Vital Statistics of Professional Athletes

Eric Kuo

General Assembly

Capstone Project

Problem Statement

- What impact does a career in professional sports have on the life expectancy of an athlete?
- According to Wikipedia article about Football Players:
  - The average life expectancy or lifespan of an American football NFL player has been reported to be extremely low, only 53 to 59 years depending on playing position.
  - However, a 2012 study reported that retired NFL players have a lower death rate than men in the general population.

How To Answer That Question…

- Can we build a model to predict how many athletes will die in a given year?
- How does the distribution of ages at death of athletes compare to that of the general population?
- Of athletes who were born in a certain time period, can we predict whether they are still alive, or how long they lived based on the length of their playing careers or their physical dimensions?

Collecting Player Data

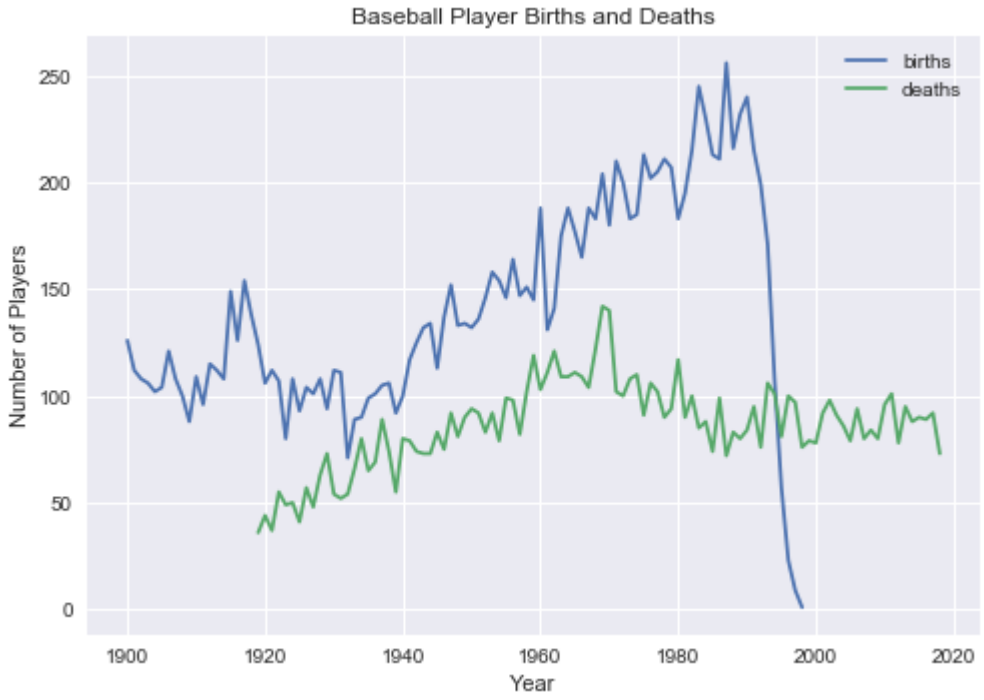
- Player data was collected from the following sites:

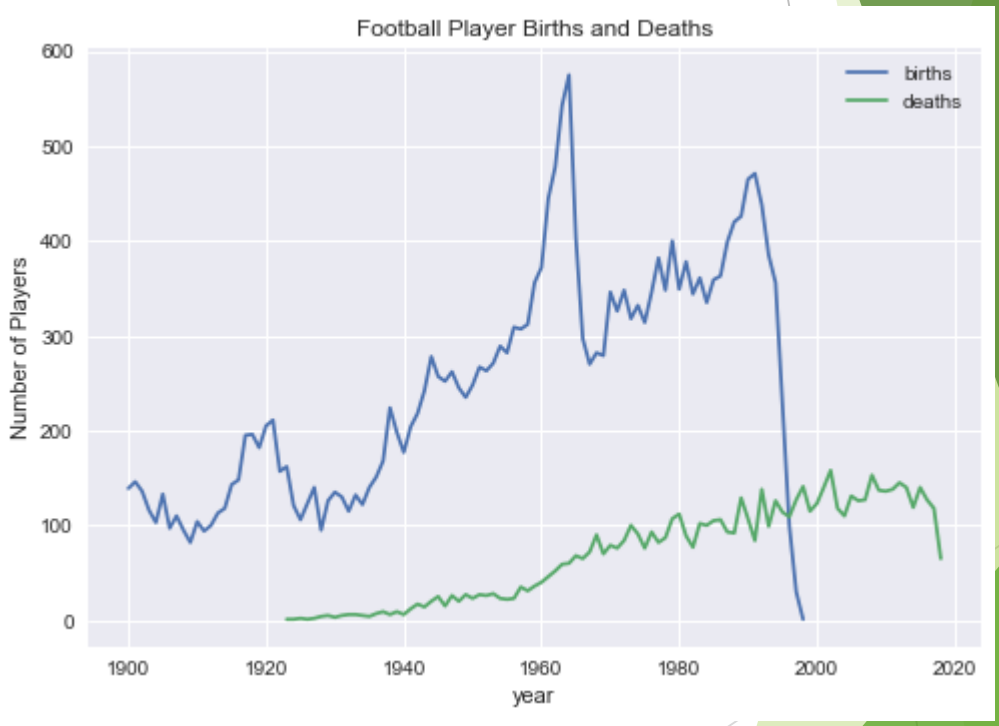
- From each site, data was collected (or inferred) about each player:
  - Date of birth and death
  - Age at death
  - Length of career: number of seasons and games played
  - Height and weight (for selected baseball and football players)

Vital Statistics of General Population

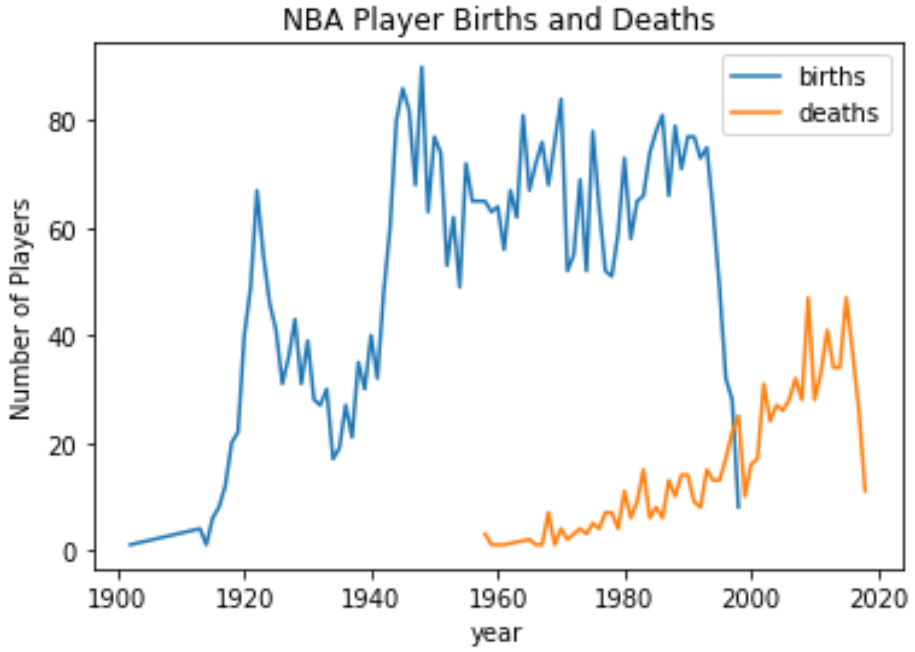
- Life expectancy tables from 2004 to 2015 were collected from the Social Security Administration
- Number of annual live births in the United States were taken from the Center of Disease Control and Prevention

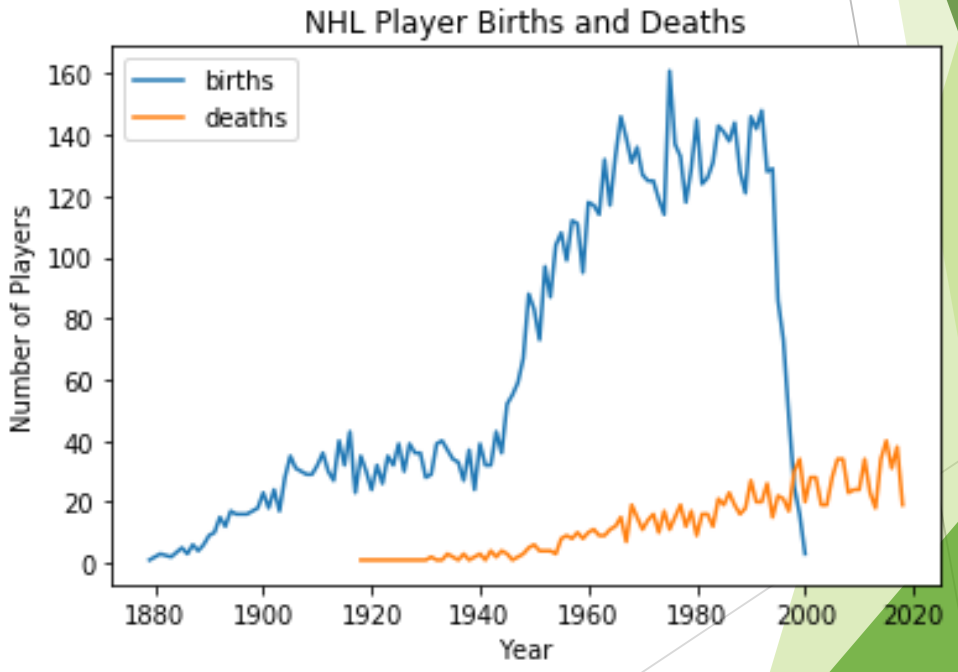
Annual Number of Births and Deaths of Professional Athletes





Annual Number of Births and Deaths of Professional Athletes

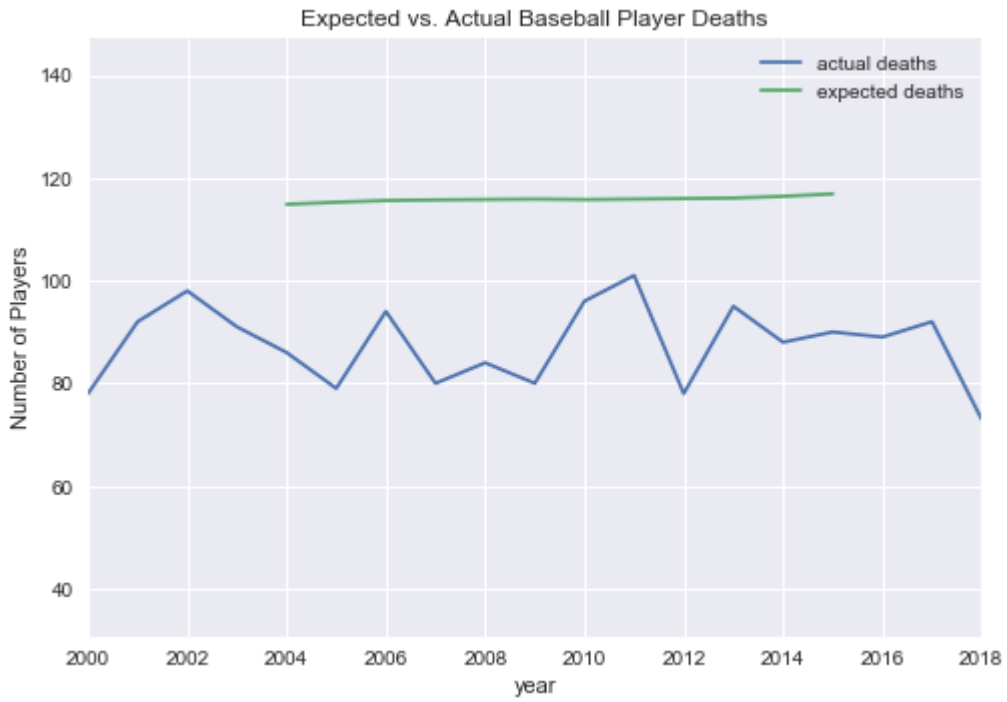


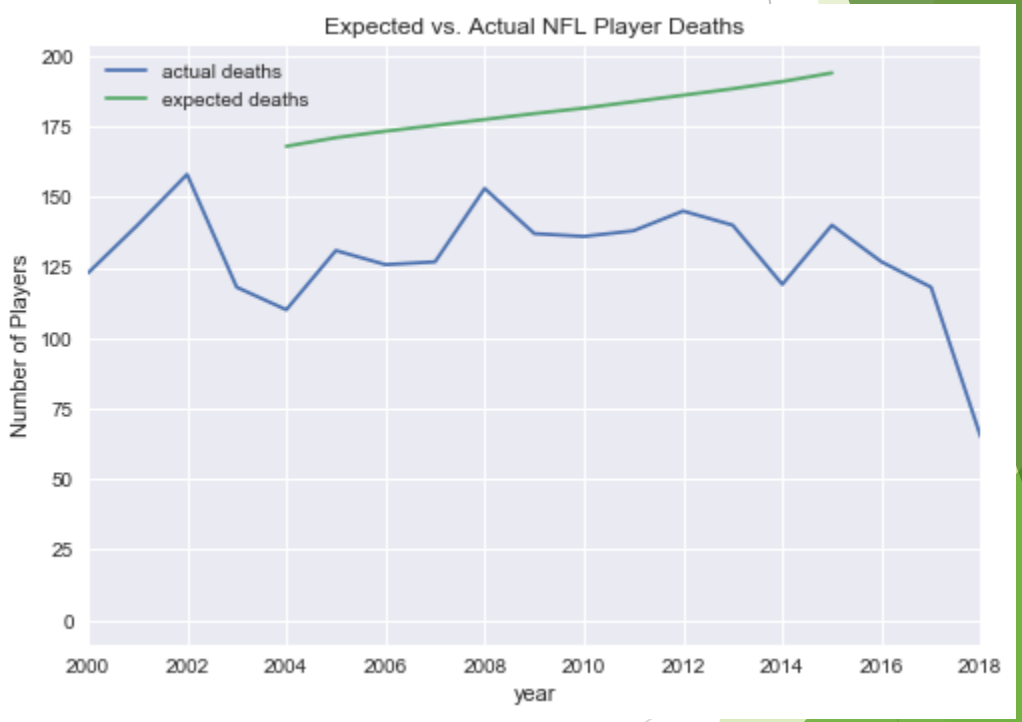


Modeling Number of Athlete Deaths in a Particular Year

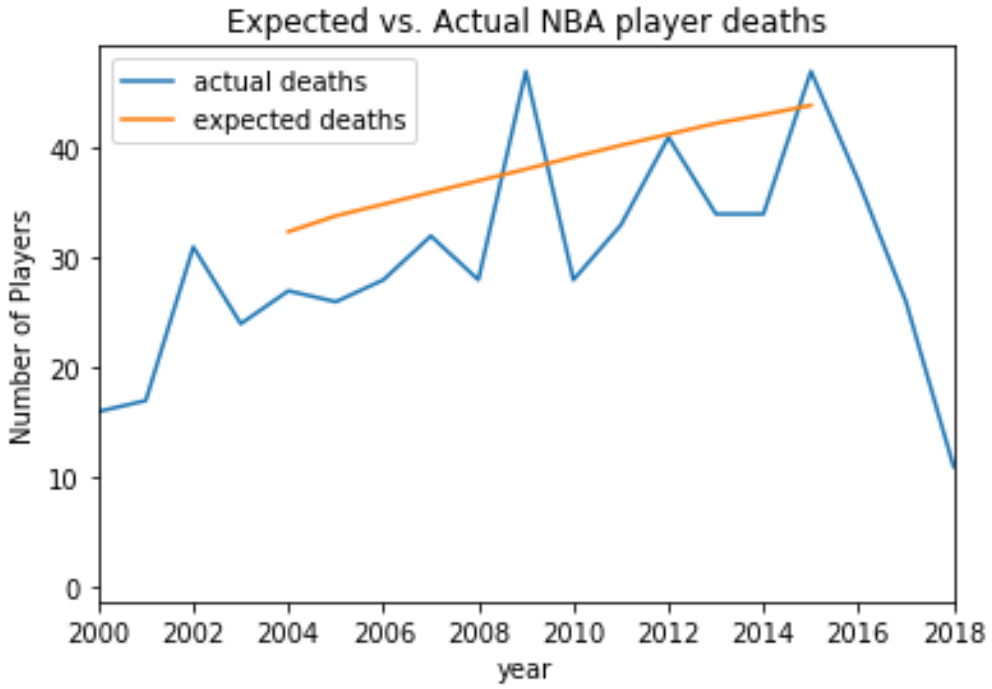
- Example: how many NBA players will die in 2015?
- For each year in the 2015 SSA Life Table, estimate percentage of males who were born that year that will die in 2015
  - Example: roughly 3.5% of males born in 1930 will die in 2015
- Multiply that estimated percentage by the number of athletes who were born in that year to get expected number of athletes who will die at that age
  - Of the 39 players born in 1930, about 0.035 * 39 = 1.365 will die in 2015
- Sum up the expected number of deaths for each birth year to get total expected number of athlete deaths in 2015
  - For NBA players 2015, expected number is 43.9 deaths. In actuality, 47 players died.

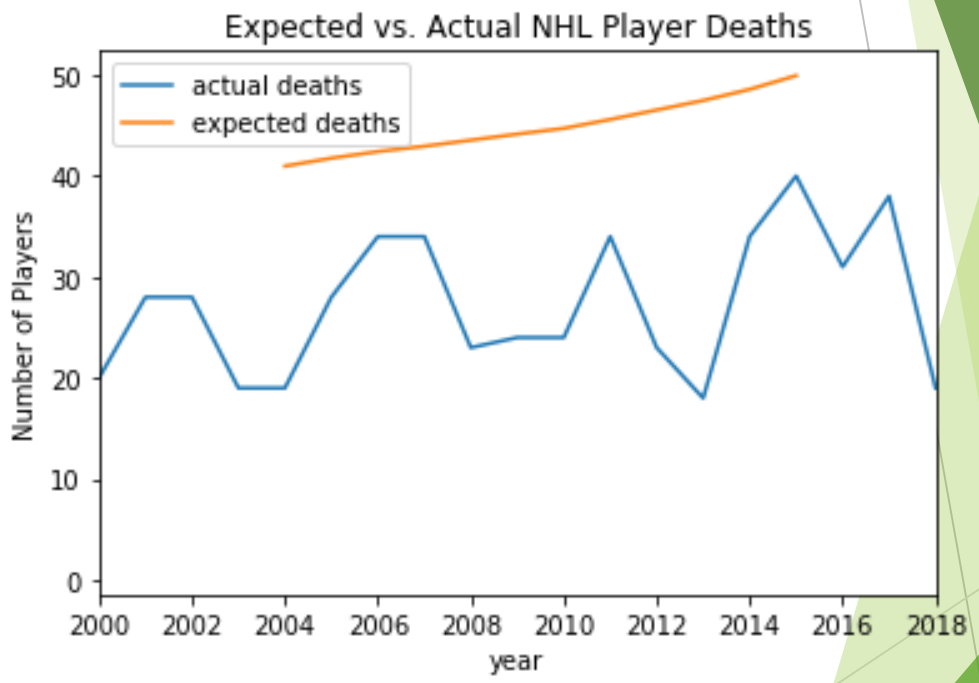
Comparison of Predictions with Actual Number of Deaths





Predicted vs. Actual Number of Deaths

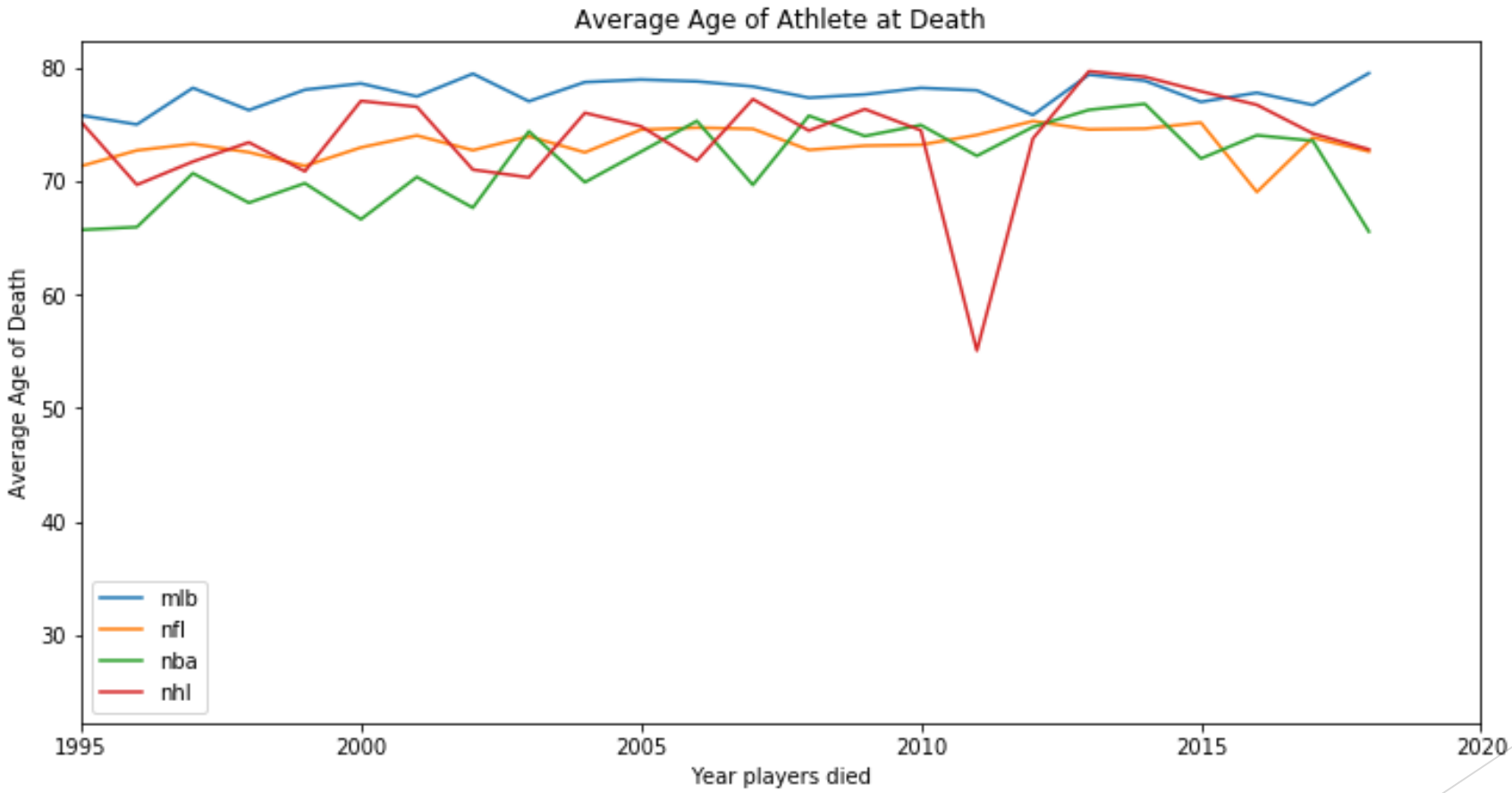




Comparison of Distributions of Ages at Death

- Conduct an A/B test between two population samples:
  - First group: all athletes of a particular sport who died in a particular year
  - Second group: general population of American males who died in a particular year
- For NBA, NHL, and NFL athletes, A/B test did not reveal any conclusive differences between the athletes' ages with those of the general population
  - One exception: NHL player deaths in 2011
- However, for Major League Baseball players, the A/B test revealed a difference between their age distribution and that of the general population

Average Age at Death of Pro Athletes



Attempt at Classification

- Of all Major League Baseball players who were born between 1930 and 1945, 42% are deceased
- Can we build a classification model to predict whether a player is still alive?
- Based on length of career, numbers of games played, listed height and weight, no classification model achieved over 60% accuracy
- As it turns out, no correlation between any of those characteristics with whether a player is still alive, or how long a player lived
  - At best, a slight (and obvious) correlation exists with the year of birth and how long a player lived

Conclusions

- Prediction of number of athlete deaths works reasonably well for NBA players, but consistently overestimates for the other sports (MLB, NFL, NHL).
- Distribution of ages at death is not significantly different from the general American male population for NFL, NBA, or NHL players
- However, Major League Baseball players seem to have higher life expectancies than players in other leagues
- No correlations exist between life expectancy and length of playing career, or even physical dimensions of professional athletes