peakPerformR EDA

Eli Vatsaas and Jacob Berlin

2025-03-30

Ridge Plot of Career Prime Start and End Ages

Distribution of Career Prime Start and End Ages by League

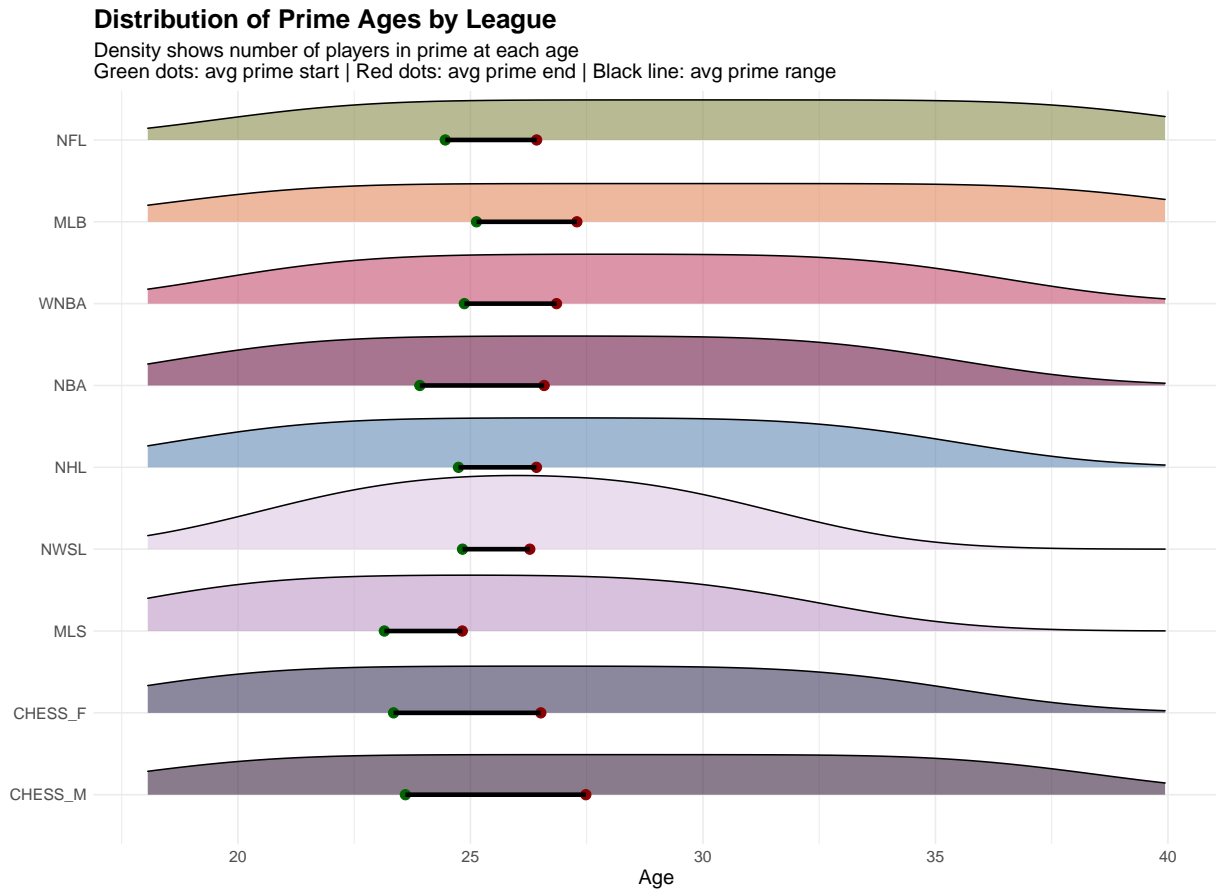Lighter density shows prime start ages, darker density shows prime end ages
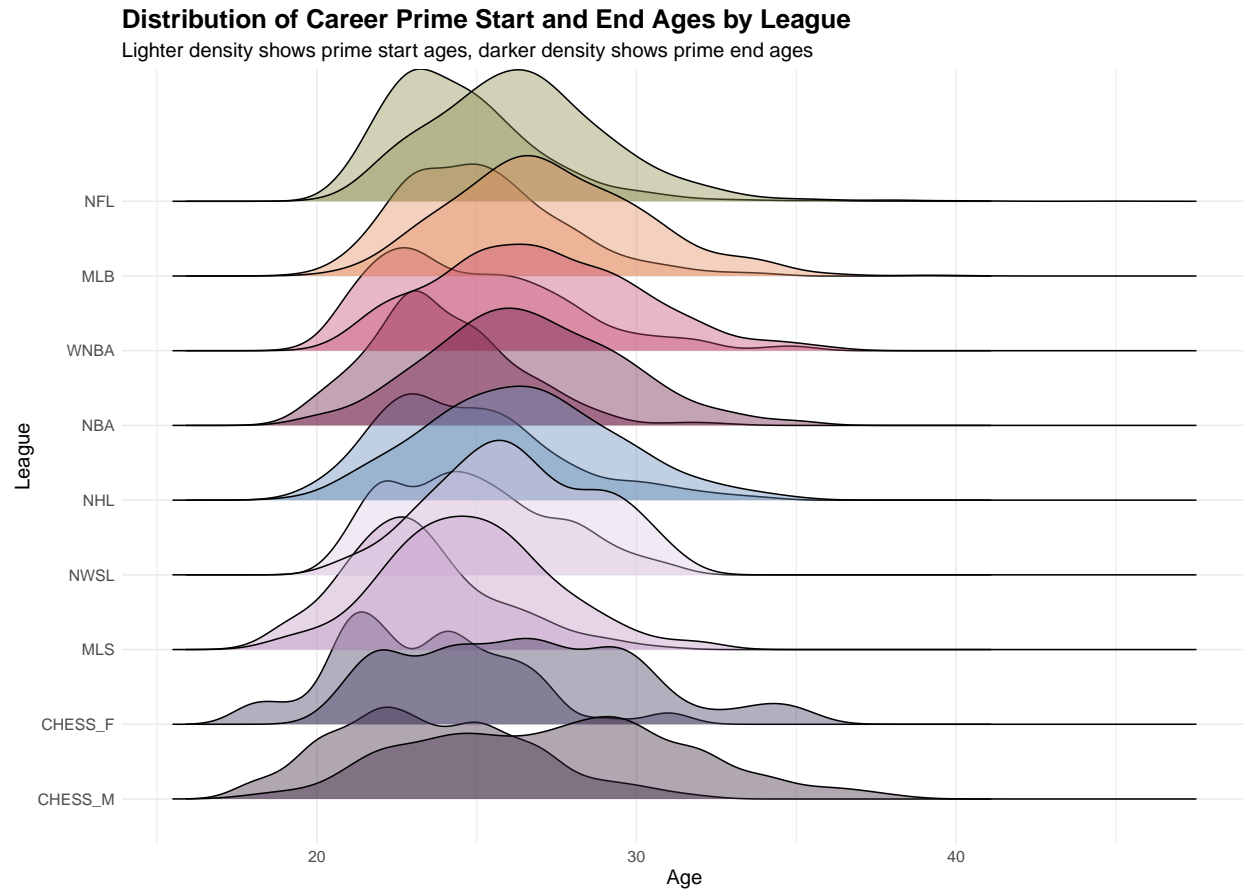
This visualization uses density ridge plots to display the distribution of career prime start ages (lighter density) and end ages (darker density) for athletes across different sports leagues. The x–axis represents age, while each row represents a different sports league. This visualization reveals sport–specific patterns in career development, with some leagues showing earlier prime starts and others showing more extended prime periods. The leagues with wider curves suggest less standardized career trajectories.

Career Prime Duration by League

Career Prime Duration by League

Box shows interquartile range, line shows median duration
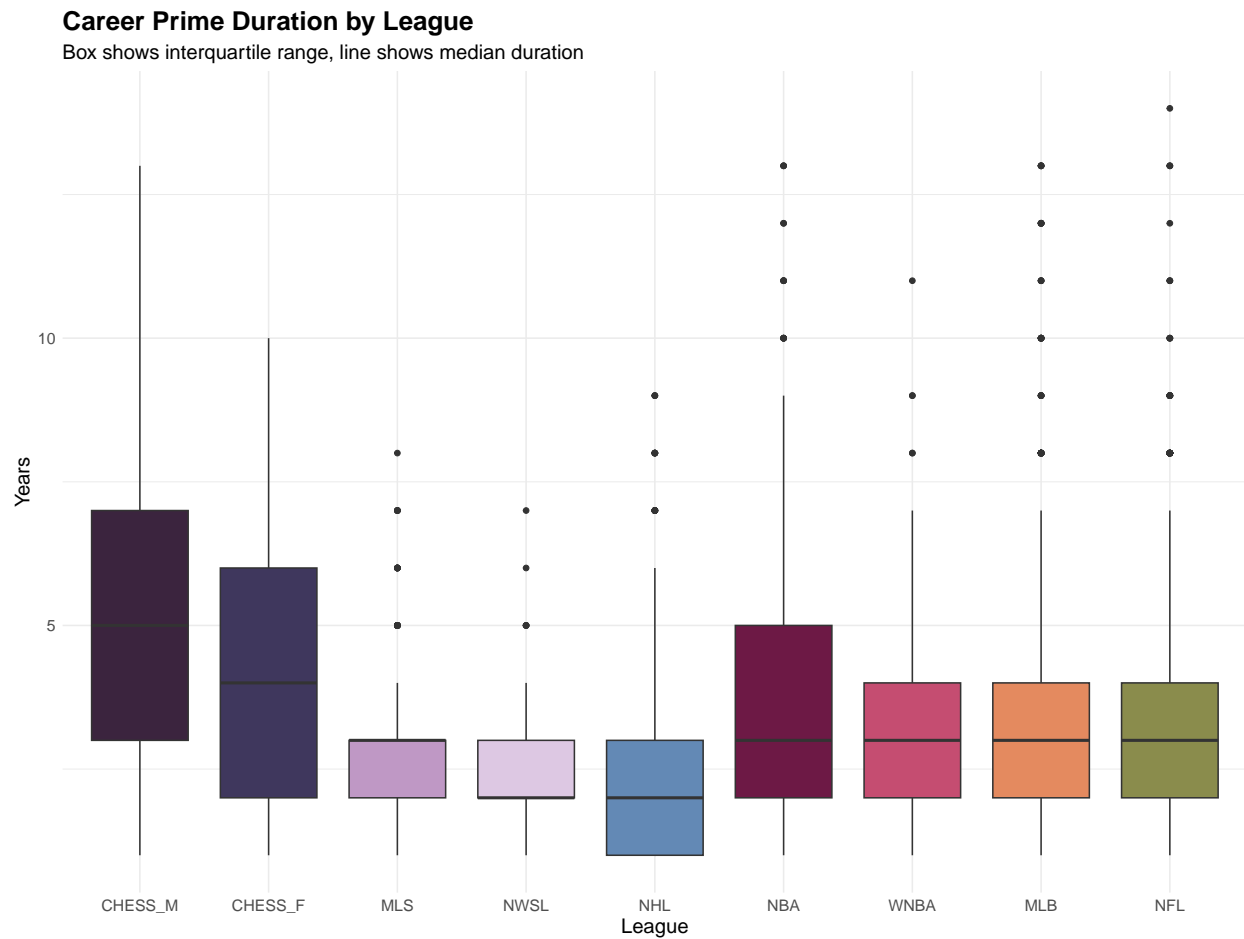
This box plot compares the duration of athletes' career primes across different sports leagues. Each box represents the distribution of prime durations for a given league. Some leagues show tighter distributions, indicating more predictable prime durations, while others display greater variability. This information can help to understand career longevity differences between leagues.

Distribution of Prime Ages by League

Distribution of Prime Ages by League

Density shows number of players in prime at each age
Green dots: avg prime start | Red dots: avg prime end | Black line: avg prime range

This density ridge plot shows the distribution of ages during which athletes are in their prime. The shaded areas represent the frequency of players in their prime at each age. Green dots mark average prime start ages, and the red dots mark average prime end ages. This visualization provides both the average prime window and the full distribution of prime ages, revealing not just when athletes typically peak, but also the shape and concentration of the age distribution during prime years. The plot is limited to ages 18–40 to focus on the most relevant career range.

Faceted Distribution of Career Prime Ages by League

Distribution of Career Prime Ages by League

Shaded area: players in prime at each age
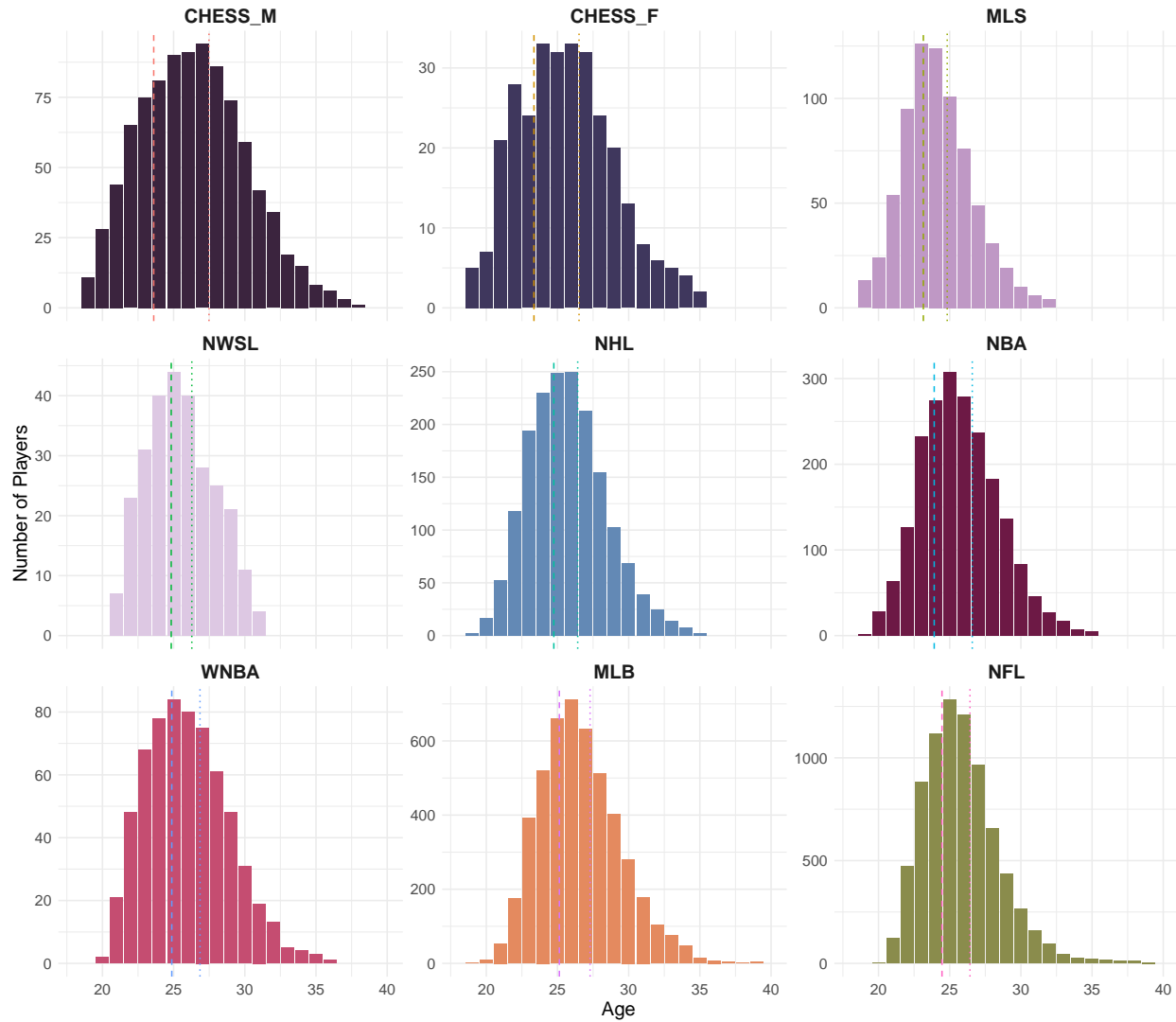Dashed lines: average start/end ages
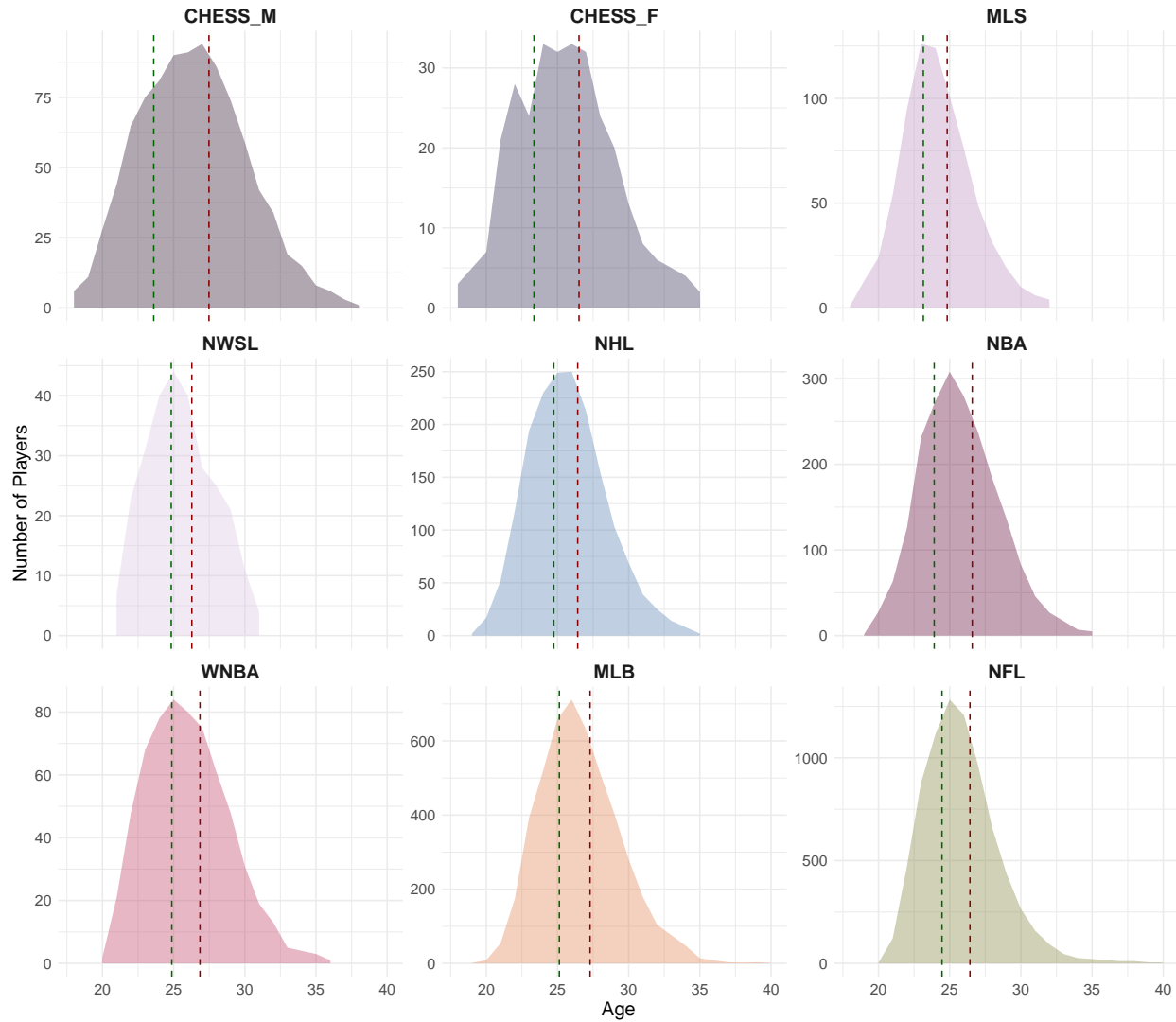
This visualization breaks down athlete career primes by league. The shaded area shows the number of
players in their prime at each age, give an idea of when most athletes are performing at their peak.
Vertical dashed lines mark the average start (green) and end (red) ages for each league.

Players in Career Prime by Age and League

**Players in Career Prime by Age and League**

Height shows number of players in prime at each age
Dashed line: avg prime start | Dotted line: avg prime end

This bar chart visualization provides a precise count of how many athletes are in their career prime at each age, shown separately for each league. Vertical dashed lines mark the average prime start age, while dotted lines indicate the average prime end age for each league.

Distribution of Player Tiers by League

Based on league-normalized PQI (NFL uses position-normalized)
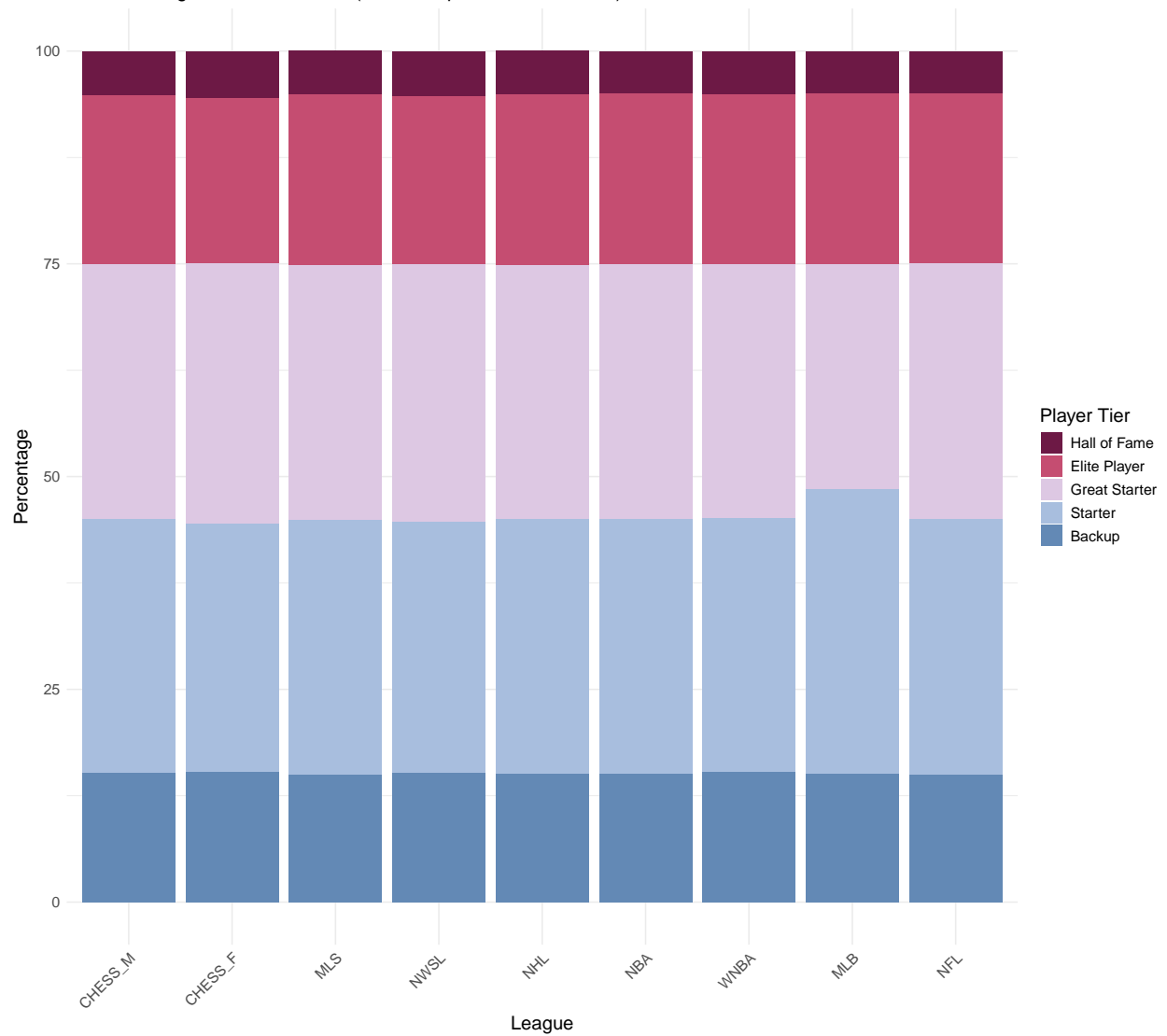
This visualization shows the distribution of player tiers across different sports leagues. Each bar represents a league, with colored segments showing the proportion of players in each tier from Backup to Hall of Fame.

## Relationship Between Prime Duration and PQI

Longer prime durations tend to correlate with higher PQI scores
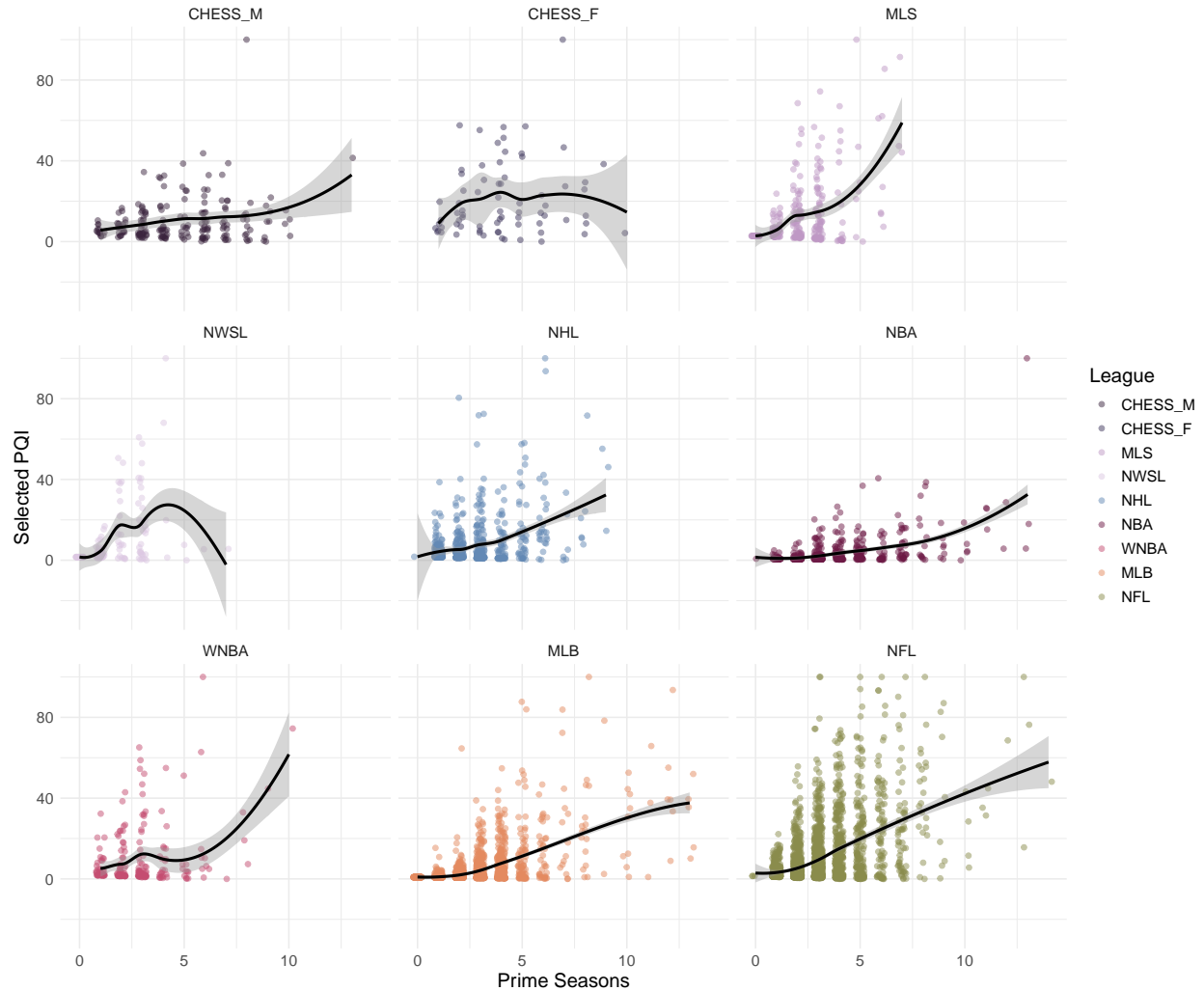
This scatter plot explores the relationship between an athlete's prime duration (number of seasons in their prime) and their PQI score. Each point represents a player, with colors indicating their league. The black trend line shows the overall correlation across all sports. Longer prime durations generally correlate with higher PQI scores, though this relationship varies by sport. Some athletes achieve high PQI scores with shorter primes through exceptional peak performance, while others accumulate value through consistency over longer primes.

PQI Comparison: Active vs. Retired Players

Examining differences in player quality distribution between active and retired athletes
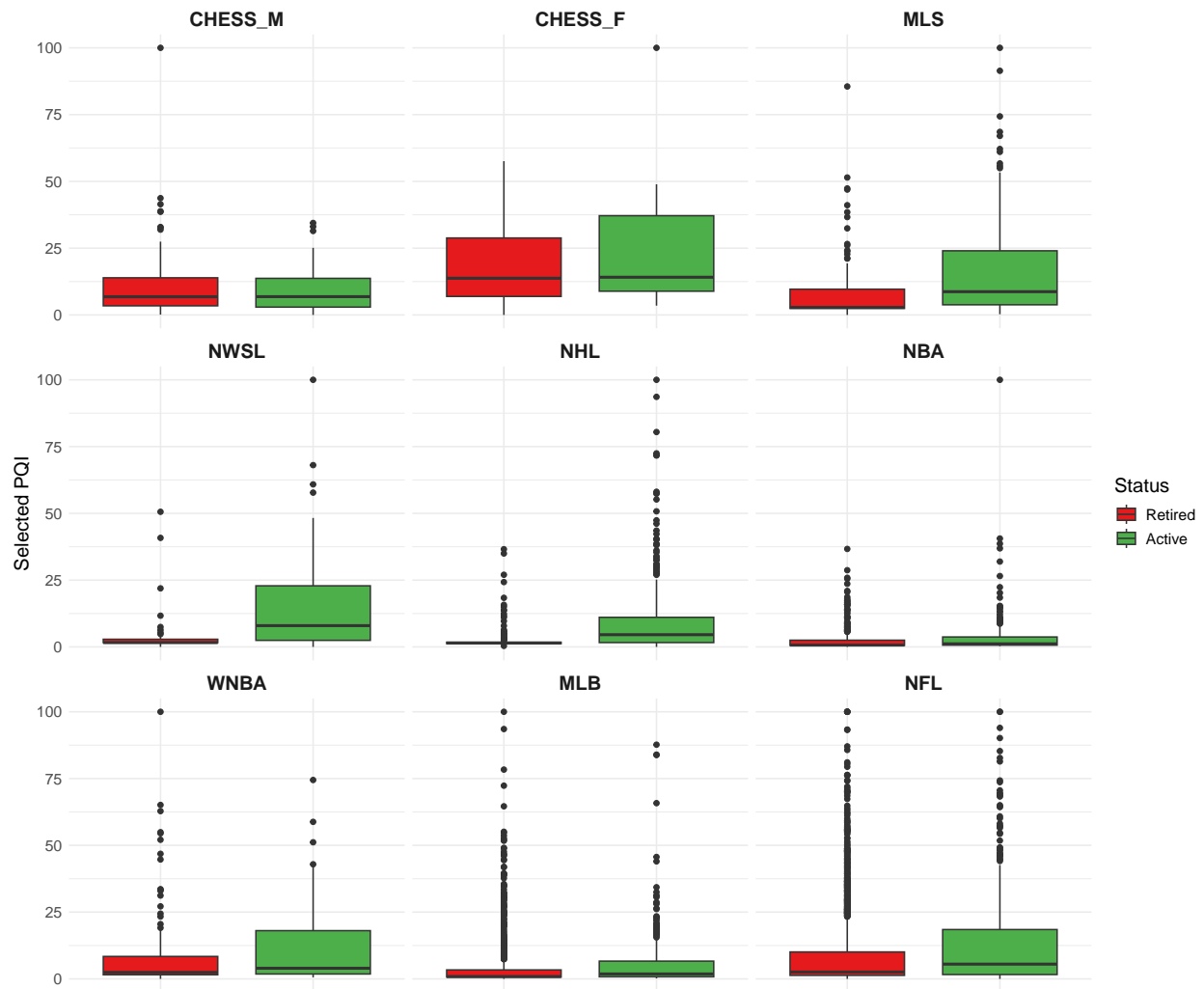
This visualization compares PQI distributions between active and retired players across different leagues. Differences between active and retired players can reveal shifts in talent quality, changes in performance measurement, or recency bias in player evaluation. In some leagues, active players show higher PQI scores, possibly due to improved training methods, rule changes benefiting certain playing styles, or incomplete career trajectories.

Career Progression Timeline by League

Average age at key career milestones
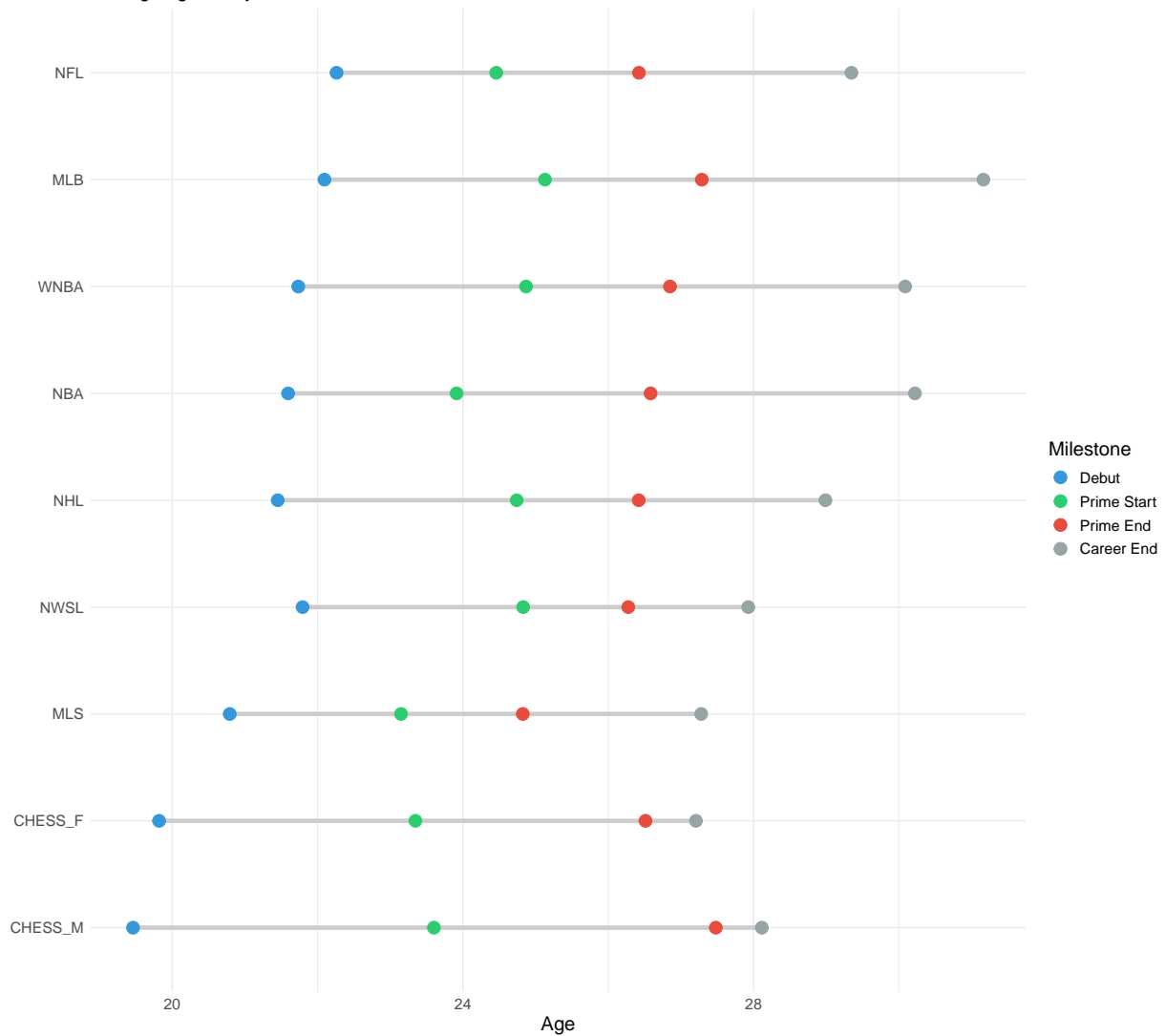
This timeline visualization shows the average age progression through major career milestones for athletes across different leagues. Each row represents a league, with colored points marking the average age at debut, start of prime, end of prime, and career end. This visualization provides insight into the typical career trajectory and timing across different leagues

# Actual vs. Predicted Career Trajectories of Elite Players

Normalized performance curves with actual and predicted prime periods
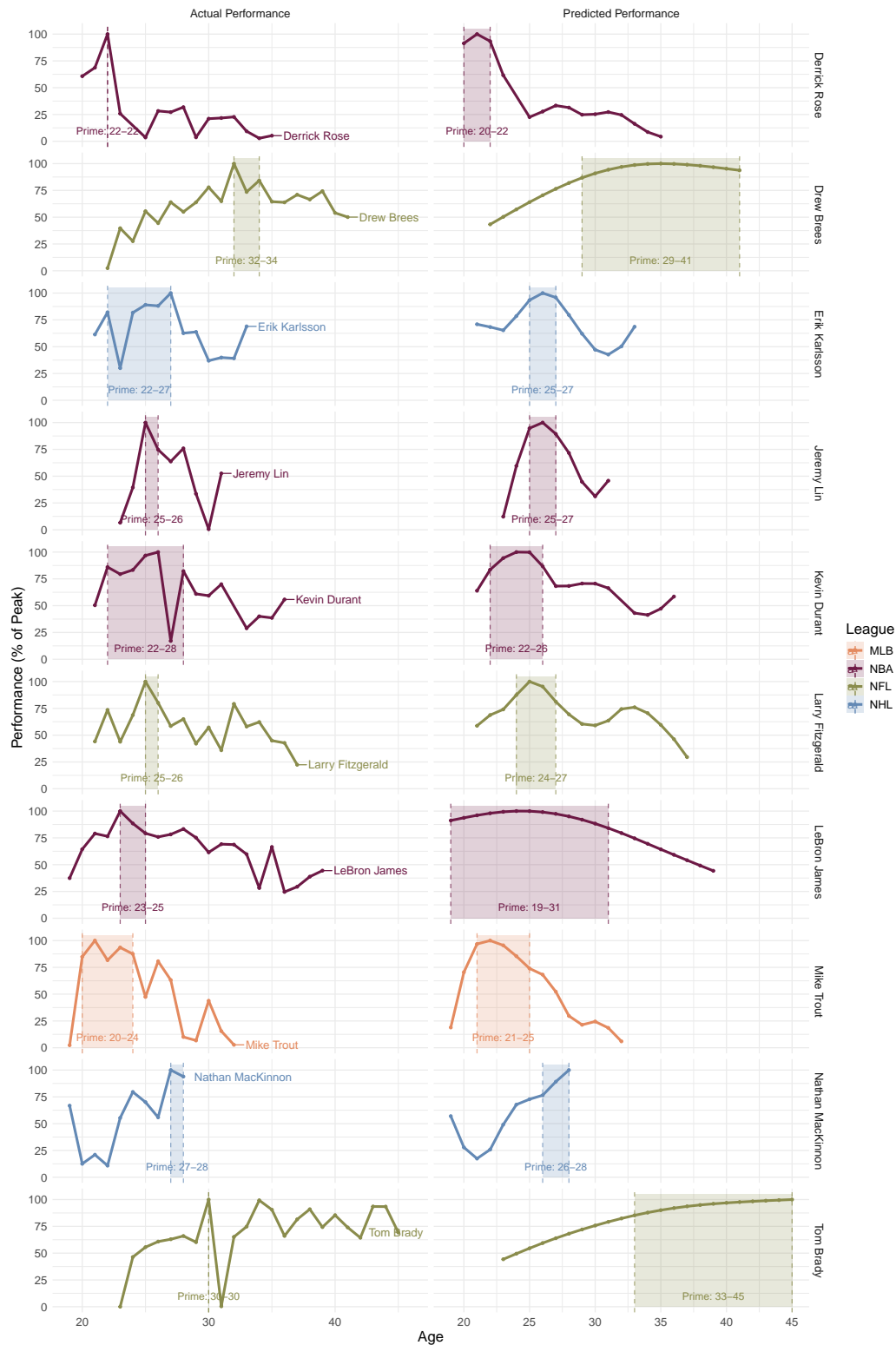
This visualization compares actual and predicted performance trajectories for selected players.
Each graph shows a player's performance over their career, normalized to their peak (100%). The left
column shows actual performance with actual prime periods, while the right column shows predicted
performance with predicted prime periods. The highlighted sections indicate each athlete's prime
period. The comparison allows us to see how well predicted values align with actual performance and
whether predicted prime periods match actual prime periods.

# Prime Age Patterns by Sport Physicality Level

Comparing career development across mental, moderate, and high–physical sports
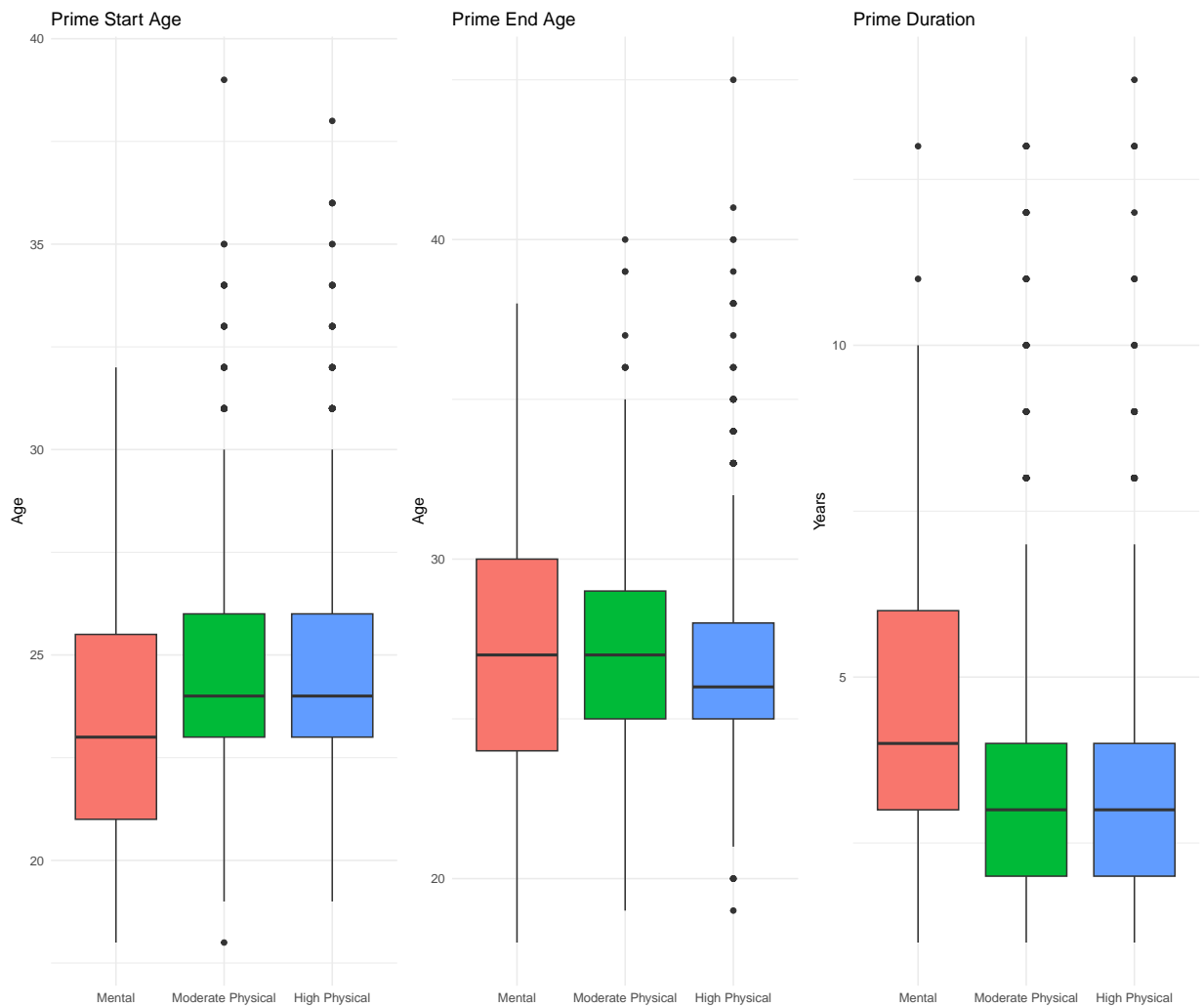
This visualization compares prime age patterns between sports grouped by their physical demands. Sports are categorized into mental (chess), moderate physical (baseball,soccer,basketball), and high physical (football, hockey). The boxplots show the distribution of prime start ages, end ages, and durations across these categories. This helps reveal how the physical nature of a sport influences career development patterns.

Prime Duration: Elite vs. Non–Elite Players

Comparing career prime patterns between top performers and others
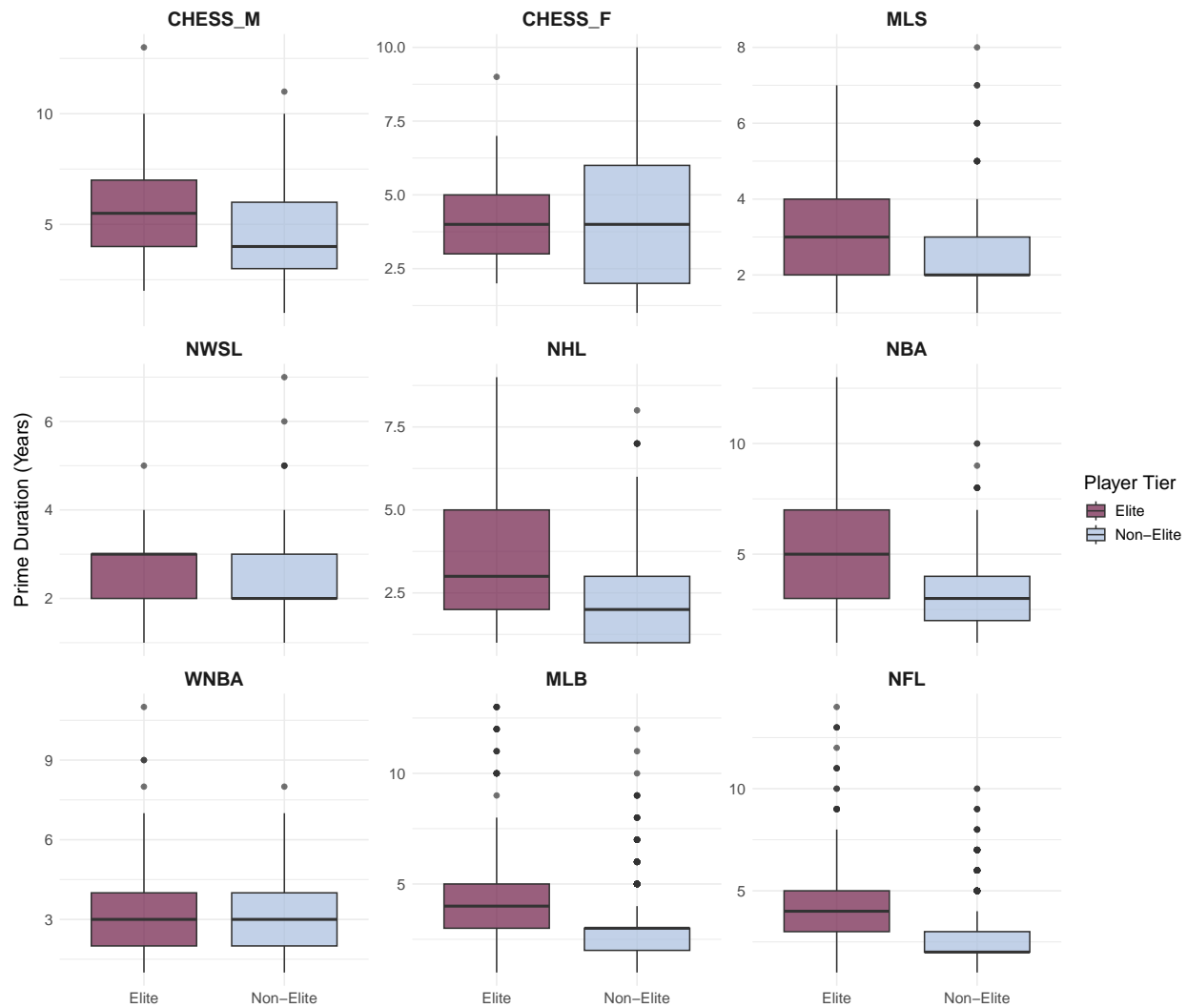
This visualization compares the prime age patterns between elite players (Hall of Fame and Elite tier) and non–elite players across different leagues. Each facet compares the start age, end age, and duration of primes. This can identify whether exceptional talent emerges earlier, sustains longer, or follows unique patterns compared to typical athletes in each sport.