Exploring Depression and Anxiety: Objective Hardship Exposure and Psychological Distress Among Pregnant Individuals*

Analysis of Prenatal Mental Health During the Covid-19 Pandemic

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Abstract

The outbreak of the Covid-19 pandemic was a substantial stressor, especially for pregnant individuals. This paper uses Bayesian model and logistic regression to estimate levels of prenatal depression and anxiety during this hardship. The analysis reveals that the perceived threats to oneself and the unborn child are positively correlated to the mental distress, especially among younger pregnant individuals with lower levels of education and from lower-income families.

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1 Introduction

2 Data

2.1 Data Source and Measurement

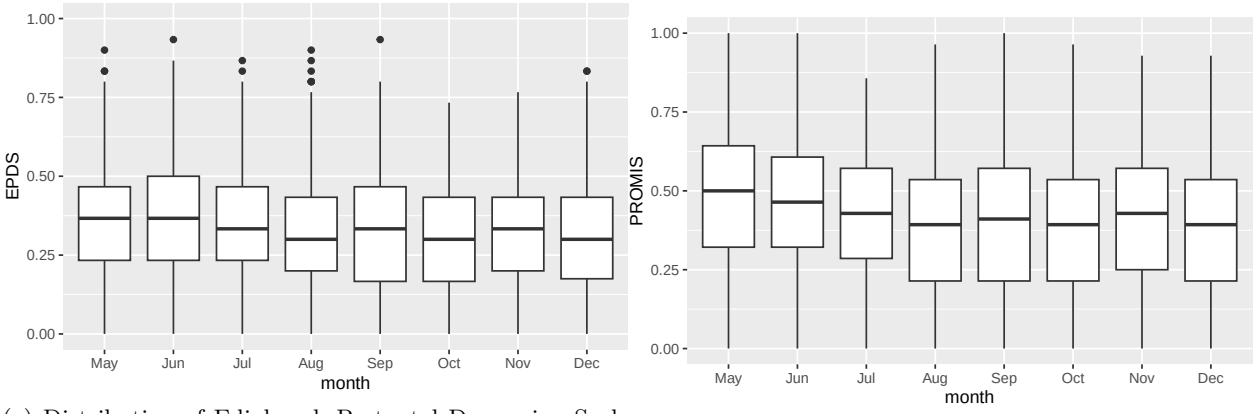
The prenatal mental health dataset from the Open Science Framework was designed to explore the relationship between exposure to objective hardship caused by the Covid -19 pandemic and psychological distress in pregnant individuals (Gerald Giesbrecht 2023). The study population is pregnant individuals aged 17 or older, with gestation periods of no more than 35 weeks, residing in Canada. Data were collected from May 2020 to December 2021, containing demographic information, mental health data and basic birth outcomes (Catherine Lebel 2023). For this paper, I will only use data collected from May 2020 to December 2020 to analyze the prenatal mental health during the onset of the outbreak, a period highly marked by panic and hardship.

*Code and data in this analysis is available at: https://github.com/Elaineyi1/Prenatal_Mental_Health

Participants were recruited through advertisements via pregnancy organizations, care providers, social media, and paid ads on Facebook and Instagram, with the chance to win a $500 gift card. A portion of advertisements targeted geographic regions and sociodemographic groups with less representation to reduce underrepresentation (Catherine Lebel 2023).

Prenatal data, including age, 2019 household income in Canadian dollars, and education level, were collected as part of the national Pregnancy during the COVID-19 Pandemic (PdP) project using online questionnaires through REDCap. Birth data were also acquired using parents reports in REDCap (Catherine Lebel 2023). Depression symptoms were self-assessed using the Edinburgh Postnatal Depression Scale (EPDS), consisting of 10 questions, each scored from 0 to 3, with possible scores ranging from 0 to 30. Anxiety symptoms were self-assessed by Patient-Reported Outcomes Measurement Information System (PROMIS), including 7 questions, each scored from 1 to 5, with possible total scores ranging from 7 to 35. Higher scores on both surveys indicate more severe depression or anxiety symptoms. The surveys were available in either English or French.

Data are available for 10,772 participants. After excluding observations with missing values and setting the delivery month from May 2020 to December 2020, 3266 observations remain. Further details regarding data cleaning can be found in Section 6. All participants in this study provided informed consent.



(a) Distribution of Edinburgh Postnatal Depression Scale Scores by Month

(b) Distribution of Promis Anxiety Scores by Months

Figure 1: Distribution of Levels of Depression and Anxiety by Month

Table 1: Levels of Depression and Anxiety Among Different Age Groups

Age Group	Survey Language	Average Level of Depression	Average Level of Anxiety
Under 27	English	0.4057530	0.4978245
Under 27	French	0.3243386	0.4075964
27 to 34	English	0.3343954	0.4241995
27 to 34	French	0.2850746	0.3546109
35 to 39	English	0.3236429	0.4015574
35 to 39	French	0.3063492	0.3832200
40 and above	English	0.3325758	0.4117965
40 and above	French	0.2727273	0.4155844

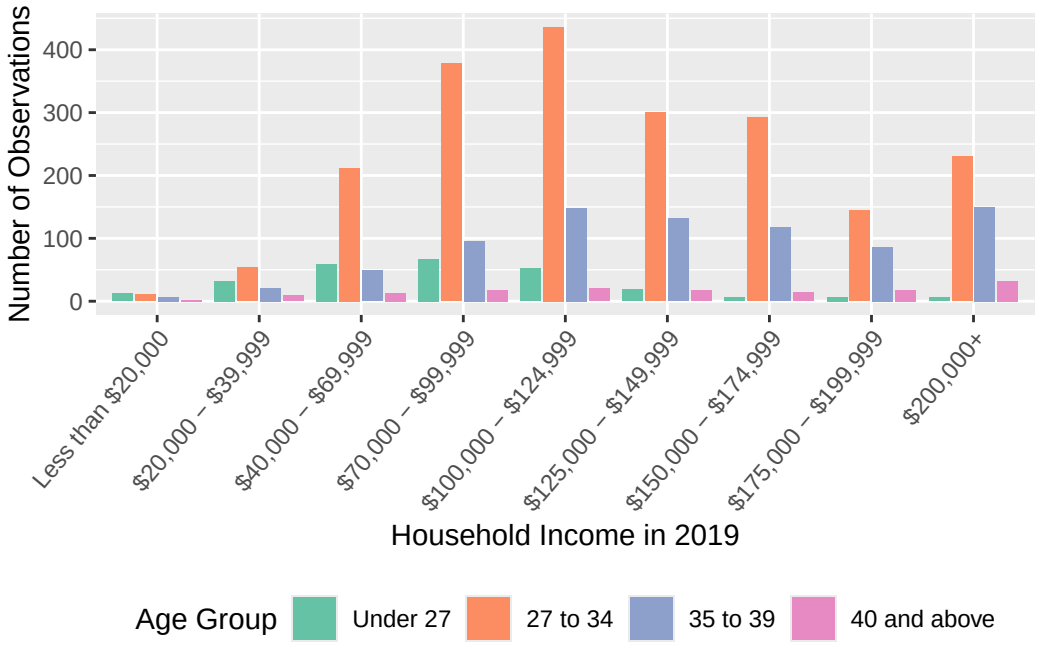


Figure 2: The Distribution of Age Groups and Household Income for Pregnant Participants

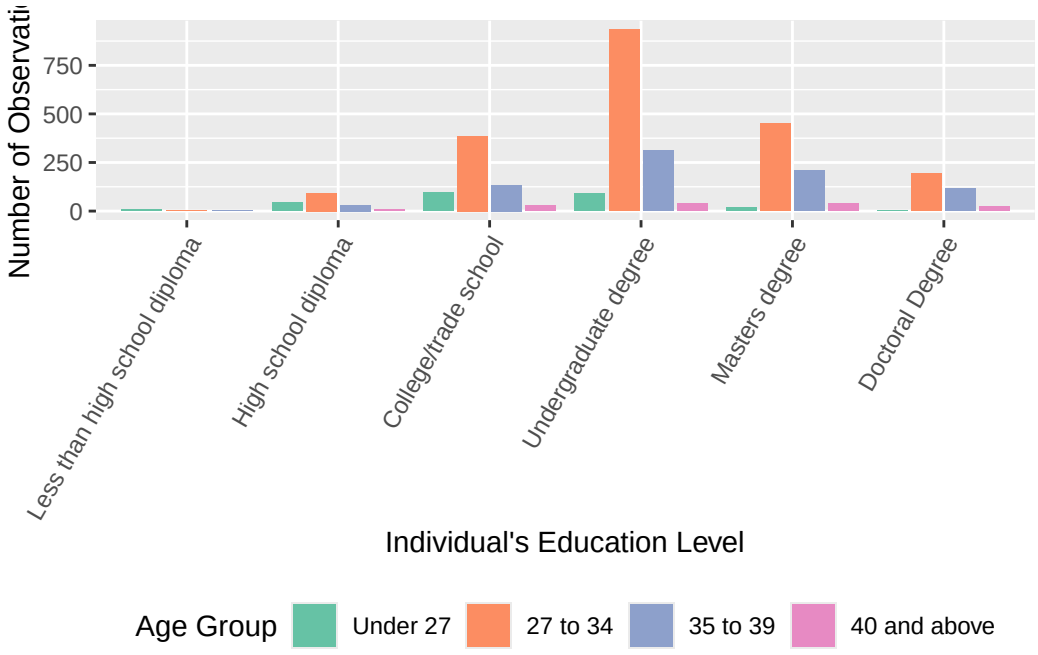
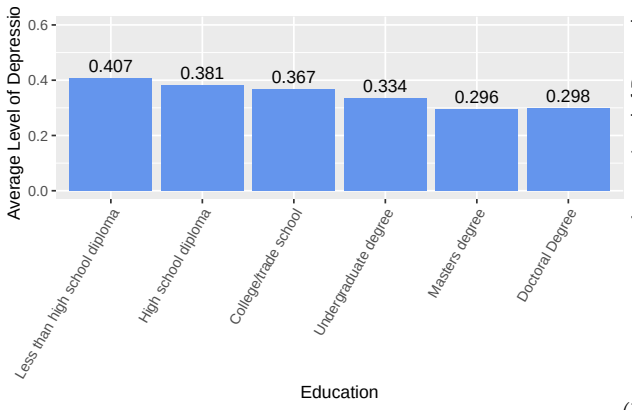
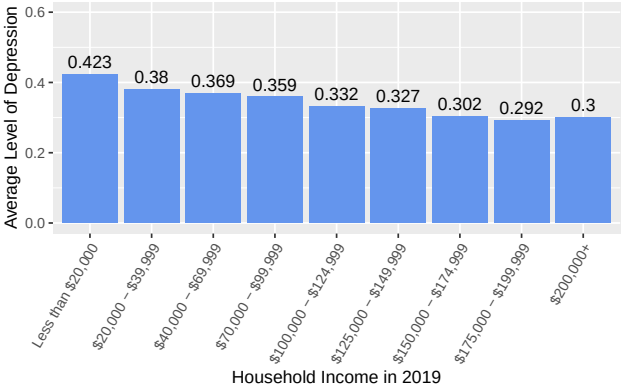


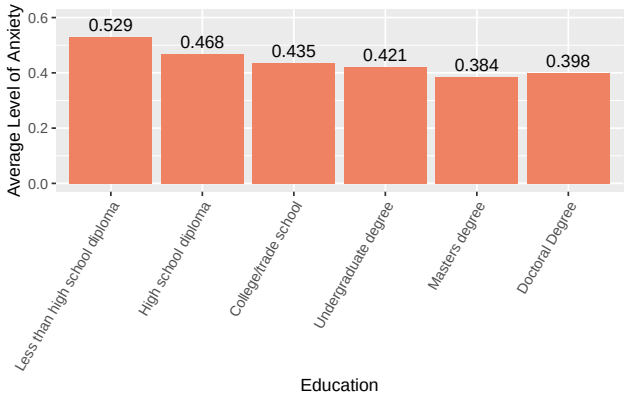
Figure 3: The Distribution of Age Groups and Level of Education for Pregnant Participants



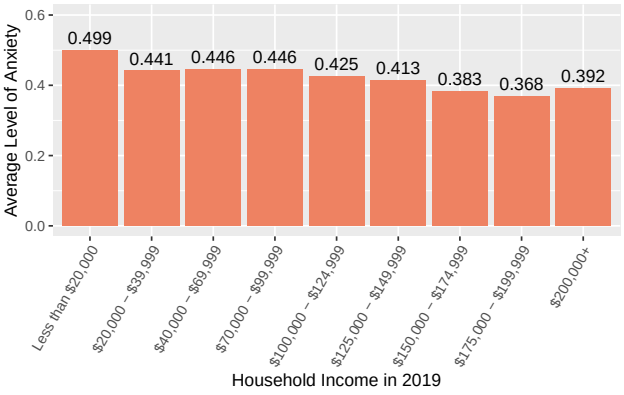
(a) Distribution of Levels of Depression by Education



(b) Distribution of Levels of Depression by Household Income

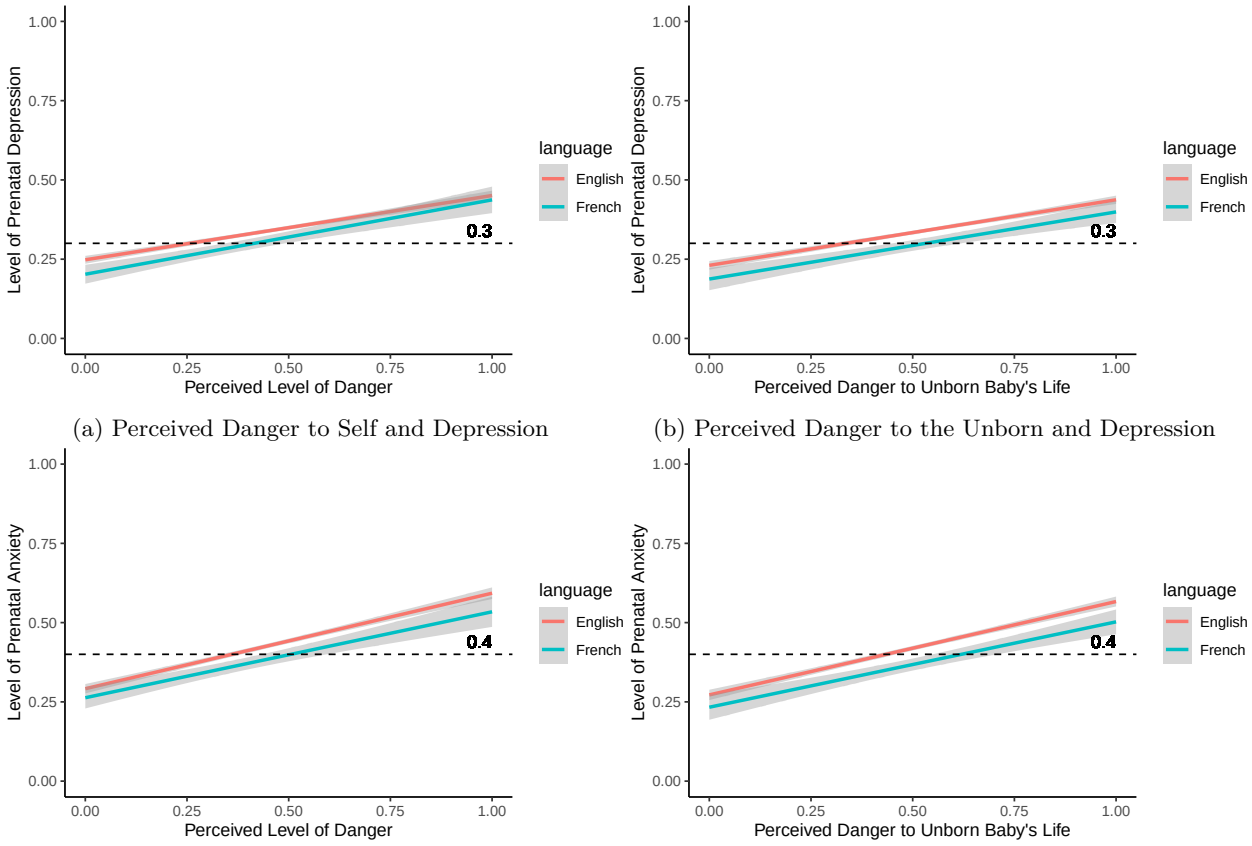


(c) Distribution of Levels of Anxiety by Education



(d) Distribution of Levels of Anxiety by Household Income

Figure 4: Distribution of Levels of Depression and Anxiety by Education and Household Income



(a) Perceived Danger to Self and Depression

(b) Perceived Danger to the Unborn and Depression

(c) Perceived Danger to Self and Anxiety

(d) Perceived Danger to the Unborn and Anxiety

Figure 5: Relationship between Perceived Level of Danger and Prenatal Mental Health

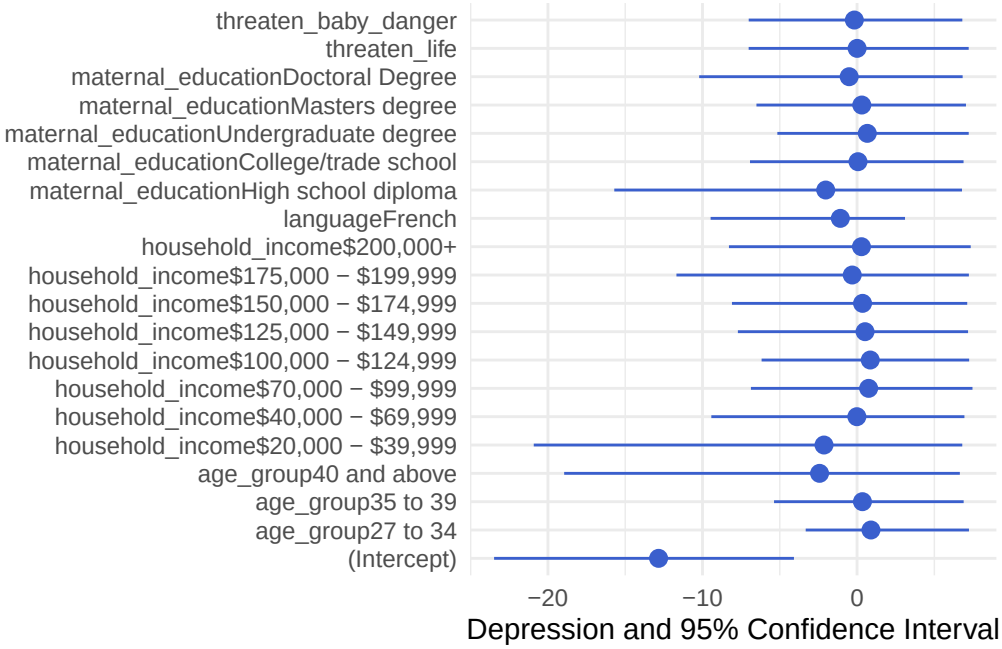


Figure 6: The Coefficients and Confidence Interval in the Depression Model

Table 2: Estimating Prenatal Depression given Age, Household Income, Education Level and Choice of Language

	Depression
(Intercept)	−12.841
age_group27 to 34	0.899
age_group35 to 39	0.349
age_group40 and above	−2.425
household_income$20,000 - $39,999	−2.139
household_income$40,000 - $69,999	−0.012
household_income$70,000 - $99,999	0.750
household_income$100,000 - $124,999	0.855
household_income$125,000 - $149,999	0.516
household_income$150,000 - $174,999	0.356
household_income$175,000 - $199,999	−0.312
household_income$200,000+	0.285
languageFrench	−1.082
maternal_educationHigh school diploma	−2.027
maternal_educationCollege/trade school	0.061
maternal_educationUndergraduate degree	0.662
maternal_educationMasters degree	0.307
maternal_educationDoctoral Degree	−0.510
threaten_life	0.004
threaten_baby_danger	−0.175

Table 3: Estimating Prenatal Anxiety given Age Group, Household Income, Education Level and Choice of Language.

	Anxiety
(Intercept)	−12.887
age_group27 to 34	0.025
age_group35 to 39	−0.295
age_group40 and above	−4.756
household_income$20,000 - $39,999	2.955
household_income$40,000 - $69,999	−1.702
household_income$70,000 - $99,999	2.819
household_income$100,000 - $124,999	1.567
household_income$125,000 - $149,999	−1.063
household_income$150,000 - $174,999	−1.069
household_income$175,000 - $199,999	−1.745
household_income$200,000+	2.228
languageFrench	−3.129
maternal_educationHigh school diploma	−3.680
maternal_educationCollege/trade school	1.483
maternal_educationUndergraduate degree	1.562
maternal_educationMasters degree	1.116
maternal_educationDoctoral Degree	−1.774
threaten_life	−0.845
threaten_baby_danger	5.081

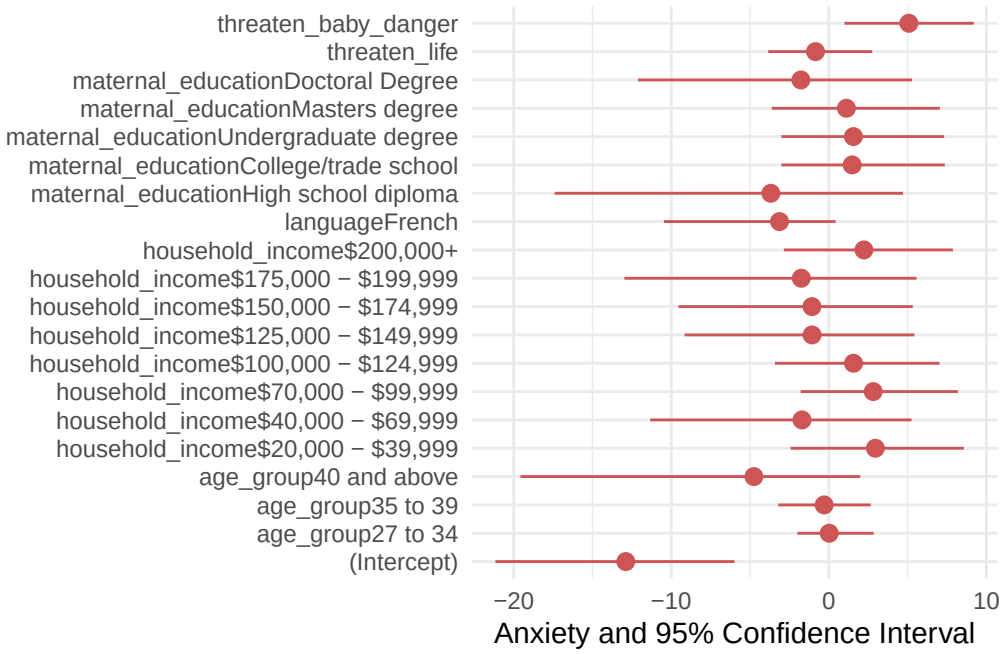


Figure 7: The Coefficients and Confidence Interval in the Anxiety Model

3 Model

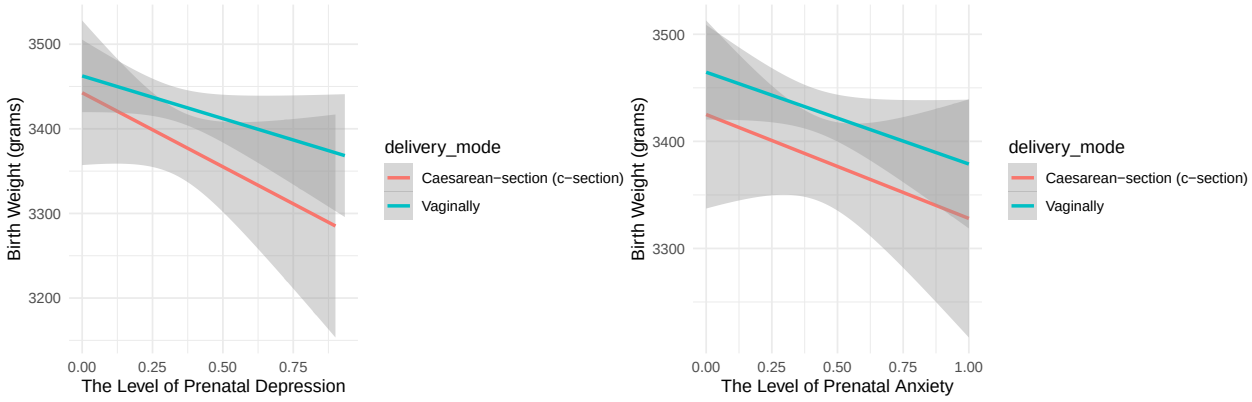
4 Results

5 Discussions

6 Appendix

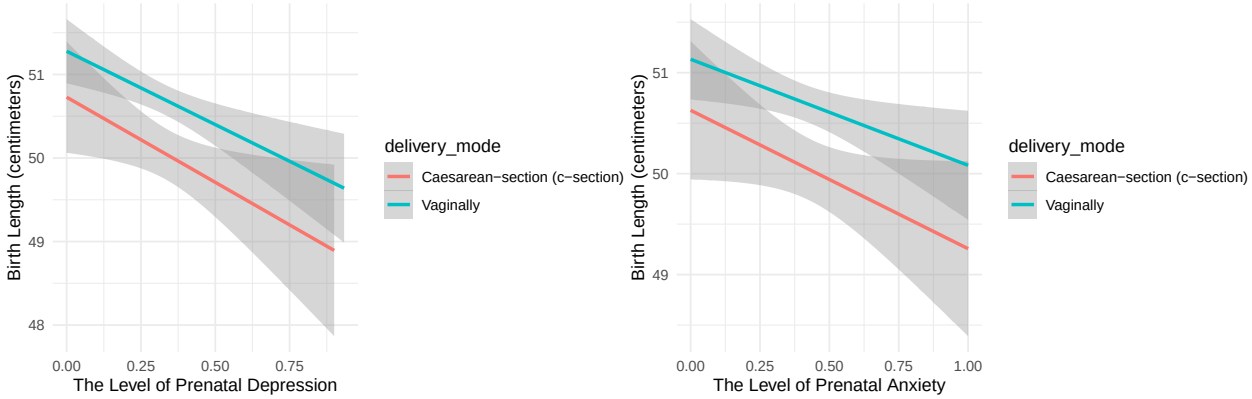
Catherine Lebel, Gerald Giesbrecht, Lianne Tomfohr-Madsen. 2023. "Prenatal Mental Health Data and Birth Outcomes in the Pregnancy During the COVID-19 Pandemic Dataset." https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10339202/.

Gerald Giesbrecht, Lianne Tomfohr-Madsen, Catherine Lebel. 2023. "Pregnancy During the COVID-19 Pandemic Study." https://osf.io/ha5dp/.



(a) Birth Weight and Depression by Delivery Mode

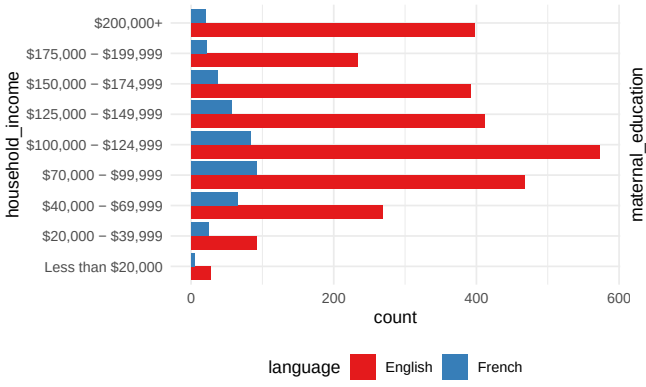
(b) Birth Weight and Anxiety by Delivery Mode



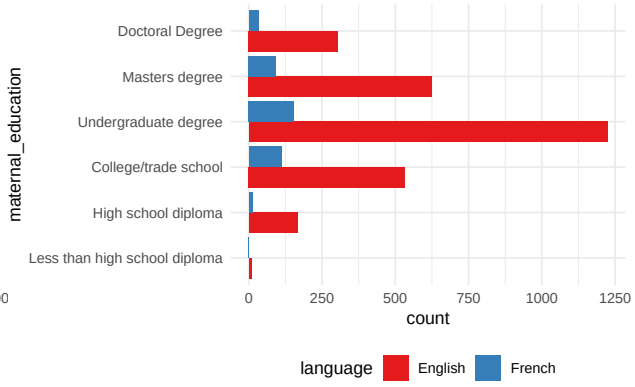
(c) Birth Length and Depression by Delivery Mode

(d) Birth Length and Anxiety by Delivery Mode

Figure 8: Distribution of Birth Weight and Length and Prenatal Mental Health by Delivery Mode



(a) Distribution of Income by Language



(b) Distribution of Education by Language

Figure 9: Income and Education Groups Distribution Based on the Choice of Survey Language

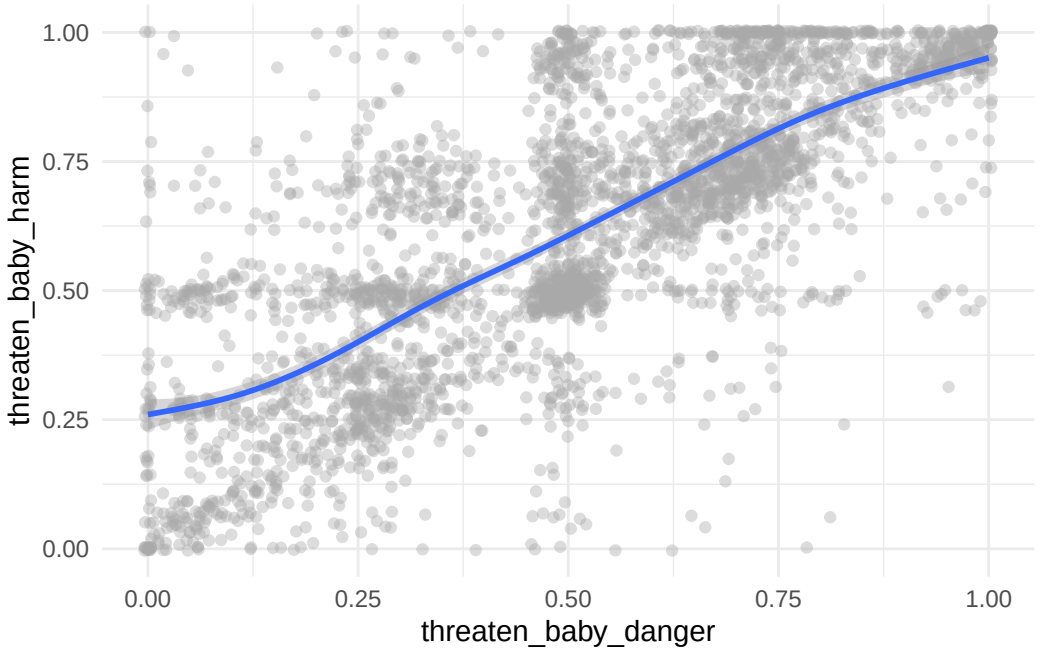


Figure 10: Distribution of the Preceived Danger to Baby and Preceived Potential Harm to Baby