Client 24-042

Meeting time: 06/19 Tuesday 10:30am

Current stage: Analysis (all data collected)

Expected completion date: 7/31/2024.

Supported by a grant or contract: Yes (Ends 9/15/24)

Background:

The client is a dream hire professor in the sociology department who studies the genetic, epigenetic, and socioenvironmental determinants of depression, with a focus on the role of childhood adversity in early life. Her current project is about short-term training to learn concepts and methods to measure tooth development and dental hard tissue phenotypes, to study the connections between tooth and brain development. The client does not have any formal background in dental development; However, she will collaborate with subject matter experts and universities to get the experience.

The project training will consist of coursework, on-line seminars, guided readings, conference attendance, and lab experiences at two sites (University of Kent and Calgary), which will provide training distinct from the PI’s and other collaborators home institutions. Training will also include a secondary analysis of a study from the Center for Oral Health Research in Appalachia (COHRA). Under one of COHRA’s projects (R01-DE014899 PD/PIs Marazita, McNeil, Foxman, Shaffer) the COHRA2 longitudinal birth cohort was built and followed 1000 European-ancestry and 250 African American pregnant women from northern Appalachia. All of the above is how the client gathered the data.

The client needs to analyze existing data from COHRA2 to investigate the extent to which genetic factors and children’s exposure to maternal distress (A common type of childhood adversity) and see how this associates with dental caries (tooth decay) and age at first tooth eruption. The client has 2 aims with regards to their plain of analysis.

1. The client will use bioinformatics data on brain structures and disorders to calculate genetic risk scores capturing the aggregate effect of multiple genes (i.e., polygenic risk scores; PRS) and then examine their role on both dental caries risk and age at first tooth emergence.
2. The client will use an analytic technique called the structured life course modeling approach (SLCMA) to assess with repeated-measures data how the developmental timing of children’s exposure to maternal distress (e.g., global and parenting stress; depressive symptoms) associates with number of dental caries and primary tooth eruption timing.

During this summer semester the client needs help completing the second analysis technique and understanding the findings from this data.

Overall, the client hopes to discover, and the identification of new genes associated with dental caries and tooth formation timing and increase knowledge on the role of maternal distress on these dental outcomes, which could then guide targeted preventive interventions.

The specific design set up was indicated as:

* 1,172 European-ancestry adult mother-child pairs were recruited and enrolled prenatally, beginning in November 2011 for West Virginia-based mothers and January 2012 for Pennsylvania-based mothers, and ending recruitment in 2017. Mothers were recruited through 42 partnering health and dental care offices, clinics, hospitals, and community centers, as well as other community sampling methods (e.g., radio and television ads, WIC offices, Head Start) across the state of West Virginia (n=555) and through one hospital and its associated clinics and offices in southwest Pennsylvania (n=617).
* Data has been collected on mothers and offspring through phone interviews, home visits, and in-person assessments. Phone interviews were conducted by a professional and HIPAA-compliant research survey service. 47 data collection periods have occurred there was ~10% attrition between each study visit. By age 5, 554 mother/child pairs were still in the longitudinal study out of the original 1,172 enrolled, representing 47% retention at that point, comparable to many similar studies worldwide1.
* There is slight variation in assessment measures and timepoints between the two sites, with the Penn site adding measures and measurement periods to the common protocol. These data can be combined, however, because the majority of timepoints are the same and we propose using the common timepoints for the overall analyses. We can also repeat analyses separately for the two sites to assess the congruence of results.

Variables measured:

* The response variable is the outcome Measures of Dental Caries and Tooth Eruption.
  + Dental caries was assessed from age 2 months to 10 years during yearly intra-oral exams performed by a trained/licensed dentist or hygienist. Providers used the Decayed, Missing, or Filled Tooth Surfaces (DMFS) Index to evaluate the status of each primary tooth (e.g., decayed, healthy, restored) and surface, as part of the PhenX Toolkit Dental Caries Experience Prevalence Protocol.
  + For the clients project DMFS at age 5 is the age of interest, the age before primary tooth exfoliation. Tooth eruption was assessed through the DMFS and phone interviews conducted every 6 months from 2 months of age to 10 years. Interviewers asked mothers if their child had any new teeth, how old the child was when their first tooth came in, and how many teeth the child has now. Client will analyze the age (in months) at first tooth emergence.
* The predictor variables are the exposure measures of maternal distress.
  + There exist 23 different measurement occasions as indicated in the client’s grant proposal where mothers reported their experiences of stressors and mental health symptoms commonly examined in studies of maternal distress74-84. These domains were measured using single items or well-known, psychometrically sound, and standardized measures. With these data, we can characterize the effect of the developmental timing, accumulation, and recency of maternal distress on children’s dental caries and age at tooth eruption. Some examples of distress include (anxiety, stress, depression, etc).

Research questions from client:

* What is the relationship between maternal distress and childhood caries?
* What is the relationship between maternal distress and age at tooth eruption?

Statistical issues

* The client did not indicate any specific statistical issues with their project. Their only concern is that they don’t have a data analyst to complete the analysis and they want to publish their research before their grant ends.

Discussion points:

1. Where can we find the specific grant application to look at all the tables, figures, protocols? It was referenced a lot in the application but wasn’t attached.
2. How is the risk score computed?
3. How does SCLMA work exactly? Where can we find resources to learn more about how this works?
4. What does the data look like?