

Supplementary materials for:

Prenatal Brain Connectivity and Postnatal Language: How Familial Risk and Prenatal Speech Exposure Shape Early Language Skills.

Cristina Cara^{1,2}, Matteo Canini^{3^}, Claudia Oprandi³, Nicolò Pecco³, Paolo Ivo Cavoretto⁴, Massimo Candiani⁴, Andrea Falini³, Cristina Baldoli³, Marco Tettamanti^{5§^} & Pasquale Anthony Della Rosa^{3§^}

¹ CIMEC - Center for Mind/Brain Sciences, University of Trento, Italy.

² Faculty of Mathematics and Natural Sciences, Heinrich Heine University Düsseldorf, Düsseldorf, Germany.

³ Department of Neuroradiology, IRCCS San Raffaele Scientific Institute, Milan, Italy.

⁴ Department of Obstetrics and Gynecology, IRCCS San Raffaele Scientific Institute, Milan, Italy.

⁵ Department of Psychology, University of Milano-Bicocca, Milan, Italy.

§ Equal contribution.

^ Corresponding authors. On their behalf:

Marco Tettamanti

Department of Psychology, University of Milan-Bicocca, Milano, Italy

Piazza dell'Ateneo Nuovo 1, I-20126 Milano, Italy

Email: marcodante.tettamanti@unimib.it

Table S1. Anagraphic information.

Participants	GW at MRI Scan	Sex	Months at Bayley-III
01	32.0	F	38
02	26.9	M	35
03	32.4	M	22
04	33.3	M	24
05	30.3	M	21
06	33.1	M	36
07	33.7	M	22
08	32.0	M	20
09	31.9	F	35
10	33.4	F	21
11	33.0	F	19
12	33.0	F	26
13	33.0	F	20
14	33.1	M	26
15	29.4	F	26
16	35.1	M	25
17	33.7	M	13
18	34.4	F	24
19	31.3	F	14
20	31.7	M	13
21	34.0	F	12
22	32.0	M	24
23	34.7	M	14
24	34.0	F	13
25	31.6	F	13

Note. GW = gestational week; M = males; F = females.

Figure S1. Flowchart for the aggregate familial risk score calculation.

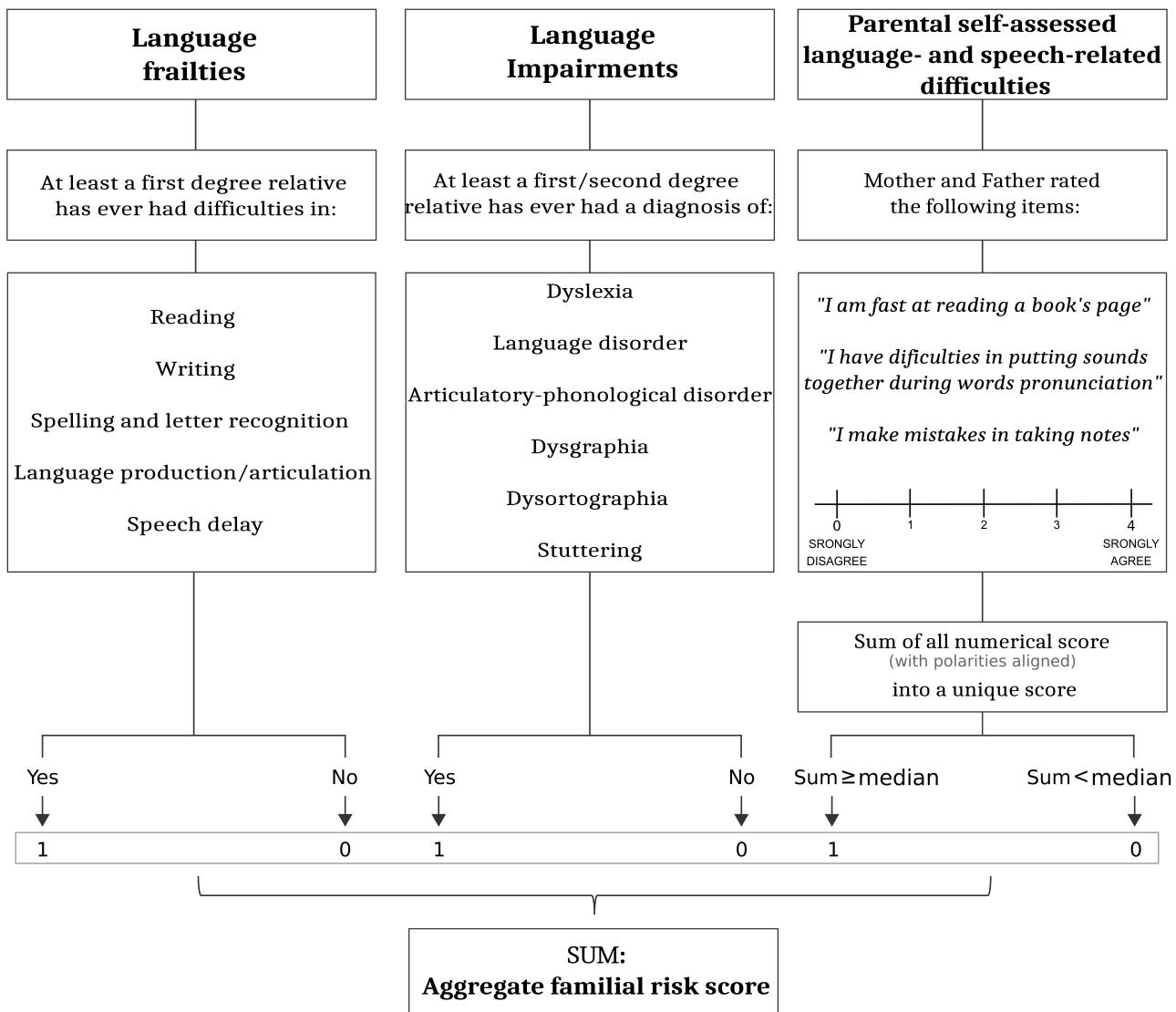
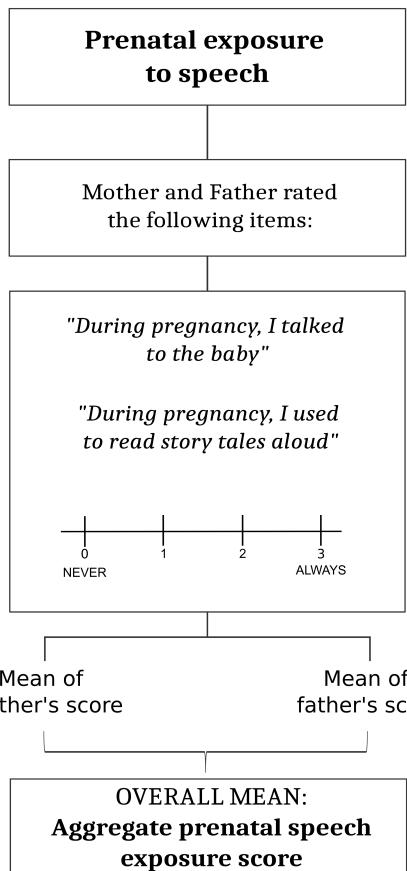


Figure S2. Flowchart for the prenatal speech exposure score calculation.



Methods S1. FBQ validation

The FBQ was evaluated by independent experts in the field of language development: each expert received the general description of the questionnaire, along with the description of each specific item and the intended underlying construct, and rated each item for either content validity ($n = 3$ experts) or face validity ($n = 4$ experts). Content validity refers to how adequately the items of an instrument reflect and accurately measure the construct they are intended to assess¹. The experts rated the content validity of each item on a 3-point scale (0 = not necessary; 1 = useful but not essential; 2 = essential). Face validity refers to how adequately the items of an instrument appear to measure what they are intended to assess¹. The experts indicated whether each item was understandable, unambiguous, and appropriate, based on a yes/no response.

From the responses regarding content validity, we gathered that no items were evaluated as not necessary. Half (8/16) of the items were deemed essential, whereas 37.5% (6/16) of the items were considered as essential by two experts, and as “useful but not essential” by another expert. One item was rated as essential by one expert and as “useful but not essential” by the other two experts. Finally, one item was rated as “useful but not essential” by all three experts (Figure S3A).

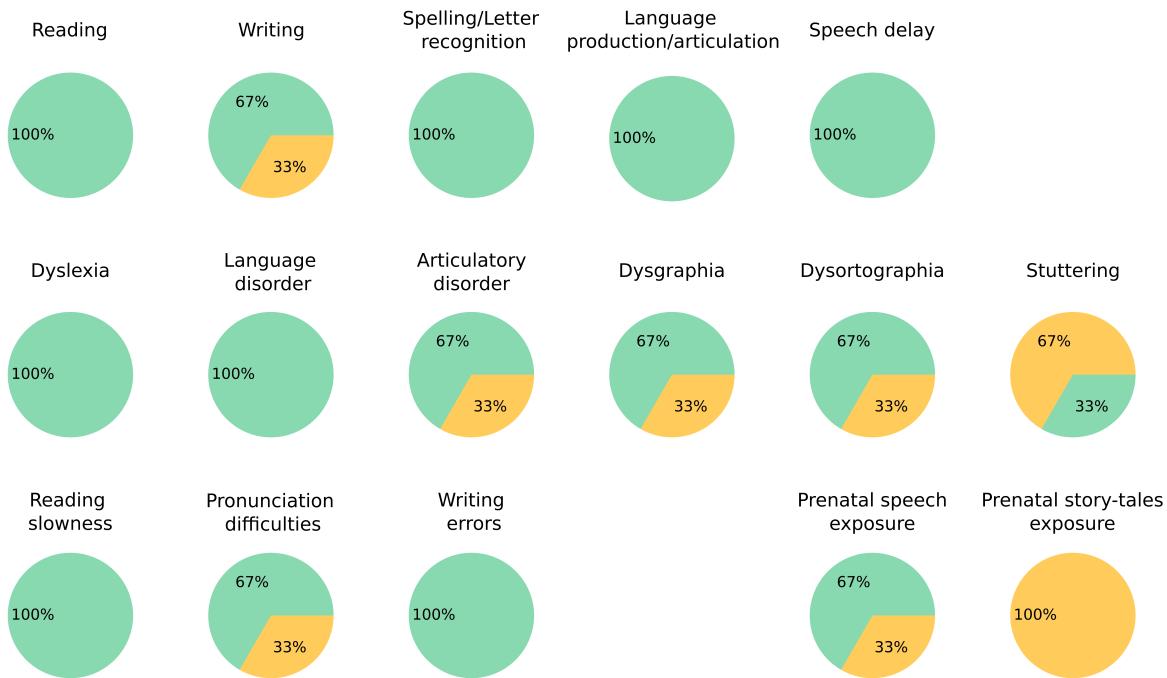
As for face validity, no single item was rated as invalid by more than 50% of the experts. Specifically, 81% (13/16) of the items were rated as valid by all experts. 12% (2/16) of the items received a negative evaluation by one expert but was positively evaluated by the other three. One item received two positive and two negative evaluations (Figure S3B).

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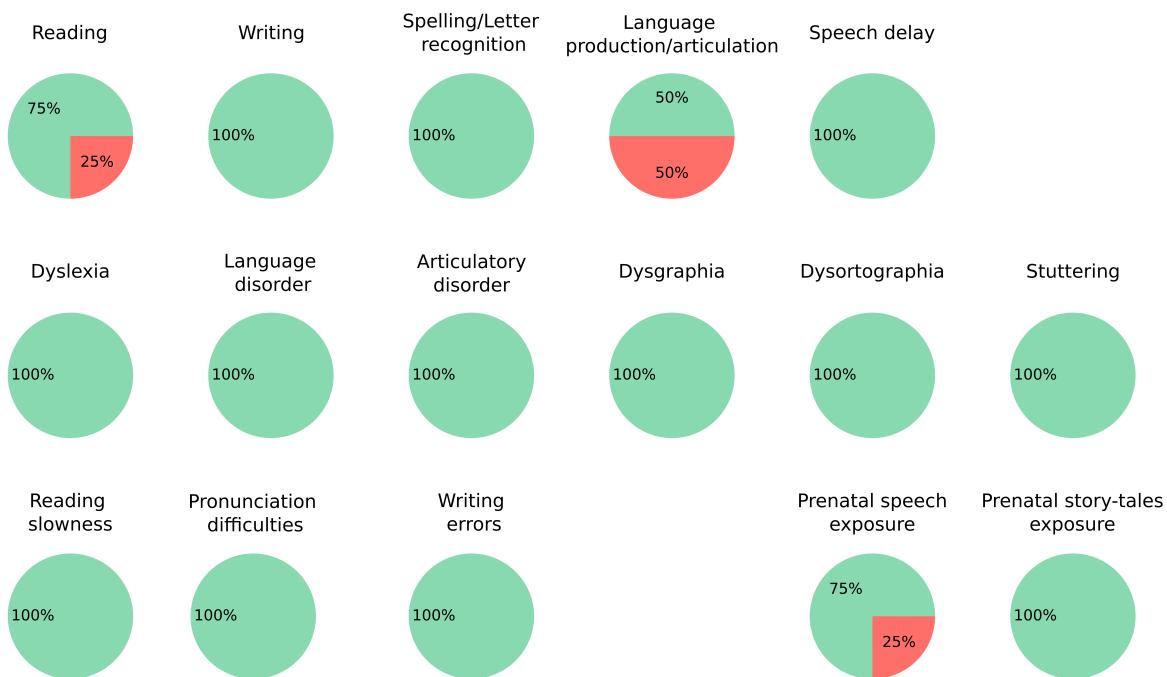
Figure S3. Content and face Validity.

The percentages of expert ratings for (A) content validity (green = “essential”; yellow = “useful but not necessary”), and (B) face validity (green = “yes”; red = “no”) are reported.

A)



B)



Results S1. Family background questionnaire (FBQ) – familial risk variable distribution.

In the binary score measuring the familial risk for language frailties (Figure S1), 16 subjects had a score of 0, indicating that no first-degree relatives had ever had difficulties with spoken or written language. Nine subjects had a score of 1, indicating that at least one first-degree relative had at least one difficulty in the investigated domains (Figure S4A). Similarly, in the binary score measuring the familial risk for language impairments (Figure S1), 18 subjects had a score of 0, indicating that no family members had an official diagnosis of developmental language- and speech-related disorders. Seven subjects had a score of 1, indicating that at least one first-degree or second-degree relative was diagnosed with one of the investigated disorders (Figure S4B). As for the binary score measuring familial risk related to parental self-assessed language- and speech-related difficulties (Figure S1), 15 subjects had a score of 0, indicating no or low perceived difficulties by the child's parents, whereas ten subjects had a score of 1, indicating higher difficulty levels (Figure S4C).

Figure S4. Family background questionnaire familial risk scores.

The plots show the sample distribution of: A) language frailties binary score; B) language impairments binary score; C) parental self-assessed language- and speech-related difficulties binary score (see also Figure S1).

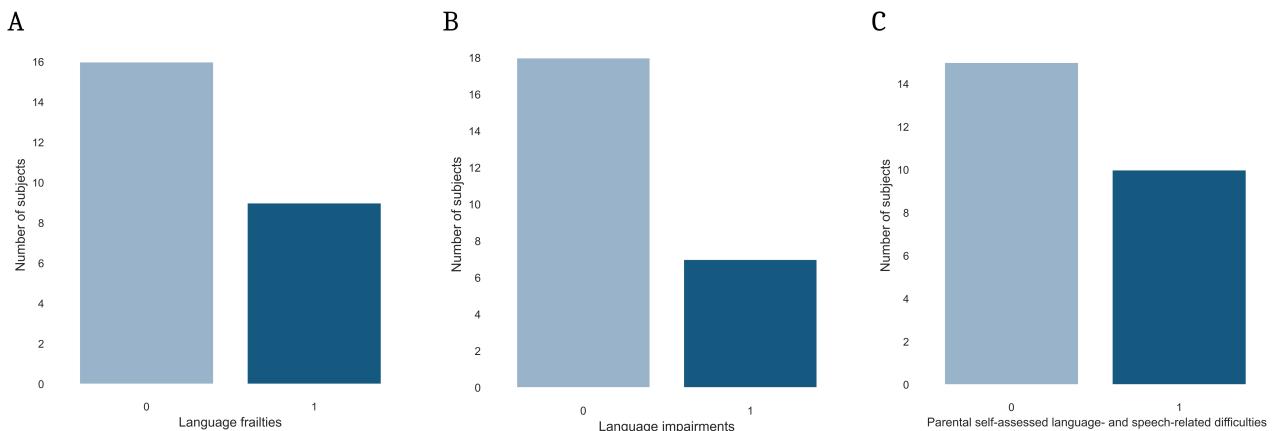
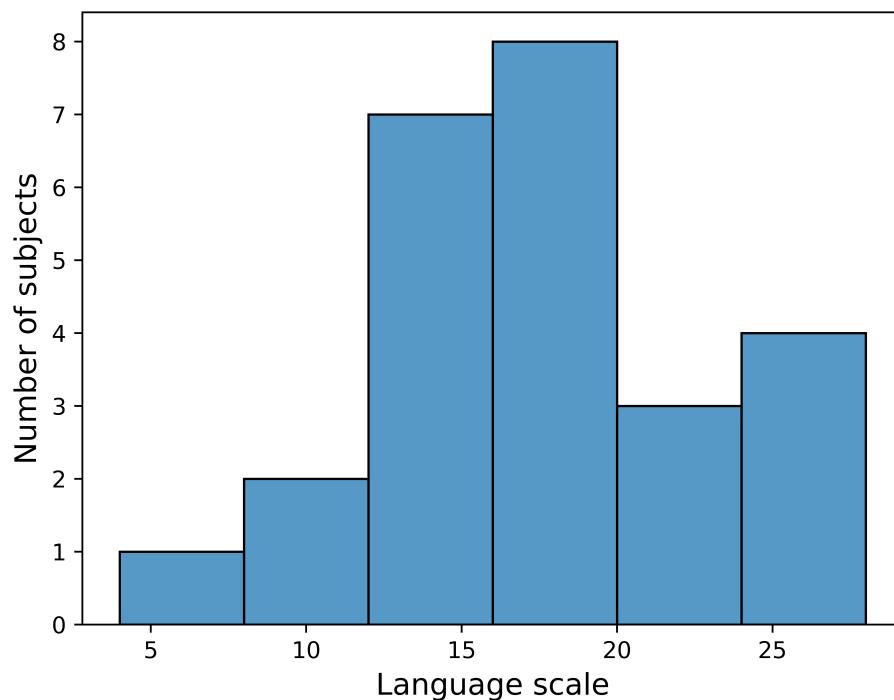


Figure S5. Children's performance at the Bayley-III language scale.



Supplementary references

1. Taherdoost, H. Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. *SSRN Electron. J.* (2016) doi:10.2139/ssrn.3205040.