Does Frequent Wearing of Masks Help Stop the Spread?

An independent study by Vincent Yabor

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Throughout the entire Covid-19 pandemic, many people have questioned the validity of masks despite countless doctors and scientists advocating for their use. In order to quell people's concerns, I have conducted a study on how often one should wear a mask if they are to help stop the spread of Covid-19 in the 50 US states and DC. The data was pulled from the New York Times github repository which featured, by county in the US, the mask wearing frequency broken down into 'never,' 'rarely,' 'sometimes,' 'frequently,' and 'always' (Nytimes). The dataset did not include the state from which each county was located, so I had to manually match the county fp with the respective state. Some counties were omitted because of a lack of data. I also used a publicly available dataset on the up-to-date Covid-19 statistics from the CDC's website. The relevant columns I used were 'State/territory' and 'Case rate per 100000' (CDC COVID Data Tracker).

I began by averaging the mask wearing frequencies across all 50 states and DC so I could build models by states rather than by county. Note that this weighs every county used in this study the same. This is not fully realistic regarding population density, and is something I would like to improve upon in the future. I immediately wanted to know if more masks correlated to less cases. So I found the number of cases per 100,000 where mask wearing frequency was 'never' and 'rarely' more than 20% of the time vs 'frequently' and 'always' more than 80% of the time. It turns out that states

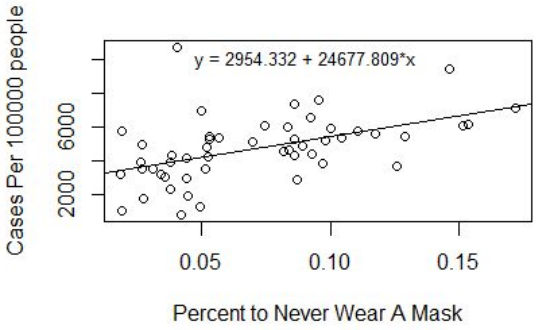
that are more less frequently masked based on my criteria are 1.71 times more likely to contract Covid-19. The following is a Tableau Public graph I made representing this statistic. This can be found at https://public.tableau.com/profile/vincent.yabor#!/vizhome/Covid-19StudyVyabor/Sheet1

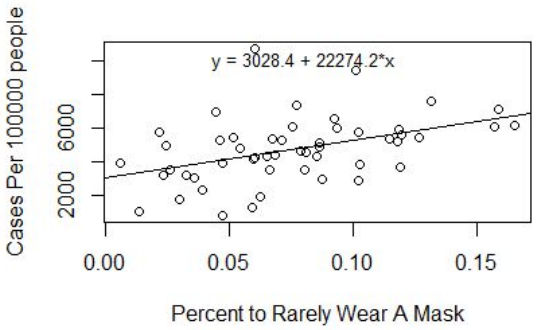
Next, I performed a multiple linear regression of infection rate per 100,000 on the five mask wearing frequencies. The p-values for never, rarely, sometimes, frequently, and always were 0.12, 0.118, 0.121, 0.118, 0.12, and 0.12 respectively. Since none of my variables were significant in the model at the 0.05 significance level, I decided to try to determine a more efficient model by using the best subsets regression model with Mallows' Cp statistic. None of the models were accurate enough to give a good

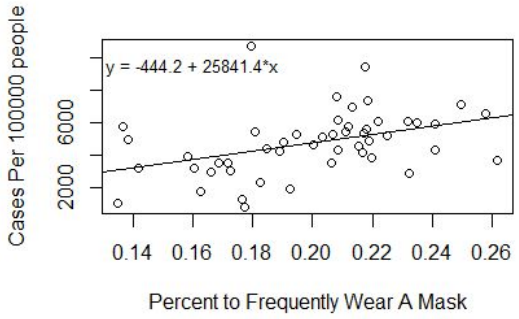
representation of the data, so I decided to scrap the multiple regression model in lieu of five simple linear regression models. After checking the assumptions for simple linear regression by using the plot function on the linear model in R, I determined that it was feasible to proceed with these models with the exception of the ‘frequently’ model. To fix this, I found both outliers by using a boxplot and removed them from the data for this model. The places being omitted are Alaska and DC. Here is a breakdown of the p-values in the five regression models where I tested rate per 100,000 on each frequency.

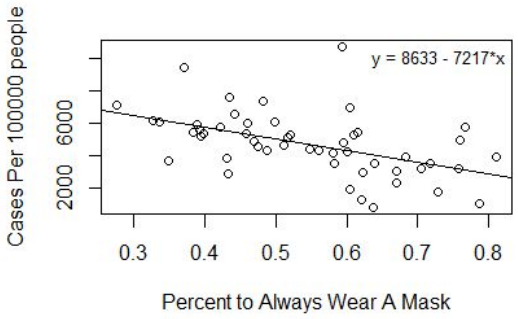
Frequency	Never	Rarely	Sometimes	Frequently	Always
P-value	0.000233	0.00148	0.000103	0.0037	0.000187

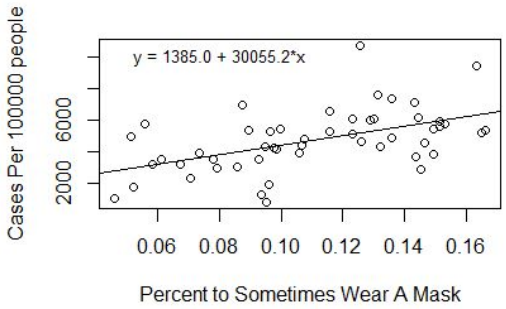
Each model is significant at the 0.05 level, thus I proceeded to create plots for each.











From the plots, it is evidently not enough for people to frequently wear a mask. The only isolated case in which cases per 100,000 people decrease is when most people always wear a mask. Granted, these models show a correlation, not necessarily a direct causation. It is possible that the more frequently masked states have stricter Covid-19 protocols and better safety measures. Nevertheless, wearing a mask is a cog in the machine of collectively beating this virus and should be taken seriously by everyone.

References

CDC COVID Data Tracker. (n.d.). Retrieved December 05, 2020, from https://covid.cdc.gov/covid-data-tracker/

Nytimes. (n.d.). Nytimes/covid-19-data. Retrieved December 05, 2020, from https://github.com/nytimes/covid-19-data/tree/master/mask-use