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# Legacy Airlines' Monthly Percentage Delays: Before and During the COVID-19 Pandemic

Orlando Gonzalez Fuentes, Chinkyung Lee, Hyungyeong Lee, Dr. Brooke Wheeler

## ABSTRACT

The COVID-19 pandemic negatively affected and caused considerable changes in the aviation industry. This study determined the difference in the monthly percentage of flight delays before and during the pandemic, including United, Delta, and American Airlines. The results showed the percentage of average flight delays was higher for the pre-pandemic period.

## BACKGROUND

In the United States (US), a flight is defined as delayed when it arrives 15 or more minutes later than its scheduled time (Bureau of Transportation Statistics, 2022). An increase in delays will cause airlines to expand flight blocks, decrease aircraft utilization, and increase crew costs resulting in lower supply which directly leads to an increase in airfares (Britto et al., 2012). The number of passengers transported by air in the United States has dropped significantly due to the COVID-19 pandemic. Overall statistics show that passenger transportation decreased to 77.28% in 2020 compared to 2019 (Stajniak & Wenerska, 2022).

## PURPOSE & RESEARCH QUESTION

The purpose of this study was to compare the rate of legacy airline delays in the United States (US) before and during the COVID-19 pandemic. The rate of legacy airline delays was calculated as the average monthly percentage of flight delays for Delta, American and United. The pre-pandemic was defined as June 2018-February 2020 and compared to the COVID-19 pandemic, March 2020-November 2021.

Is there a difference between the rate of legacy airline delays before and during the pandemic?

## METHODS

The raw data were downloaded for all three airlines and combined in an Excel spreadsheet. The percentage delay statistics were calculated by dividing the Arrival Delays column by the Total Arrival of Flights column. This percentage of delays was used to calculate all the monthly percentage of delays between June 1, 2018, and November 30, 2021 (Bureau of Transportation Statistics, 2022). All descriptive statistics were calculated in Microsoft Excel. A  $t$ -test was calculated in RStudio version 1.2.5001. The DV was average monthly flight delays, and the IV was time period: before and during the pandemic.

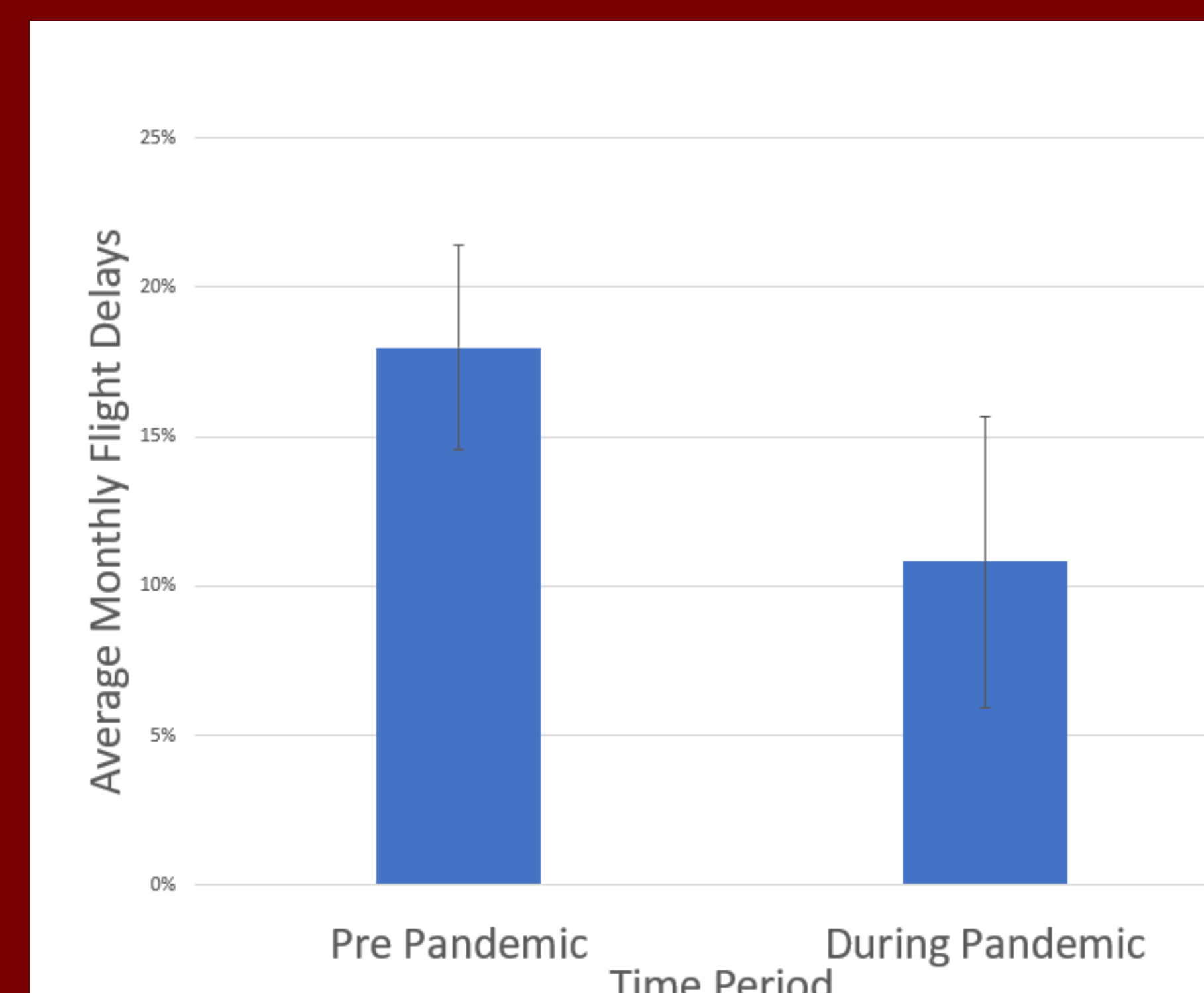
## RESULTS

The data included all reported information for American Airlines, Delta Air Lines, and United Airlines in the US from the Bureau of Transportation Statistics (2022). The sample included 7,424 airports, which reported delays before the pandemic, and 6,275 airports that reported delays during the pandemic. From April to December 2020, the total number of flights was 839,864, and the total number of delays was 66,061. From January to November 2021, the total number of flights was 1,741,332, and the total number of delays was 251,854.

### Descriptive Statistics for the Percentage Flight Delays Before and During the COVID-19 Pandemic

Time Period	Mean	Median	Mode	Range	Standard Deviation
Pre-Pandemic	18.00%	17.47%	0.00%	Min: 0% Max: 100%	3.4%
During Pandemic	10.84%	9.29%	0.00%	Min: 0% Max: 100%	4.8%

### Average Monthly Flight Delays Before and During the Pandemic



The  $t$ -test demonstrated a significant difference between the two time periods ( $t(6) = -4.71, p < 0.001$ ). The average monthly percentage of delays during the pre-pandemic period ( $M = 0.18, SD = 0.03$ ) was different from the average monthly percentage of delays during the COVID-19 pandemic period ( $M = 0.11, SD = 0.05$ ). The mode, for both time periods, was 0% because several regional airports or airports with less traffic had no delays during some months in the sample. *Cohen's d* was 1.45, which is a large effect size.

## DISCUSSION

Results show a statistically higher percentage of flight delays before the pandemic compared to during the COVID-19 period. We excluded data from 37 airports during specific months and years due to a lack of data or no data provided by the airlines. This study indicates that the pandemic period had a lower monthly percentage of delays and fewer flight delays. The large effect size suggests a meaningful difference in the monthly percentage of delays between the two periods (pre/during the pandemic).

One of the reasons that the pandemic period may have had a lower monthly percentage of delays and fewer flight delays was due to flight cancellations. The increasing flight cancellations during the COVID-19 pandemic led to a decrease in flight demand; fewer people were traveling due to health concerns, border closures, and strict travel requirements. As fewer people used air travel, the flight demands were reduced, and it led to overall airside, landside, and terminal decongestion (Fisher, 1989). Reducing congestion meant less time to approach, take off, and park at a gate, leading to fewer flight delays.

## FUTURE RESEARCH

Further research could explore other variables, such as cancellations before and during the pandemic. In addition, the scope could be widened to include low-cost carriers or regional airlines within the contiguous US to determine the percentage delays before and during the pandemic and establish whether low-cost carriers or regional airlines had improved statistics compared with legacy airlines. Moreover, cargo carriers such as FedEx and UPS could be included. Continued monitoring of these variables would show whether delays are recovering or worsening.

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