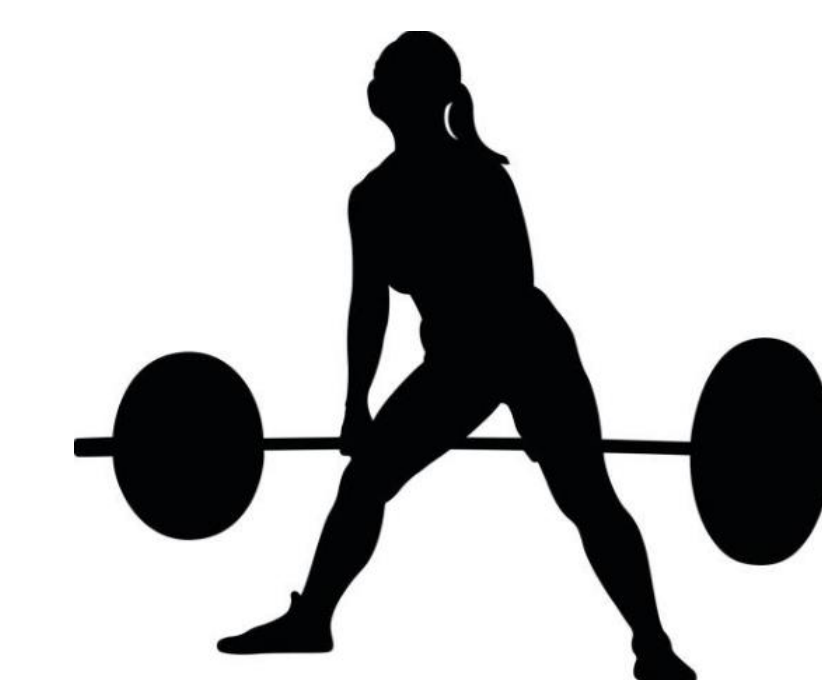# Modeling the Impact of Age on Powerlifting

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Age vs. Strength by Sex

- The goal of this module is to create a model use Age and Sex as predictors for BestDeadliftKg.
- We want to see if Age has an effect on the heaviest weight lifted for a contestant.

Impact of Age on Best Deadlifted Weight Among Different Sexes
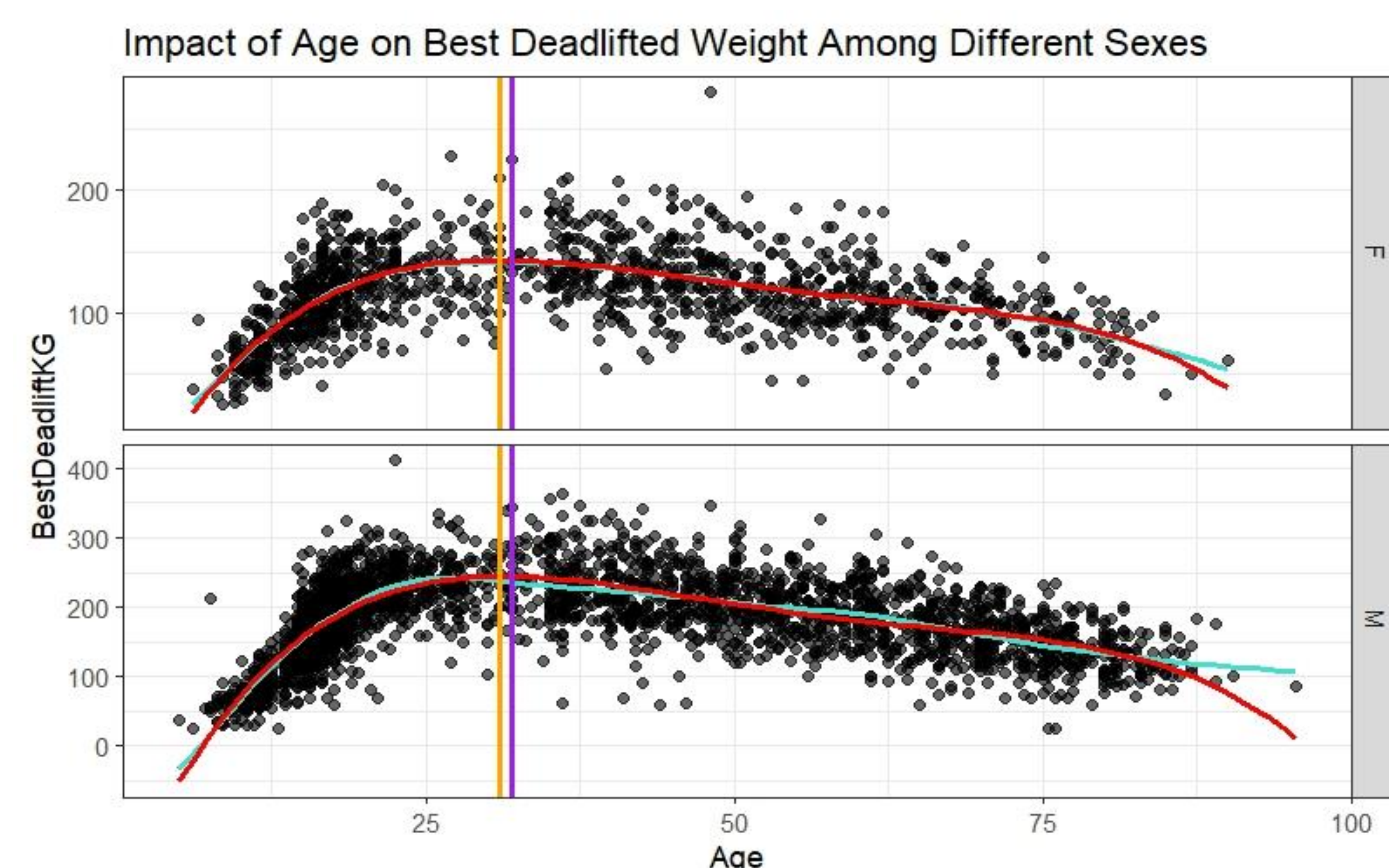
- Students will establish 4th order polynomial graphs for each sex.
- Using the graphs, they will determine the peak values of the curves and compare between sexes.
  - This will give insight into which age results in the maximum weight lifted for each sex.
- Students will be introduced to the concept of indicator variables (for Sex) and choosing which polynomial model best fits given the two different curves.
  - The conclusion should be that the highest order gets chosen.

Future Work:
- Introduce lifespan double exponential model as an introduction to the topic of non-linear regression as a way to model data.

Score

- Funded by the National Science Foundation with the goal of promoting statistics and data science education using sports data.
- Modules are created by faculty and students to be used as classroom tools.

Powerlifting

- Powerlifting is a strength sport where competitors in the same weight class compete to lift the heaviest weights in squat, bench, and deadlift.
- Competitors use different types of equipment depending on the division: single or multi-ply wraps, sleeves, or nothing (raw).
- Operation: Judge will give specific commands tailored to each lift, and the lifter is required to follow them to receive approval from all 3 judges.
- Data is still recorded even if a lifter doesn't finish or is disqualified.

Data Processing

- Data was taken from an archive named openpowerlifitng.
- The original data set had over 3 million rows
- To reduce the number of rows, we:
  - Got rid of any missing variables.
  - Filtered out lifters that didn't place.
  - Filtered to one competition (SBD) with two different equipment types (Raw, Single-ply).
  - Took a random sample of 500 lifters per Age group.
  - Lowered from 3 million to around 4000.

Age vs. Strength by Status

Goal: Model how Age impacts strength performance in elite vs. non-elite lifters.
Model: Quantile Regression
- 4th order polynomial
- 90th percentile = elite
- 10th percentile = non-elite

Best Lifts Across Age for Male Lifters
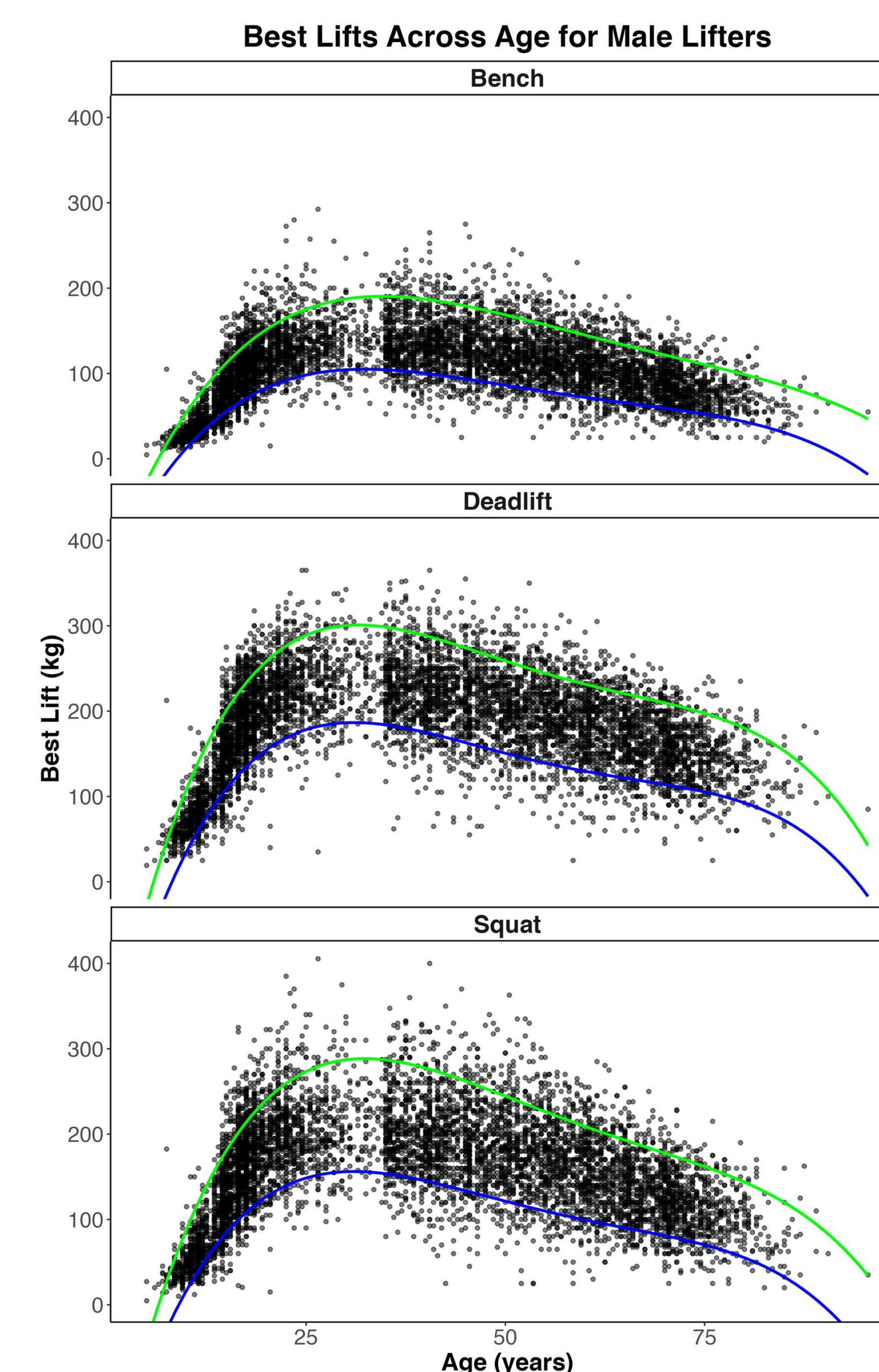
Analysis:
- Elite lifters develop faster than non-elites.
- Both groups peak between ages 24–35.
- Decline occurs at a similar rate for both.
- Key difference lies in the developmental phase.

Future Work:
- Model individual lifters (multi-level).
- Explore: What predicts elite status?