

Math Anxiety, Learning Difficulties, and Math Environment

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INTRODUCTION

- While a positive HLE can benefit math skills and help reduce math anxiety, it does not necessarily eliminate it. Other factors are similarly influential in math anxiety (Cosso et al., 2023).
- In an otherwise positive HLE, parents’ math anxiety can strengthen or weaken their child’s math anxiety based on their modeling of anxiety, numeracy skills, promotion of math activities, and general displayed attitude towards math (Cosso et al., 2023; Li et al., 2021).
- Children exposed to a positive math HLE tend to perform better in math and with their early numeracy skills (Li et al., 2021).
- Math anxiety was negatively correlated with both math and overall academic performance. Students with higher math anxiety usually performed worse across all academic subjects (Gahsaj et al., 2023).
- Socioeconomic factors were positively correlated with HLE quality, cognitive development, and math achievement, reducing math anxiety risk (Daucourt et al., 2021), (Li et al., 2021).
- Household income was positively correlated with parents’ reports of their child’s skills (Hart et al., 2016).

METHODS



Participants:

- Data from the Home Math Environment Project, obtained from LDbase (Hart et al., 2021).
- Sample includes parents of children aged 3 through 8 years old drawn from Mechanical Turk who answered a questionnaire online (N = 339).
- Sampled included 152 males and 187 females.
- Predominately white sample (80.8%), followed by Black or African American, (8.3%), Asian (7.4%), and others (3.5%).

Measures:

Math Anxiety (MA): Anxiety in Action questionnaire which uses a 5-point Likert scale to answer 6 questions. (Gulick, 2012).

Home Math Environment (HME): a questionnaire that asks 52 questions on a 5-point Likert scale about how math is used with their child at home (Hart, 2021).

Learning difficulties (LD): Colorado Learning Difficulties Questionnaire, which uses a 5-point Likert scale to rate 20 questions. (Willcutt et al., 2011).

Socioeconomic Status (SES): annual household income.

Procedure:

- Pearson correlations between MA, LD, and HME.
- Correlation between MA and HME controlling for SES
- Regression for MA correlated with HME controlling for SES.
- Regression for LD correlated with HME when controlling for SES.

HYPOTHESES

- Math anxiety will be positively correlated with learning difficulties.
- Math anxiety and learning difficulties will both be positively correlated with a strong home math environment.
- Higher socioeconomic status will be associated with a stronger home math environment, less math anxiety, and less learning difficulties.

Variable Demographics

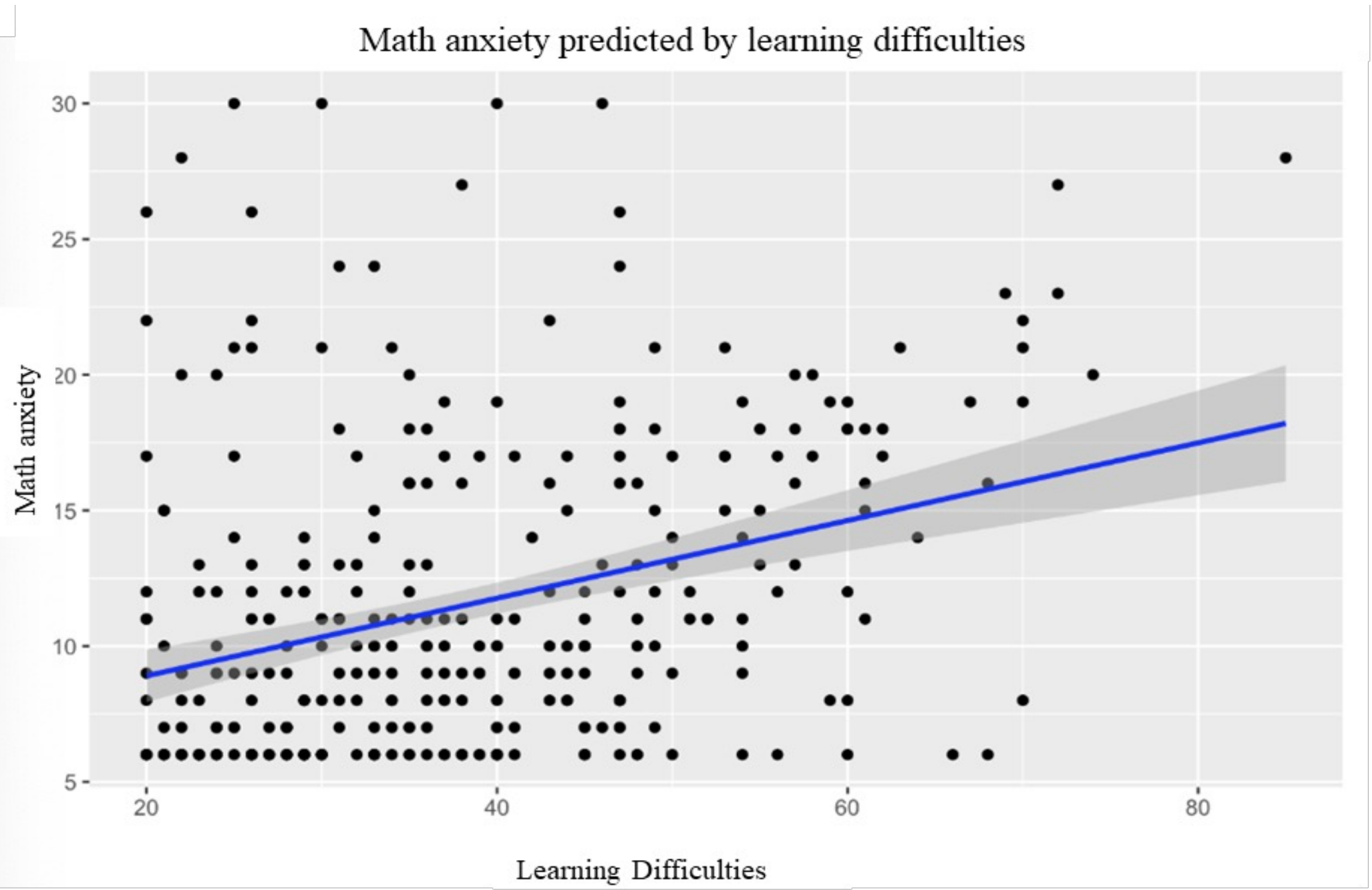
Variable	Minimum Value	Maximum Value	Mean	Standard Deviation
Math Anxiety	6.00	30.00	11.46	5.61
Learning Difficulties	20.00	85.00	37.89	12.96
Home Math Environment	52.00	299.00	190.62	43.49
Socioeconomic Status	1.00 (Under \$10k)	12.00 (Over \$210k)	4.16	1.86

RESULTS

Correlation Matrix

	Math Anxiety	Learning Difficulties	HME	SES
Math Anxiety				
Learning Difficulties	0.33*			
HME	-0.03	-0.02		
SES	-0.15*	-0.15	0.09	
Age	-0.10	-0.14*	0.13	0.13

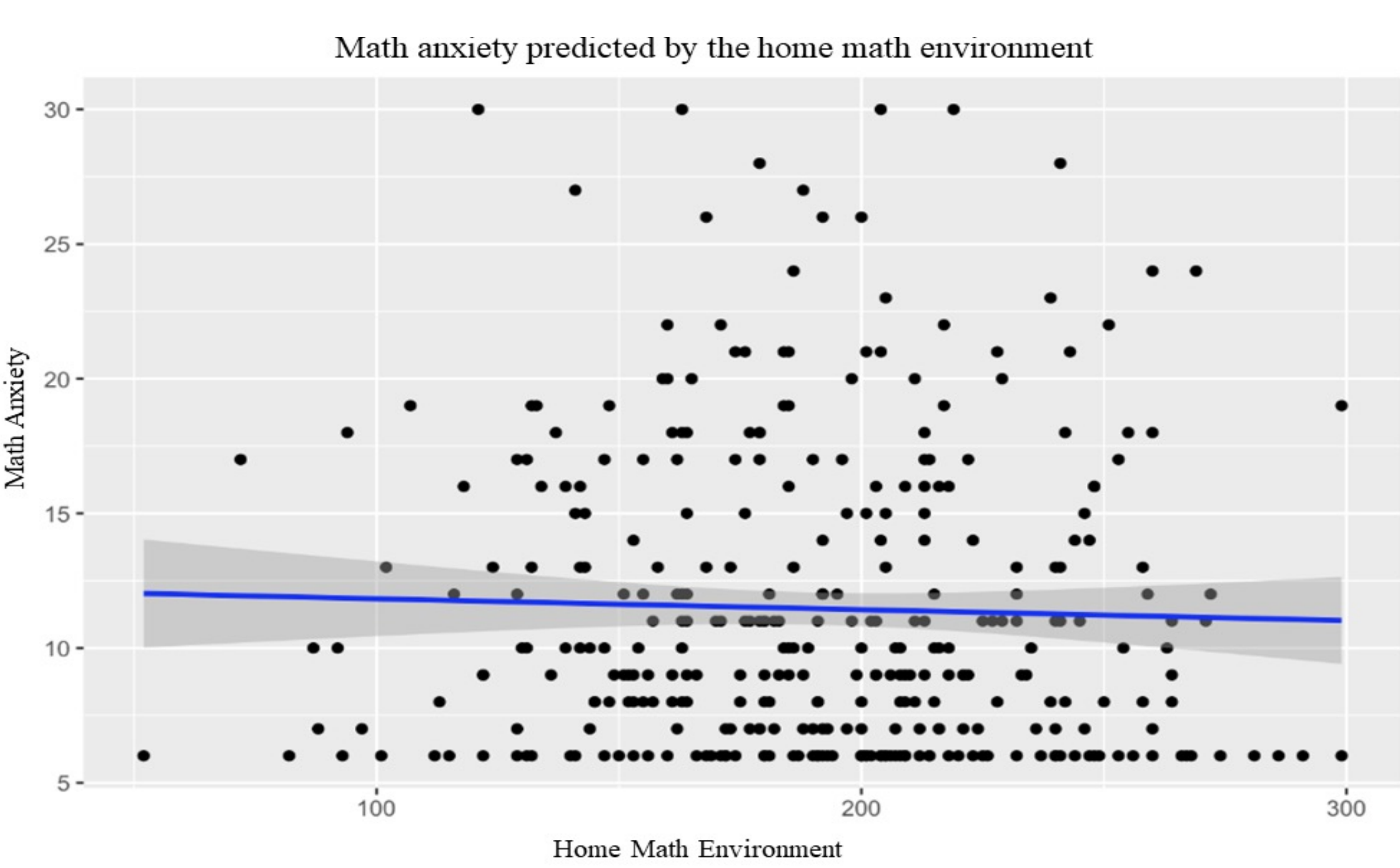
MA predicted by LD:



The average MA for a child with an average LD is 6.04. For every one point increase in MA, LD increases by 0.14 ($B = 0.14$, $SE = 0.022$, $p < .001$).

- Positive association between MA and LD ($B = 0.14$, $SE = 0.022$, $p < .001$).
- No longer significant when controlling for SES ($B = -0.003$, $SE = 0.006$, $p = .65$).

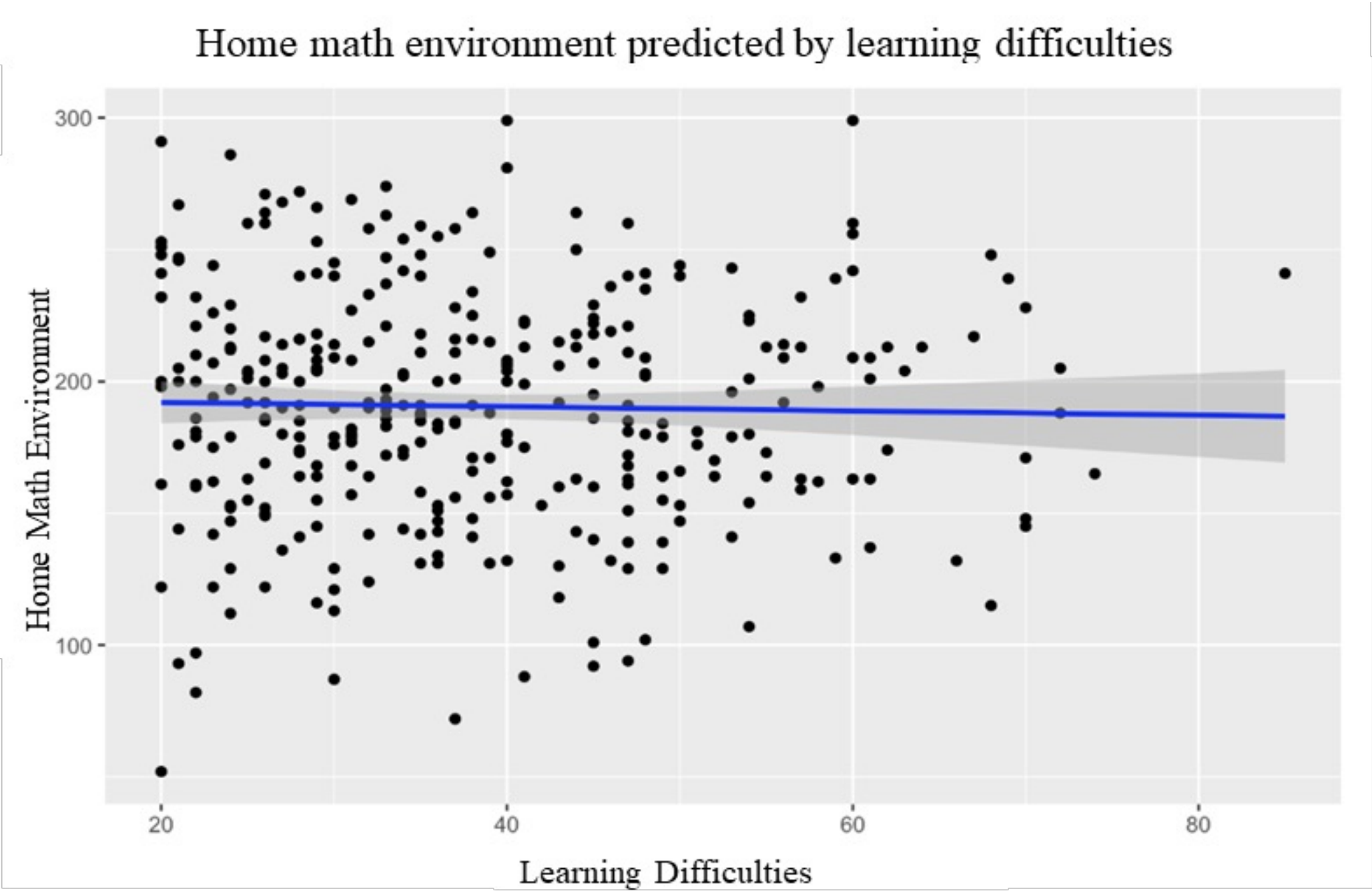
MA predicted by the HME:



The average MA for a child with an average HME is 12.23. For every one point increase in HME, MA decreases by 0.004 ($B = -0.004$, $SE = 0.007$, $p = .570$).

- No significant association between MA and HME ($B = -0.004$, $SE = 0.007$, $p = .570$).
- Still not significant when controlling for SES ($B = -0.45$, $SE = 0.16$, $p = .0066$).
- Negative association between MA and SES.
 - For every one point increase in SES, MA decreases by 0.45 ($B = -0.45$, $SE = 0.16$, $p = .0066$).

HME predicted by LD:



The average HME for a child with an average LD is 6.193.69. For every one point increase in LD, HME decreases by 0.08 ($B = -0.081$, $SE = 0.18$, $p = .66$).

- No significant association between HME & LD ($B = -0.081$, $SE = 0.18$, $p = .660$).
- Still not significant when controlling for SES ($B = 2.16$, $SE = 1.29$, $p = .095$).

DISCUSSION

- Our findings contradict our second and third hypotheses, as well as previous findings that a strong Home Math Environment is associated with lower math anxiety (Cosso et al., 2023; Li et al., 2021).
- Results also suggest that lower SES tend to experience slightly higher levels of math anxiety.
 - This supports previous findings that math anxiety decreases as socioeconomic status increases (Daucourt et al., 2021; Li et al., 2021).
 - Low SES students may need more support with MA
- As learning difficulties in children increase, math anxiety is likely to increase as well.
 - These results support our first hypothesis.
 - It may be useful to parents and teachers who notice learning difficulties in students to address possible math anxiety.
- As children age, learning difficulties tend to become slightly less prominent.
 - This suggests the importance of identifying learning difficulties and providing support to younger children

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