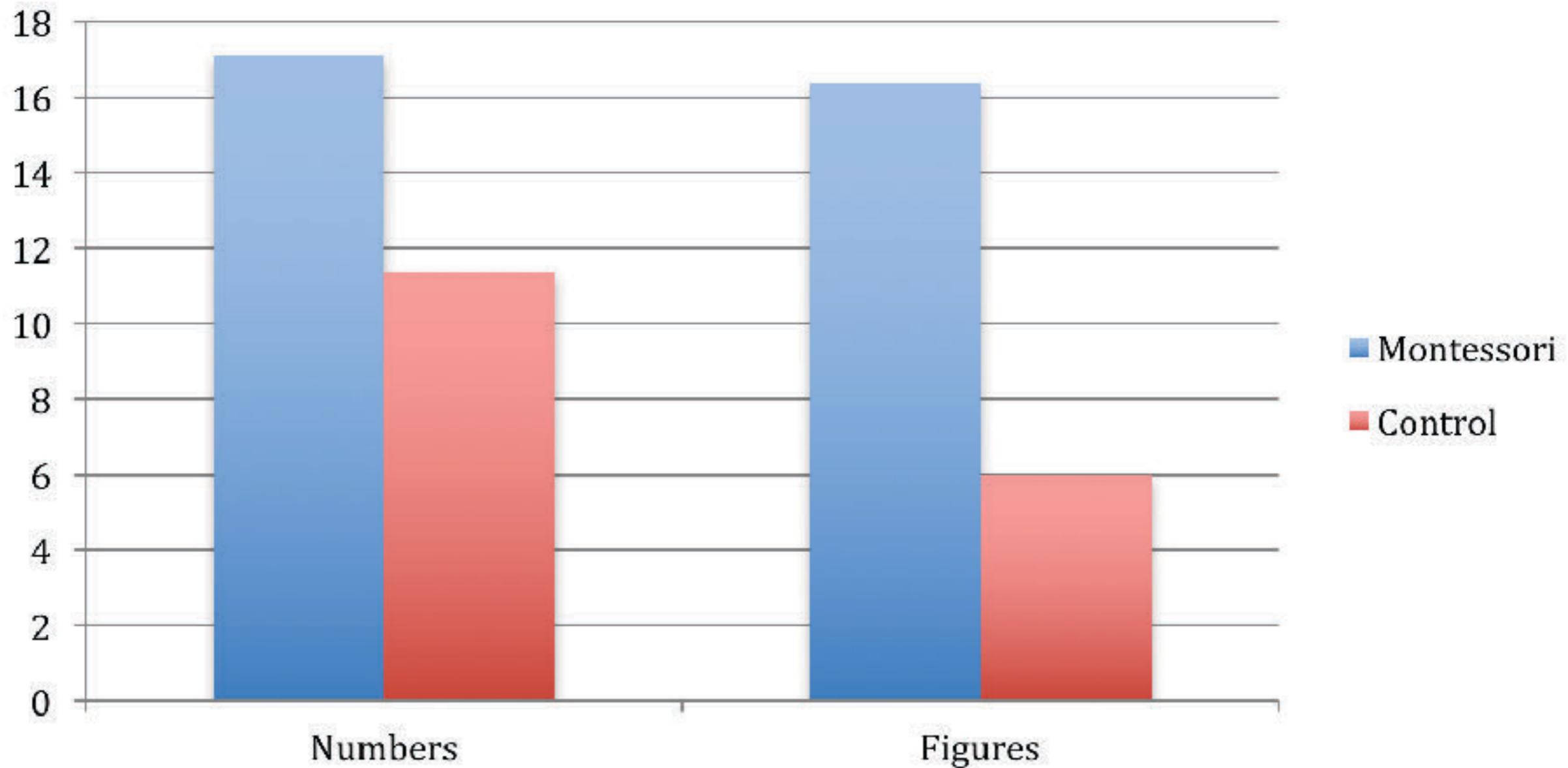
Elements of ASQ-3™: Areas & Questions

- 5 developmental areas (Communication, Gross Motor, Fine Motor, Problem Solving, Personal-Social)
- 6 questions in each area
- Questions are in hierarchical order
- Questions #5 and #6 are average skills for children of that age interval
 - i.e., a 12-month skill for a 12-month child, not a 16-month skill for a 12-month-old
- Response options: *Yes, Sometimes, Not Yet*
- Written at 4th- to 5th-grade reading level

6-18:
Creativity

Results from OECD creativity study using the Evaluation of Creative Potential - Math

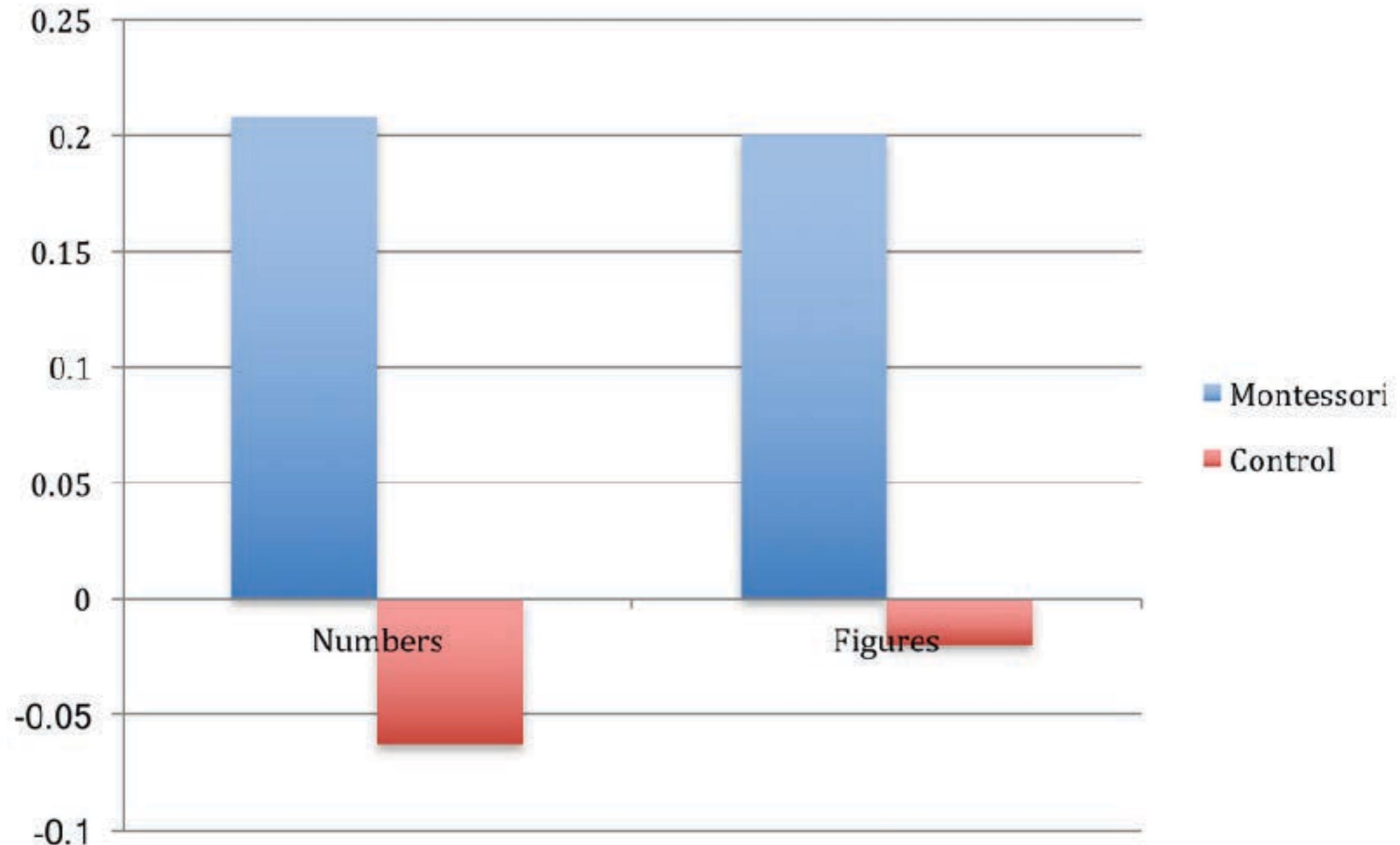
Divergent Tasks



Katie Brown, K., Dosmann, Phillip (2017). Creativity in Montessori Adolescent Programs. Poster Presented at 2017 Annual conference of the American Montessori Society, San Diego.
Courtesy of National Center for Montessori in the Public Sector

Results from OECD creativity study using the Evaluation of Creative Potential - Math

Convergent Tasks



Katie Brown, K., Dosmann, Phillip (2017). Creativity in Montessori Adolescent Programs. Poster Presented at 2017 Annual conference of the American Montessori Society, San Diego.

Courtesy of National Center for Montessori in the Public Sector

DIVERGENT THINKING: TITLES GAME

Part of the *Runco Creativity Assessment Battery* (rCAB)[©] 2011.

List alternative titles for the movies, plays, and books below. Spelling does not matter and there are no grades for this. Have fun and list as many alternatives as you can.

List alternative titles for the movie, "Titanic."

<hr/>	<hr/>

List alternative titles for the play, "Romeo and Juliet."

<hr/>	<hr/>

Sample NOT for use or reproduction

ATTITUDES AND VALUES

Part of the *Runco Creativity Assessment Battery* (rCAB)[©] 2012

Directions: Use the a-e scale (given below) to indicate how much you agree or disagree with a certain statement. You may need to approximate. Please indicate how you really think and behave, not how you would like to. Remember--no names are used. Your responses are confidential.

Again, you may need to approximate. For each item, circle the response option that is THE CLOSEST to being accurate. Here are the options:

- (a) = totally DISAGREE
- (b) = mostly disagree
- (c) = neutral
- (d) = mostly agree
- (e) = totally AGREE

To what degree do you agree with each of the following?

1. Even if some method has worked well in the past, it is a good idea to question and perhaps change it on a regular basis.
(a) totally disagree (b) mostly disagree (c) neutral (d) mostly agree (e) totally agree
2. One of the advantages of developing expertise is that you can make useful assumptions and work more quickly.
(a) totally disagree (b) mostly disagree (c) neutral (d) mostly agree (e) totally agree
3. Time is often wasted when everyone involved in a project shares each of his or her own

*“If you do Montessori **at least this well**, you consistently, reliably, predictably get these kind of results, regardless of the child’s family background or social conditions.*

We have a large catalog of programs that do this.

*We see it across culture, language, region, and economic status. **It is a predictable, reliable result that we see over, and over, and over.**”*





197731
197731
CAN
CAN

200623
52005

765
05

207854
28705

5115
05

731
05

780
05