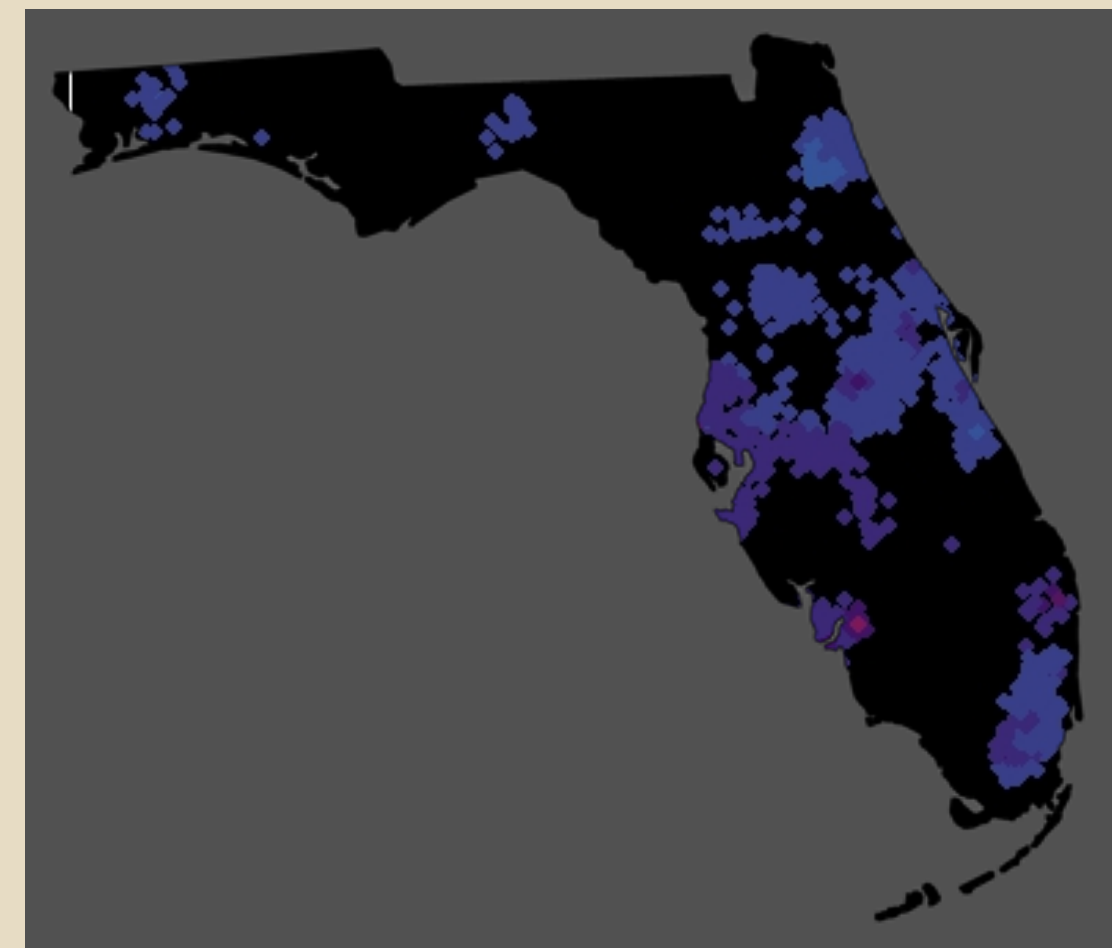
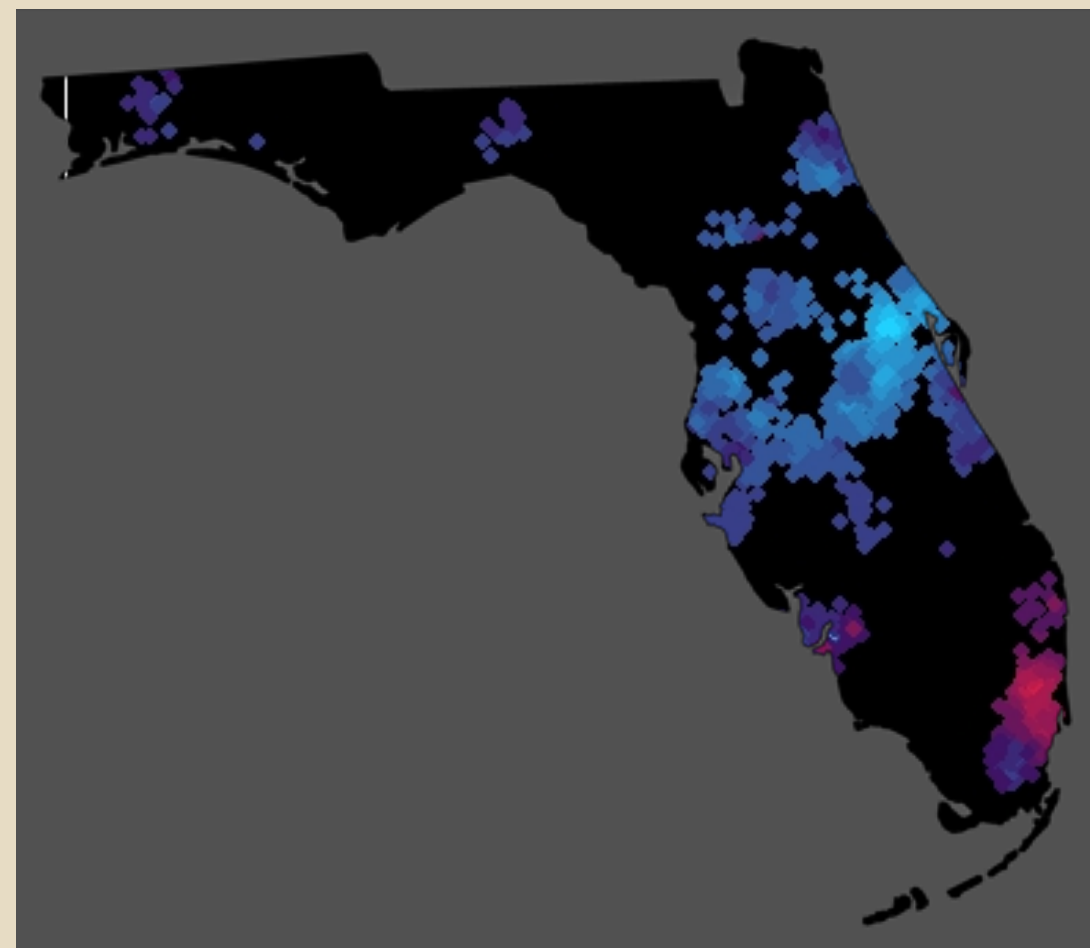
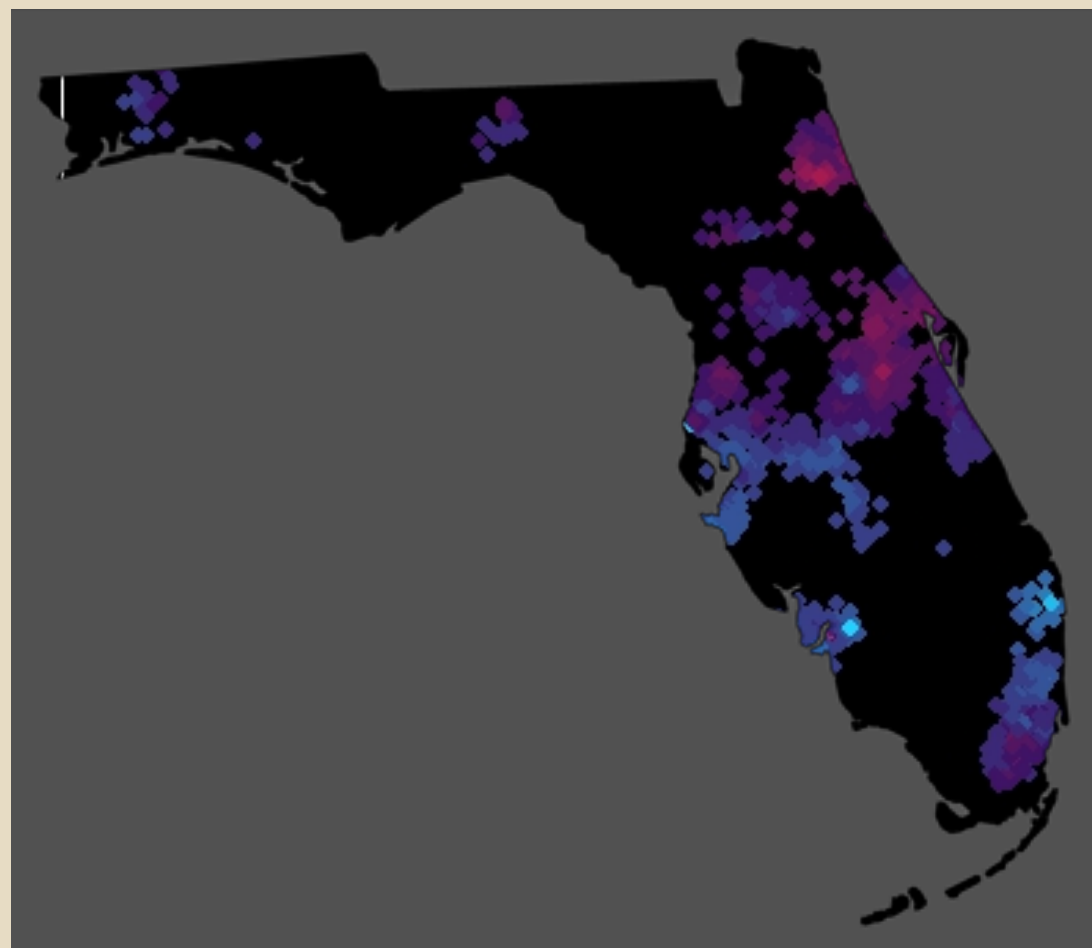




Visualizing the nature and nurture of reading comprehension: Geocoding a large diverse twin sample

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Genetic, shared environmental and nonshared environmental raw variance by location. Blue (low) to red (high) color palette indexes the variance attributable to genetic or environmental effects, with increased luminance at the extremes to emphasize areas that diverge from the sample average.

Introduction

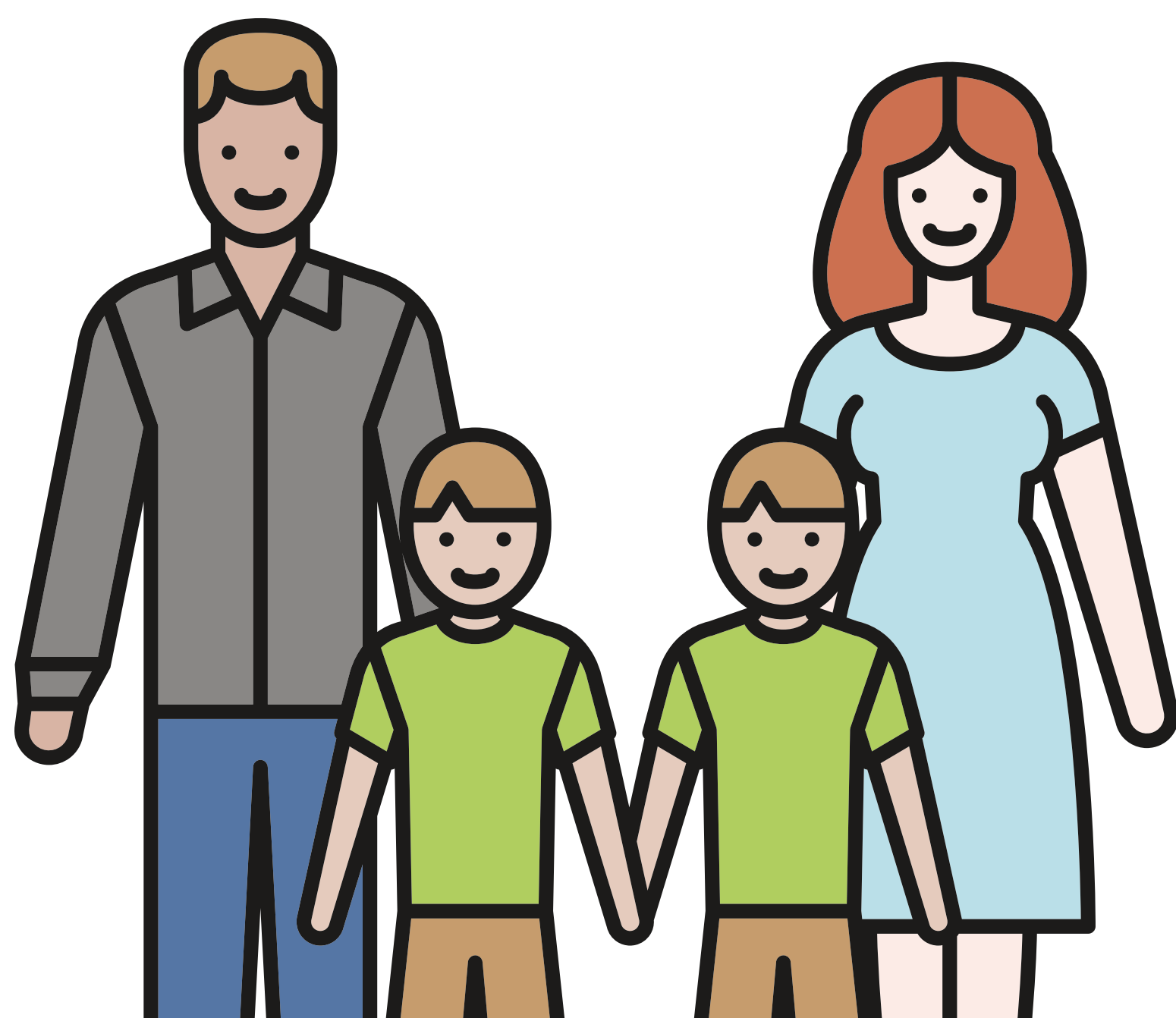
A growing body of literature indicates that environmental influences (e.g., SES) can moderate the genetic and environmental contribution to reading performance (Turkheimer et al., 2003).

In 2012 an influential publication used the UK twin project TEDS, and spatial visualization, to map the differences in heritability, shared environment and nonshared environment of 46 different outcomes based on geocoded home addresses (Davis et al., 2012).

Although large in sample size, the TEDS sample is 95% white, with relatively little economic inequality (reflecting the UK).

Research questions

This project will use spatial visualization to examine the relative importance of nature and nurture on reading performance based on household location, using a very diverse sample.



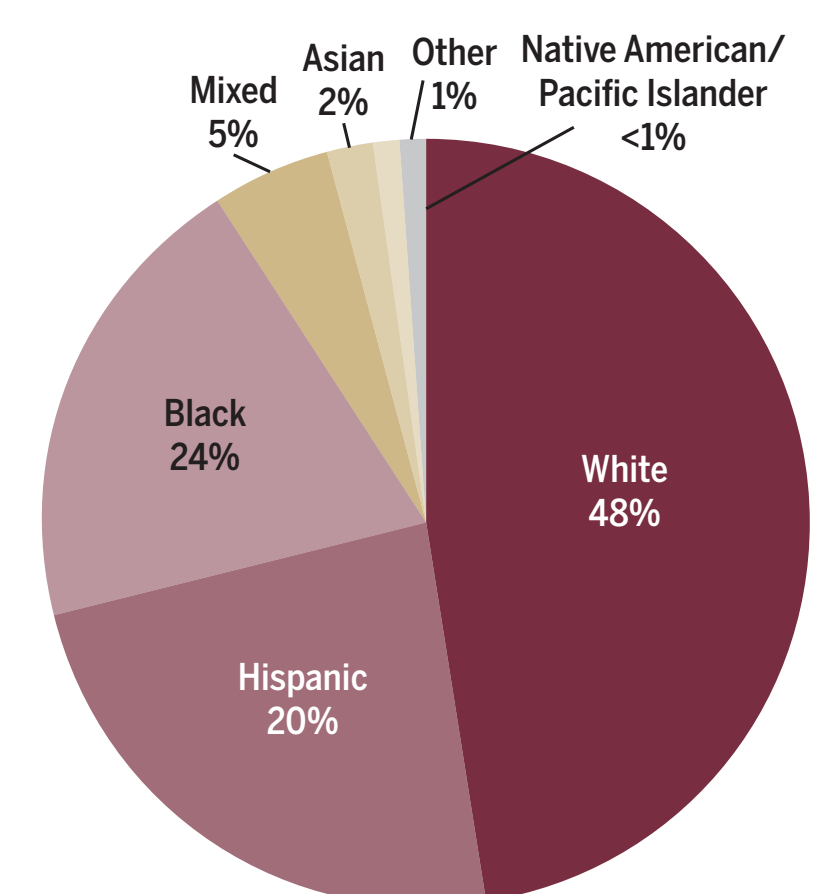
Method

Participants

- 1841 pairs of twins from Florida Twin Study on Reading
- 623 MZ, 1218 DZ pairs
- Mean age 12.45 (range = 9-16)
- Grades 3-10

Measures

- FCAT-2 Reading Test, administered spring 2014
- Most recent family addresses were geocoded using GIS



Discussion

Visualizing heritability, shared environment and nonshared environment like this gives us a chance to see areas of interest for further analyses. For example:



1. There was greater total variance in Miami-area (bottom right corner). This corresponded to slightly less heritability and greater shared environmental variance, an "environmental hotspot".
 - An "environmental hotspot" means that environmental variation has more of an effect on reading comprehension in this region (Davis et al., 2012)
 - Miami is a place with many different cultures, as well as large wealth gradients, etc. Culture, or SES, or both or other, could be serving as a moderator of genetics



2. There seems to be a little less heritability in general in "South Florida".
 - Areas with differential heritability do not mean people have large genetic differences, but instead there is environmental moderation. Areas with greater heritability means that the environment allows genetic variation to express itself
 - Again, potentially due to cultural differences



3. There seems to be less shared environmental variance in the counties in the middle of the state
 - Is there something different going on with their reading curriculum than anywhere else in the state?

These are correlational conjectures at best, but the point of these analyses are to give us environmental target areas for future quantitative exploration

