

# Teaching Detained Juveniles About Their Brains: A Study on a Novel Brain-Health Intervention at the St. Joseph Juvenile Justice Center

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A dark blue diagonal graphic that starts from the bottom left corner and extends towards the top right corner, creating a triangular shape in the bottom right of the slide.

# Background

- Children constantly learn and adapt to their context, including the context of poverty
- Mechanisms underlying adaptation to the high-stress environment of poverty allow brain and behavior to adapt.<sup>1</sup> Living in poverty leads to...
  - Poor academic achievement<sup>2,3</sup>, reduced attentional control<sup>3,4</sup>, poor emotional regulation, impaired prosocial attributes<sup>2,3,4</sup>
  - Smaller cortical white and gray matter, and hippocampal and amygdalar volumes<sup>5,6</sup>
- Despite these dismal findings, the young brain is plastic, and the adaptation to the chronic stressor of poverty can be slowed or reversed by interventions in adolescence
  - Paunesku et al. 2015<sup>7</sup>
  - Good, Aronson, & Inzlicht 2003<sup>8</sup>
  - Seroczynski et al. 2016<sup>9</sup>
- Detained juveniles are often from backgrounds of poverty and/or high-stress home environments, so there should be interventions to target that group<sup>10</sup>

# Timeline

- Spring 2016 - Spring 2017
  - Developed the intervention via literature searches and observations during volunteering
  - Developed the scale in conjunction with Center for Social Research
  - Obtain IRB approval
- Fall of 2017 - Spring of 2018
  - Teach intervention and evaluate scale using statistical methods

# Brain Health Intervention

- 4, 30-minute lessons on M/W/F mornings
- Each lesson focused on a specific attribute that I felt was important for the juveniles to understand, based on my observations as well as literature searches

**Table 1.** Learning goal for each of the four lessons in the BHI.

Lesson	Learning Goal
1 – Anatomy/Function	Be able to identify the brain structures that create and/or regulate emotion. Understand the functional role of the PFC and amygdala.
2 – Emotional Regulation	Develop the ability to identify how one is feeling. Recognize how the balance between the PFC and amygdala function determines one's response.
3 – Neural Plasticity	Understand how one is changing the connections between the PFC and amygdala. Recognize the concept of neural plasticity and that every choice changes the brain.
4 – Neuronal Development	Evaluate long-term goals and how those align with certain types of behavior (i.e. not coming back to the JJC). Establish the idea of choice in behavior and resultant outcomes.

# Scale

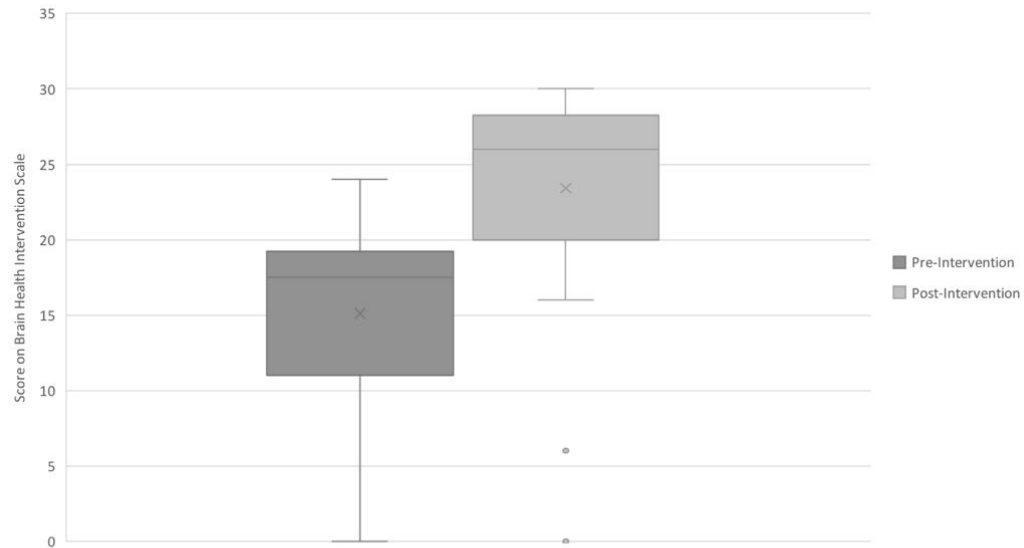
- Developed the Brain Health Intervention Scale (BHIS)
- 31 affirm/deny statements designed to measure knowledge gained or opinion changed by the participant about the brain
  - One validity check (“I understand what the cortical homunculus is”)
  - Other 30 statements were divided into 4 attributes that reflected 4 sections of the course
- Example statements
  - “I understand what a neuron does” (Anatomy)
  - “I can control my emotions” (Emotional regulation)
  - “I want strong connections in my brain between the amygdala and the prefrontal cortex” (Neural plasticity)
  - “The environment in which I grew up shaped my brain” (Neuronal development)

# Participants

**Table 2.** Sample Characteristics for Intervention Group.

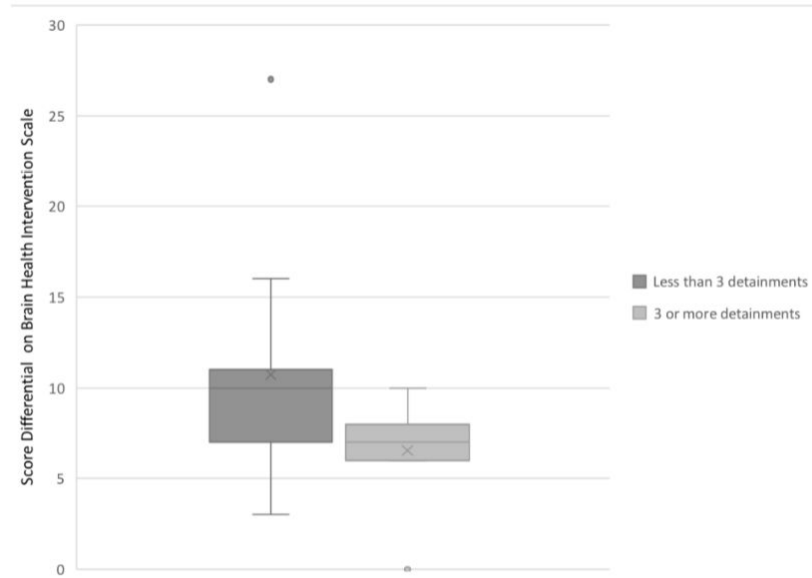
Characteristic	n	%
Age		
13-14	4	15.38%
15-16	16	61.54%
17-18	5	19.23%
19+	1	3.85%
Average household income by ZIP Code		
<\$40,000	13	50%
>\$40,000	13	50%
Gender		
Female	9	34.62%
Male	17	65.38%
Race		
Minority	20	76.92%
Non-minority	6	23.08%
Highest offense level filed		
Misdemeanor	9	34.62%
Felony	15	57.69%
Number of previous detainments		
<3	11	42.31%
3+	15	57.69%
ACE Score		
<3	4	15.38%
3+	21	80.77%

# Results



**Figure 1.** Pre-intervention and post-intervention scores on the Brain Health Intervention Scale. Paired t-test indicates post-intervention scores ( $M = 23.42$ ,  $SD = 7.23$ ) are significantly greater than pre-intervention scores [ $M = 15.12$ ,  $SD = 7.17$ ;  $t(25) = 8.44$ ,  $p < 0.01$ ].

# Results



**Figure 2.** Score differentials between pre- and post-intervention scale for juveniles with less than three detentions versus three or more detentions. Unpaired t-test indicates juveniles with less than three detentions ( $M = 10.73$ ,  $SD = 6.31$ ) had a significantly greater score differential compared to juveniles with three or more detentions ( $M = 6.53$ ,  $SD = 2.92$ ;  $t(24) = 2.27$ ,  $p < 0.05$ ).



# Conclusions

- Finding is in agreement with Seroczynski's 2016 study, which found in its pilot trial that the program would have the most impact on recidivism rates in first-time offenders
  - Hypothesized juveniles who already had a history with the justice system may be “jaded”<sup>9,11</sup>
- Point to need for diversion programs that involve cognitive and behavioral aspects
- Finding an answer to decreasing the effects of poverty on the developing brain of adolescents is of public health and economic concern<sup>14</sup>
  - Detention is more expensive than diversion
  - Detention doesn't lower crime rates

# Take-home message

- 100,000 juveniles detained right now in the U.S.
- Is detention the right place for an adolescent to learn from their mistakes?
- It is advantageous to intervene during adolescent period of marked neural plasticity

# Thank you!

Especially to my friends, family, and advisor, Dr. Nancy Michael

Questions?

# Works Cited

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