

## Intro/Question:

Does fan attendance rates (percentage of home stadium capacity/game) reflect manager turnover from 2008-2018? We expect that seasons in which a manager is fired will have lower average attendance. We also were curious about how average attendance correlated with win rates per team, which we addressed on the second slide. We expect that as win rates increase, average attendance will also increase. Manager firings also tend to indicate team performances and we expect to see teams with longer tenured coaches often having more success which we'll see based off of win totals.

## Data Sources:

The ESPN dataset provided us with average game attendance for each team per year. We had to aggregate the average percent attendance by year and by team, and place them onto one spreadsheet so we could make figures from it. We also had to convert some of the raw average attendances to percent by factoring in stadium capacity.

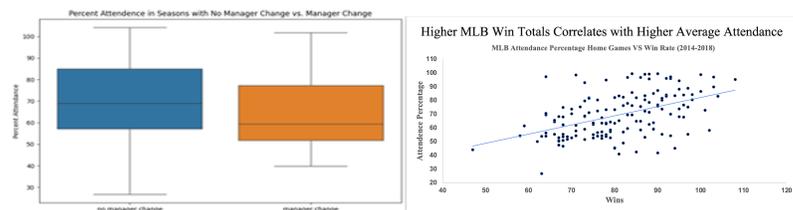
The baseball reference data set told us about what managers were fired and what years. We used our previous data set and highlighted years in which manager firing was indicated to show differences.

This team reference source provided us with the win totals per team from 2008 to 2018. This allowed us to compare those win percentages with average attendance.

## Methodology: (What graphs/models we're building)

We built a boxplot comparing the attendance percentage in seasons that had a manager change—either in season or after the season—with the attendance percentage vs. when the manager was retained by the team. Some limitations are factors that could be contributing to fan attendance, like win percentage or geographical location. We built a simple linear regression for this graph, measuring the coefficients with no manager change, coefficient with a manager change, and the p value for the manager change in order to see the contrast between the situations.

For the second graph, we built a scatter plot comparing win totals and attendance percentage per team by year. We used a simple linear regression model to find the intercept coefficient, the wins coefficient (slope) and the p values.

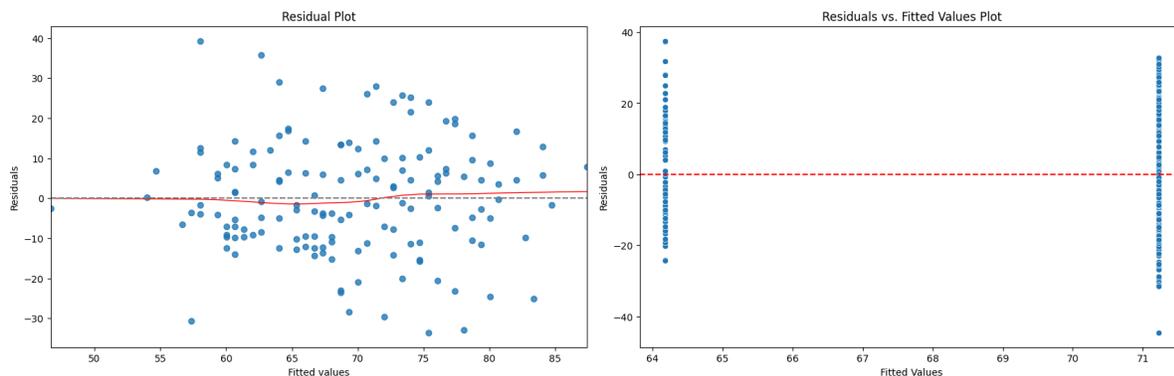


## Results and Analysis:

We found that attendance percentage was significantly higher in seasons with no manager change than in seasons with a manager change. For the first graph, we found that the constant coefficient was 71.2. This means that the average percent attendance in MLB seasons with no manager change was 71.2 percent. We also found that the manager change coefficient was  $-7.05$ , meaning that in seasons where the manager was fired, the average attendance was 7.05 percent lower than in seasons with no manager firing. This manager change's p value was 0.002, meaning that these results are statistically significant. Ultimately, there is a significant decrease in fan attendance when a manager was fired compared to when a manager was not fired.

We also found that higher win totals are correlated with higher attendance. For intercept coefficient, we got a value of 15.3, meaning that with wins of zero, the average attendance would be 15.3 percent. For wins coefficient, we had a value of 0.66, meaning that for every one increase in wins, average attendance increased by 0.66 percent. The p value for wins was 0.000, meaning the odds of getting values that extreme by random chance are 0.000. This means that those values are statistically significant, and average attendance increases as wins increase.

We also created residual plots for both graphs, included below. Both of these residual plots have means very close to zero, show relative homoskedasticity, and seem to have a random scatter. Because of this, we can say that our models are relatively valid.



### Conclusion:

Ultimately, we found that percent attendance was significantly higher in seasons with no manager change than in seasons with a manager change. The data reflected that this variable caused a significant decrease in fan attendance across all teams, through all years. The second graph also shows that higher win totals meant higher win totals.

### References:

Anthony Chirinos, Abrar Mostofa, Ethan Papa

[https://pitt-my.sharepoint.com/:x/r/personal/etp39\\_pitt\\_ed3u/Documents/Copy%20of%20finalr.xlsx?d=wb3c5a019536646a5b3bae21de7e8bbf4&csf=1&web=1&e=WcA1Pr](https://pitt-my.sharepoint.com/:x/r/personal/etp39_pitt_ed3u/Documents/Copy%20of%20finalr.xlsx?d=wb3c5a019536646a5b3bae21de7e8bbf4&csf=1&web=1&e=WcA1Pr) MLB Attendance and Manager Turnover

[BaseballReference.com](https://www.teamrankings.com/mlb/stat/win-pct-all-games), [2018 MLB Attendance - Major League Baseball - ESPN](https://www.espn.com/mlb/attendance/_/year/2018)

<https://www.teamrankings.com/mlb/stat/win-pct-all-games>

Manager Turnover: [BaseballReference.com](https://www.espn.com/mlb/attendance/_/year/2018), ESPN team transaction logs that show manager changes

Fan Attendance: [BaseballReference.com](https://www.espn.com/mlb/attendance/_/year/2018), [https://www.espn.com/mlb/attendance/\\_/year/2018](https://www.espn.com/mlb/attendance/_/year/2018) (If page not found: search MLB 2018 attendance through ESPN on search browser) . Page should look like this

The screenshot shows the ESPN website's MLB Attendance Report for 2018. The page includes a navigation bar with ESPN and various sports links, and a main content area with a table of attendance data. The table is titled '2018 Attendance' and lists 30 MLB teams, their attendance figures, and other statistics.

Rank	Team	Games	Total	Avg	Pct	Games	Avg	Pct	Games	Avg	Pct	Overall
1	LA Dodgers	82	3,857,500	47,043	84.0	80	32,228	77.3	162	41,238	81.1	
2	NY Yankees	81	3,442,855	42,498	84.6	80	30,445	73.7	161	36,880	80.8	
3	St. Louis	81	3,403,387	42,018	93.6	81	29,274	69.8	162	35,646	82.7	
4	San Francisco	81	3,138,185	38,866	93.0	81	23,923	79.9	162	31,445	81.6	
5	Chicago Cubs	82	3,101,098	38,293	94.3	80	22,800	74.8	162	28,204	85.5	
6	LA Angels	81	3,026,124	37,360	85.1	81	20,204	64.6	162	25,682	75.6	
7	Columbus	81	3,013,880	37,333	73.7	82	21,677	78.5	163	24,402	72.2	
8	Pittsburgh	81	2,982,246	36,954	89.8	80	20,842	63.4	161	23,848	77.5	
9	Boston	81	2,963,175	36,712	81.3	81	19,910	61.6	162	23,270	61.5	
10	Philadelphia	81	2,949,879	36,419	81.0	81	20,222	67.8	162	23,298	70.8	
11	Washington	80	2,924,604	36,658	79.3	80	20,122	62.3	160	23,841	71.6	
12	Atlanta	81	2,918,791	36,153	74.8	81	17,828	64.1	162	24,659	70.8	
13	Seattle	80	2,828,241	35,366	84.0	80	20,110	61.1	160	21,239	68.8	
14	Seattle	81	2,829,488	34,808	89.3	80	21,174	83.6	161	21,788	81.2	
15	NY Mets	79	2,724,955	34,484	67.4	80	20,793	70.1	159	24,860	66.7	
16	Arizona	81	2,646,496	32,809	84.9	81	18,842	74.9	162	24,766	64.1	
17	Philadelphia	79	2,539,318	32,131	81.4	80	18,381	64.6	159	21,803	60.0	
18	San Diego	80	2,543,000	31,813	84.5	81	19,716	61.1	161	24,761	68.4	
19	New York	81	2,337,107	28,853	52.9	81	24,471	62.0	162	24,241	57.1	
20	Minnesota	80	2,349,187	29,489	83.6	81	27,677	64.4	161	24,761	64.6	
21	Cleveland	80	1,928,701	24,083	55.4	81	18,188	64.2	161	18,091	59.7	