Analyzing the Correlation Between Gym Attendance and COVID-19 Cases in Colorado State

Summary

As recent holiday gatherings drive up COVID-19 cases counts, multiple states have moved to re-close businesses to mitigate further spread. Among the affected industries and establishments are gyms and fitness clubs, as well as bars and restaurants. Governor Andrew Cuomo of New York stated that gyms are one of three primary settings that are responsible for surges in cases. However, examining data from states that publish comprehensive COVID-19 case information, such as Colorado, may suggest that gyms are being inaccurately cited as pervasive sources of COVID-19 transmission.

The Oregon Consulting Group was retained by IHRSA (International Health, Racquet & Sportsclub Association) to conduct an analysis and interpret the relationship between gym attendance and COVID-19 cases using Colorado state case data as a proxy. Preliminary analyses indicate that gym attendance is not correlated with COVID-19 transmission in Colorado. This conclusion suggests that legislators should take a closer look at the data available on gym attendance and COVID-19 rates before labeling gyms as high risk and categorizing them with bars and restaurants.

Methodology

The OCG received Colorado gym attendance data from nearly 100 facilities representing 160,00 non-unique check-ins from the period of March 6th to October 15th courtesy of ABC Fitness Solutions, Mindbody, and 24-Hour Fitness. This proprietary data was then compared to publicly available case records compiled by the Colorado Dept. Of Public Health and Environment, specifically resolved case data. Both data sets were also aggregated to reflect weekly gym traffic and case numbers. COVID-19 case data was selected to reflect the onset of illness rather than reporting date then staggered one week (7 days) to account for transmission window in line with CDC guidance that symptoms appear 2-14 days after contracting the virus.

Fig. 1
Correlating weekly gym attendance data with the following week of positive COVID-19 rates yields a result of 0.22. Significance testing at the 95% confidence level suggests that this correlation is not statistically significant, meaning there is no correlation between COVID-19 case rates and gym attendance (0.2207>.05). However, further analysis is needed to account for variables that are omitted from the analysis, as well as interaction terms of the omitted variables.

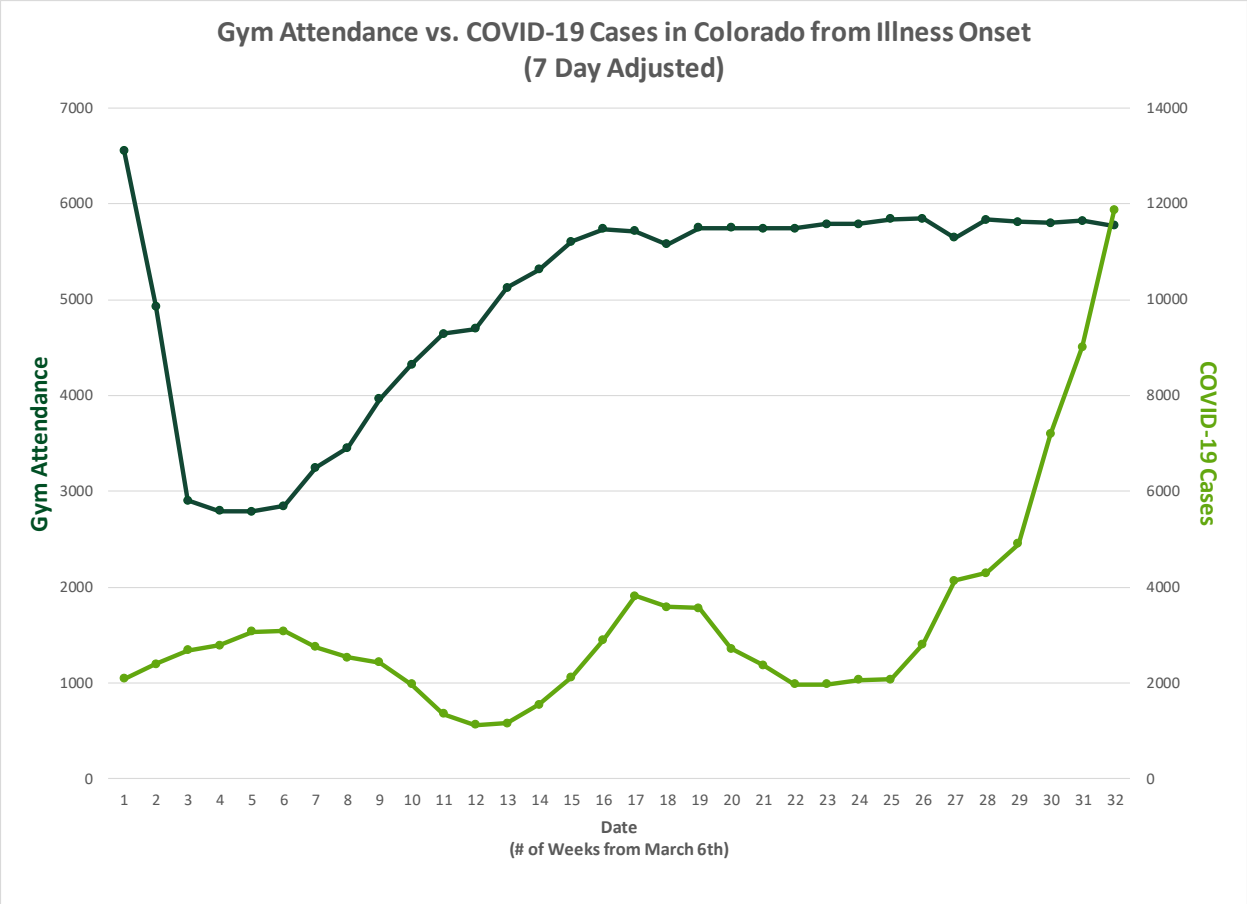
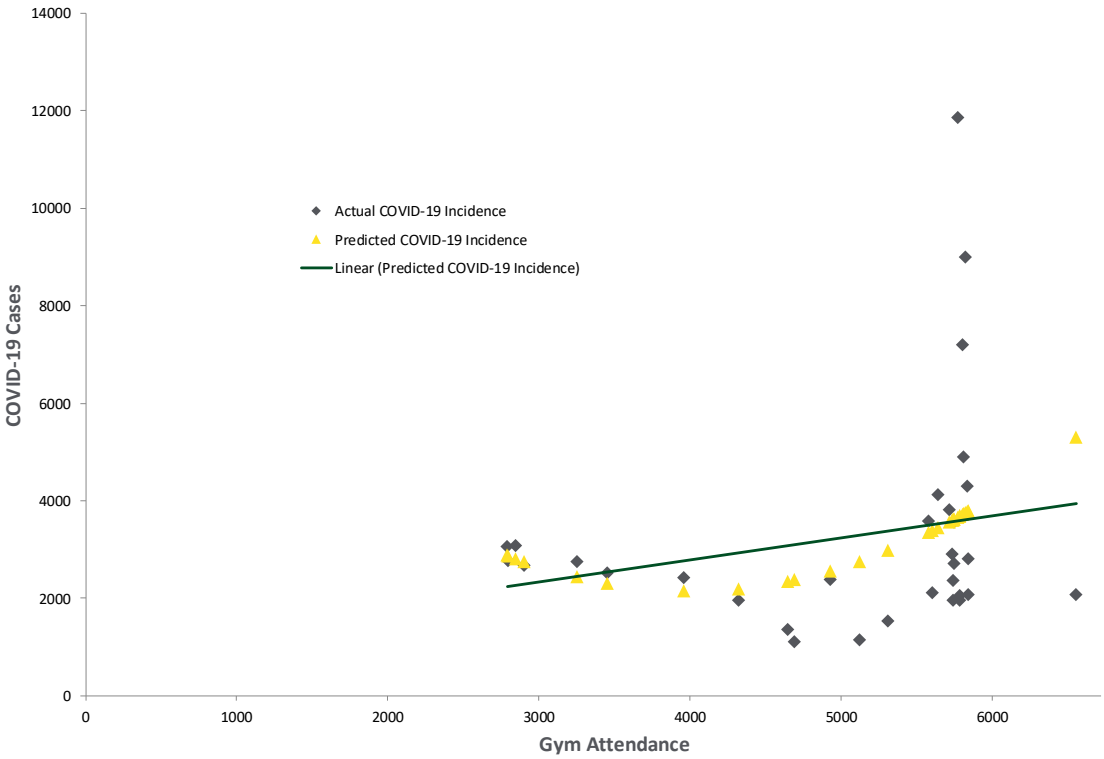


Fig. 2 & 3

Reconfiguring the data as a scatterplot and regressing positive COVID-19 cases as a function of either gym attendance or gym attendance squared elucidates whether there is a salient quadratic or linear relationship. In both cases, a non-statistically significant relationship was found, and the predicted levels of COVID-19 did not visually coincide with the actual incidence of COVID-19. Quadratic (r^2=0.090, p-value gym: 0.32, p-value gym^2: 0.26) Linear (r^2=.04, p-value gym: 0.22)



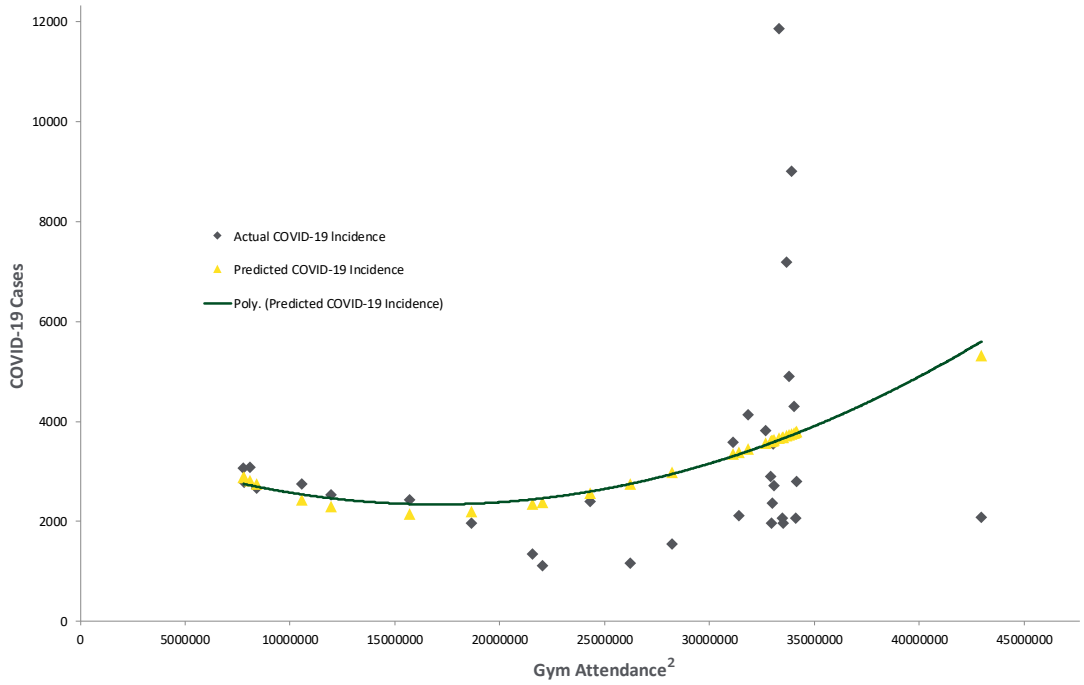
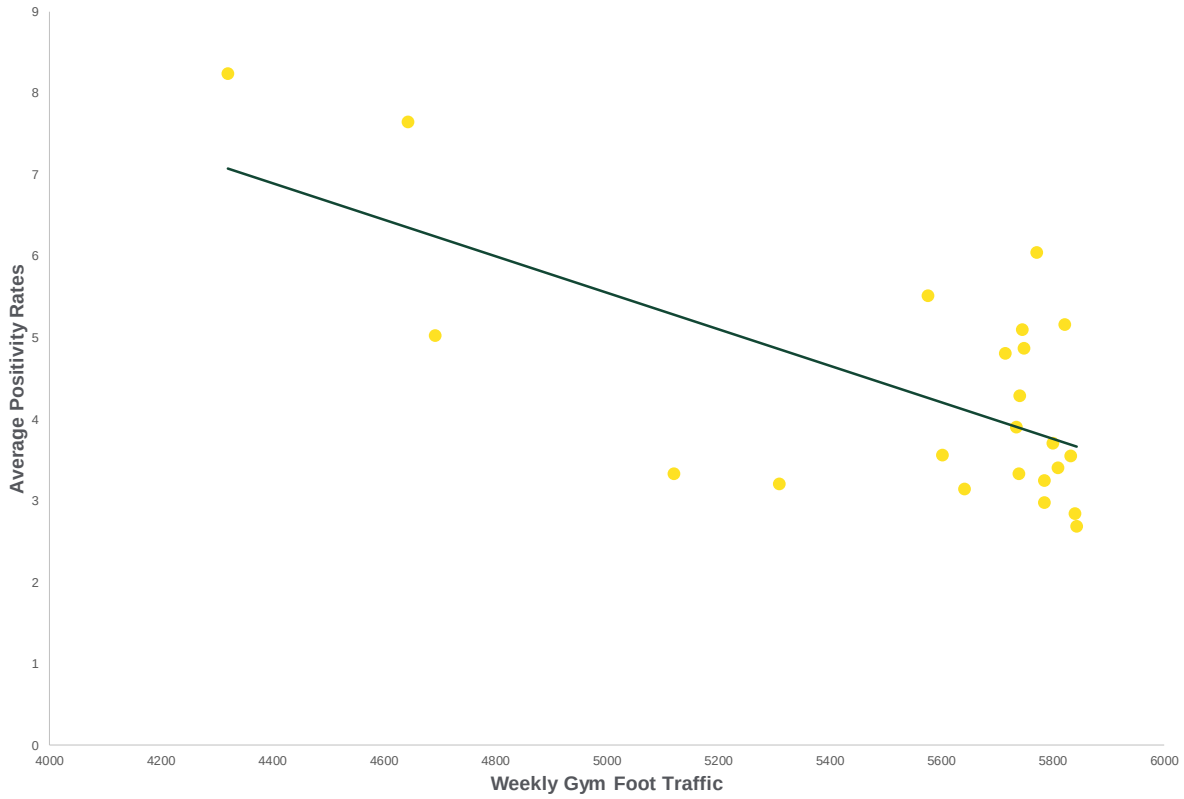


Fig 4.

Another valuable source of information is the COVID-19 average weekly positivity rates from testing. As testing has become more widespread and accurate, there is more to be learned by comparing it to gym attendance. The time window was shortened to begin on May 16th to

eliminate the period where the accuracy and frequency of testing were limited. Examining the data, we found a statistically significant negative correlation of -0.5067 and a p-value of 0.000139. However, increasing gym attendance is not driving down positivity rates, or vice-versa, correlation is not causation. However, this result spurs a discussion about what the explanatory variables may be for this negative correlation including gym guidelines, capacity limitations, or mask-wearing.



Limitations of the Analysis

- Further robustness testing is needed to disqualify outlier data and account for non-normal distribution given that n=32
- We do not have access to positive COVID-19 rates prior to March 12th when gym attendance was at consistently higher levels
- Qualitative factors of gyms are unaccounted for which may contribute to a safer/ less safe gym environment

Conclusion

Gyms typically have high ceilings, wide floor plans, adequate ventilation, outside airflow, social distancing measures, capacity limits, mask enforcement, as well as other precautions that the CDC suggests will reduce the transmission risk of COVID-19. Gyms, like any other facility, carry inherent risk, however, the evidence illustrates that their relative risk, especially when compared to restaurants and bars, is low. **Therefore, state governments need to take a closer look at data that is available when labeling gyms as high-risk environments and grouping them with restaurants and bars.**

Acknowledgment

The OCG would like to thank ABC Fitness Solutions, Mindbody, and 24-Hour Fitness for providing access to the gym data and making this study possible.