

## Background

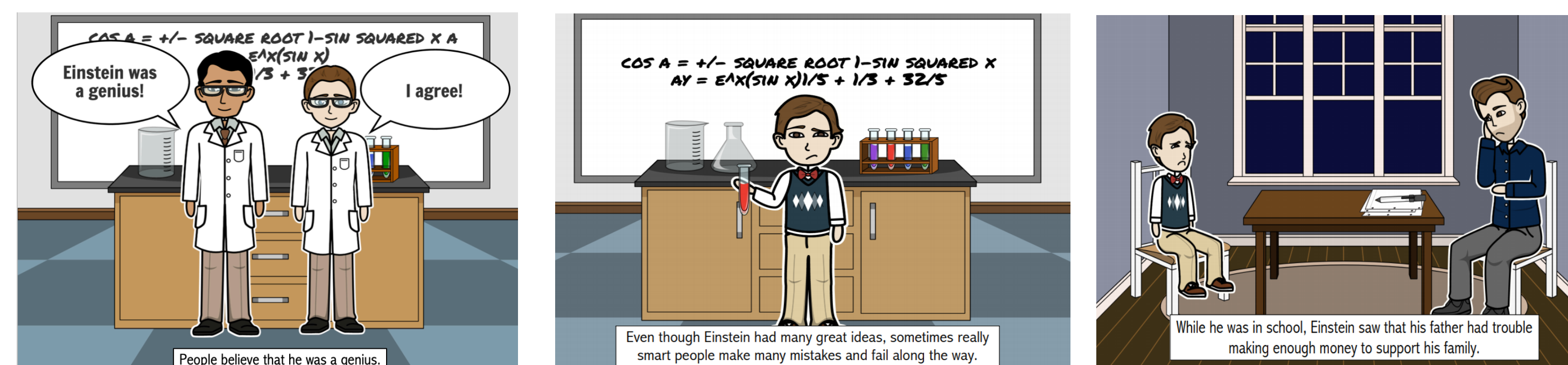
- Perceiving academic achievement and success as a product of an innate exceptional ability, rather than a product of active effort can have negative effects on students' STEM performance (e.g., Lin-Siegler, Ahn, Chen, Fang & Luna-Lucero, 2016).
- Lin-Siegler et al. (2016) found that storybooks are an effective way to encourage students motivation in science subjects. High-school students who read about famous scientists' intellectual and personal struggles performed better in their science classes than students who only read about famous scientists' academic achievements.
- Research has shown that young children's science performance can be impacted by subtle differences in language (Rhodes, Yee, Leslie & Saunders, 2019).
- Previous research has not investigated whether reading certain types of stories impacts young children's persistence and motivation.

## Research Question

- To what extent will a book-reading intervention impact young children's motivation and persistence on a STEM task?

## Method

- Participants:** 62 4-5 year old children ( $M = 59.901$  months;  $SD = 5.66$  months;  $female = 30$ ).
- Children read one of three storybooks:



Achievement ( $N = 19$ )

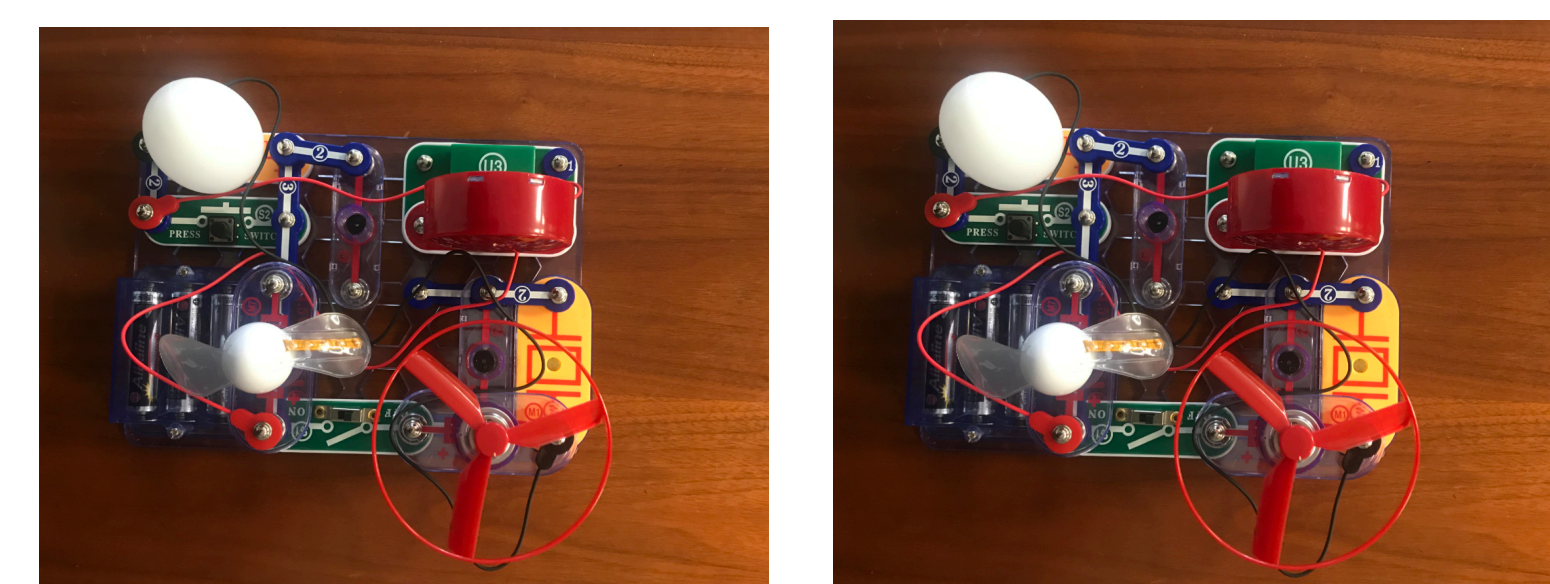
Intellectual Struggle ( $N = 21$ )

Life Struggle ( $N = 22$ )

- After reading the storybook, children were asked questions adapted from the Dimension of Mastery Questionnaire (DMQ18), which examined their persistence and motivation when faced with a challenge.

## Method Continuation

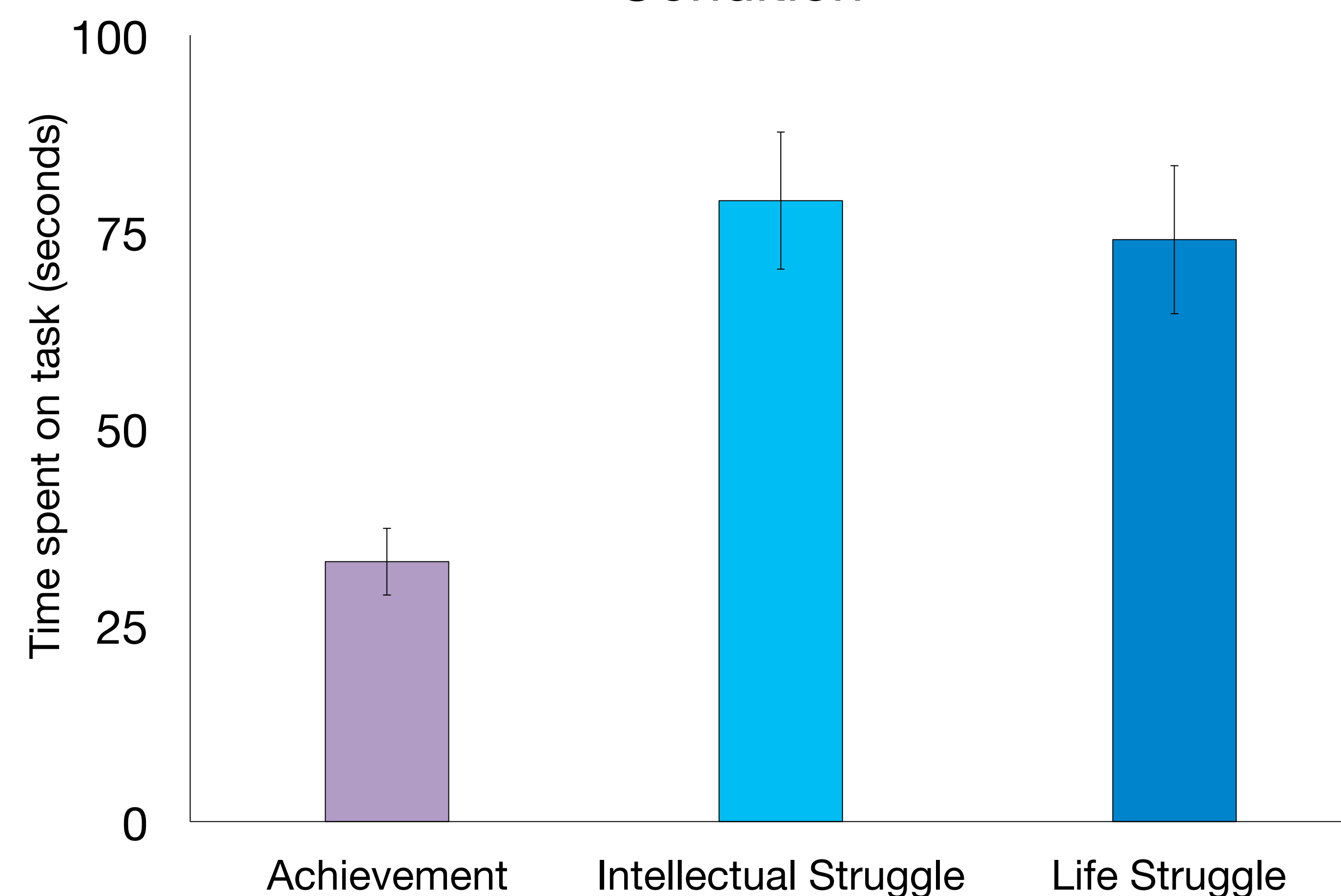
- Following the questionnaire the child was presented with an impossible STEM task, which consisted of two identical photographs of Snap Circuits, as seen below (e.g., Pitcairn & Wishart, 1994).



**"Your job is to find the differences between these two Snap Circuits. Let me know whenever you're done."**

## Results

Figure 1. Persistence on STEM Task by Condition



- Analyses revealed that there was a significant difference between conditions, with children in the Intellectual Struggle and Life Struggle conditions persisting longer on the impossible STEM task than children in the Achievement Condition ( $\beta = -45.90$ ,  $SE = 11.6$ ,  $p < 0.0001$ ).
- There was no difference between the Intellectual Struggle and Life Struggle conditions ( $\beta = -4.95$ ,  $SE = 11.2$ ,  $p = 0.66$ ).

## Conclusions

- These findings suggest that reading about the struggles of a famous scientist can boost children's motivation and persistence in STEM.
- These findings also extend previous research with high school students, showing that even young children are sensitive to subtle differences in language cues about scientist achievements and struggles. This can inform the ways in which storybooks are used to motivate students towards STEM subjects and reframe students' beliefs regarding effort and achievements.

## Future Directions

- Future research could examine whether a short storybook intervention such as this one could have long-term benefits for students' motivation in STEM subjects. This future work can also investigate developmental differences in children's persistence as they enter formal schooling.

## References

- Lin-Siegler, X., Ahn, J. N., Chen, J., Fang, F.-F. A., & Luna-Lucero, M. (2016). Even Einstein struggled: Effects of learning about great scientists' struggles on high school students' motivation to learn science. *Journal of Educational Psychology*, 108(3), 314–328. doi: 10.1037/edu0000092
- Pitcairn, T. K., & Wishart, J. G. (1994). Reactions of young children with Down's syndrome to an impossible task. *British Journal of Developmental Psychology*, 12(4), 485-489.
- Rhodes, M., Leslie, S. J., Yee, K. M., & Saunders, K. (2019). Subtle linguistic cues increase girls' engagement in science. *Psychological science*, 30(3), 455-466.

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