Patterns of Postpartum Depression during the COVID-19 Pandemic, 2018-2021

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Introduction

Postpartum depression (PPD) is a serious mental health issue that can affect women who have recently given birth. For that reason, a postpartum depression screening is typically given within the first year of postpartum care. For this research, Edinburgh questionnaire scores from Kids Plus Pediatrics sites in Western Pennsylvania, collected between the years 2018 and 2021 inclusively, are used to determine if temporal pattern of PPD rates were affected by the COVID-19 pandemic. Time series modelling is utilized to understand overall trend and seasonal patterns of PPD. Preliminary results suggest that rates of PPD were adversely affected by the pandemic.

Materials & Methods

The data used in my research was provided by the Kids Pediatric sites located near Pittsburgh. I used two different statistical software packages: SAS for descriptive statistics and R for time series modeling.

Results

Summary statistics of PPD rates suggest an increase in 2020, with a slight decrease in 2021.
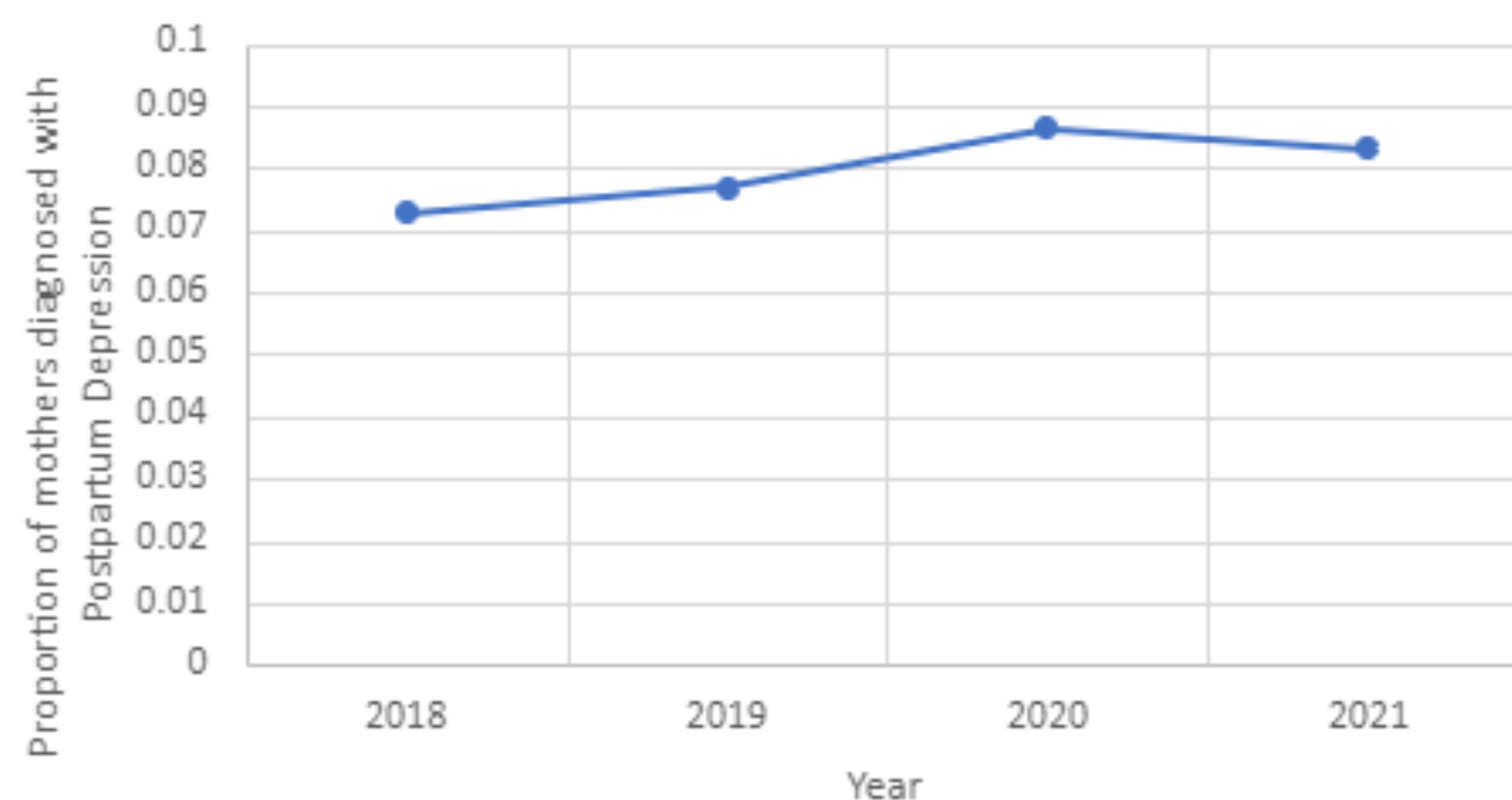

Figure 1: Proportion of mothers presenting with PPD as diagnosed by a score of ten or greater on the Edinburgh Postnatal Depression Scale. Source: 2022 SRU PPD study database.

A time series decomposition of mean score on the Edinburgh Postnatal Depression Score yield a significant trend over time and suggests some seasonal effects. The blue line, representing the beginning of the COVID-19 pandemic.
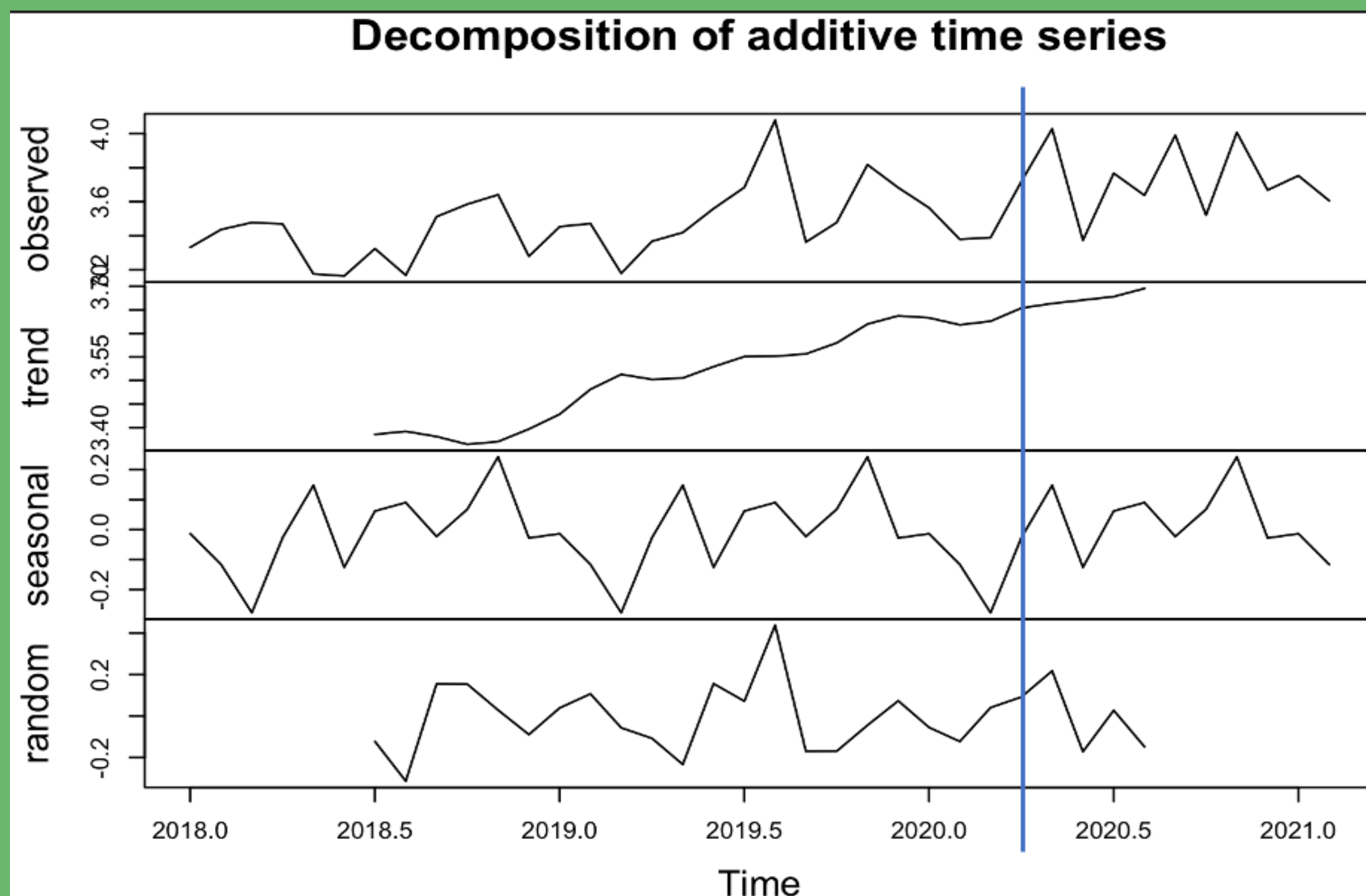

Figure 2: Time series decomposition of mean EPDS score across all mothers by month and year.. Source: 2022 SRU PPD study database.

Results

A time series decomposition of proportion of mothers diagnosed with PPD also yields a significant trend over time and suggests some seasonal effects. The blue line, representing the beginning of the COVID-19 pandemic.
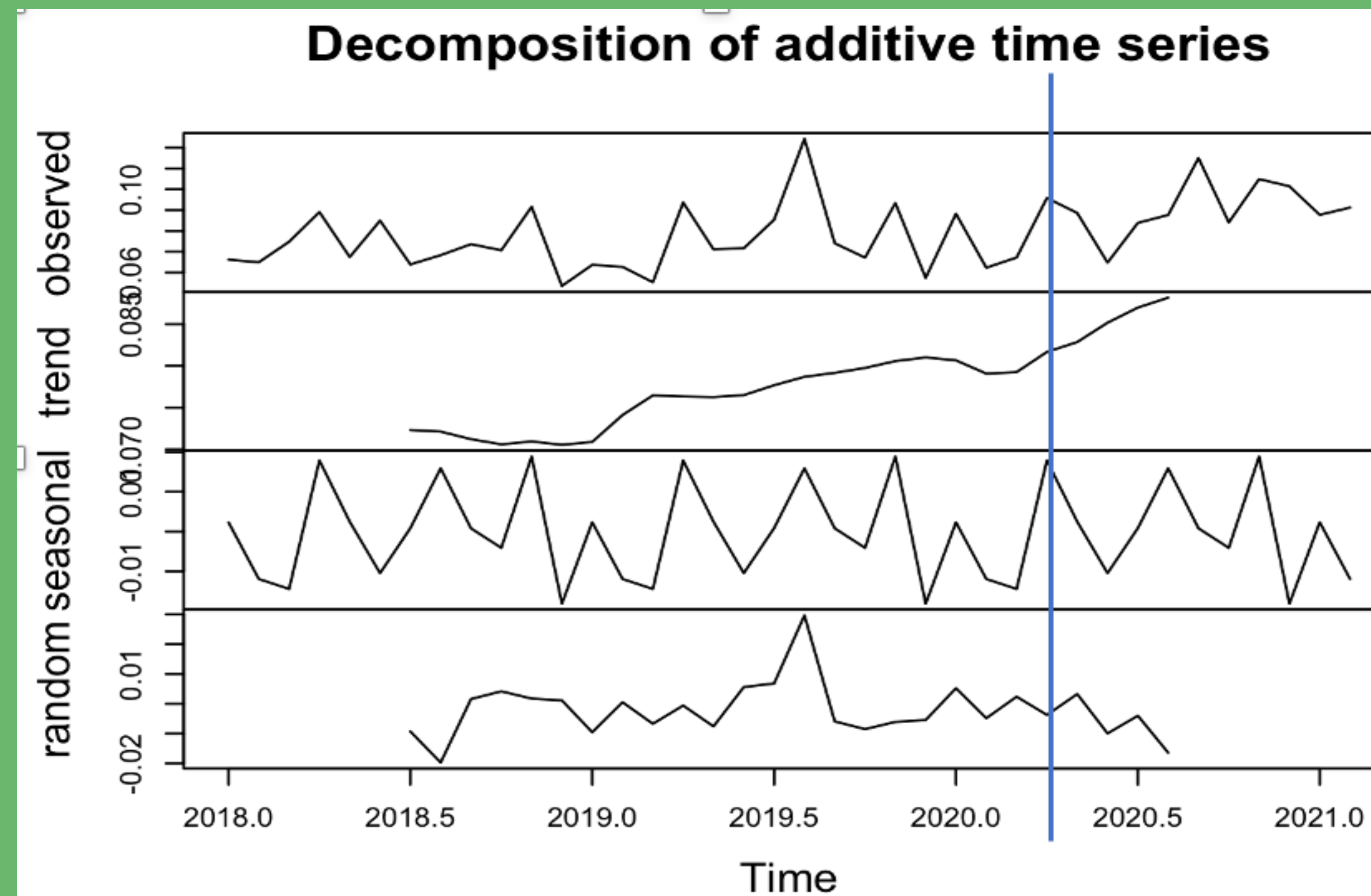

Figure 3: Time series decomposition of proportion of mothers diagnosed with PPD by month and year.. Source: 2022 SRU PPD study database.

A time series decomposition of mean score on the EPDS for mothers diagnosed with PPD shows a different story. This time series shows strong seasonal effects and a downward slope starting in 2020. These results suggest that while diagnoses of PPD rose over time, severity of PPD decreased on average starting in 2020.
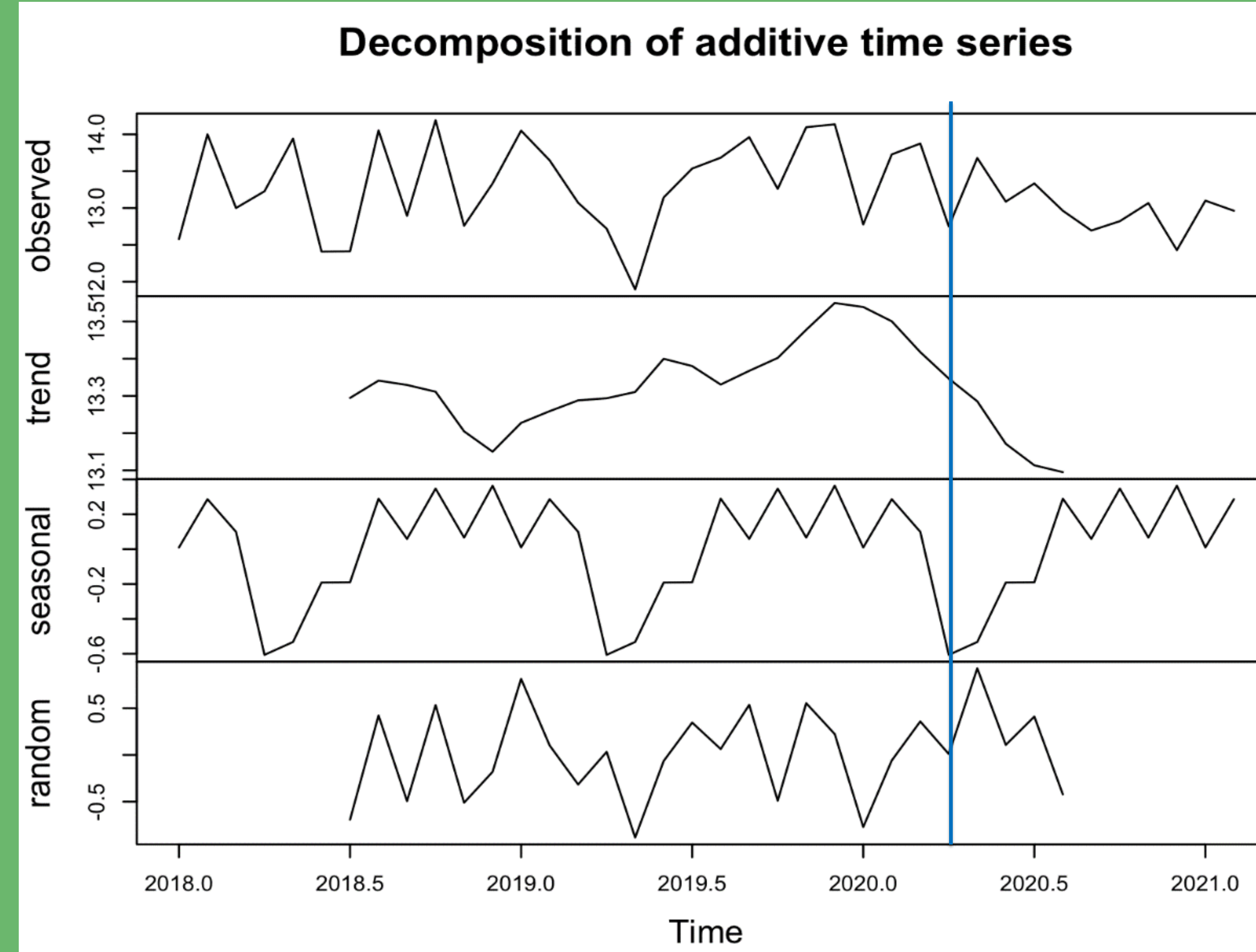

Figure 4: Time series decomposition of mean EPDS score for mothers diagnosed with PPD by month and year. Source: 2022 SRU PPD study database.

An ARIMA model was run on the PPD indictor, the EPDS, and the EPDS scores above 9.

	PPD ARIMA(0,1,1)	EPDS ARIMA(0,1,1)	EPDS ABOVE 9 ARIMA(0,0,0)(0,0,1)
Sigma^2	0.0002664	0.04907	0.2994
Log likelihood	99.68	3.25	-31.09
AIC	-195.36	-2.5	68.17
BIC	-192.14	0.72	73.09

Table 1: ARIMA models. Source: 2022 SRU PPD study database.

Discussion

Within the Kid Plus Pediatrics patient pool, as shown in the decomposition and ARIMA, the average PPD scores over time are increasing from 2018-2021, and the overall proportion of women experiencing PPD is increasing as well. However, the mean EPDS score for women undergoing effects of PPD first increases from 2018 through the end of 2019, and then decreases for the remainder of the time period. In addition, the mean EPDS score for women experiencing symptoms of PPD has an obvious seasonal component. Preliminary modeling suggests this seasonal component is correlated with hours of daylight.

The blue line in the decompositions shows the beginning of the COVID-19 pandemic. While the mean EPDS score does not appear to change in trajectory after the COVID-19 pandemic commences, the proportion of women diagnosed with PPD appears to increase as a higher rate after the COVID-19 pandemic begins.

Future Work

I will be looking into the reasoning behind the significance of daylight-saving time on the increasing number of women experiencing PPD symptoms.

Limitations

Results of this study are representative of the study participants only, as a random sample of individuals was not used. Further modeling to determine potential reasons for the seasonality in the time series is required.

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