



# Relationship between Students' and Families Growth Mindset with Students' Academic Performance in Math: The Case of the Dominican Republic

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## Abstract

Recent academic literature on education, psychology, and economics of education has widely documented a strong significant relationship between growth mindset - the belief that intelligence is not fixed and can be developed - and students' academic achievement, particularly when these two variables are controlled by students' socioeconomic background. Current findings in the Latin America region suggest that student growth mindset can temper the effects of poverty on academic achievement, but to our best knowledge no study has considered the interplay between students' and their families' growth mindset on academic achievement. We use a novel database of 9th graders students and their families in the Dominican Republic (N=110,000). Preliminary results show that families' growth mindset strongly predicts students' growth mindset, and also their math academic achievement. Multilevel regression analysis depicts differences in math scores ranging from 0.1 to 0.4 standard deviations. These findings suggest that students' mindset are highly influenced by families' mindset and may be a mechanism to elicit explicit academic behaviors, especially in under-privileged students' and families

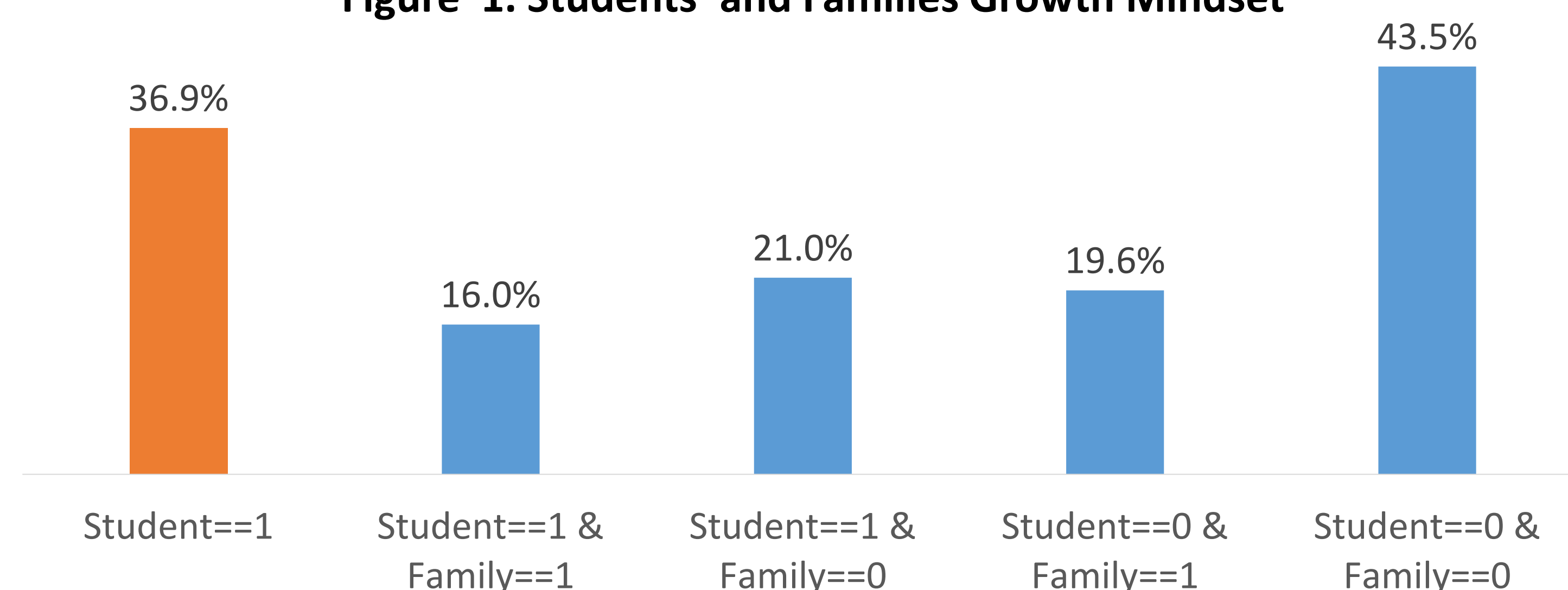
## Related literature

Previous studies have shown that vulnerable students could benefit more from having a growth mindset than their wealthiest peers. Claro et. al. (2016) found that family income is a strong predictor of achievement, having a growth mindset is also a strong predictor of academic achievement across all socioeconomic groups in the USA. This study also found that students from lower-income families are less likely to have a growth mindset than wealthier students, those with a growth mindset were appreciably buffered against negative effects of poverty on achievement. In PISA, it was found that grade repeaters were less likely on average to present a growth mindset (OECD, 2021).

## This research

Data comes from two national datasets collected by the Ministry of Education of the Dominican Republic in 2019. These datasets include measures of academic performance on mathematics, language, sciences, and social studies, mindset, and socioeconomic background 11th-grader students. This data was collected through a survey (*Evaluaciones Diagnósticas*) that the Evaluation of Educational Quality Office of the Ministry of Education administers every three year. In addition, students, parents, and teachers complete a questionnaire that covers mindsets about intelligence scale (Dweck, 1995). As shown in *Figure 1*, **36.9%** of students have a growth mindset. But when taking account for their family's mindset, **16%** of students have a family with a growth mindset. In addition, the **43.5%** of students and families do not have a growth mindset.

Figure 1. Students' and Families Growth Mindset



## Methods

We use a multinilevel regression model to evaluate the variance in mindset schools when students are nested in school. This model assess relationships between school and student levels (Hox, 2002). Therefore, a total of 102,619 students are nested into 2,259 schools

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## Results

Table 1 shows that students with a growth mindset have an additional score of 12.16 ( $p < 0.001$ ) points in math standardized test. However, when including student's family's mindset, this coefficient increases to 17.72 ( $p < 0.001$ ). In other words, the first regression underestimates for about 40% the difference of the subgroup of students where both families and students have a growth mindset. Furthermore, it overestimates in about 31.5% the subgroup that only the students have a growth mindset. This significant difference between groups suggests that families can play a significant role when predicting math scores. Covariables such as mothers' education, quantity of books at home, schools' socioeconomic level, although not included in table 1, are significant to predict math scores as well. Finally, intra class correlation (ICC) analysis depicts that 16% of students' math scores can be attributed to the schools they are matriculated in.

Table 1. Differences in math scores of Growth-mindset students vs fixed mindset.

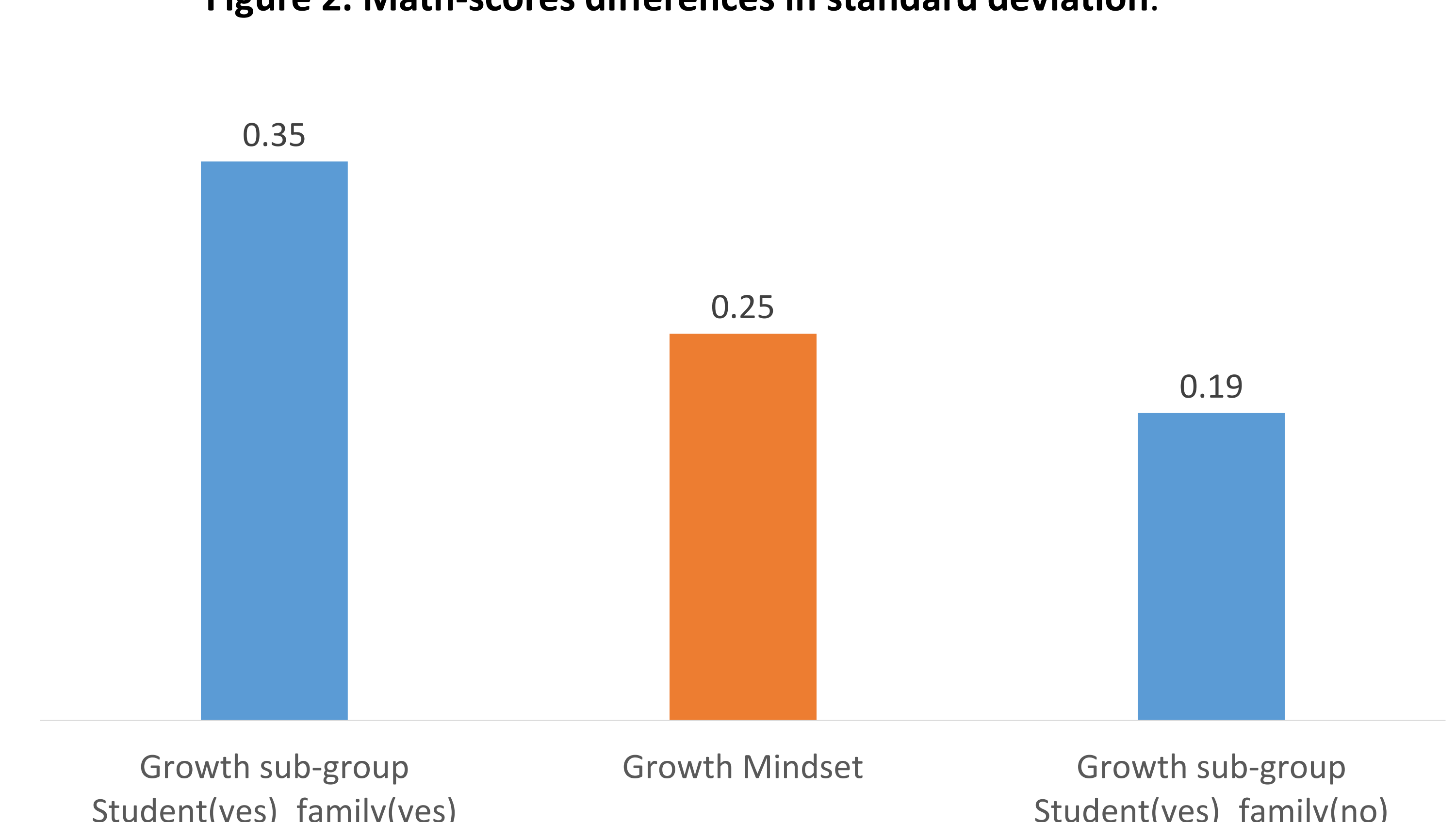
Nested multilevel regressions at the school level		
Growth Mindset	<b>12.27</b>	<b>***</b>
Student==1		
Growth Student_family	<b>17.72</b>	<b>***</b>
Student==1. Family==1		
Growth Student_family	<b>9.75</b>	<b>***</b>
Student==1. Family==0		
Growth Student_family	<b>2.15</b>	<b>***</b>
Student==0. Family==1		
Number of students	102,619	102,619
Number of schools	2,259	2,259

(\*\*\*) significant at 1%

## Discussion

Growth mindset may be a potential strong predictor of students' academic achievement as recent literature has shown. However, families' mindset need to be considered also, specially given that families mindset may be related to students' mindsets as well. As shown in *Figure 2*, math scores of students and families with a growth mindset are 0.35 over the standard deviation. For this matter, future public policies could aim into this direction by encouraging both students and families to have a growth mindset.

Figure 2. Math-scores differences in standard deviation.



## References

- Claro, S., Paunesku, D., & Dweck, C. S. (2016). Growth mindset tempers the effects of poverty on academic achievement. *Proceedings of the National Academy of Sciences*, 113(31), 8664–8668. <https://doi.org/10.1073/pnas.1608207113>
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- Hox, J. J. (2002) *Multilevel analysis : techniques and applications / Joop J. Hox. – 2nd ed. p. cm. – (Quantitative methodology series)*