Successes and Challenges of Extending an Effective Classroom-Based Math Board Game Intervention to the Home

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Outline

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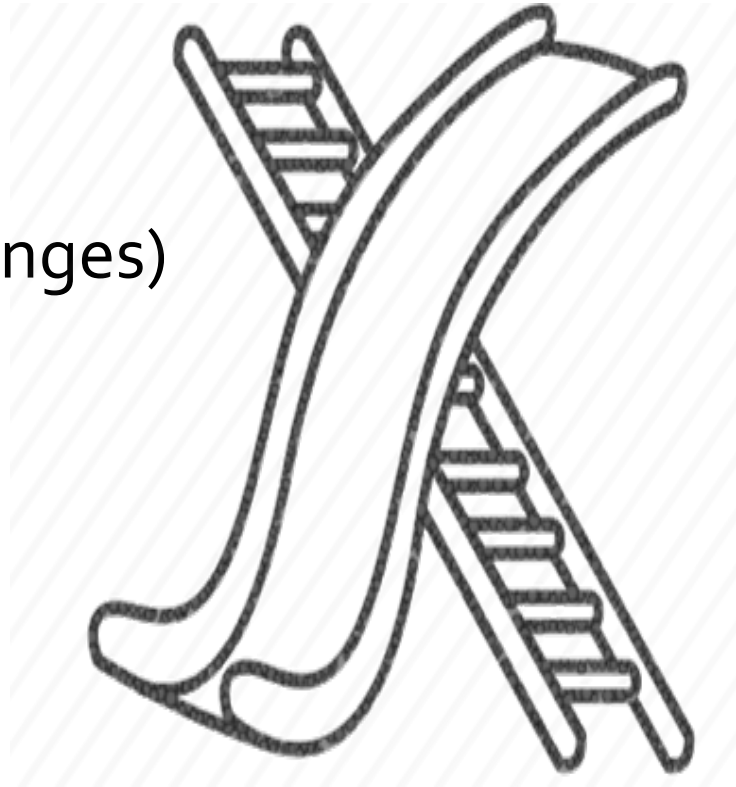
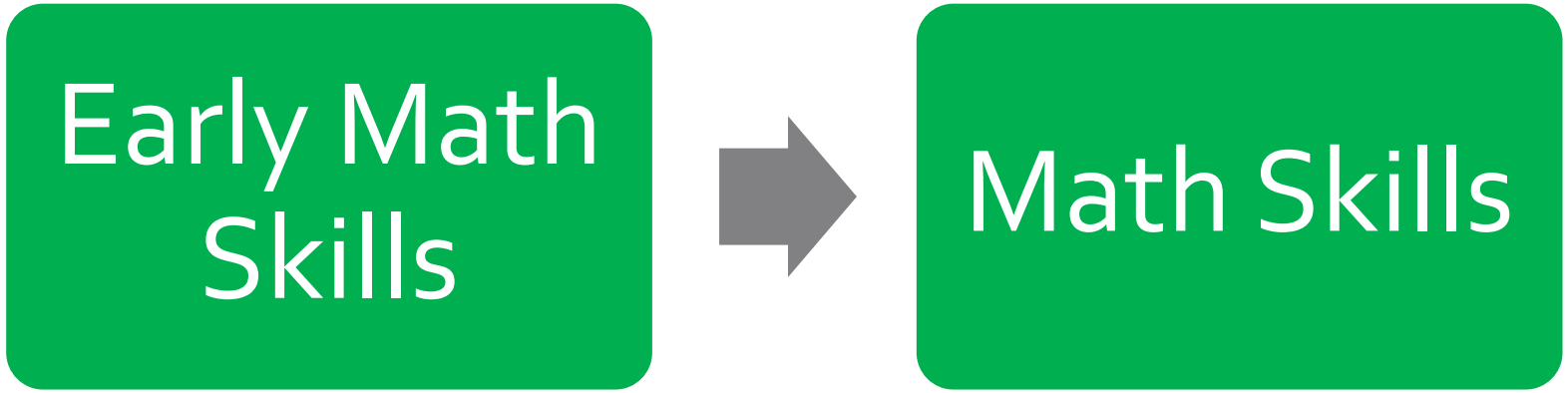


Theoretical Framework

- Many children from low-income backgrounds start school with limited math skills



(Crosnoe & Cooper, 2010; Duncan et al., 2007; Galindo & Sonnenschein, 2016; National Math Advisory Panel, 2008; Ramani & Siegler, 2014)

Theoretical Framework

- Family engagement and effective home-school partnerships can mitigate the income-related achievement gaps
- Parent beliefs play an important role in the math activities that children engage in at home, which are associated with children's math skills development
- For more effective home-based interventions, we must consider parents' ability to implement the tasks and barriers to parents' participation

(Cannon & Ginsberg, 2008; Epstein, 2001; Hoover-Dempsey & Sandler, 1997; Mapp & Kuttner, 2013; Sonnenschein et al., 2012, 2016)

Classroom-Based Intervention

- Ramani and Siegler's work
  - Playing linear board games with numbers on them improves children's early math skills
    - The Great Race
    - Count-on procedure
  - Small groups in child's classroom
  - About an hour of play over 2 weeks

(Ramani & Siegler, 2008, 2011; Ramani, Siegler, & Hitti, 2012; Siegler & Ramani, 2008, 2009)

Study 1: Initial Implementation

- 84 families in Head Start
- Three conditions
  - Chutes and Ladders with count-on procedure
  - Chutes and Ladders with traditional directions
  - Candy Land
- Test children, train parents, children play game at home for 5 weeks, test children again

Study 1: Successes

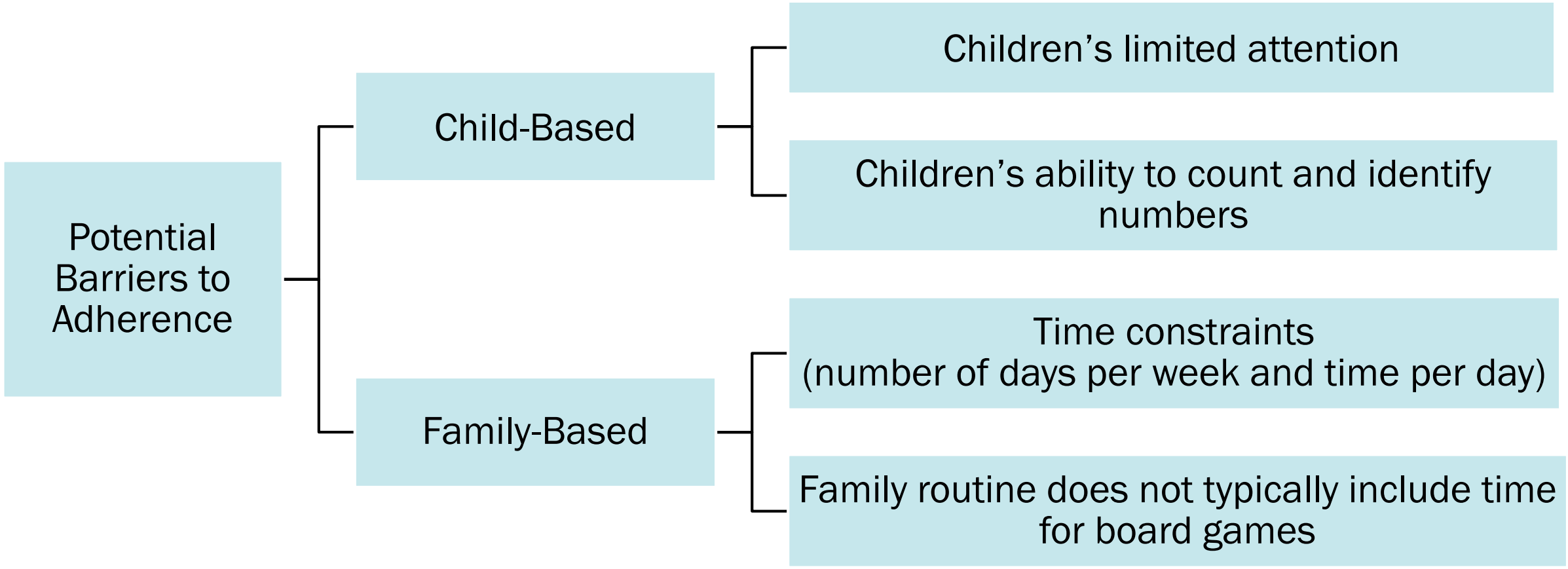
- Children reportedly played Chutes and Ladders or Candy Land an average of 8 hours during the five weeks
- Significant increase in children's counting and numeral identification (did not differ across conditions)
- Parents believed their children gained math skills

Study 1: Challenges

- Training some parents was difficult due to availability
- 35% of interviewed parents reported that their children never play board games at home before the intervention
- Only 57% of children always played the game with an adult
- Many parents did not play the games as we had hoped
  - Only 50% of parents in the experimental condition reported using the count-on procedure (21% specifically said they did not)
  - 17% of parents reported using counting when playing Candy Land

Parent Focus Groups

- 40 parents/primary caregivers of children in Head Start centers used in the interventions



Parent Focus Groups

Addressing Barriers for Future Implementation	
Focus Group Suggestion	**Improvement Made to Intervention**
Train children at their school to increase familiarity with the special counting procedure	**Child training in school added**
Provide children with an incentive to keep their attention while playing	**Sticker Charts added**
Allow parents to play until child is no longer engaged, rather than requiring them to finish the game each session	**15-20 mins. play time (not required to get to 100 on the board)**

Study 2: Revised Intervention

- 98 families in Head Start
  - Mean age of children- 4.07 years
  - 38 parents participated in post-study interviews

- Three conditions- Chutes and Ladders
  - Stickers
  - Child Training
  - Stickers and Child Training

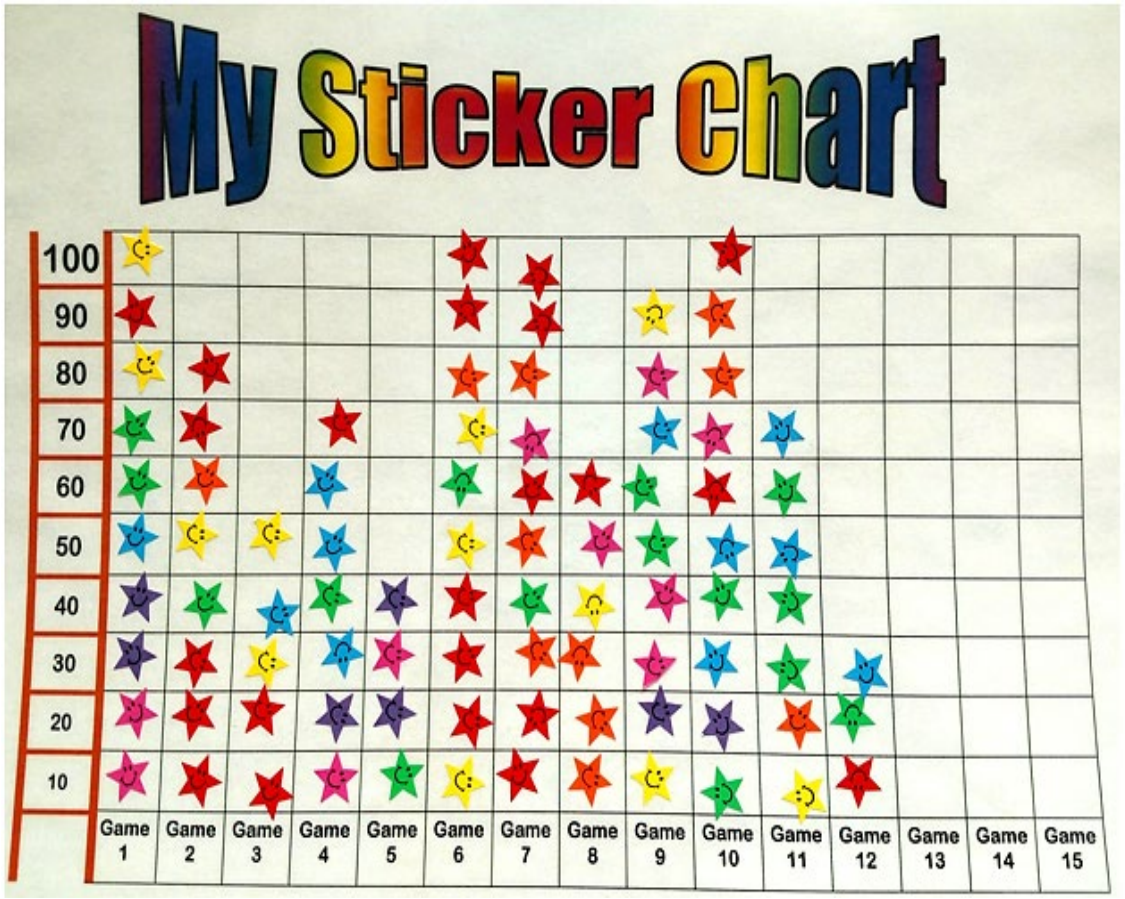
- Control group tested only- no game sent home

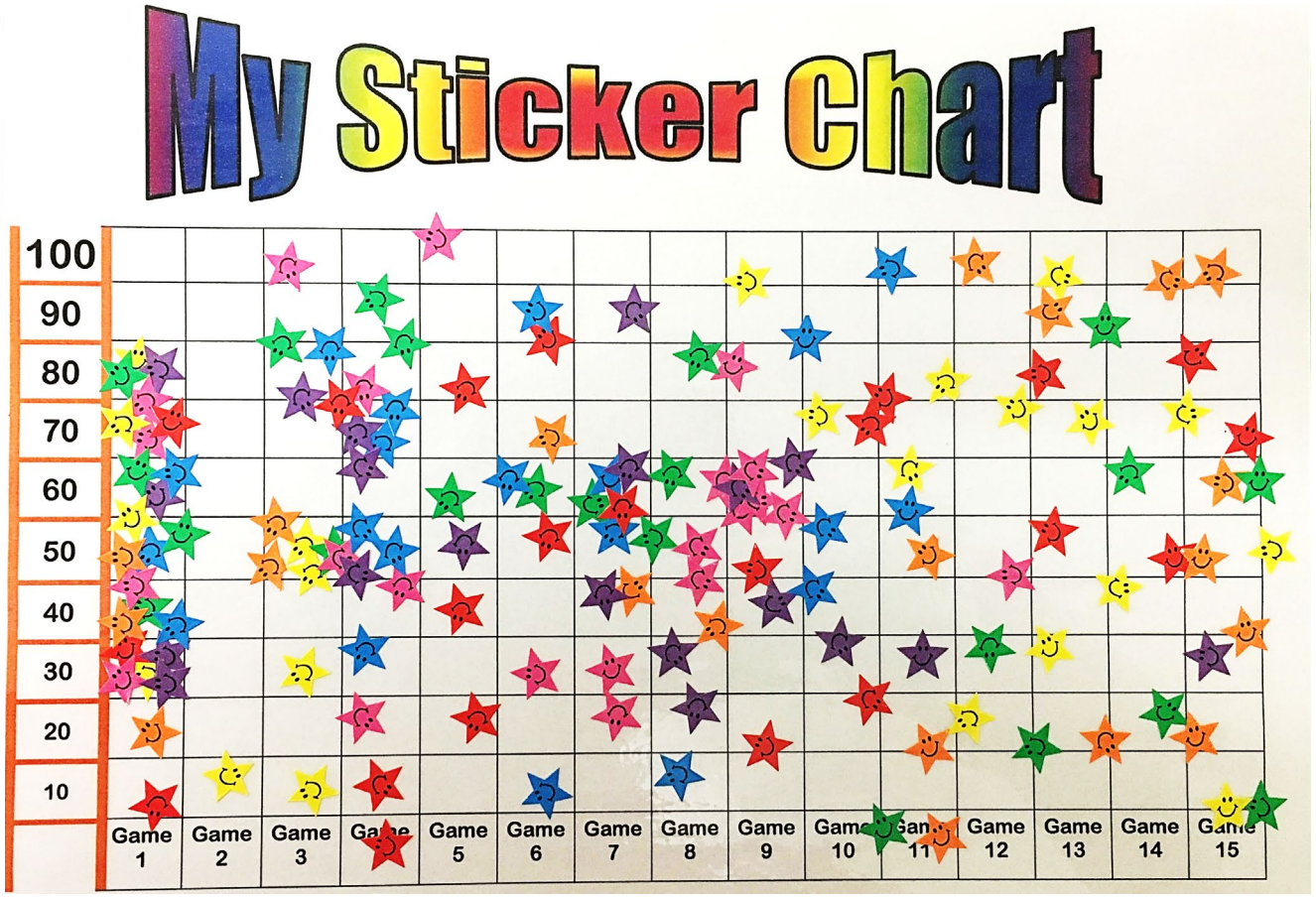
Retrieved from: https://voicesofglass.wordpress.com/2012/01/23/bpd-the-snakes-or-chutes-ladders-of-mental-health/

Study 2: Successes

- Parents were enthusiastic about playing the game
  - 58% reported children's improved counting
  - 37% reported children's improved number recognition
  - Reported improvements in social/emotional skills including patience, taking turns, and sharing
- 63% of parents used the count-on procedure (higher than Study 1)
- Significant increase in children's numeral identification (all groups)
- Children in sticker chart condition significantly improved their number line estimation, compared to a decrease in the control group

Study 2: Challenges





Study 2: Challenges

- *"…it was **difficult for her because we're still learning the numbers** so it was kind of hard for her to start in the middle say okay mommy let's start so what's this number next to it? That's a 1. Okay so 31 you know. It was hard at first but once she got into the hang of it and I kept saying what's the number next to it she kind of got it."*

- *"…she seemed like it [was] kind of **hard for her to grasp** once you start counting. Once you get your numbers and start counting, start counting from where we left off [as] opposed to 1, 2, 3 counting the spaces…she seemed to improve but you know she had to have several reminders."*

Conclusions

- Our home-based intervention approach was less successful than a similar classroom-based intervention
  - Parents may have had more barriers to using the board game than teachers and paraprofessionals in the classroom
  - Parents did not adhere to count-on procedure consistently
- Parents were excited to play, but better training and support (school/home partnerships) may be helpful
- Future interventions need to "meet parents where they are"
  - Incorporate tasks/activities into already established routines
  - Link tasks/activities to parents' beliefs to increase adherence

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