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Background

The lack of students who choose to major in science, technology, engineering, or mathematics (STEM) fields is a growing concern in the United States and across the world. Because an individual's attitudes and understandings of STEM are likely shaped by "an individual's direct, personal experiences, needs, expectations, and culture"¹ it is important to address the issue from a systems perspective.

Family Influence: Family culture plays a vital role in developing STEM interests. Parents have been shown to be important in encouraging the STEM interests of youth. Parents who discuss the value and importance of STEM tend to have children with a higher level of self-efficacy and STEM outcome expectancies.² Youths' interest in STEM careers is related to their families' science capital and science habitus.³

However, most programs aimed at increasing youth interest and career aspirations focus on the youth and **little is known about programs that seek to approach the problem from a systems perspective**. Of particular importance is increasing the tools parents have to support the STEM interests and career aspirations of their children.

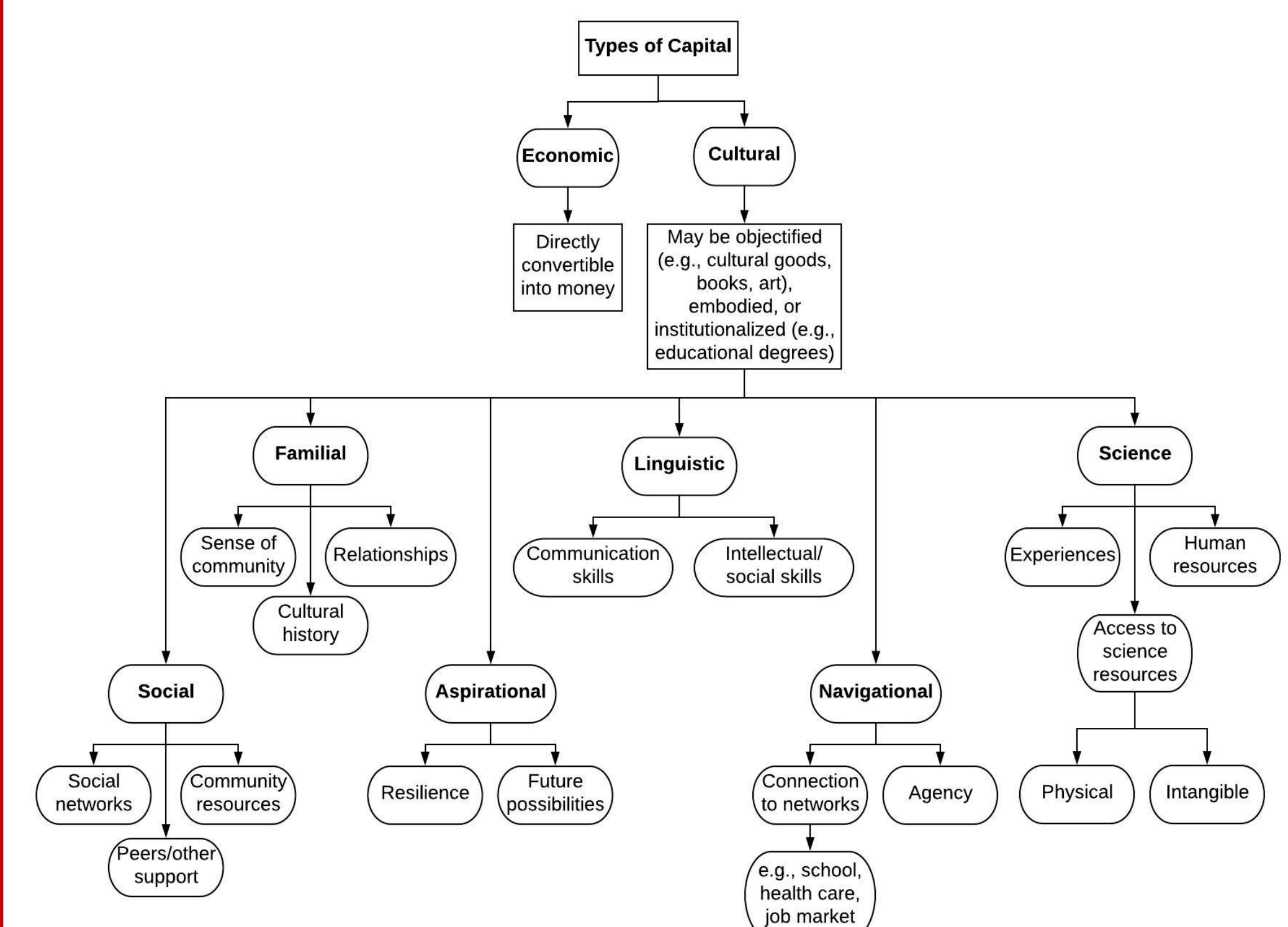
Research Question

How does participation in a museum-based, family STEM program aimed at increasing the science capital and family habitus of youth influence the:

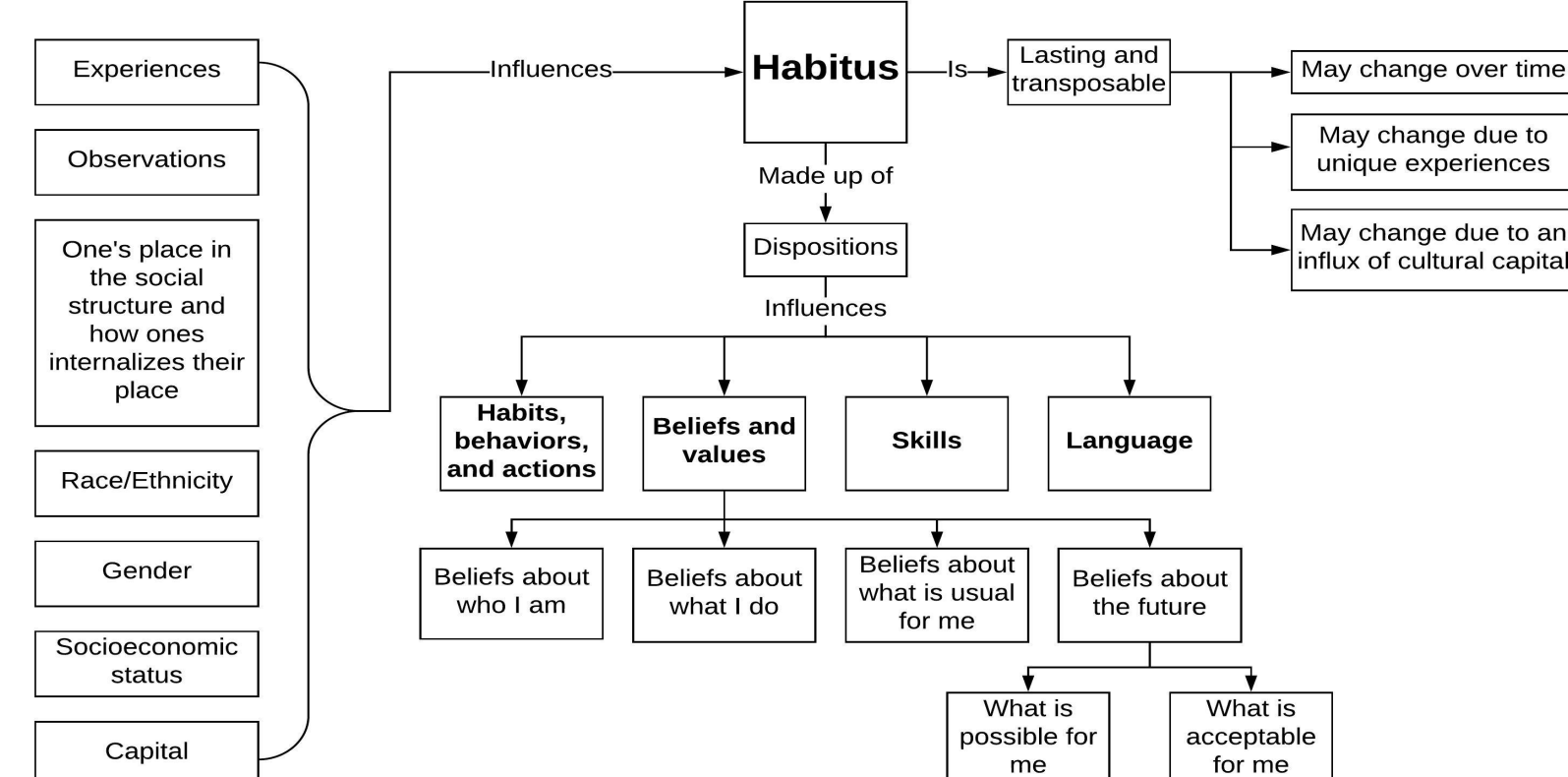
- Cultural capital and science habitus of the adult participants?

Theoretical Frameworks

Community Cultural Wealth Theory: the types of knowledge, connections, and capabilities communities possess⁴



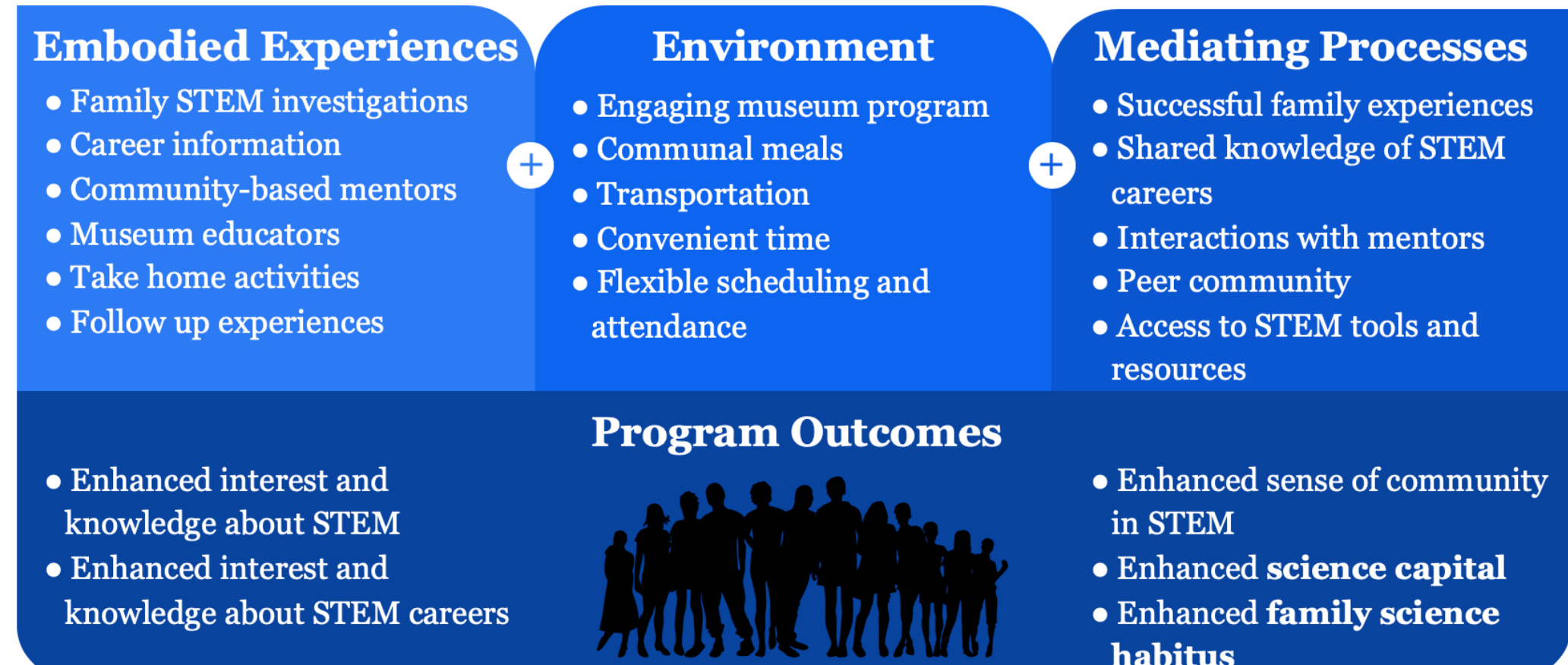
Science Family Habitus: beliefs, dispositions, and behaviors families hold related to what is appropriate, acceptable, and possible for them related to science⁵



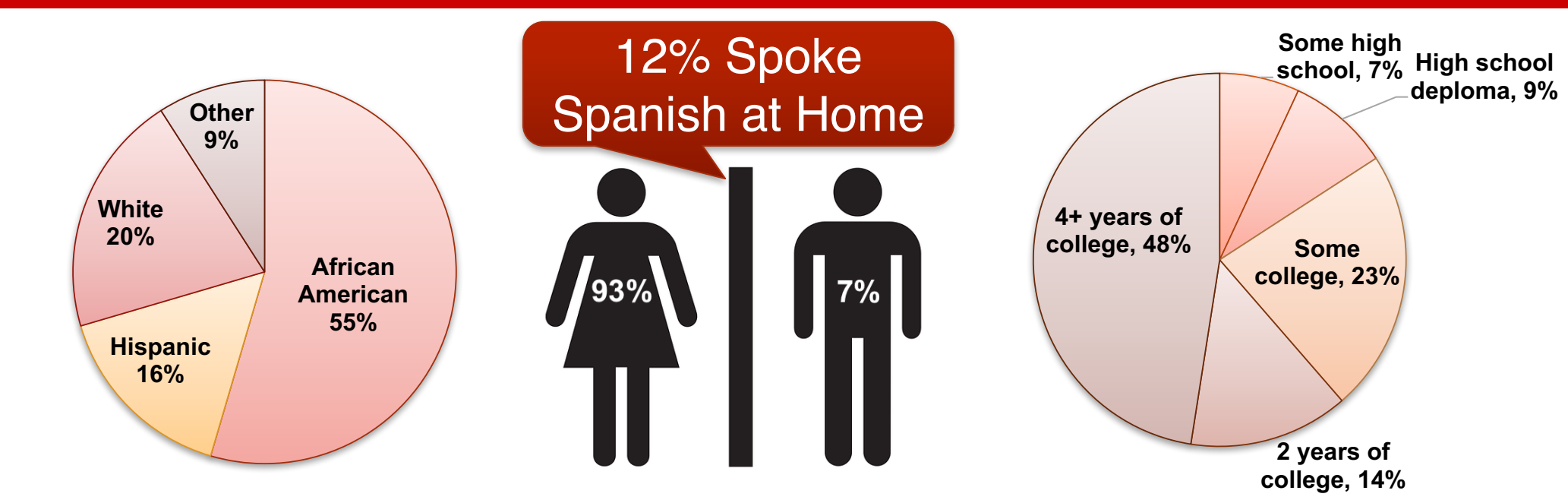
Methods

This quasi-experimental⁵ family STEM program, included the *NextGen Scientist Survey*, and 11 intensive family case studies.

FAME: Families and Museums Exploring

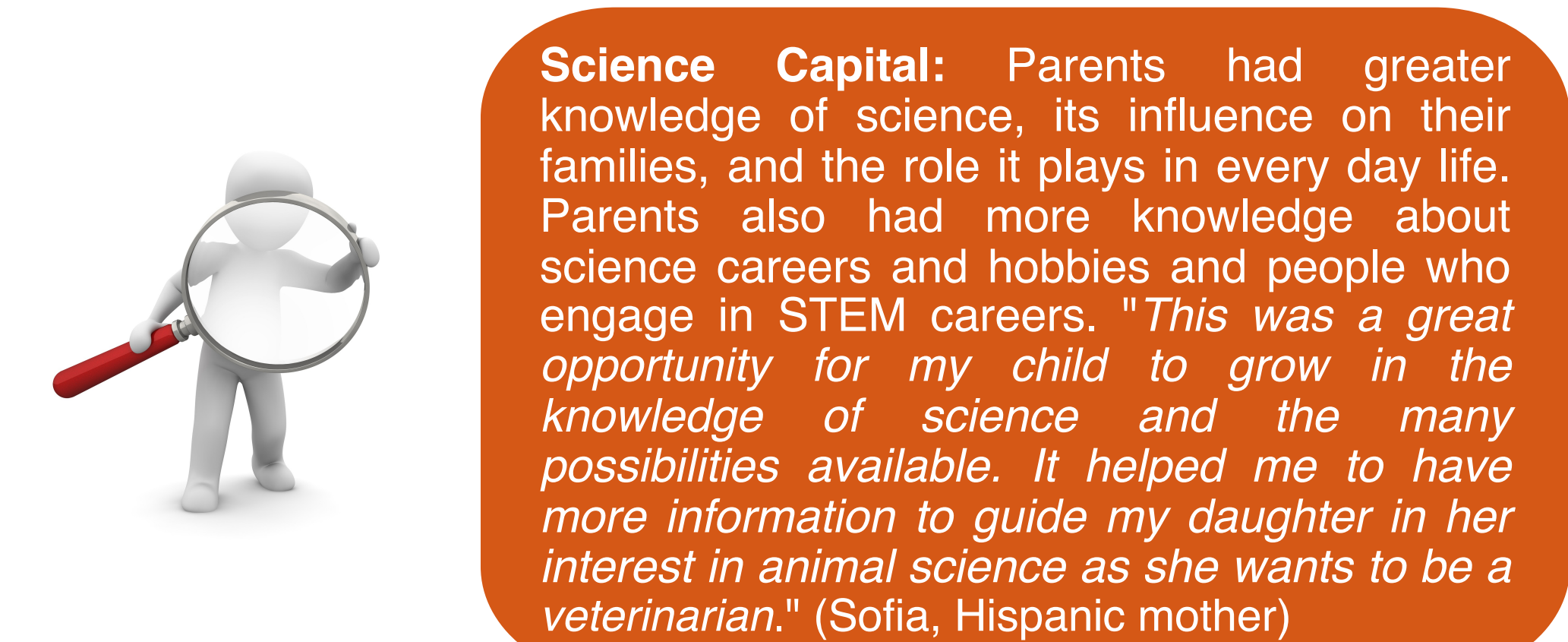


Population (N = 44)



Results

Cultural Capital



On the *NextGen Scientist Survey*, the adults were asked questions about their access to science capital as a child.

Nearly half (46.5%) of the parents reported that they did not know anyone who had a STEM career as a child. Yet more than half (57.1%) of them wanted a STEM career when they grew up. However, only about a third (35.7%) of the parents reported that they currently work in a STEM, STEM-Related, or Technical STEM career.

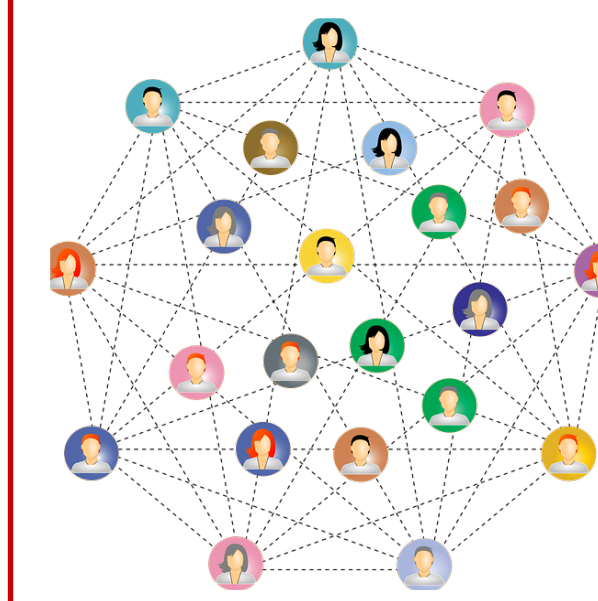
	n	STEM Career	NonSTEM Career
What did you want to be when you grew up?	42	57.1	42.9
What is your current job?	42	35.7	64.3

When you were a child	n	Yes	No
Did you have access to science toys and tools	43	76.7	23.3
Did you know anyone who worked in STEM	41	53.5	46.5

When asked at the beginning of the program if they knew anyone who worked in a STEM field, less than a quarter of the parents knew someone in their family (23.8%) or anyone at all who worked in a STEM field (22.7%). However, by the end of the program, a Wilcoxon signed-rank test found the number of people reporting that they knew anyone who worked in STEM had significantly increased ($z = -2.65$, $p = .008$) with more than three quarters (76.7%) of the parents indicating they now knew someone who worked in STEM.

Findings

Cultural Capital



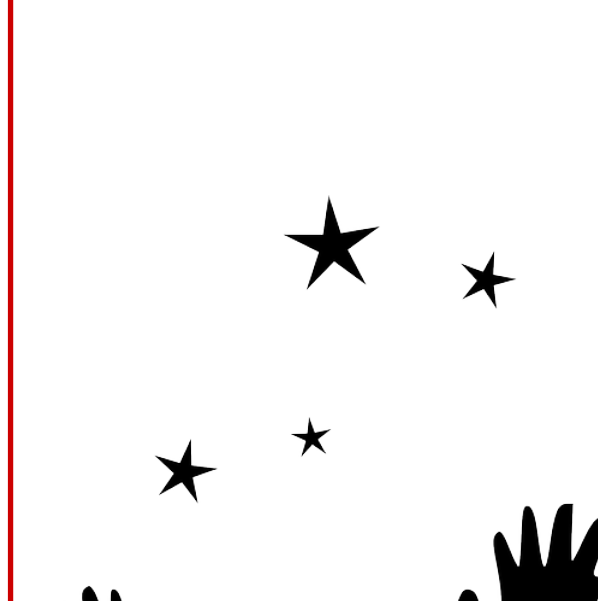
Social Capital: The program helped the parents build a social network to support their child's interest but also to help their children meet peers who were also interested in science. The program was "an opportunity [for her son] to see that other friends his age are interested in science as he is." (Kelly, White mother)



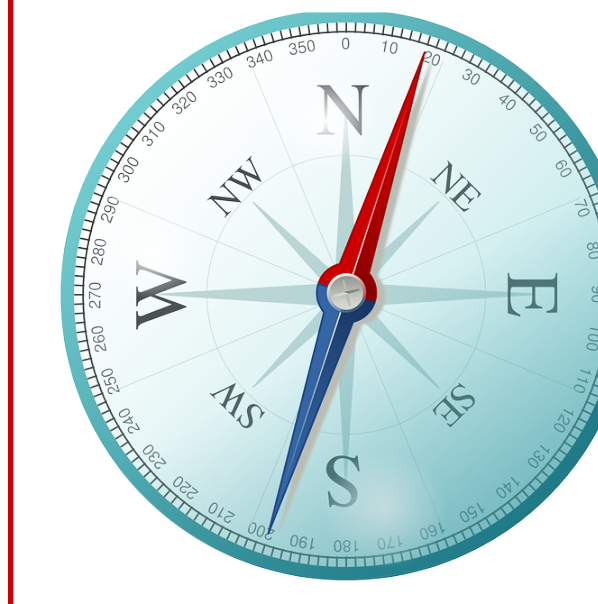
Familial Capital: Parents were able to learn together and bond as a family. It also gave them opportunities to engage together on the weekends. One mother said the program "helped us bond and learn new things together. I've learned my child is very knowledgeable on things I never knew. It exposed us to new things and made learning fun as a family." (Heather, African American mother)



Linguistic Capital: The families spent more time talking about science at home. They changed how they spoke about science. One mother said her daughter was even using more scientific language: "I hear my daughter talk to her friends that she goes with to explain what she is doing and how things work. She also explains things to her family upon return after activities. She uses more science vocabulary too." (Elizabeth, White mother)



Aspirational Capital: The parents' aspirations changed not only for their children but also for themselves. Three parents decided to go back to school to pursue a STEM career and many parents felt better able to support their children's STEM career aspirations. "My family has a deeper appreciation for science related experiences and understand the impact these experiences will have on our son's future. We are increasing dialogue about science related careers and I feel strongly that he will pursue a career in STEM." (Olivia, African American mother)



Navigational Capital: Parents felt they had a better understand of what types of activities were available and better able to find opportunities for their children to engage in STEM. "It has made me explore other opportunities to integrate science into my children's routines." (Brittany, African American mother)

Family Science Habitus



Parents reported significant changes to their family's habitus. This included how often they talked with others about science ($t(42) = 3.51$, $p = .001$) and how often they went to a zoo, aquarium, museum, or planetarium ($t(43) = 3.32$, $p = .002$). "My children now can tell what science is all about and the different types of science. They are more interested in becoming [a scientist]. They want to explore the world, they look for rocks, plants, animals and tried to find more about it. We go to explore at museum, parks, zoos, beach, etc. They ask to buy tools to use that are science related like binoculars, bug catching, etc."

Implications

Family support plays a critical role in students' identities and career aspirations. The results of this study suggest that **family STEM programs can positively influence the cultural capital, including science, social, familial, including aspirational capital, and family science habitus** of the parent participants.

Future programs should:

- Help parents understand the **wide variety of careers that are considered STEM**
- Introduce families to **community members** who engage in STEM careers and hobbies who are representative of the participants
- Help parents understand the **wide variety of home activities that are considered STEM**
- Explicitly teach parents how to **engage in effective questioning** during science activities
- Build parent's **navigational capital** such as applying for college or other STEM programs
- Specifically address linguistic capital and **the language of science** which may be a barrier to participation in STEM

By building the cultural capital and family science habitus of the parents, they will have more tools to effectively support the science interests and career aspirations of their children.



Sustained, engaging, family-based programs out-of-school, and potentially in schools, is one way to approach the need for more youth, particularly women and those from underrepresented groups, to pursue STEM careers.

Limitations

This study has a limited sample size and results should not be generalized beyond this sample. Additionally, the participants in this study were volunteers and their science interests may not be representative of the larger populations.



References

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