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Gender Differences in Children's Prior Play Experiences as a Predictor of Success in Engineering Tasks

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Authors

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Introduction

- Research shows that female student's science and mathematical scores are consistent with their male peers (NSF, Science & Engineering Indicators, 2018), yet women are still drastically underrepresented in STEM related fields (Corbett & Hill, 2015.)
- It has been found that early exposure to STEM concepts and practice leads to later success in the field (McClure et al. 2017)

Research questions:

- Is there a difference between male and female children's interests in engineering and construction activities?
- Is there a difference between male and female success in an engineering activity?
- Are prior interests in engineering a predictor of success in engineering tasks?

Methods

Participants:

68 families (M age = 5.5 years)

Procedure:

- Families attended family night at the Science center
- Children were asked to fix a wobbly structure by adding or removing pieces to make it more sturdy both with a parent and without.
- Parents were asked to complete surveys, ranking their child's interest in playing with building activities before the museum visit, their child's knowledge before the experiment on construction activities, and how much they believe their child learned from the activity.
- The parents also completed surveys on their child's interest in various activities such as legos, art, music, construction, and video and card games etc. The three areas of interest with significant differences between gender are shown in the figures .

Measures:

- Success in the engineering task was measured by the ratio of functional to total pieces added. Functional pieces include cross braces and other pieces that improve the stability of the structure.
- Surveys were rated on a scale of 1 (very little knowledge or interest) to 7 (great knowledge or interest)

Figures

Figure 1:

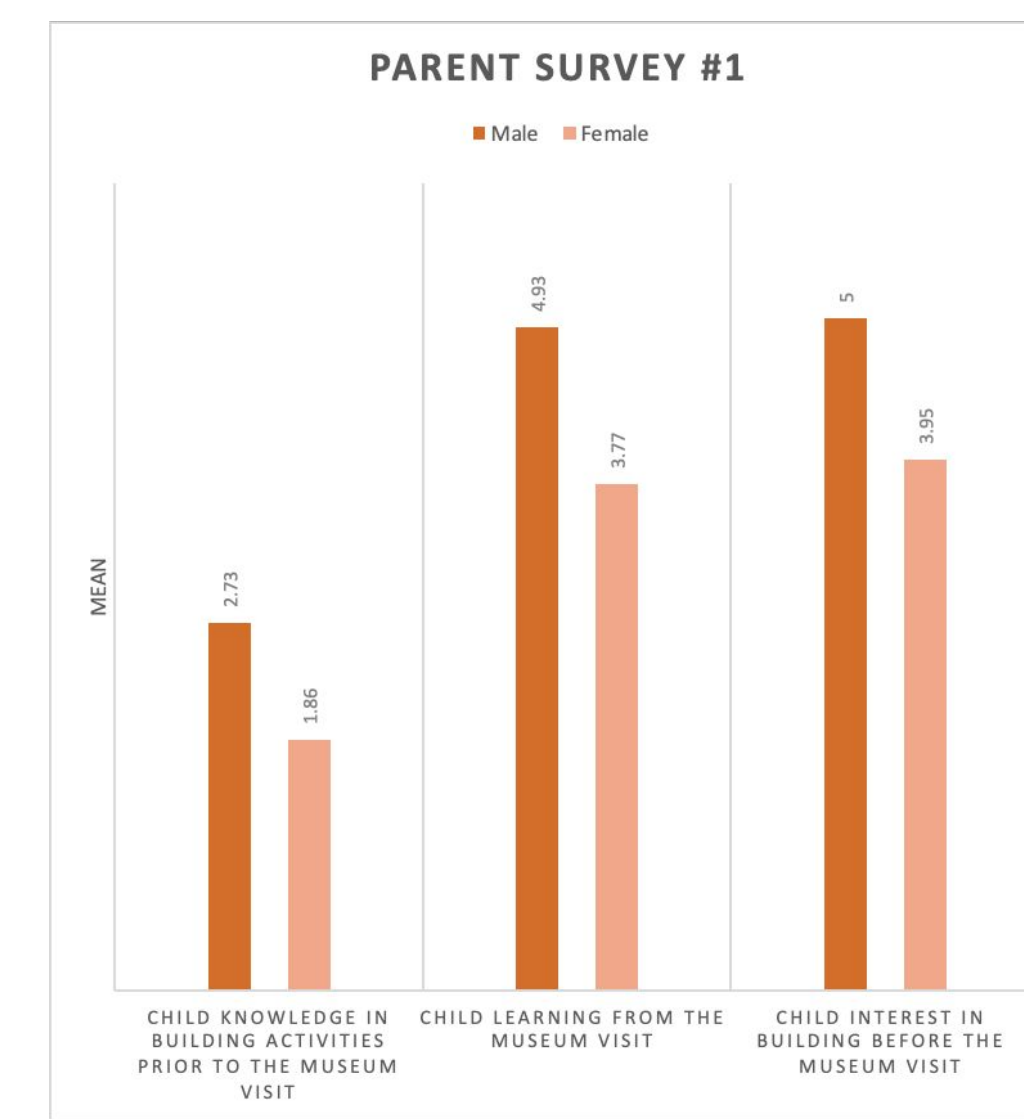


Figure 1: Gender difference in child knowledge in building activities prior to the museum visit in $F(1, 64) = 4.82, p < .05, n^2 = .07$, gender difference in child learning $F(1, 64) = 7.85, p < .05, n^2 = .11$, gender difference in child interest before the museum visit $F(1, 64) = 5.26, p < .05, n^2 = .08$

Figure 2:



Figure 2: Gender difference in child interest in legos $F(1, 64) = 11.1, p < .05, n^2 = .15$, gender difference in child interest in construction $F(1, 64) = 6.01, p < .05, n^2 = .09$, gender difference in child interest in art $F(1, 64) = 5.44, p < .05, n^2 = .08$

Figure 3:

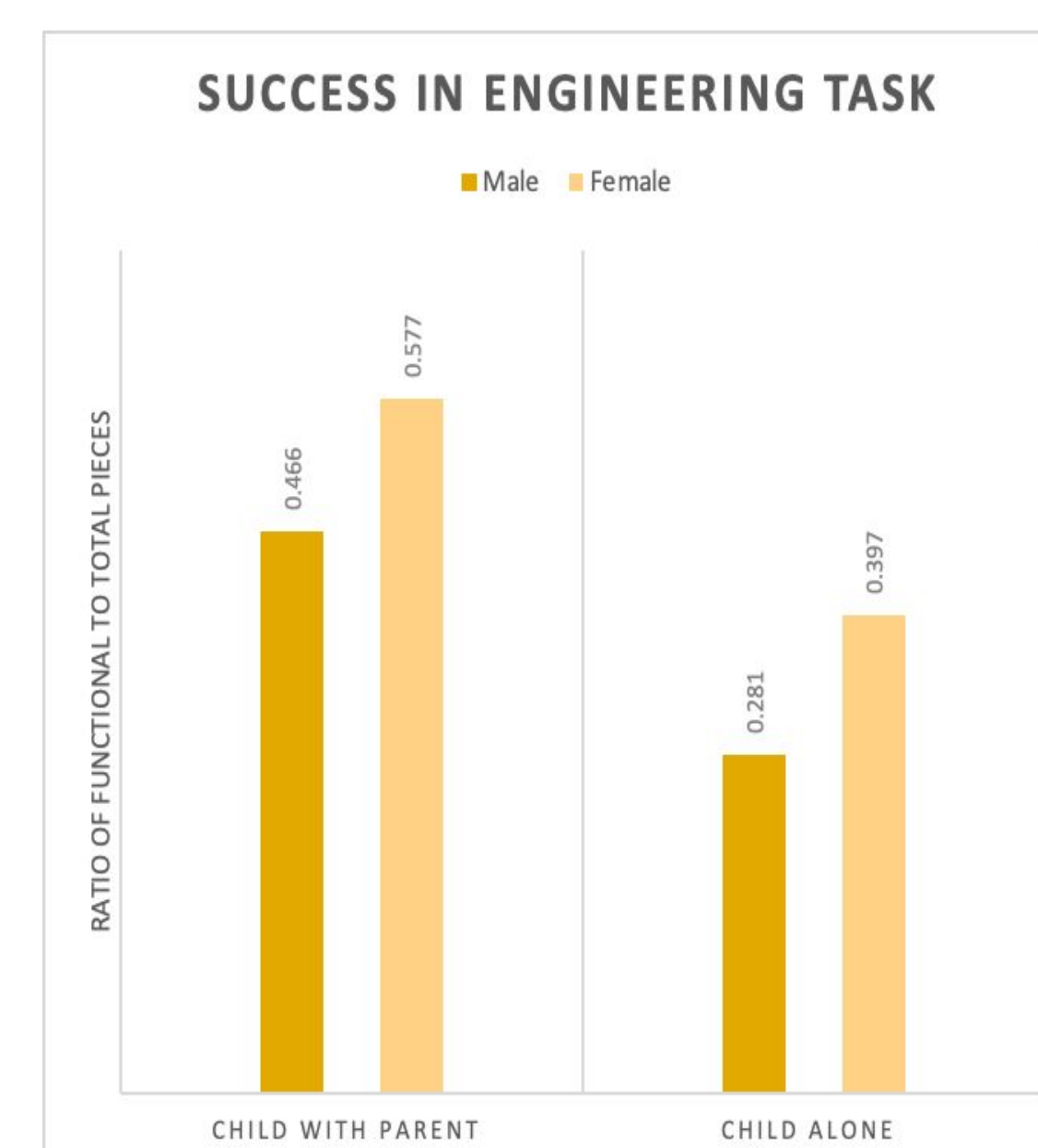
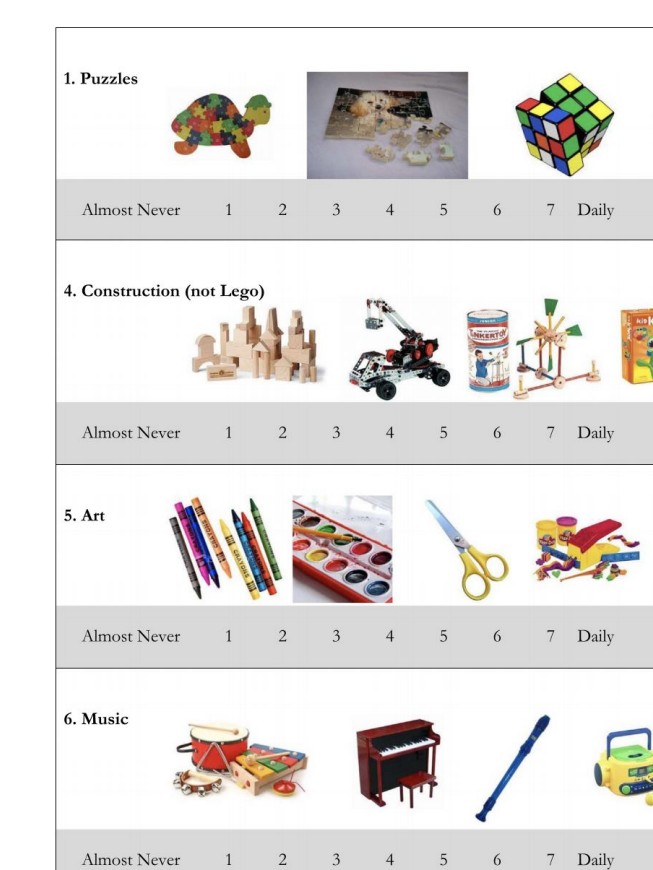


Figure 3: Gender difference in ratio of functional to total pieces with parent $F(1, 64) = 1.61, p > .05, n^2 = .03$, gender difference in ratio of functional to total pieces without parent $F(1, 64) = 1.49, p > .05, n^2 = .02$



Results

- It was hypothesized that the males will have a higher prior interest in engineering than the females, so they will have higher success in the tasks.
- The statistical tests showed that parents were more likely to report male children to have greater knowledge, interest and learning in construction tasks than female children.
- They also showed that parents were more likely to report that male children were more interested in legos and construction than females, while females were more interested in art than males.
- Lastly, the data showed that there was no significant difference between male and female children's success in the engineering task both with and without a parent.

Discussion

- The hypothesis was rejected because males did not perform significantly better on engineering tasks compared to females
- However, parents did report that male children had greater prior interest and knowledge in construction activities and games than females
- Male's prior interest was not a predictor of success in the engineering task
- This is consistent with past research that males and females perform similarly in STEM related tasks
- A limitation of this study is that the sample size is unequal between males and females which could skew the results
- Limitation is that prior interest is based off of parent report
- Stereotypes most likely play a role in parent reportings
- Parents may encourage males children to play with more STEM related activities than females due to stereotypes
- we must encourage female children to participate in engineering activities
- Future research should look at gender differences in other STEM related tasks, and stereotypes at home