



Latin American Society for Maternal Fetal Interaction and Placenta

Perceived maternal stress during pregnancy affects newborn development in a low-income cohort of pregnant women



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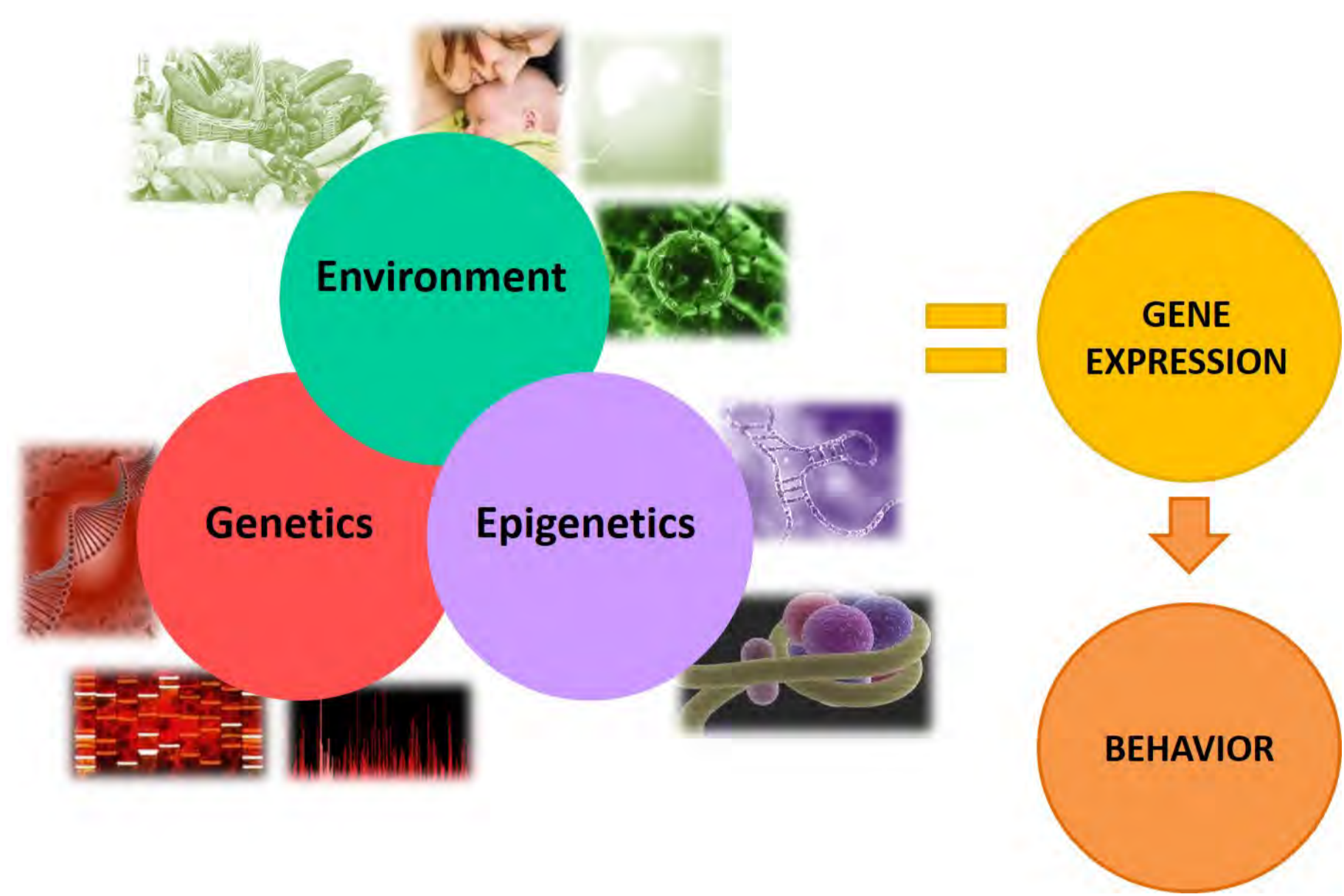
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HOSPITAL MATERNO INFANTIL Ramón Sarda

Introduction



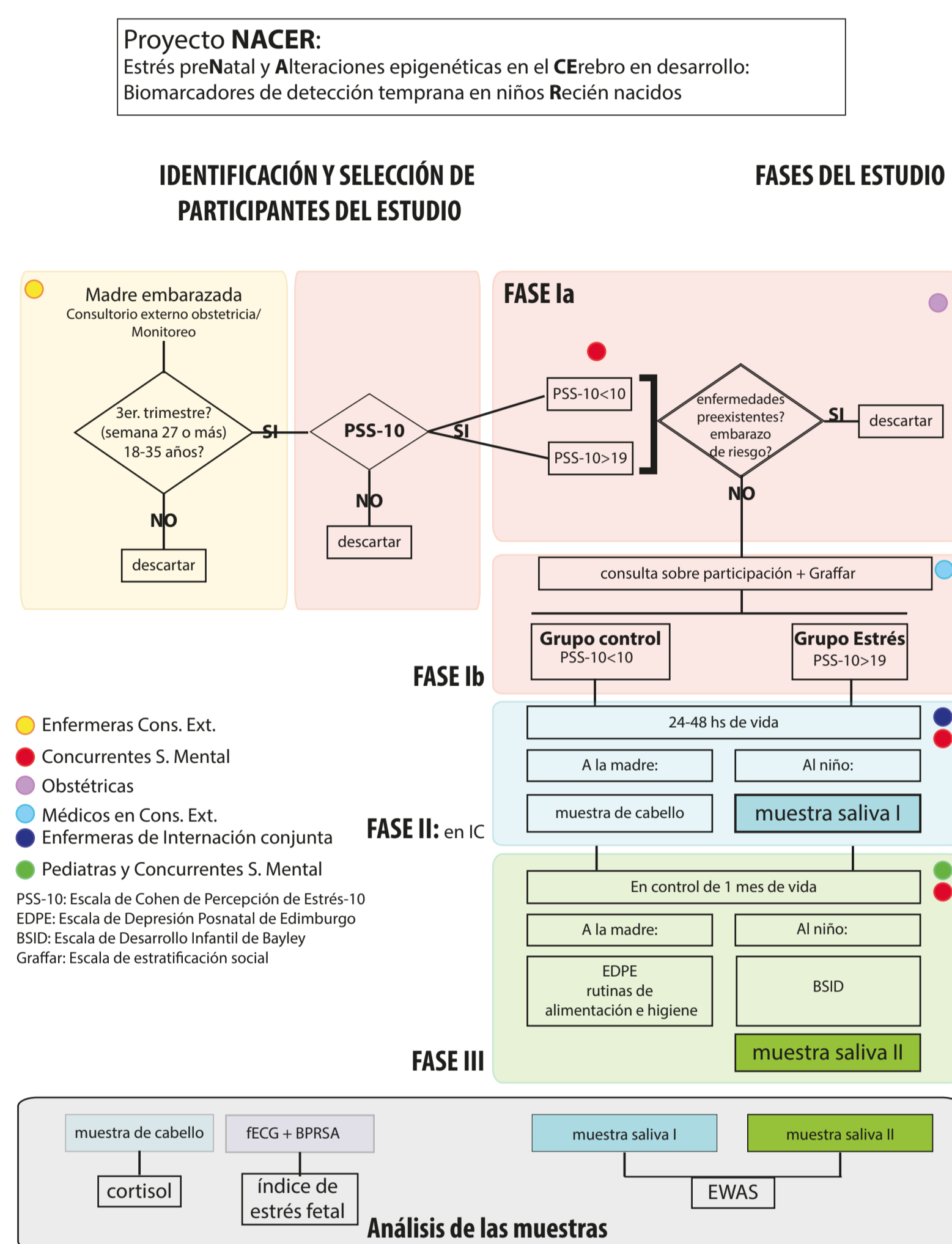
Maternal stress increases risk of

- premature delivery
- low birth weight
- cognitive problems of the child
- emotional problems of the child

Objectives

To test the feasibility of using a biomarker panel to detect prenatal stress (PS) induced epigenetic reprogramming of the infant brain affecting neurocognitive development.

Methods



Project NACER

Prospective case-control study from 28 weeks to term Hospital Materno Infantil Ramón Sarda (HMIRS) (CEI Protocol 09/2015). Many hospital departments worked coordinated: Obstetrics/Gynecology, Social Work, Maternity, Neonatal and Pediatrics, Nursing, Mental Health.

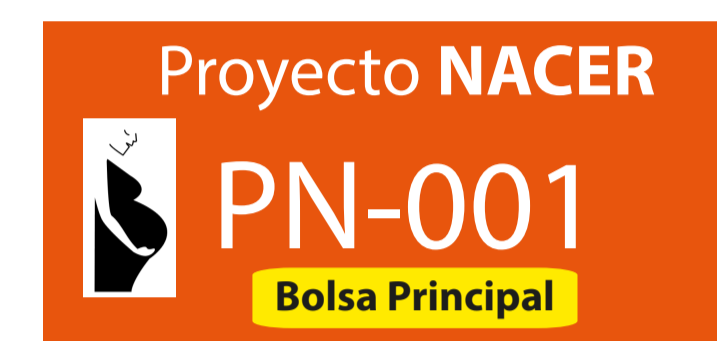
Cohen Perceived Stress Scale (PSS) questionnaire to classify pregnant women.

PSS-10 < 19: control group
PSS-10 ≥ 19: stress group

After delivery: Maternal hair and newborn saliva samples collected.

One-month after delivery:

Mothers: Edinburgh Post-partum Depression Scale (EPDS).
Newborns: Bayley Scale of Infant Development (BSID).



Maternal hair sample collection



Newborn saliva sample collection



Results

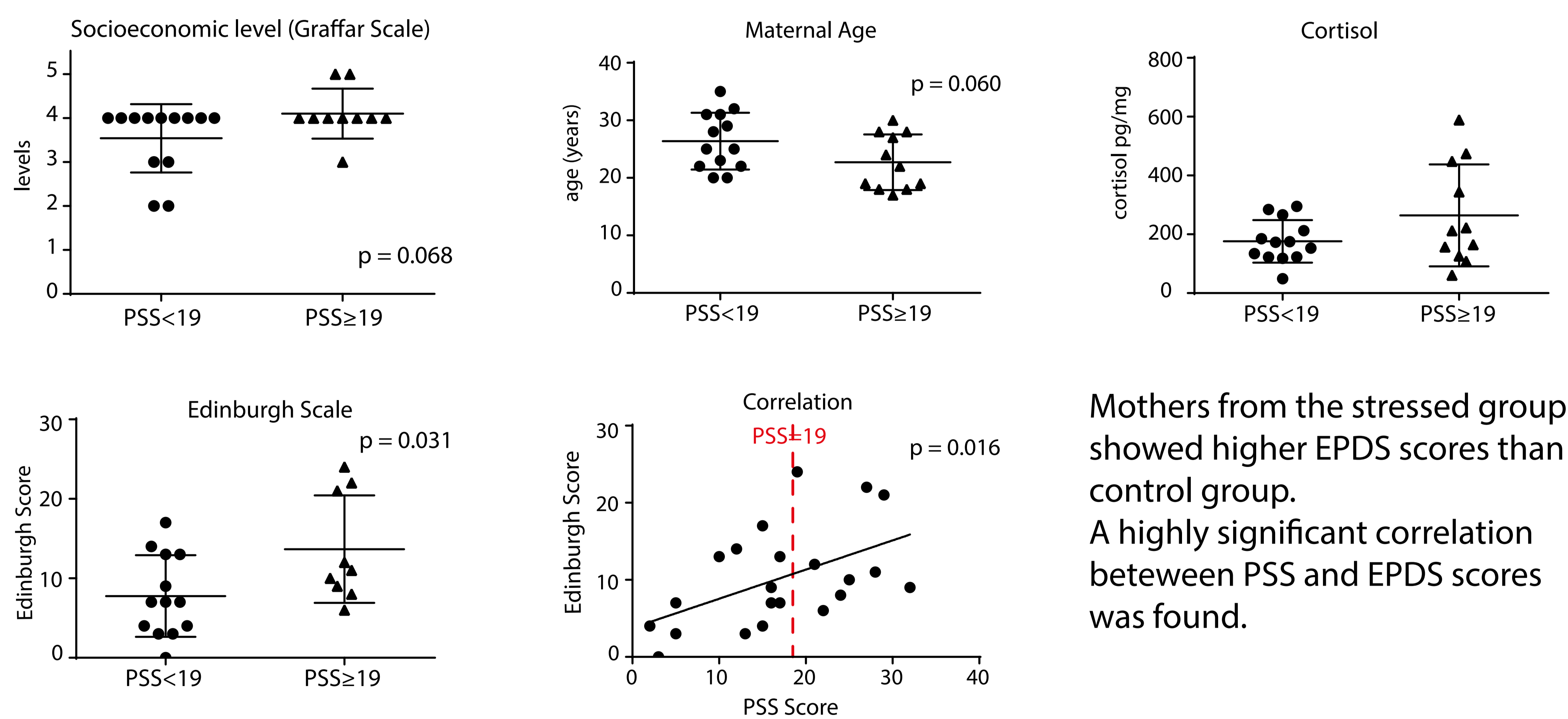
Pilot study: 26% of stressed pregnant women
51 questionnaires
34/51 patients (66.7 %) not eligible upon delivery
13 women with PSS < 19: control group
11 women with PSS ≥ 19: stressed group

| Characteristics | Control n=13 | Prenatal stress n=12 |
|---|--------------|----------------------|
| Mother data | | |
| PSS-10 score | 11.2 ± 1.6 | 24.5 ± 1.2 |
| maternal age at inclusion (years) | 26 ± 1 | 23 ± 1 |
| BMI pregestational (kg/m ²) | 25.6 ± 1.0 | 24.4 ± 0.6 |
| Argentinian | 31% | 55% |
| married | 92% | 91% |
| Annual income (above 2800 US) | 55% | 45% |
| multiparity | 69% | 50% |
| planned pregnancy | 46% | 20% |
| EPDS score | 7.8 ± 1.4 | 13.8 ± 2.3 |
| cortisol in maternal hair (pg/mg) | 176.1 ± 20.1 | 264.2 ± 52.3 |
| gestational age at delivery (weeks) | 38.7 | 39.4 |
| cesarean delivery | 23% | 10% |
| Perinatal outcome | | |
| Female | 50% | 50% |
| Birthweight (g) | 3343 ± 135 | 3495 ± 147 |
| Weight gain (g/day) | 27.1 ± 3.0 | 34.5 ± 7.5 |
| Length gain (cm/day) | 0.13 ± 0.01 | 0.15 ± 0.03 |
| head circumference (cm) | 33.9 ± 0.5 | 34.3 ± 0.5 |
| Apgar min 5 | 9.9 | 10 |
| fetal heart rate (bpm) | 141.5 ± 4.8 | 142.9 ± 3.9 |

Data are mean (SD) or n (%).

What happened to the mothers?

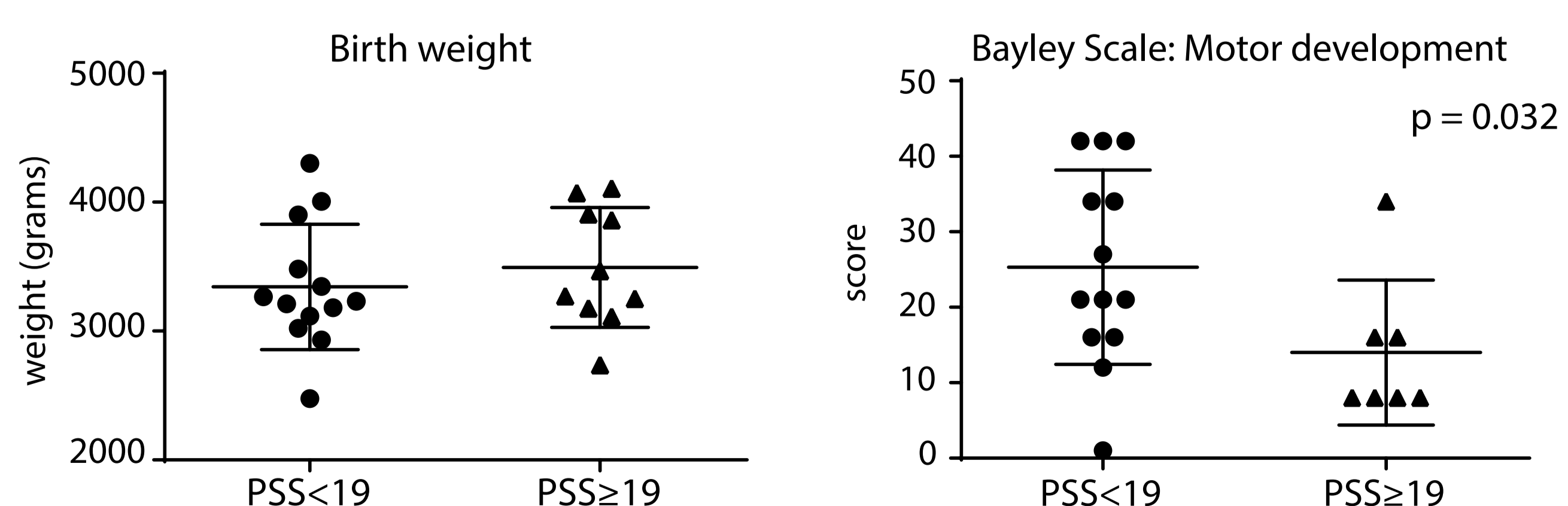
According to the Graffar scale, most participants from both groups were classified as stratum IV (low-income). In addition, participants classified as stratum V belong to the stressed group. Mothers from stressed group were younger. Cortisol levels were more variable among stressed mothers.



Mothers from the stressed group showed higher EPDS scores than control group. A highly significant correlation between PSS and EPDS scores was found.

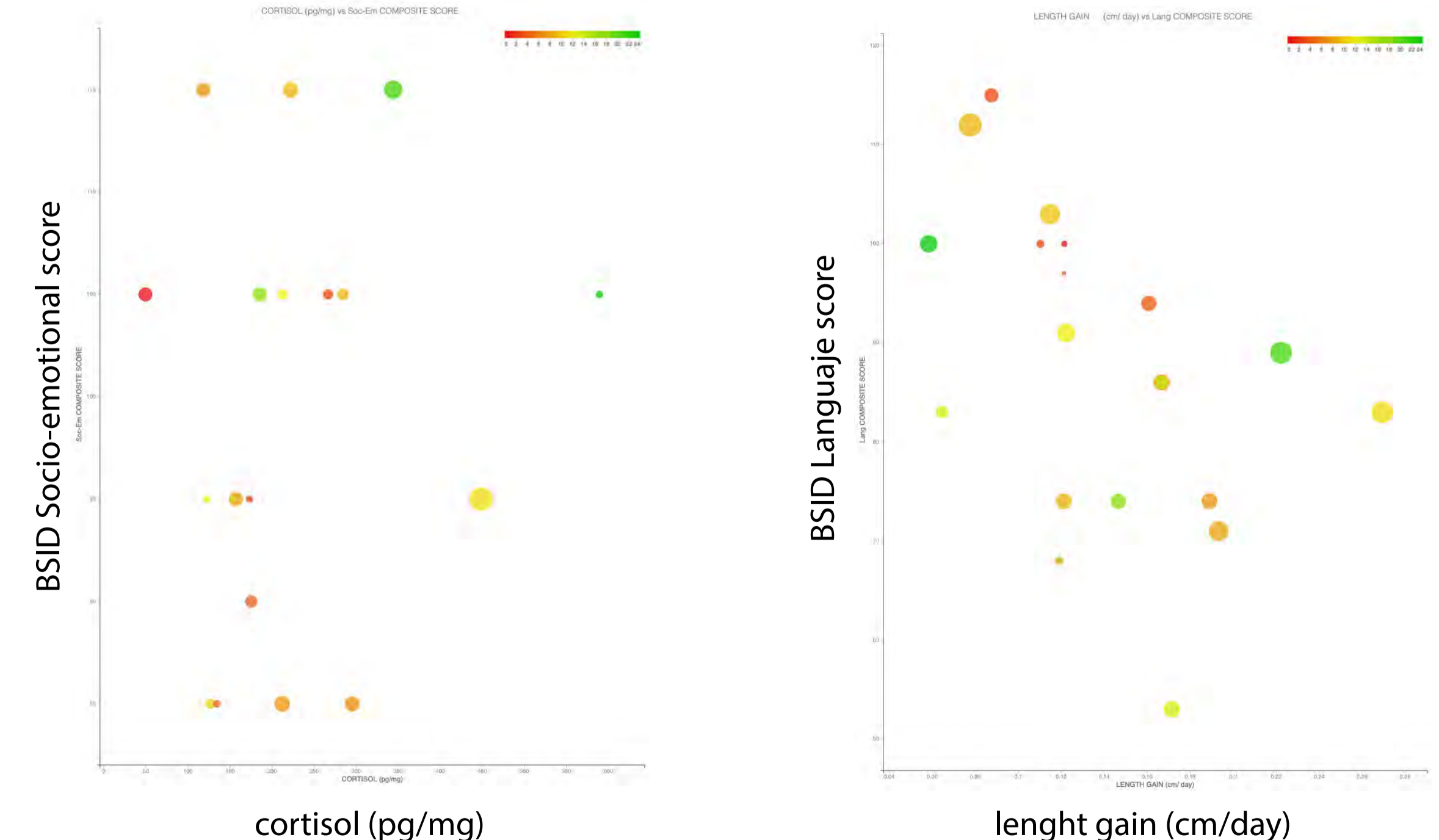
What happened to the babies?

Notably, among babies, most parameters were similar between both groups. However, babies born from stressed mothers showed a significant reduction in BSID Motor score.



Then we asked: Can the parameters predict the range of observed scores for the Bayley test?

PSS score seems to be predictive for all Bayley's domains. While cortisol and Edinburgh scores for some of them.



Scatter plot: BSID Socio-emotional score vs. cortisol. Color indicates EPDS score. Circle size indicates weight gain.

Scatter plot: BSID Language score vs. length gain. Color indicates EPDS score. Circle size indicates PSS score.

Conclusions

Maternal perceived stress during pregnancy correlated with one-month old babies impaired motor development. This preliminary study suggests a direct transgenerational transmission of PS onto offspring development. EWAS analysis of DNA from saliva samples will complete this study.

Acknowledgments



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