**Statistical Design Consulting**

**SEMESTER REPORT**

**Summer 2024**

**Client:** Dr. Erin Dunn **File Number:** 24-042

**Department:** Sociology **Major Prof:**

**Consultant:** Sumeeth Guda **Initial Meeting Date:** 06/19/24

**Meeting Attendees:** Sumeeth Guda, Dr. Erin Dunn, Dr. Chong Gu, Dr. Antik Chakraborty, Xiyu Wang (Observer)

**Statement of Problem:** To what extent do genetic factors and children’s exposure to adversity affect tooth decay and tooth formation timing.

**Goal of This Project:** Publication and Grant Application

**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 gathered data through a study from the Center for Oral Health Research in Appalachia (COHRA). The population used in the study was a birth cohort consisting of 1000 European-ancestry and 250 African American pregnant women from northern Appalachia.

The client needs to analyze existing data from COHRA 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.

The client indicated that they need 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

**Progress During Current Semester:**

The client is a new hire professor who lost her data analyst during her transition to Purdue. She reached out to Dr. Bruce Craig to see what her options were, and Dr. Craig thought it might be beneficial for the SCS to learn more about her project and see if we could help her out.

During the IM meeting, the consultant and SCS professors had some concerns about the project. Which they told Dr. Dunn. The two major concerns were that Dr. Dunn did not have any specific statistics questions she needed help with, and the second was that Dr. Dunn did not share the dataset or show how the data worked. Dr. Gu expressed that the first concern is problematic because although the statistical consulting service is willing to help researchers with their project, ultimately, we would not be data analysts on behalf of the client and do the analysis for the client, but we could always help them if they had specific questions or problems. Dr. Chakraborty and Dr. Gu had concerns about not being able to see the data, especially since there wasn’t a deep understanding of the SCLMA model within the SCS. So, unless the data could be viewed, ultimately no advice could be given about her analysis procedures or model.

The ultimate conclusion of the meeting was that Dr. Dunn wanted to finish the project; however, she needed help from a new data analyst to run her model and do the exploratory data analysis. The recommendation that Dr. Gu gave Dr. Dunn was that the SCS might not be the best place for her to ask for help because the demands of her project are greater than what the SCS can offer clients. Dr. Gu, however, told that she should instead make this job temporary research posting job, and share it with the statistics department and with the Purdue Data Mine Learning Community. By collaborating with both of the departments, she can hire a student or faculty statistician who is willing and able to put in the hours to complete her project. Dr. Craig and Dr. Gu even mentioned that they could ask former SCS consultants and see if they would be willing to do private consulting for Dr. Dunn and thus be able to become more involved in the EDA and deeper analysis questions.

Overall, the SCS is still willing to help out Dr. Dunn, however on the condition that she asks for more specific statistical-related help from us. Otherwise, she would need help from a private statistical consultant or a new data analyst to accomplish the goals of her project.

**Current Status: Hold.**