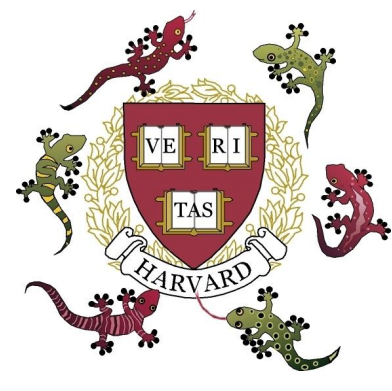
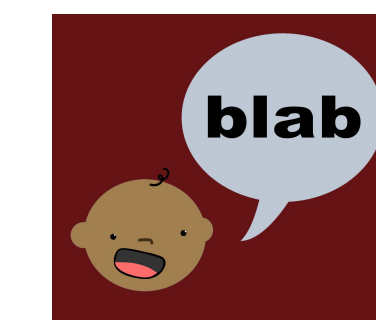


Measuring early word exposure in infants: a low-cost parent-report survey captures individual language input and predicts vocabulary outcomes



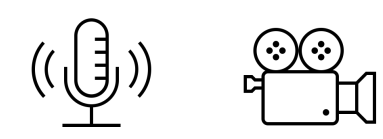
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Background

- Central role of frequency in early word acquisition¹
 - Aggregated frequency norms²
 - Frequency from individual language environment³
 - Laborious recordings and transcription⁴
 - parent-report word exposure survey**
- Study 1 (using hand-tailored test items for each infant), tested **longitudinally** if the survey predicts
 - observed word frequency in infants' naturalistic home recordings? (RQ1)
 - an infant's vocabulary comprehension and production as measured by the CDI⁵? (RQ2)
- Study 2 (using the same test items as Study 1 infants) extended the effect of word exposure to an independent **cross-sectional** aged & gender-matched sample (RQ3)

Home Recordings⁶



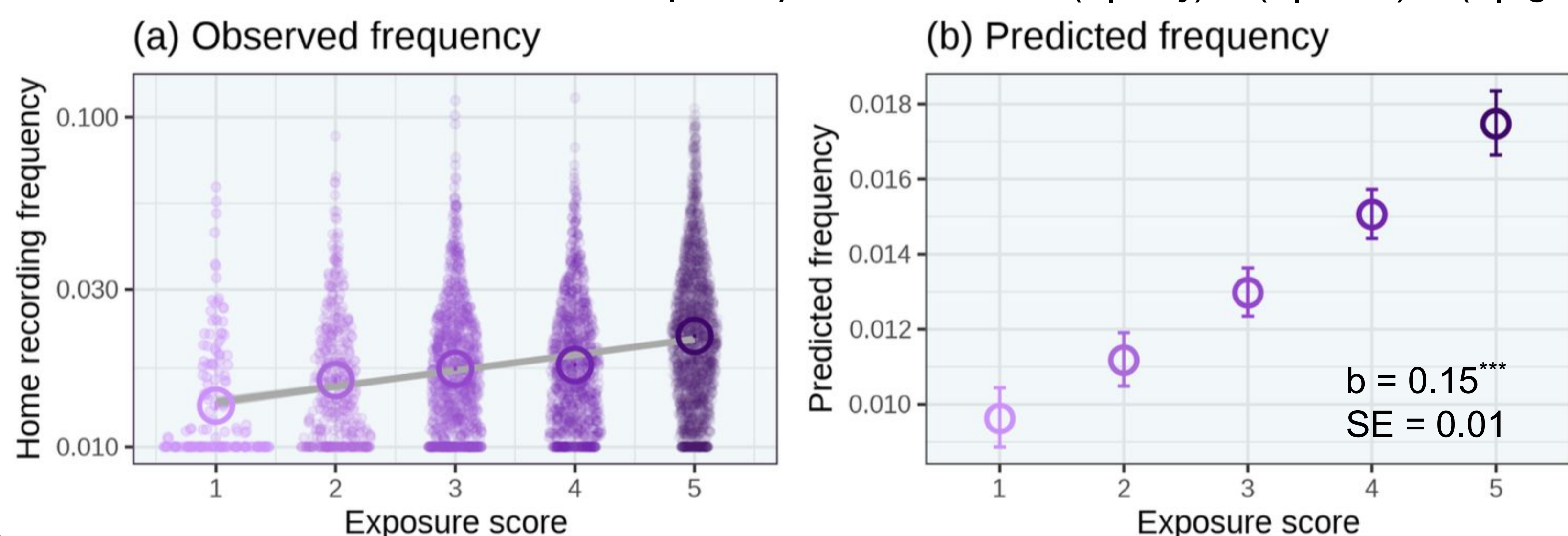
From preceding two mo. of home recordings:

Every month, 6-17mo. [For Study 1 only]

- Selected nouns for testing
- Calculated relative noun frequency

RQ1: Does parental exposure survey predict infants' home recording frequency?

$$\text{relative noun freq.} \sim \text{exposure score} + (1|\text{subj}) + (1|\text{noun}) + (1|\text{age})$$



Study 1:
Longitudinal
(n = 44)



Infant Age (mo.)
(n = 6 Timepoints) 8 10 12 14 16 18

Study 2:
Cross-sectional
(n = 44x6 = 264)



Word Exposure Survey
Every 2 months, 8-18mo.

CDI Vocabulary Checklist
Monthly, 6-18mo. (8-18mo. analyzed here)

How often do you think your child hears these words?

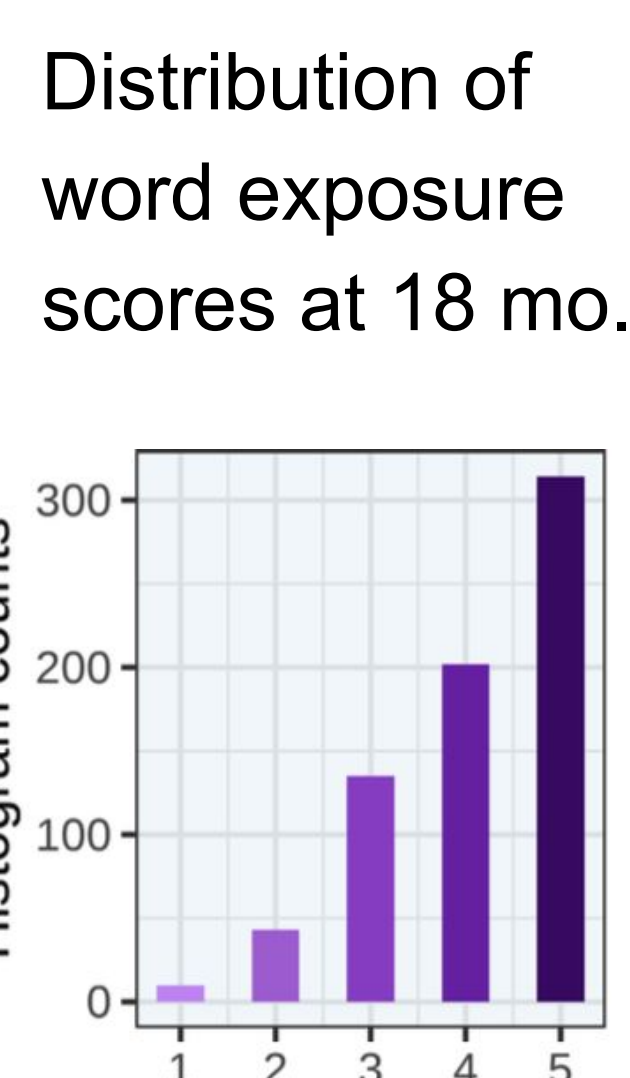
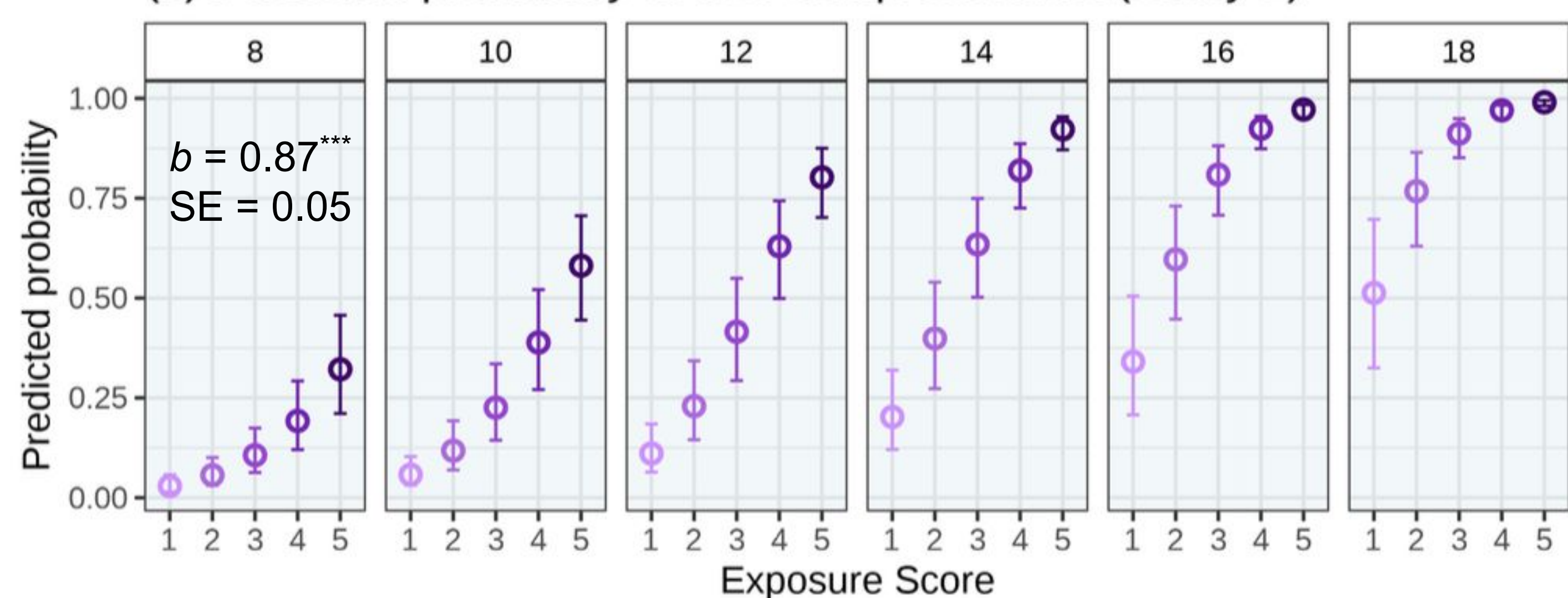
- Never
- Less than once per week
- A few times a week
- Once a day
- Several times a day

16 concrete & imageable nouns at each time point

RQ2: Does parental exposure survey predict infants' vocabulary development from CDI?

$$\text{CDI comprehension} \sim \text{age} \times \text{exposure score} + (1|\text{subj})$$

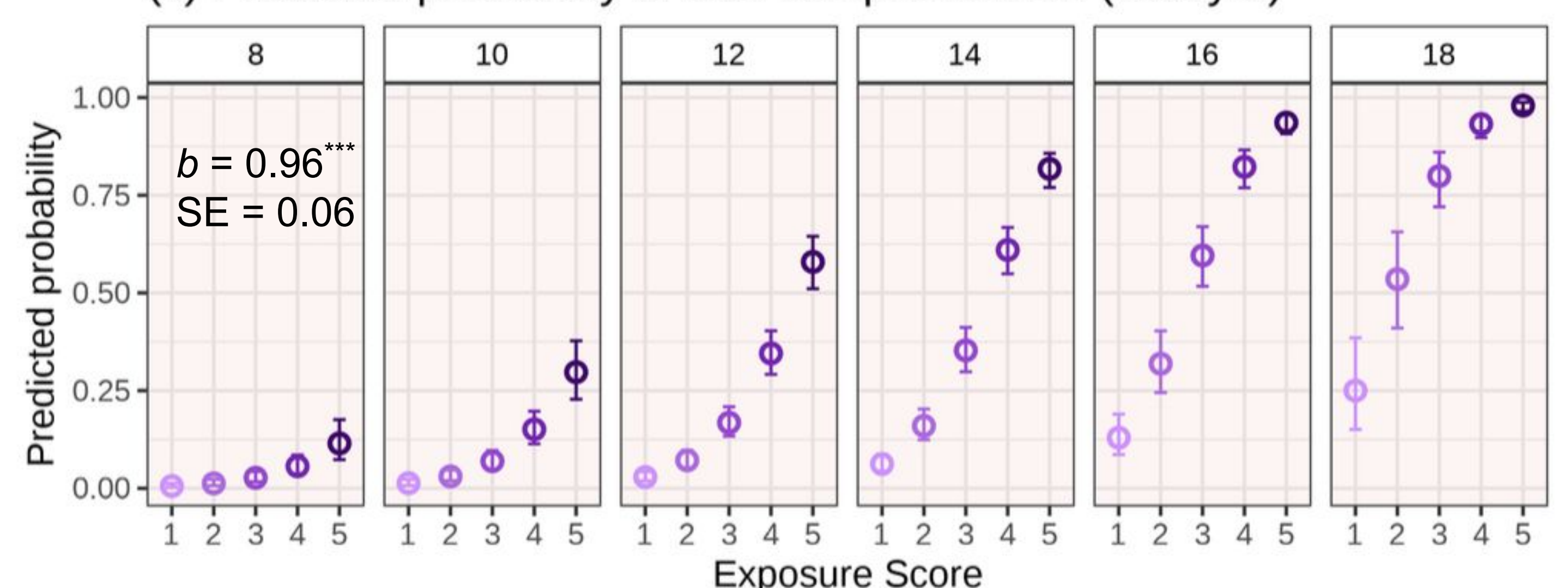
(a) Predicted probability of CDI comprehension (Study 1)



RQ3: Does the effect of exposure survey on vocab development extend to a cross-sectional sample?

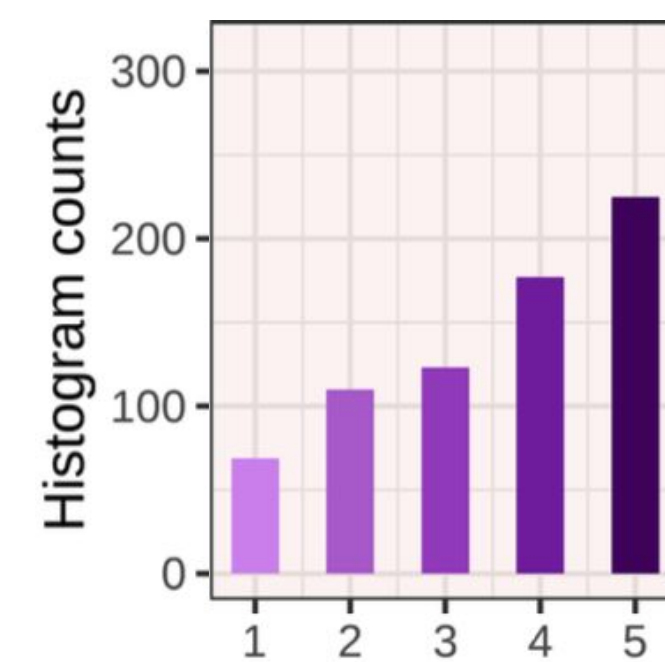
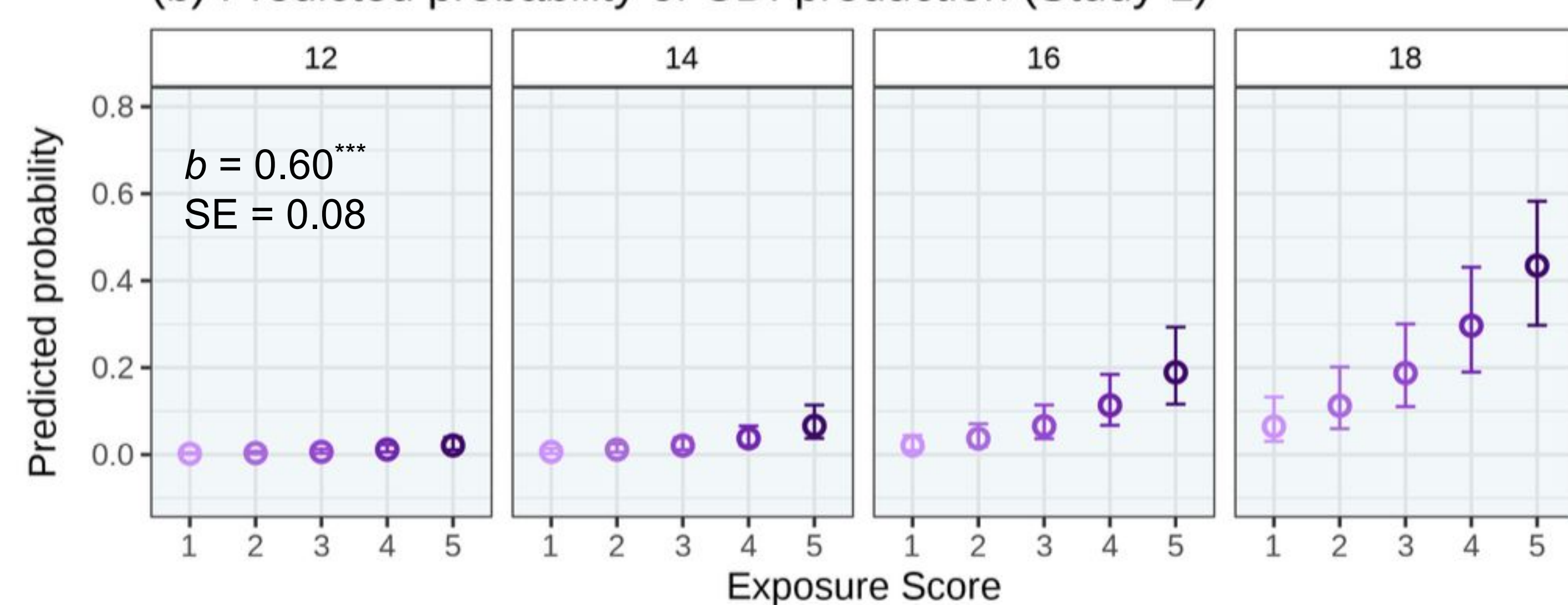
*Same test items and model structure as in Study 1

(c) Predicted probability of CDI comprehension (Study 2)

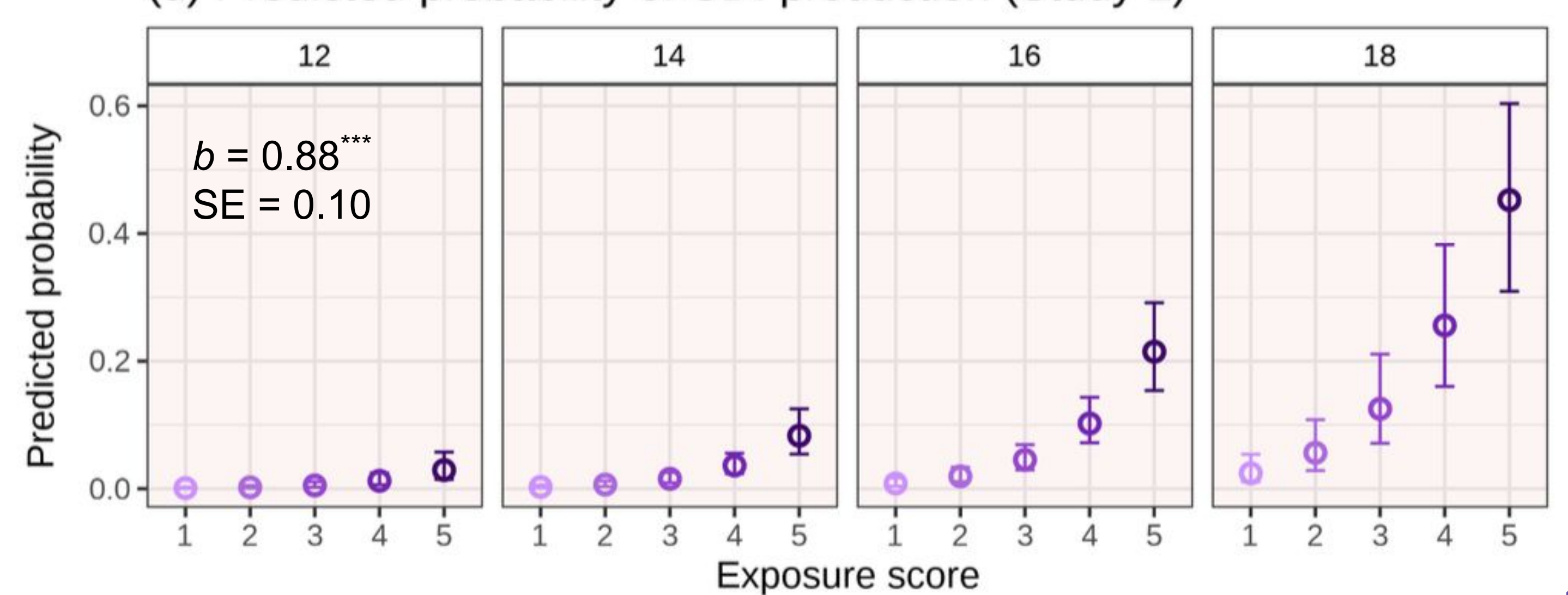


$$\text{CDI production} \sim \text{age} + \text{exposure score} + (1|\text{subj})$$

(b) Predicted probability of CDI production (Study 1)



(d) Predicted probability of CDI production (Study 2)



Discussion & Takeaways

- Parents provided valid info regarding word exposure and vocab knowledge, across longitudinal & cross-sectional samples.
- Higher reported word exposure predicts higher frequency, higher likelihood of reported comprehension & production.
- Word exposure survey is a useful tool, complementing naturalistic recordings and norms, for scalable research.
- Reliability of parental report and reflection of parental internal consistency?
 - Follow-up assessment of word comprehension with eye-tracking measures



Preprint available