Depression, Anxiety, and Objective Hardship: Examining Prenatal Mental Health During the Covid-19 Pandemic in Canada*

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

1 Introduction

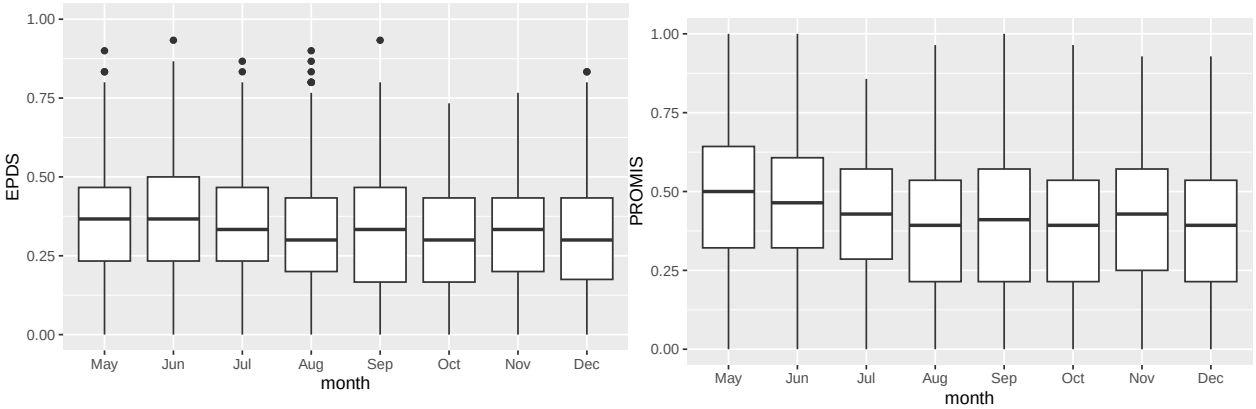
2 Data

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.

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. In this paper, the EPDS scores are divided by 30, and the PROMIS scores are adjusted by subtracting 7 from the original scores and then dividing by 35, and hence, making the level of depression and anxiety between 0 and 1 to standardize the scale. 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

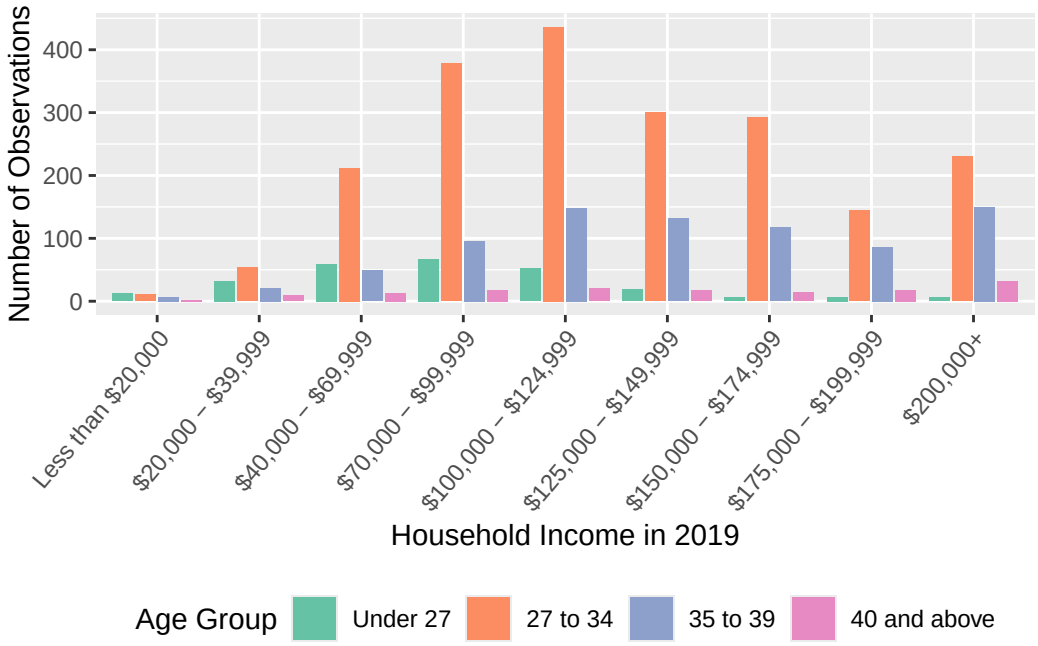


Figure 2: The Distribution of Age Groups and Household Income for Pregnant Participants

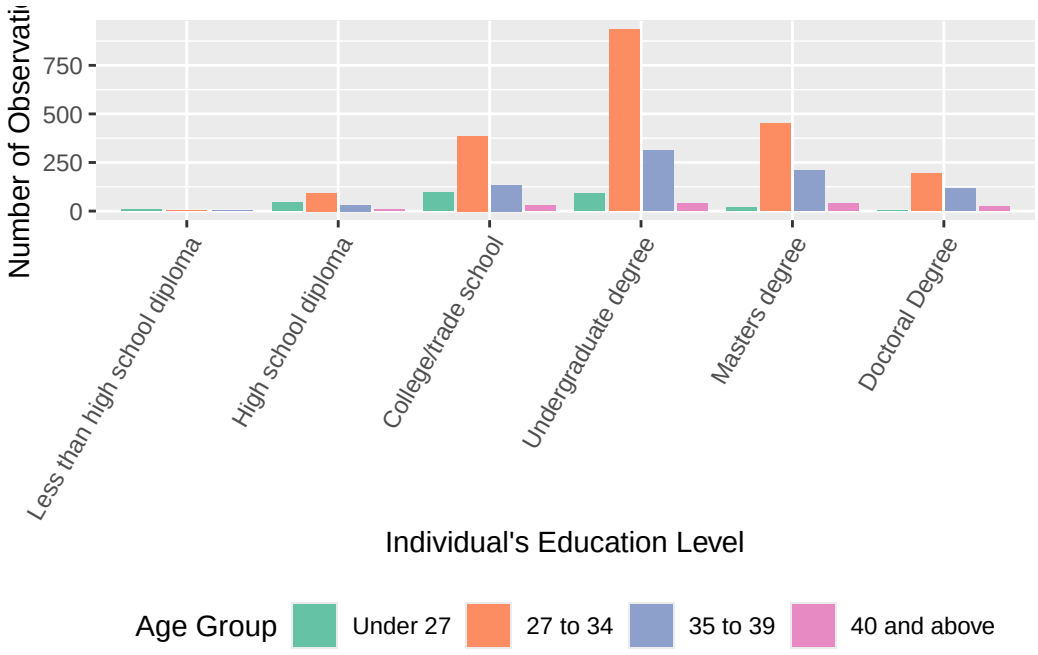
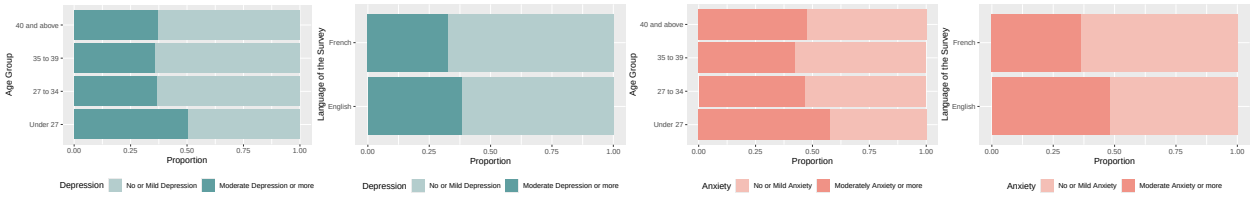
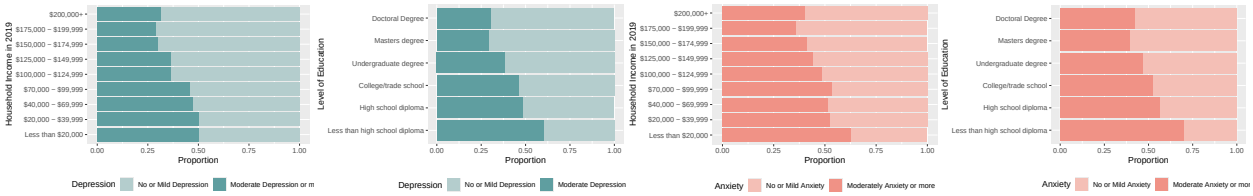


Figure 3: The Distribution of Age Groups and Level of Education for Pregnant Participants



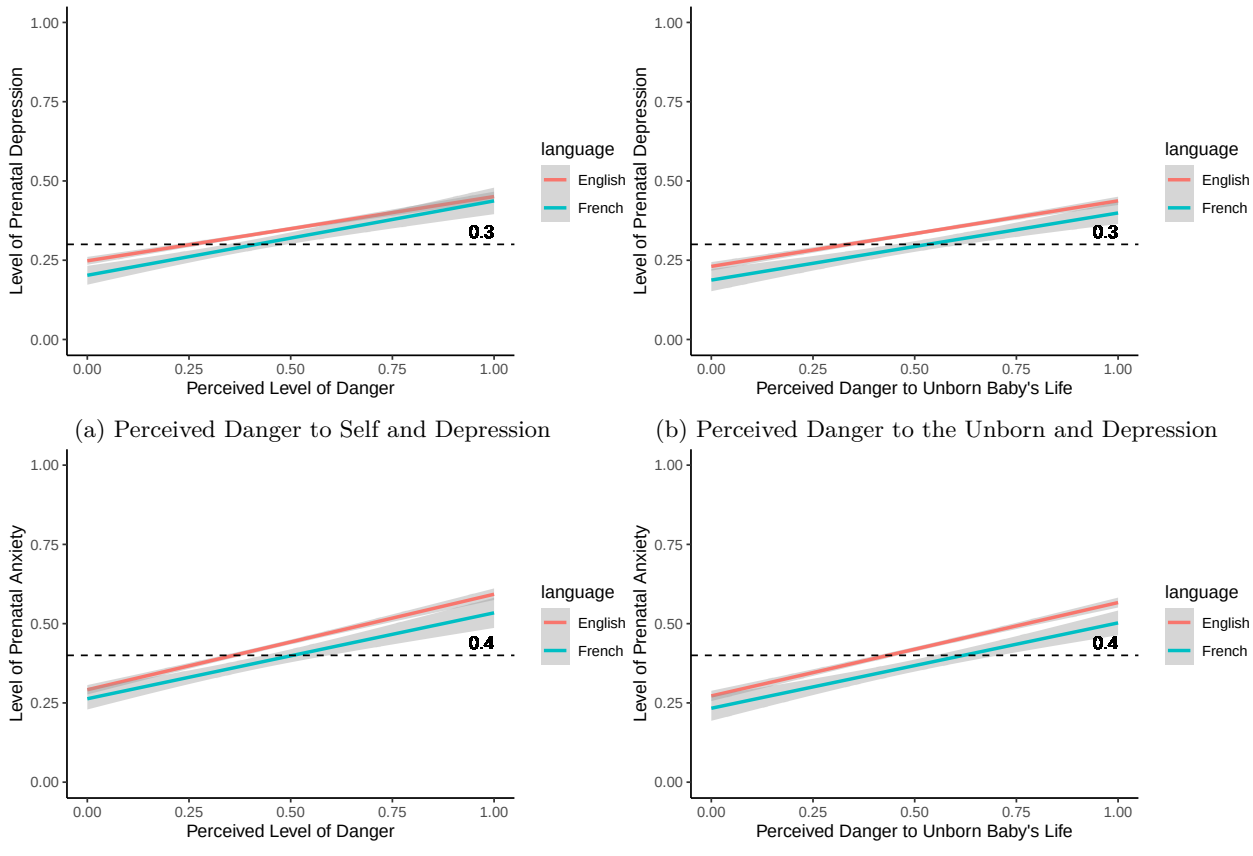
(a) Age and Depression (b) Language and Depression (c) Age and Anxiety (d) Language and Anxiety

Figure 4: Levels of Depression and Anxiety Among Pregnant Individuals Grouped By Age and Language



(a) Income and Depression (b) Education and Depression (c) Income and Anxiety (d) Education and Anxiety

Figure 5: Levels of Depression and Anxiety Among Pregnant Individuals Grouped By Household Income and Education



(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 6: Relationship between Perceived Level of Danger and Prenatal Mental Health

Table 1: Estimating Prenatal Depression given Age, Household Income, Education Level and Choice of Language

	Depression
(Intercept)	−0.669
age_group27 to 34	−0.305
age_group35 to 39	−0.274
age_group40 and above	−0.286
household_income$20,000 - $39,999	0.207
household_income$40,000 - $69,999	0.140
household_income$70,000 - $99,999	0.148
household_income$100,000 - $124,999	−0.200
household_income$125,000 - $149,999	−0.136
household_income$150,000 - $174,999	−0.417
household_income$175,000 - $199,999	−0.437
household_income$200,000+	−0.251
languageFrench	−0.327
maternal_educationHigh school diploma	−0.239
maternal_educationCollege/trade school	−0.337
maternal_educationUndergraduate degree	−0.478
maternal_educationMasters degree	−0.787
maternal_educationDoctoral Degree	−0.696
threaten_life	1.253
threaten_baby_danger	1.053
Num.Obs.	3266
R2	0.095
Log.Lik.	−2010.355
ELPD	−2030.7
ELPD s.e.	21.2
LOOIC	4061.3
LOOIC s.e.	42.5
WAIC	4061.2
RMSE	0.46

3 Model

4 Results

5 Discussions

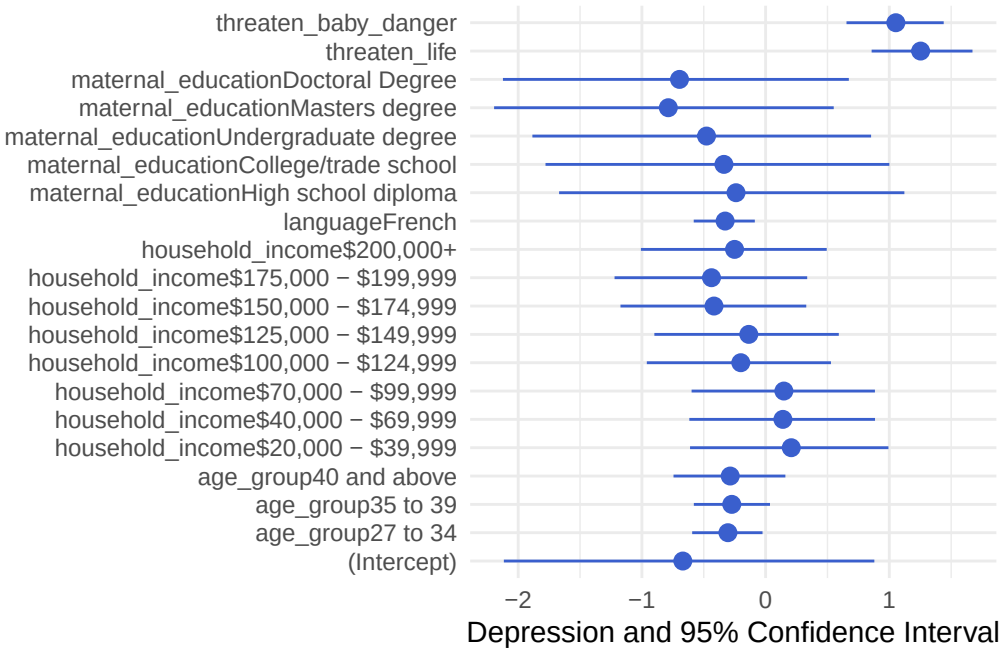


Figure 7: The Coefficients and Confidence Interval in the Depression Model

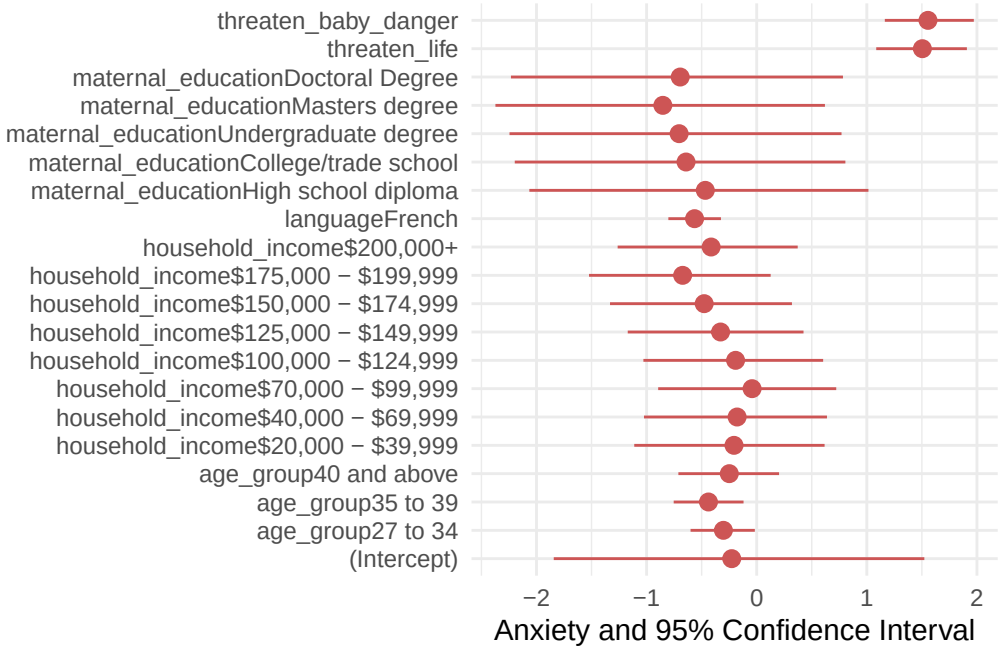
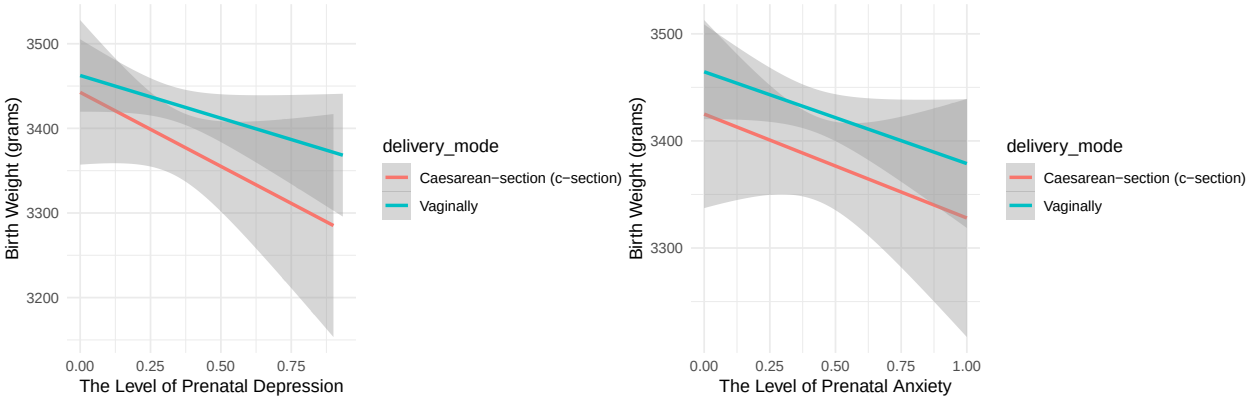


Figure 8: The Coefficients and Confidence Interval in the Anxiety Model

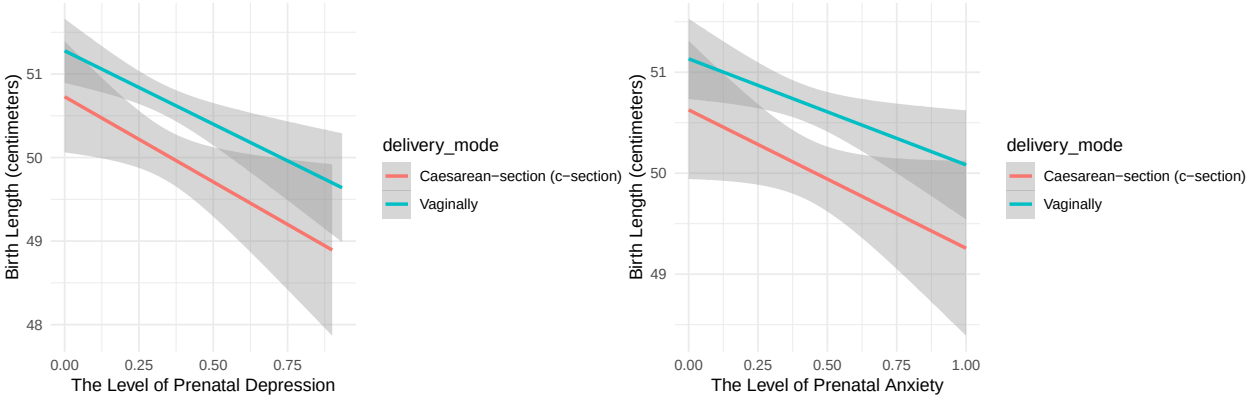
Table 2: Estimating Prenatal Anxiety given Age Group, Household Income, Education Level and Choice of Language.

	Anxiety
(Intercept)	−0.227
age_group27 to 34	−0.302
age_group35 to 39	−0.438
age_group40 and above	−0.249
household_income$20,000 - $39,999	−0.206
household_income$40,000 - $69,999	−0.178
household_income$70,000 - $99,999	−0.042
household_income$100,000 - $124,999	−0.192
household_income$125,000 - $149,999	−0.328
household_income$150,000 - $174,999	−0.477
household_income$175,000 - $199,999	−0.673
household_income$200,000+	−0.414
languageFrench	−0.564
maternal_educationHigh school diploma	−0.467
maternal_educationCollege/trade school	−0.642
maternal_educationUndergraduate degree	−0.705
maternal_educationMasters degree	−0.852
maternal_educationDoctoral Degree	−0.695
threaten_life	1.505
threaten_baby_danger	1.555
Num.Obs.	3266
R2	0.132
Log.Lik.	−2037.189
ELPD	−2057.2
ELPD s.e.	20.3
LOOIC	4114.3
LOOIC s.e.	40.5
WAIC	4114.2
RMSE	0.47



(a) Birth Weight and Depression by Delivery Mode

(b) Birth Weight and Anxiety by Delivery Mode

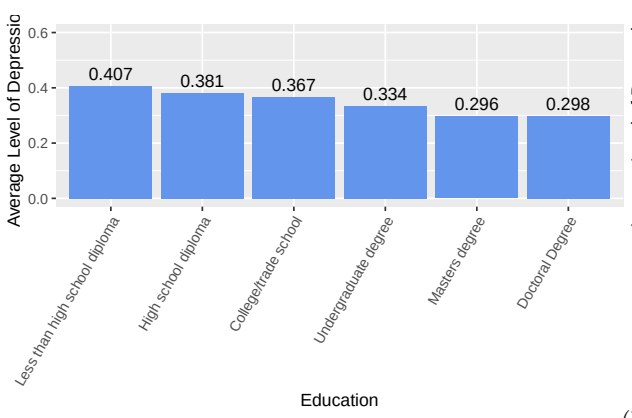


(c) Birth Length and Depression by Delivery Mode

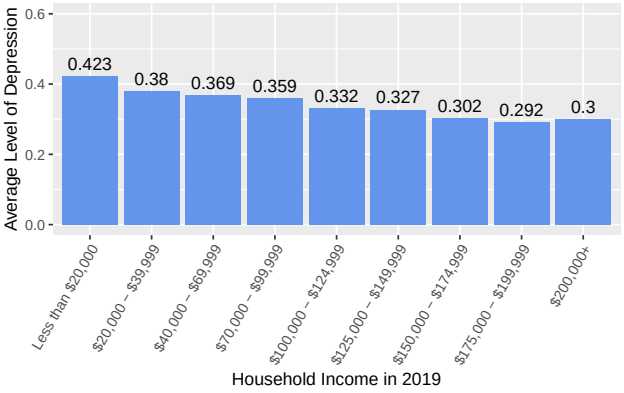
(d) Birth Length and Anxiety by Delivery Mode

Figure 9: Distribution of Birth Weight and Length and Prenatal Mental Health by Delivery Mode

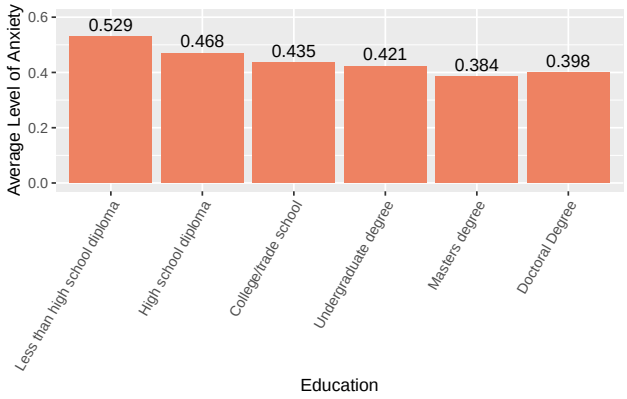
6 Appendix



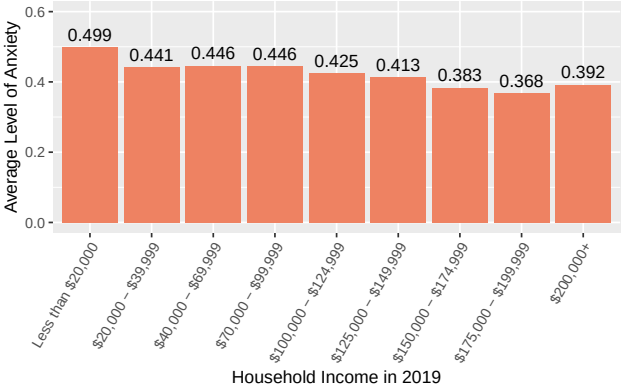
(a) Distribution of Levels of Depression by Education



(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 10: Distribution of Levels of Depression and Anxiety by Education and Household Income

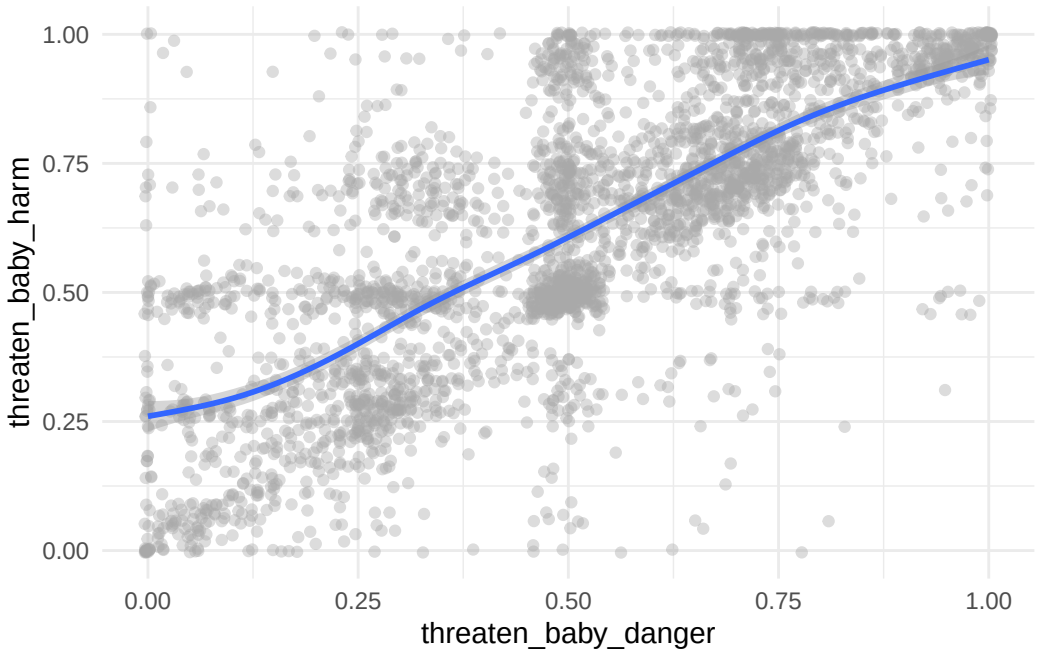


Figure 11: Distribution of the Preceived Danger to Baby and Preceived Potential Harm to Baby

References

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/.