Covid-19 Pandemic, Demographic Factors and Time Spent Outside of the Home

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Background

The Covid-19 pandemic, and the subsequent nationwide quarantine, greatly impacted the amount of time people spend outside of their home. Previous research has shown that there are demographic, socioeconomic, and geographic differences in the amount of time people spent outside of the home during the pandemic. In this project I investigate the impact of the Covid-19 pandemic and other factors on the amount of time people in the U.S. spend outside of their home.

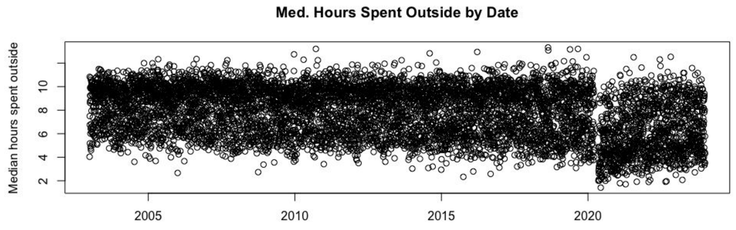
Research Question

- To what extent has the amount of time adults and children in the U.S. spend outside of their home returned to pre-March 13th 2020 levels in 2023?
- What factors are related to the amount of time a person spends outside of their home?

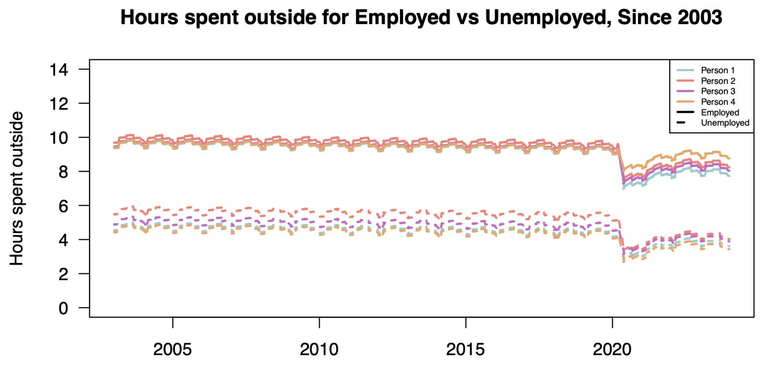
Note: “Outside” means outside of the person’s own home or yard.

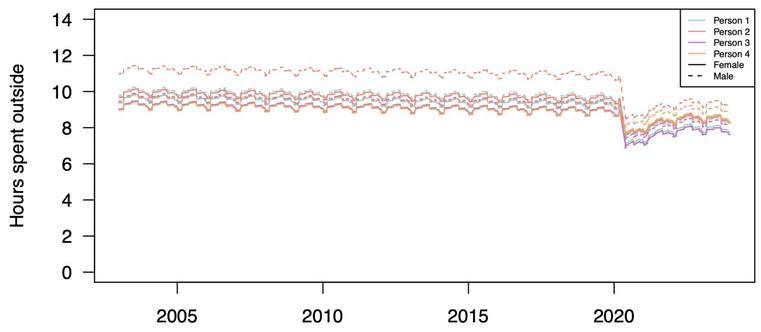
Data

Source: The data is from The Bureau of Labor Statistics’ American Time Use Survey (ATUS), which measures the amount of time people spend doing various activities.
Population: The population for the study is the civilian noninstitutional population, aged 15 and older, and residing in households in the U.S.
Sample: The sampling method is a stratified three-stage sample.
Data Collection: An eligible person from each household is randomly selected to be the designated person for ATUS and is randomly assigned a day of the week about which to report. The data is collected through phone interviews.
Time Range: The data collected is from January 1, 2003 to December 31, 2023. Note: due to the Covid-19 pandemic, there was no data collected from March 18 to May 9, 2020.
Missing Values: A total of 880,047 observations have missing values for the location of the activity. After exploring the missing values, I concluded they are not different than the rest of the data, so I assume they are missing completely at random and drop them.



Model Predictions





Person 1: 46 year old woman, living in the West, married, 3 person household with no kids or elders in the home, avg. family income of $75,000 to $99,999, working in management occupations.
Person 2: 25 year old woman, living alone in the Northeast, unmarried, avg. family income of $50,000 to $59,999, working in healthcare occupations
Person 3: 35 year old man, living in the Midwest, married, 4 person household with kids but no elder, avg. family income of 75,000 to $99,999,, working in office and administration occupations.
Person 4: 55 year old man, living in the South, married, 4 person household with kids and elder in the home, avg. family income of $60,000 to $74,999, working in transportation occupations

Modeling and Analysis

I used multiple regression models to analyze the impact of the Covid-19 pandemic and individual characteristics of respondents on the total hours people spend outside of their home or yard. I started with a model that only has predictors related to time, then tried a model that includes all predictors and the interactions of every predictor with the Post-Covid predictor. I used the stepwise procedure to create a model with only the predictors that are most significant. I chose this as my final model because it has the best BIC without compromising Adjusted R^2 or RMSE. Finally, I compared my final model with a model that is identical except it does not include any predictors related to Covid-19.

Variables	Model 1	Model 2	Model 3	Model 4
Post-Covid	X	X	X*	
Days	X	X	X**	X*
Days^2	X	X	X*	X*
Month	X	X	X*	X*
Year	X	X		
Season	X	X	X	X
Day of Week	X	X	X	X
Weekend	X	X		
Region		X	X	X
State		X		
Household Income		X	X	X
Age		X	X**	X*
Sex		X	X*	X*
Race		X		
Married		X	X*	X*
School		X	X*	X*
Employment Status		X	X	X
Job category		X	X	X
H. Under 13		X	X*	X*
H. Under 18		X	X*	X*
H. Over 65		X	X*	X*
H. Num. People		X	X*	X
Adjusted R^2	**0.0571**	**0.2197**	**0.2188**	**0.214**
BIC	**1195780**	**1159057**	**1157216**	**1158123**
RMSE	**4.241113**	**3.860963**	**3.860931**	**3.872347**

Conclusion

- Based on model visualizations and ANOVA tests, we can conclude that the Covid-19 pandemic had a significant impact on the amount of time people spend outside of their home or yards, and in 2023 it has not returned to pre-pandemic levels.
- Factors such as sex, age, employment, marital status, school enrollment, household characteristics, and region have a significant impact on the amount of time people spend outside of their home or yard.