



Encouraging Exploration: How Facilitation Supports Children's STEM-Talk in Museums

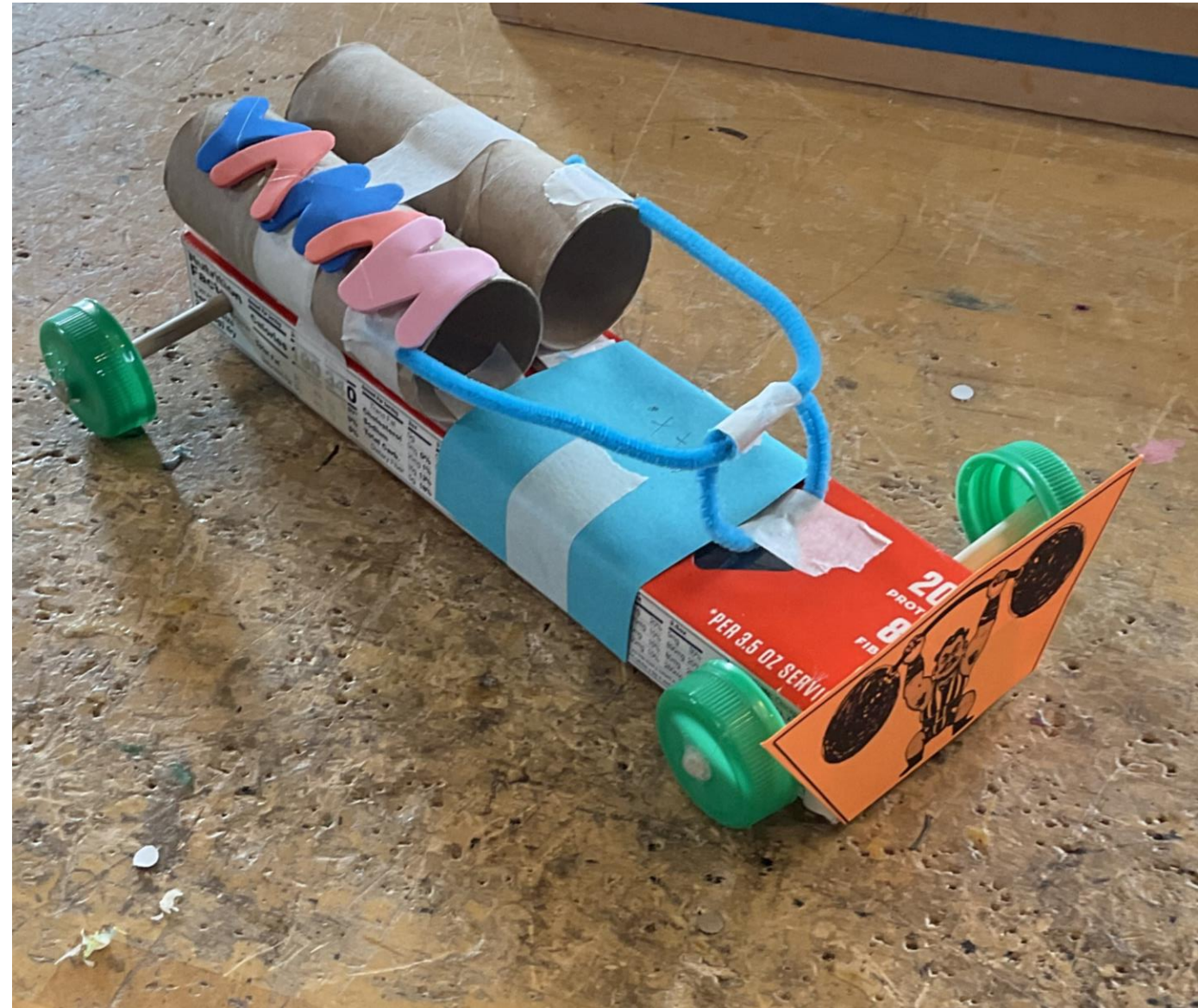
Neva Lang, Milla Metlicka, & Catherine A. Haden

Loyola University Chicago

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Introduction



- Program design and facilitation strategies used by museum staff can promote conversations about STEM concepts (Mohabir et al., 2021) and provide opportunities for increased parent-child engagement while tinkering (Letourneau et al., 2021).
- The current study examines how children's levels of engagement in a pre-tinkering orientation provided by museum staff may promote STEM talk while reflecting immediately after tinkering.

Methods & Participants

- 33 parent-child dyads participated in a tinkering activity at Chicago Children's Museum where they made cars for a paper circus character. All children participated in a post-tinkering reflection about their experience.
 - Children were 4-10 years old ($M = 6.88$, 23 girls, 10 boys)
 - 54.5% White, 24% Mixed, 12% Latine, 6% Black, 3% Asian
 - **Orientation type:** prior to tinkering, 22 families received a solo orientation about the tinkering experience by a museum staff member; 10 received a group orientation.



Coding

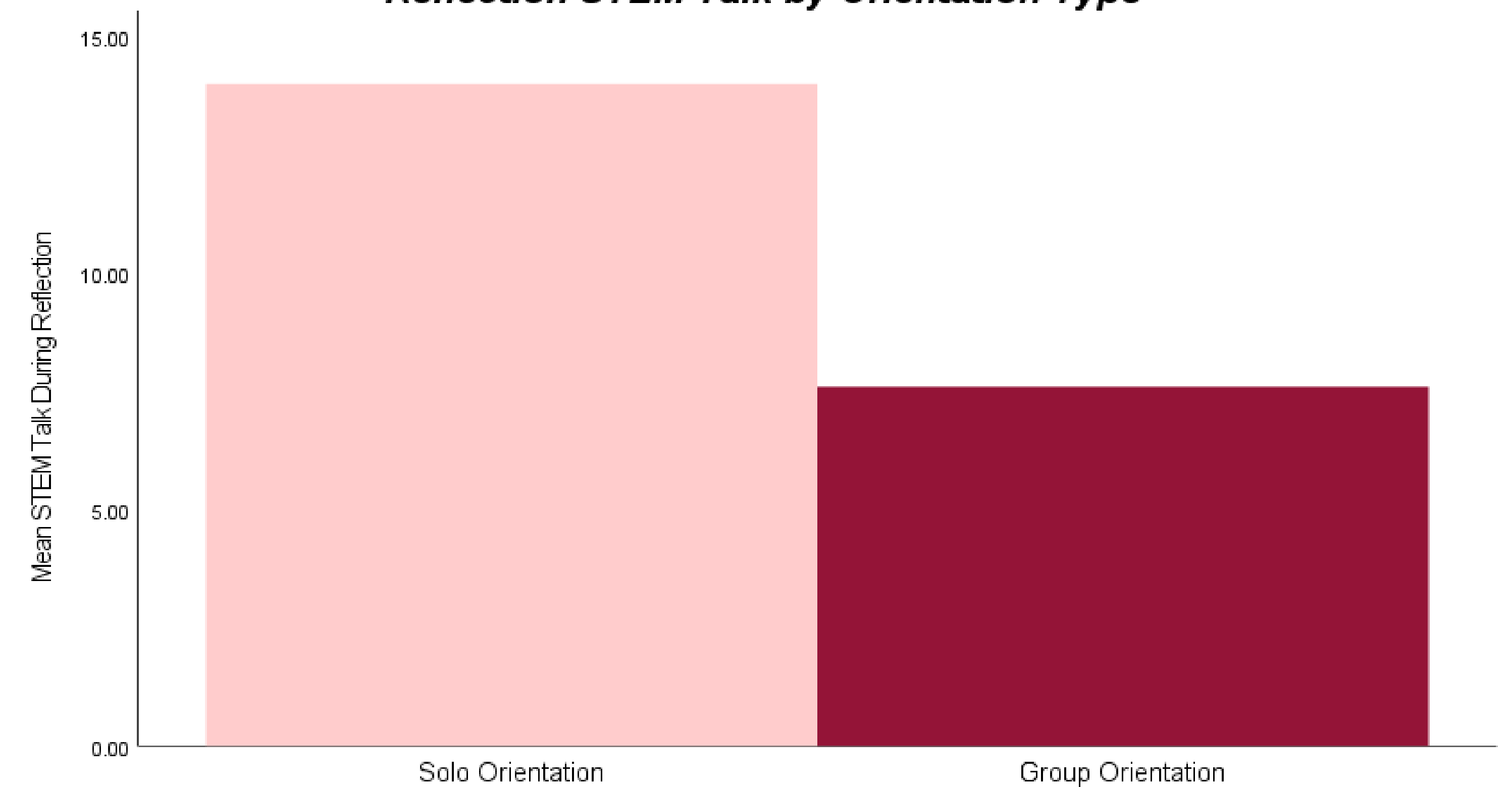
- Children's engagement during the orientation was coded as low engagement (giving yes/no answers to questions), or high engagement (giving explanations and asking questions).

STEM Coding

Code	Description	Example
Project Name	Labeling what they made.	"We made a monster truck."
Naming Tools and Materials	Naming the tools and materials used to build their project.	"We used cardboard, ribbons, beads."
Function of Tools and Materials	Talking about the function of the tools and materials they used.	"We used wires like to hold it together."
Metacognition	Referring to being aware of their own or their parent's cognitive thought process.	"Grandma had ideas to help me glue things together."
Engineering	Talk about testing, fixing, and redesigning their creation.	"The first time that I put it in a test, it wasn't working... and then I changed it to some wheels."
Challenge Language	Talk about aspects of wheels and axles that help a car roll.	"If you want something to roll you need to have an axle."
Predictions and Explanations	Using causal language to link related events or actions.	"I used the big wheels to try and make it go faster."
Mathematics	Talk about quantity, size, measurement, length, height, weight, geometric shapes, and distance.	"The most we ever got was 34 inches."

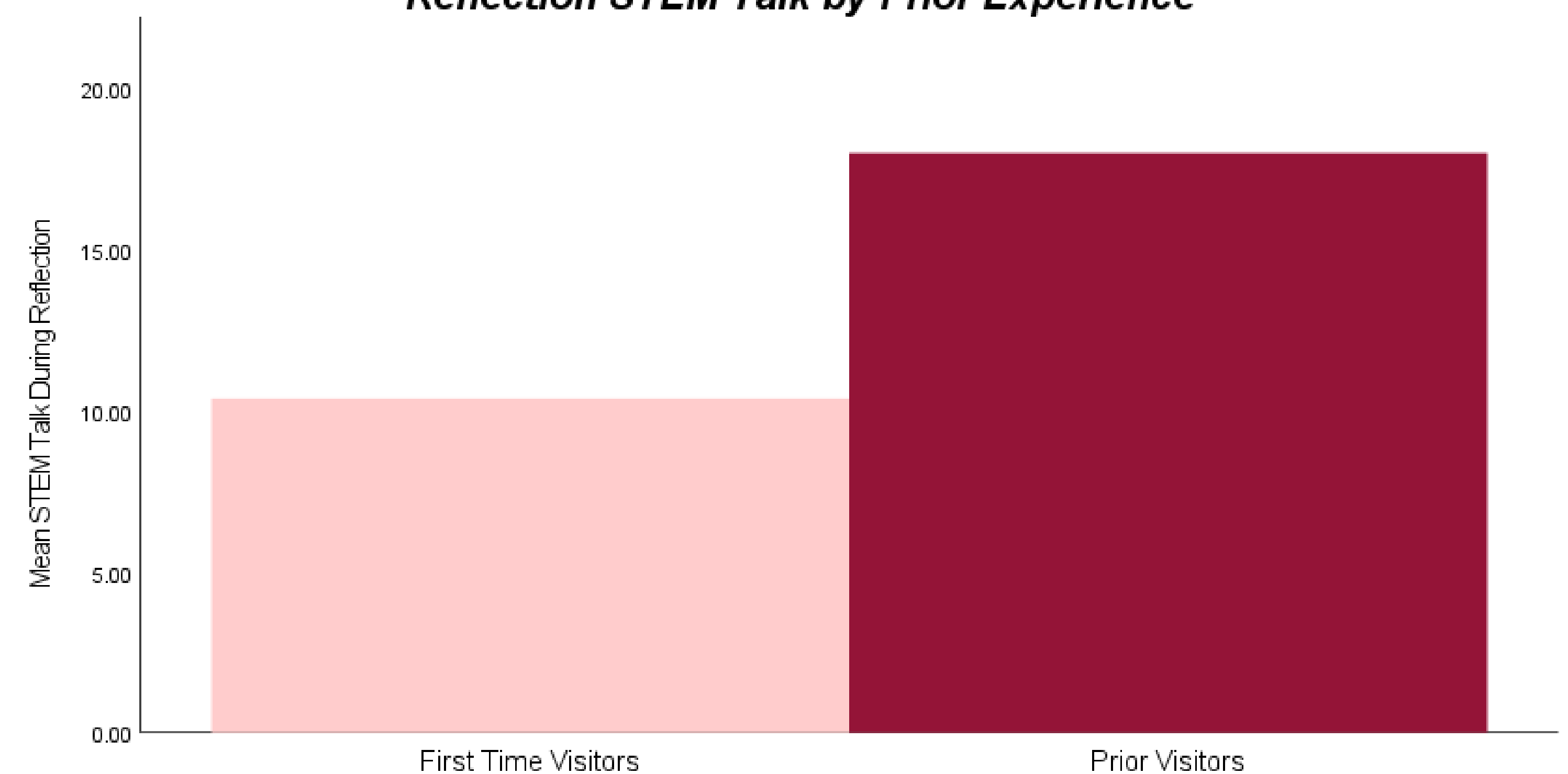
Results

Reflection STEM Talk by Orientation Type



- Children who were given a solo orientation used significantly more STEM talk in the post-tinkering reflections than children who were given a group orientation, $t(30) = 1.99$, $p = .028$.

Reflection STEM Talk by Prior Experience



- Children who had previously visited the Tinkering Lab used more STEM talk in the post-tinkering reflections than first time visitors, $t(31) = 2.29$, $p = .029$.
- Most children were highly engaged in the orientation ($N = 24$).
- There were no differences between children who demonstrated high or low levels of engagement in the orientation when considering children's STEM talk in the post-tinkering reflections, $F(1,31) = 0.17$, $p = .69$.

Discussion



- Overall, one-on-one explanations of related science concepts prior to tinkering seem to support children's STEM talk while reflecting on their tinkering experiences.
- Our study suggests that prior tinkering experiences support children's STEM talk about subsequent tinkering activities.
- The lack of difference in STEM talk by engagement level suggests that the orientation may be helpful to all children, regardless of how talkative they are.
- In ongoing work, we are examining how participation in the tinkering activity may have varied by orientation type and children's engagement in the orientation.