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Developing Self Regulation in Pre-Kindergarten Classrooms

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"Learning-Related Cognitive Self Regulation" and Executive Function

- Self regulation in classroom settings and related to learning has different names
  - Learning Dispositions (Katz, 2002)
  - Work Related Skills (Cooper & Farran, 1988)
  - Approaches to Learning (ECLS-K)
  - Learning-Related Cognitive Self Regulation (Lipsey & Farran, 2009)

- The better term may be Executive Function

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Characteristics in Common and Importance for Education

- Executive Function (Hughes, 2011)
  - Inhibitory control
  - Working memory
  - Attentional flexibility
- Recognizing the importance of EF for Education
  - Greatly increased interest in past few years
  - Evidence that EF is related to school achievement, for both early and late elementary, middle school
- The question remains – Is EF malleable?

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Early Childhood Curricula

- Public school prekindergarten classrooms serve children likely to have lower EF skills
  - Required to have curriculum, licensed teacher
- Curriculum as a possible mechanism for change in EF (see Best, Miller, & Naglieri, 2011; Diamond & Lee, 2011; Hughes, 2011)
- More experimental and process research needed to determine if curriculum can mediate changes in EF in prekindergarten classes.

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Problems in Determining Curriculum Effects on EF

- Classrooms are messy, high stimulus environments
  - Hard to determine key processes (developers are often not certain about these)
  - Observations of proposed key elements necessary
- EF measures in early childhood not well established -- though there are promising candidates

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Tools of the Mind Curriculum

- Pre-K curriculum school systems could adopt to improve EF and achievement
- Development began in the 1990's
- Focused on helping children develop learning dispositions while they are learning academic skills
- Learning dispositions will help children master new material across the school years

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Purpose and Design of This Research

- Randomized clinical trial to evaluate the effectiveness of *Tools of the Mind,* awarded to Farran, Lipsey, and Wilson by IES
  - 5 school districts, 60 classrooms, teachers randomly assigned
- Child Assessments of both EF and achievement
- Classroom observations of fidelity of implementation
- Classroom observations of key elements as mechanisms by which curriculum has effects
- Follow up children into kindergarten and 1st grade

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Project Staff

Principal Investigators

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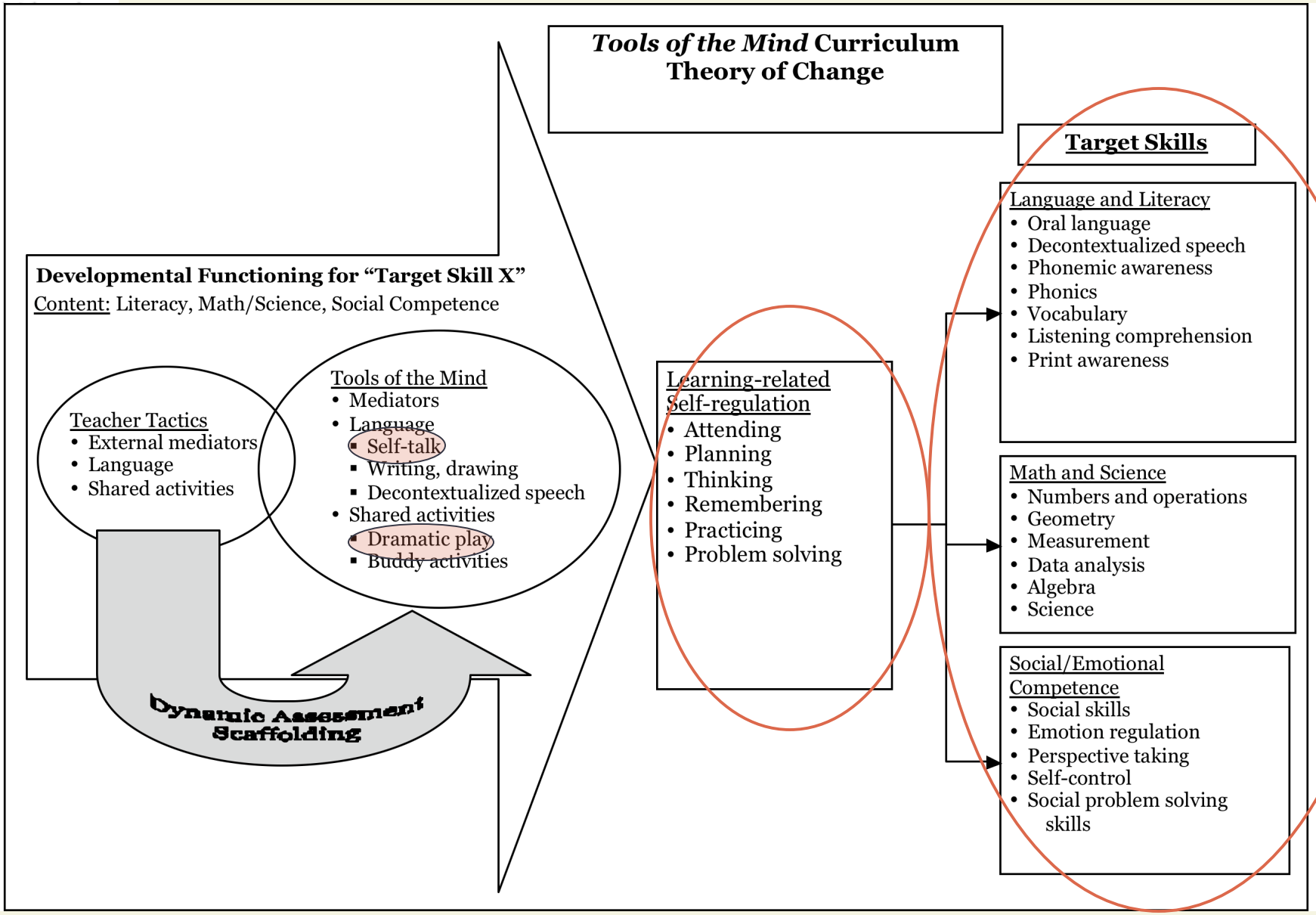
Post-Doctoral Fellows

- Mary Wagner Fuhs, PhD
- Kimberly Turner, PhD

- ***Multiple part time child assessors and classroom observers in Tennessee and North Carolina***


Tools of the Mind Curriculum
Theory of Change
Target Skills
Developmental Functioning for "Target Skill X"
Content: Literacy, Math/Science, Social Competence
Teacher Tactics
• External mediators
• Language
• Shared activities
Tools of the Mind
• Mediators
• Language
▪ Self-talk
▪ Writing, drawing
▪ Decontextualized speech
• Shared activities
▪ Dramatic play
▪ Buddy activities
Dynamic Assessment
Scaffolding
Learning-related
Self-regulation
• Attending
• Planning
• Thinking
• Remembering
• Practicing
• Problem solving
Language and Literacy
• Oral language
• Decontextualized speech
• Phonemic awareness
• Phonics
• Vocabulary
• Listening comprehension
• Print awareness
Math and Science
• Numbers and operations
• Geometry
• Measurement
• Data analysis
• Algebra
• Science
Social/Emotional
Competence
• Social skills
• Emotion regulation
• Perspective taking
• Self-control
• Social problem solving
skills

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Classroom Observations 3 times, 2 observers each time

- ***Narrative Record*** documents how classroom time is distributed among activities and *Tools* activities for fidelity

- ***Teacher Observation in Preschool (TOP)*** (behavioral counts) e.g.,
  - Teaching Tasks (e.g. Instruction, Behavior Approving, Disapproving)
  - Talk, Listen and To Whom

- ***Children's Observation in Preschool (COP)*** (behavioral counts), e.g.
  - Interaction groups (e.g. Associative, Alone, Parallel)
  - Child Verbal Behavior
    - Child Talk and To Whom
    - Child Listen and To Whom
    - Child Self Talk

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Executive Function

- **Remembering -** Corsi Blocks
- **Inhibitory Control -** Peg Tapping (Diamond & Taylor), Head Toes Knees Shoulder (Cameron et al.)
-
- **Attention Focusing -** Copy Design (Osborn et al.)
- **Attention Shifting -** DCCS Dimensional Change Card Sort (Zelazo)

For purposes of analysis, a principal components analysis of the 5 EF measures yielded a single factor score.

The EF factor, also called the Self Regulation factor, was used in all analyses reported in this paper.

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Other Child Outcome Measures

- Woodcock Johnson III subtests
  - Letter-Word Identification
  - Spelling
  - Oral Comprehension
  - Picture Vocabulary
  - Academic Knowledge
  - Applied Problems
  - Quantitative Concepts

Literacy (Letter-Word Identification, Spelling)

Language (Oral Comprehension, Picture Vocabulary, Academic Knowledge)

Mathematics (Applied Problems, Quantitative Concepts)

Principal Components Analysis yielded one primary achievement factor

- Teacher Ratings
  - Work Related Skills (EF)
  - Interpersonal Skills
  - Language Skills

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Analytic Strategy

- Multi-level regression models -- students nested within classrooms, schools, and district blocks.
- Covariates included pretest scores, age, interval between assessments, gender, ELL status, and ethnicity
- Classroom processes analyzed with the same models, including the classroom process as a predictor.
- Examining classroom effects reduces sample size to 60, or 32 if only using *Tools* classrooms, *p* value of .10 accepted as indicating a process needing further exploration.

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Children, Teachers, Classrooms, Comparable Across Conditions

- Total sample of children
  - 828 consented, 794 with complete data
  - 54 months 46% female
  - 26% Black 25% Hispanic 39% White 10% Other
  - 29% ELL 14% with IEP
  - Programs required qualification for Free/Reduced Lunch
- Total sample of teachers
  - All licensed with Bachelors or Masters degrees
  - 12 years average experience
- Total sample of classrooms
  - Average class size 17.5 children
  - All served only 4-5 year olds,
  - 1-2 Teacher Assistants per classroom

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Child Outcome Results: Main Effects Analyses

- **No effects** of the *Tools of the Mind* curriculum on literacy, language or mathematics achievement or the achievement factor score compared to "business as usual" pre-K classrooms.
- **No effects** found on any Executive Function measures
  - *Gains* in achievement and EF factors were correlated, r =.35.
- **No effects** on teacher ratings of EF or social skills
- No more or less effective for subgroups of children (e.g., ELL, gender, ethnicity, low pretest scores)
- No school district effects were found; *Tools* was not more or less effective in any of the 5 districts.

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Children Gained in Both Achievement and EF

- Across all classrooms, significant pre-post differences on all achievement and EF measures.
- Children were both learning and gaining EF skills in prekindergarten classes, with variation among the classrooms in degree of gain.
- Gains were unrelated to curriculum
- Areas to explore:
  - Fidelity of implementation
  - Reexamining the theoretical model

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Fidelity of Implementation

- Virtually all of the *Tools* teachers implemented substantial portions of the curriculum.
- Variations in fidelity of implementation across the 32 *Tools* teachers were **not associated** with greater gains in achievement or EF.
- Variation not due to differences in coaching or training --high and low implementers found across the five school systems

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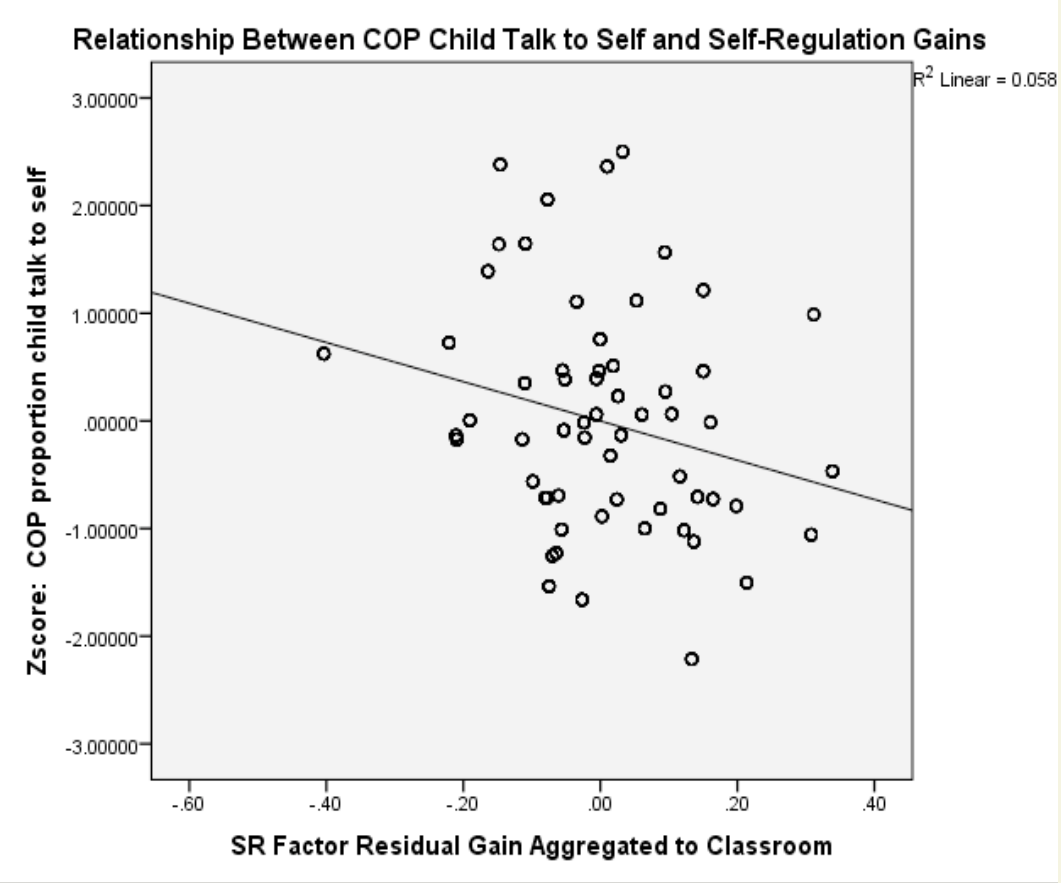
Exploring the Theoretical Model: Private Speech (Self Talk)

- Self talk coded any time we could discern the child was talking or making sounds to him or herself *(COP)*
  - Summarized across all 3 observations
  - Occurred about 6% of the time in both groups of classrooms
    (Total child talk was only @ 25% of the time in both sets of classrooms)

- Self Talk was **negatively** related to both EF and achievement gains
  - We could not find any setting in which self talk was facilitative of outcomes

Private speech in a classroom setting may function very differently from the effects seen working individually on task

Self Talk and Self Regulation Gains Across All 60 Classrooms p = .05)



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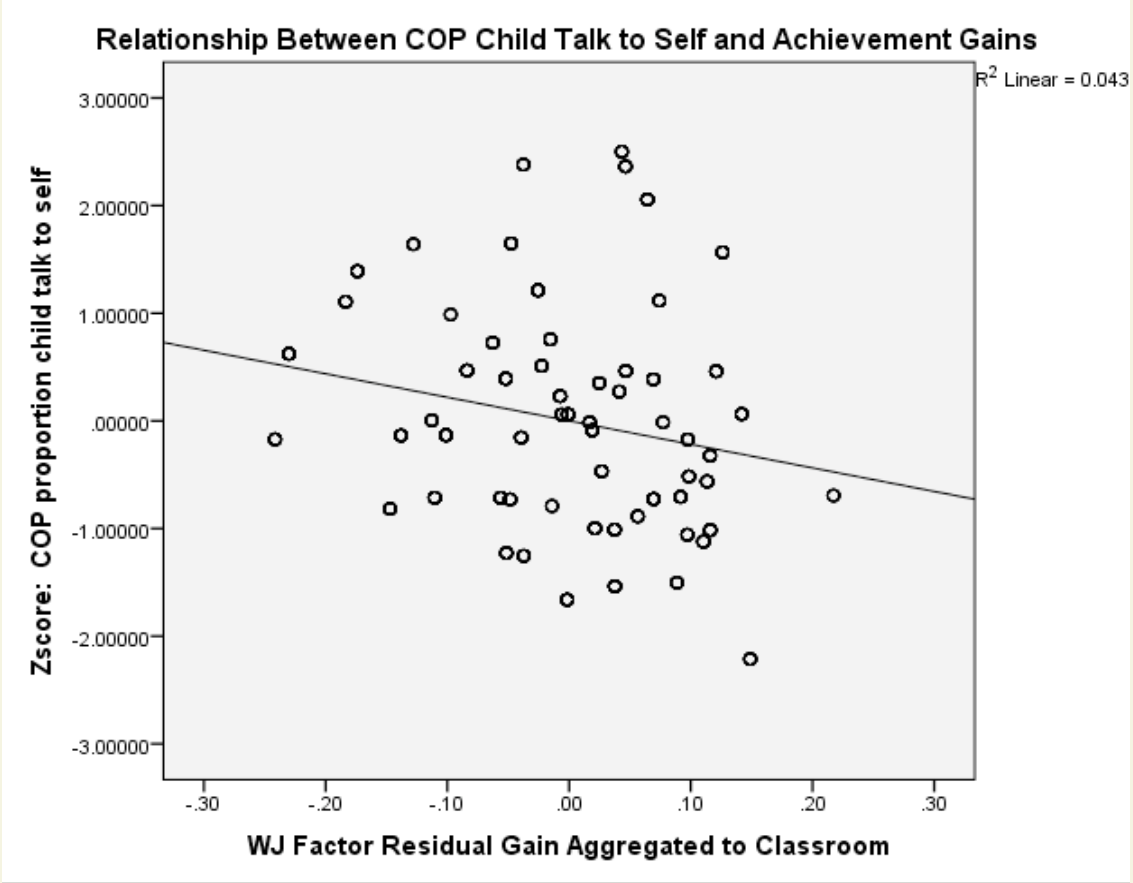
Self Talk and Achievement Gains Across all 60 Classrooms (p = .09)



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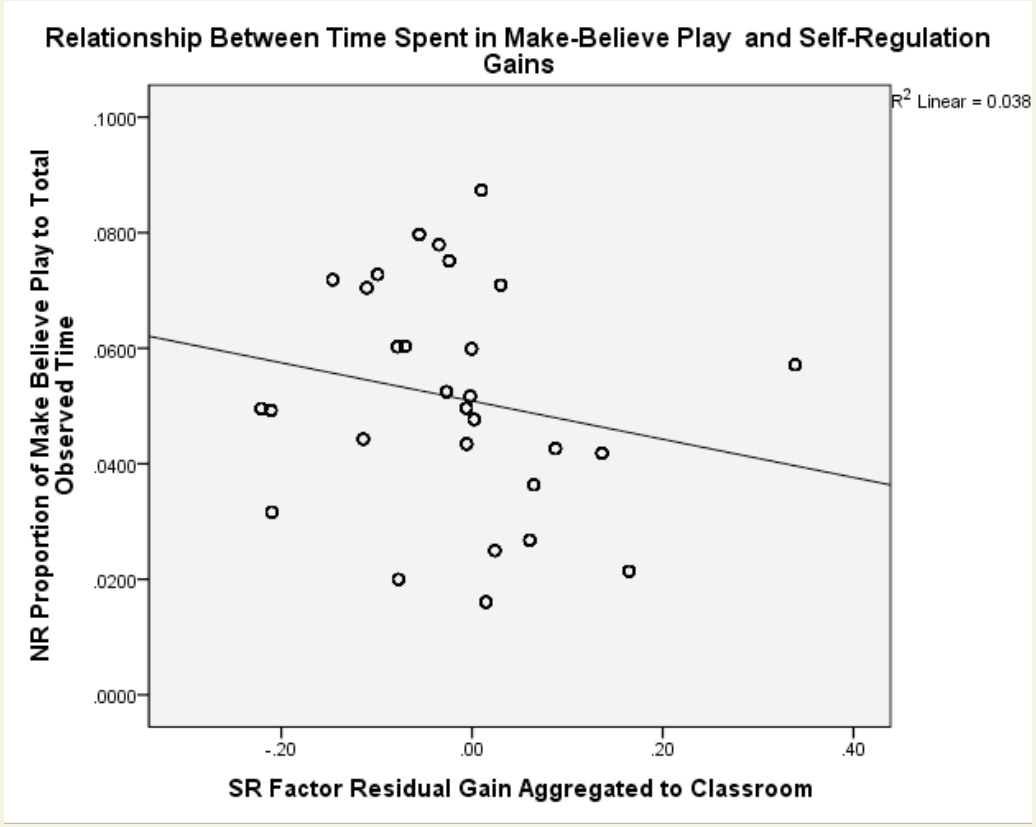
Exploring the Theoretical Model Make Believe Play

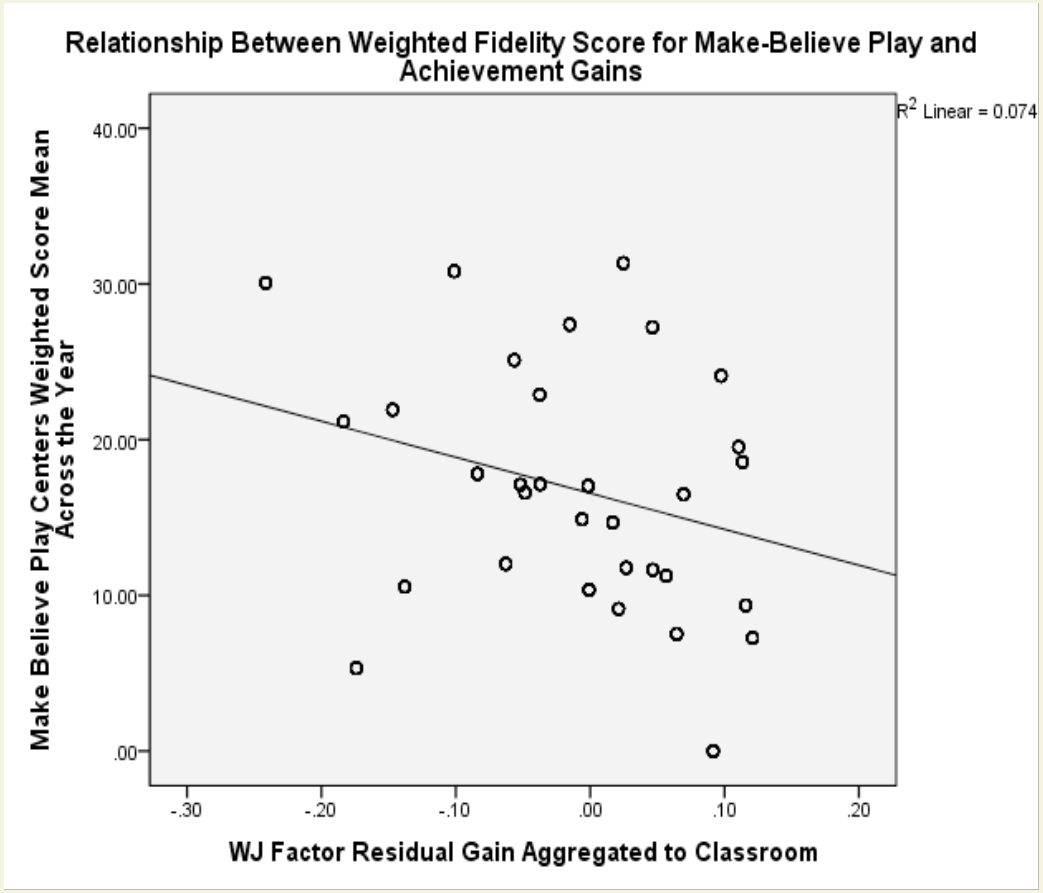
- Narrative Record identified *Tools* time blocks
  - Calculated average time in MBP in *Tools* classes
  - Scored fidelity of MBP implementation
  - Analyses examined effects of average quantity and quality of MBP
- MBP *quantity* **negatively** related to EF gains
- MBP *fidelity* **negatively** related to achievement gains

Socio dramatic play may require much more careful thought to be effective in classrooms

MBP Quantity and Self Regulation Gains Across 32 *Tools* Classrooms $p = .09$



MBP Fidelity and Achievement Gains Across 32 *Tools* Classrooms $p = .09$



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What was Related to Gains in EF?

1. The amount of "Behavior Approving" by the teacher
2. The quality of instruction provided by the teacher
3. The amount of active listening to the teacher by the children

Tools of the Mind and Comparison classrooms did not differ on these key elements.

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Final Thoughts

- EF skills are important for achievement in school
- EF and achievement gains linked during Pre-K
- A curriculum that could improve EF and achievement would make a great contribution
- Finding an effective approach requires careful experimentation and an examination of the theoretical models using empirical evidence from the actual enactment of the approach in classrooms
- Although *Tools of the Mind* seems like the right approach, these data do not support its effectiveness in its present form.