

## Report on the outcomes of a Short-Term Scientific Mission<sup>1</sup>

Action number: CA18211

Grantee name: Alessia Melacca

### **Details of the STSM**

Title: Is maternal subjective birth experience associated with maternal and offspring DNA methylation? Findings based on the ALSPAC data.

Start and end date: 27/02/2023 to 03/03/2023

### **Description of the work carried out during the STSM**

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

*(max. 500 words)*

**Grantee enters max 500 word summary here.**

The STSM took place at the Luxembourg Institute of Health in Luxembourg (LIH), under the supervision of Dr Jonathan Turner.

Together with Prof. Jonathan Turner and Dr. Cyrielle Holuka (PhD Student in Immune, Endocrine and Epigenetics at LIH) we went through the research project plan and developed further the conceptual model for analysis based on the work previously done by subgroup 2 of WG4.

The goal of the STSM was to carry out the data analysis relate to the study project "*Is maternal subjective birth experience associated (MBE) with maternal and offspring DNA methylation? Findings based on the ALSPAC data*" which is part of the work conducted by WG4. Particularly the aim of the study is to explore the possible association between MBE and infant DNA methylation after childbirth looking at DNAm data from ARIES, a sub-study of the Avon Longitudinal Study of Parents and Children (ALSPAC). A subsample of 1018 mother-child pairs that have been profiled during a period of 15 years.

To explore this possible association, we questioned whether the MBE effects would fade or increase its consequences over time, influencing other important mechanisms such as maternal mental state (MMS) [1], maternal bonding (MB) [2], and finally the development and behaviour of the offspring [3]. And whether these changes can eventually be explained by some modifications in the infant DNA methylation.

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<sup>1</sup> This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

As regards the MBE we decided to design a MBE score calculated using different ALPAC questions related to MBE. We agreed that using different questions allows us to cover as much as possible all the dimensions that influence MBE and therefore increase the power of the analysis [4].

Then, we included The Edinburgh Postnatal Depression Scale to study MME at different time points after birth as the literature suggests that women's perception of their recent birth experience may be a predictor of elevated postpartum symptoms of depression [5]. And also, maternal bonding (MB) which can be tested looking at the Maternal Bonding Scale score (at two different time points). Finally, we included the International Trauma Consortium Scale (ITQ), the Emotional Availability Scale (EAS) and Strength and Difficulties Scales (SDQ) to evaluate child development and behaviour.

Overall, during this first part of the STSM we focused on discussing and refining the model which also included, discussing moderator variables e covariates that need to be included, talking to other researchers at the Institute that had already used those ALSPAC scales as well as planning next tasks.

During the second half of the STSM we cross checked all the variables included in the refined analysis model and whether they were promptly available or hadn't been delivered by ALPSAC yet. As we didn't have all the variables needed, we planned to complete the analysis from remote together with Dr. Cyrielle Holuka as soon as they will become available. We spent the remaining time writing the research methodology section of the future paper draft as well as integrating the bibliography related to the new conceptual model.

- 1) Bell AF, Carter CS, Davis JM, Golding J, Adejumo O, Pyra M, Connelly JJ, Rubin LH. Childbirth and symptoms of postpartum depression and anxiety: a prospective birth cohort study. Arch Womens Ment Health. 2016 Apr;19(2):219-27. doi: 10.1007/s00737-015-0555-7. Epub 2015 Jul 23. PMID: 26202722; PMCID: PMC4938632.
- 2) Bell AF, Andersson E, Goding K, Vonderheid SC (2018) The birth experience and maternal caregiving attitudes and behavior: A systematic review Sex Reprod Healthc 16:67–77 doi:10.1016/j.srhc. 2018.02.007 [PubMed: 29804779]
- 3) Rees S, Channon S, Waters CS. The impact of maternal prenatal and postnatal anxiety on children's emotional problems: a systematic review. Eur Child Adolesc Psychiatry. 2019 Feb;28(2):257-280. doi: 10.1007/s00787-018-1173-5. Epub 2018 Jun 15. PMID: 29948234; PMCID: PMC6510846.
- 4) Leinweber J, Fontein-Kuipers Y, Karlsdottir SI, Ekström-Bergström A, Nilsson C, Stramrood C, Thomson G. Developing a woman-centered, inclusive definition of positive childbirth experiences: A discussion paper. Birth. 2022 Jul 5. doi: 10.1111/birt.12666. Epub ahead of print. PMID: 35790019.
- 5) Bell AF, Andersson E (2016) The birth experience and women's postnatal depression: A systematic review Midwifery 39:112–123 [PubMed: 27321728]

### **Description of the STSM main achievements and planned follow-up activities**

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

*(max. 500 words)*

**Grantee enters max 500 word summary here.**

The expected outputs of the STSM were 1 or 2 scientific papers which are part of the deliverables of WG4. The output was achieved as we have started writing up to the methodology section of the paper draft "*Is maternal subjective birth experience associated with maternal and offspring DNA methylation? Findings based on the ALSPAC data.*". Also, we set up and began the analysis' phase.

Moreover, this STSM allowed me to have meaningful collaboration with other researchers, build a network and improve my research skills.

This project directly relates to the WG4 aim of deepening the understanding of the intergenerational transmission of trauma through biomedical and epigenetic research. As per MoU WG4 will explore the role of epigenetic alterations and underlying biological and biochemical mechanisms in perinatal mental health and infant development, to underpin screening and develop interventions for those affected. Using data from comparable national datasets, biological factors such as the microbiome, telomere length, cortisol response patterns, vasopressin, role of oxytocin are related to transition to motherhood, perinatal mental health and infant outcomes, attachment and maternal sensitivity.

Furthermore, the STSM is linked to the task (connected to the above aim) of analysis of the data from Birth Cohort studies and maternity information systems/reports with the intent of identifying the effects of stressors in pregnancy. This will hopefully enable the development of future projects to explore the potential to develop biologically based outcome indicators, so that future interventions could be examined based on their impact on underlying epigenetic and biological mechanisms.

Next activities will be to complete the analysis from remote in collaboration with Dr. Cyrielle Holuka and under the supervision Prof. Jonathan Turner.

In addition, we plan to submit a poster with the analysis model to the Congress NuGOweek2023 *Impact of nutrition during different life stages – tracing the impact of diet on human health* (deadline 28/04/2023).

Finally, we will complete the paper draft and submit it to a journal.