

Roll Initiative!

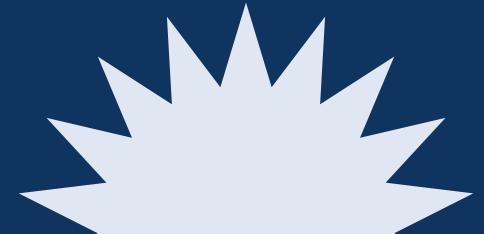
A Data-Driven Analysis of First-Mover Advantage in D&D 5E Rules



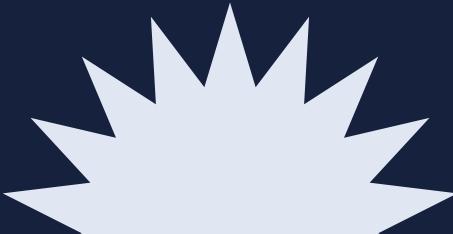
Research Motivation

Understanding the significance of initiative in D&D 5E combat dynamics

Initiative plays a pivotal role in determining combat outcomes in D&D 5E. However, **real gameplay** introduces various complexities and biases that cloud the understanding of its true impact. The objective is to quantitatively assess and isolate the effects of acting earlier, providing deeper insights into game dynamics.



Research Questions on Initiative Impact



Can acting earlier significantly influence combat outcomes?

Methodology Overview

Simulation Framework for Analyzing Combat Initiative Effects

This research employs a **controlled combat simulation** to quantify the impact of initiative advantage in D&D 5E. Utilizing a SQL database and Python scripting, I executed 5000 encounters, recording initiative, damage, and outcomes for comprehensive analysis. This methodology ensures statistical stability and the isolation of first-mover effects in turn-based combat.



Model Simplifications for Initiative Isolation



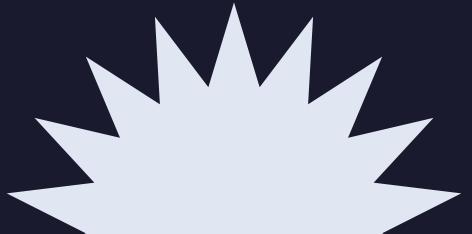
Initiative Effects

Simplifying 5e rules helps clarify initiative's true impact.

Data Pipeline

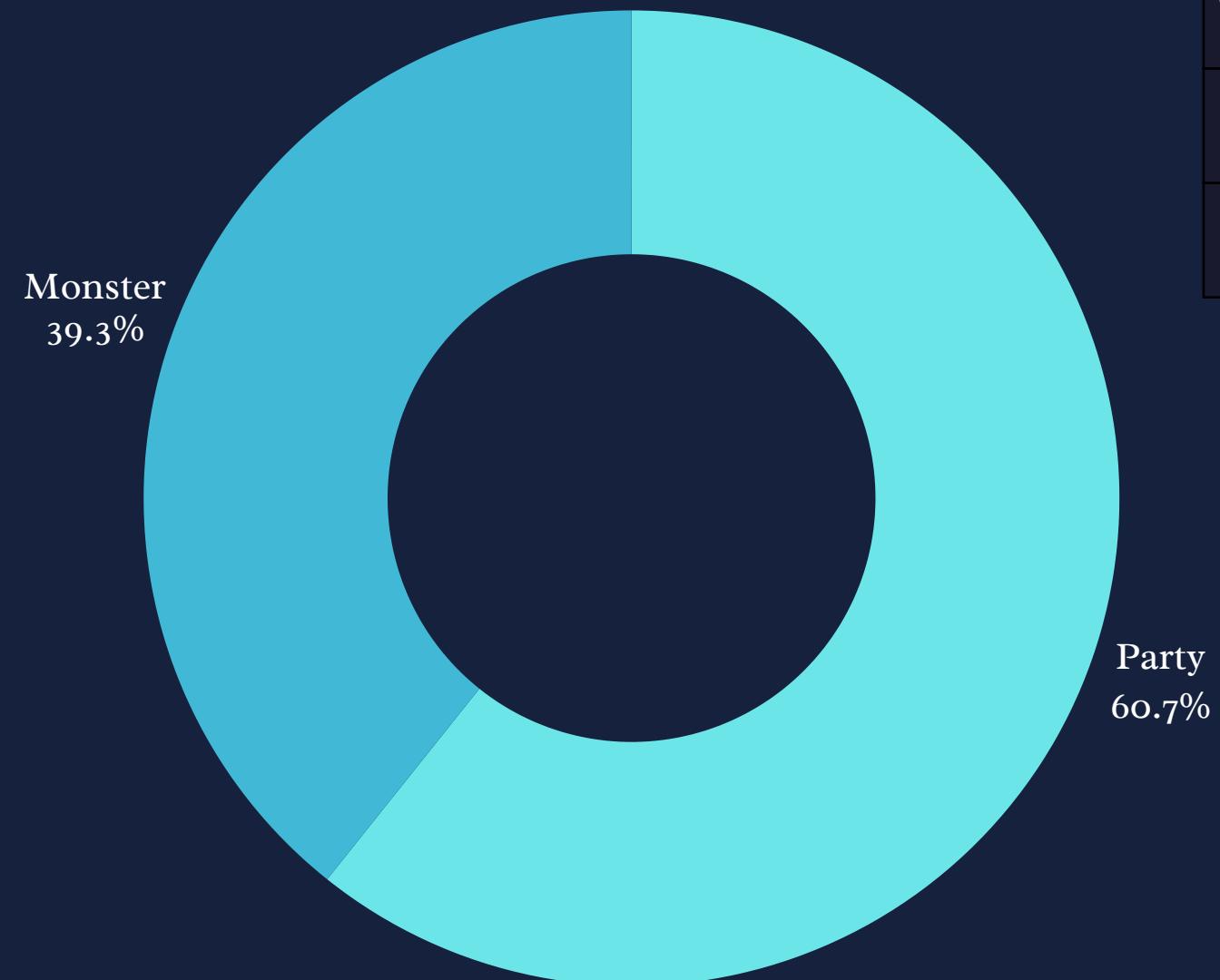
Comprehensive SQL Database Framework for Combat Simulation Metrics

The **data pipeline architecture** is essential for tracking combat simulation results. Utilizing a SQL database, the project logs each encounter's metrics, including initiative, damage, and outcomes. This structured approach enables thorough analysis and visualization through Tableau, facilitating a deeper understanding of the initiative advantage in D&D 5E combat.



Outcome Distribution and Win Rate

The data over 5000 simulations shows that the encounter is party-favored but swingy.

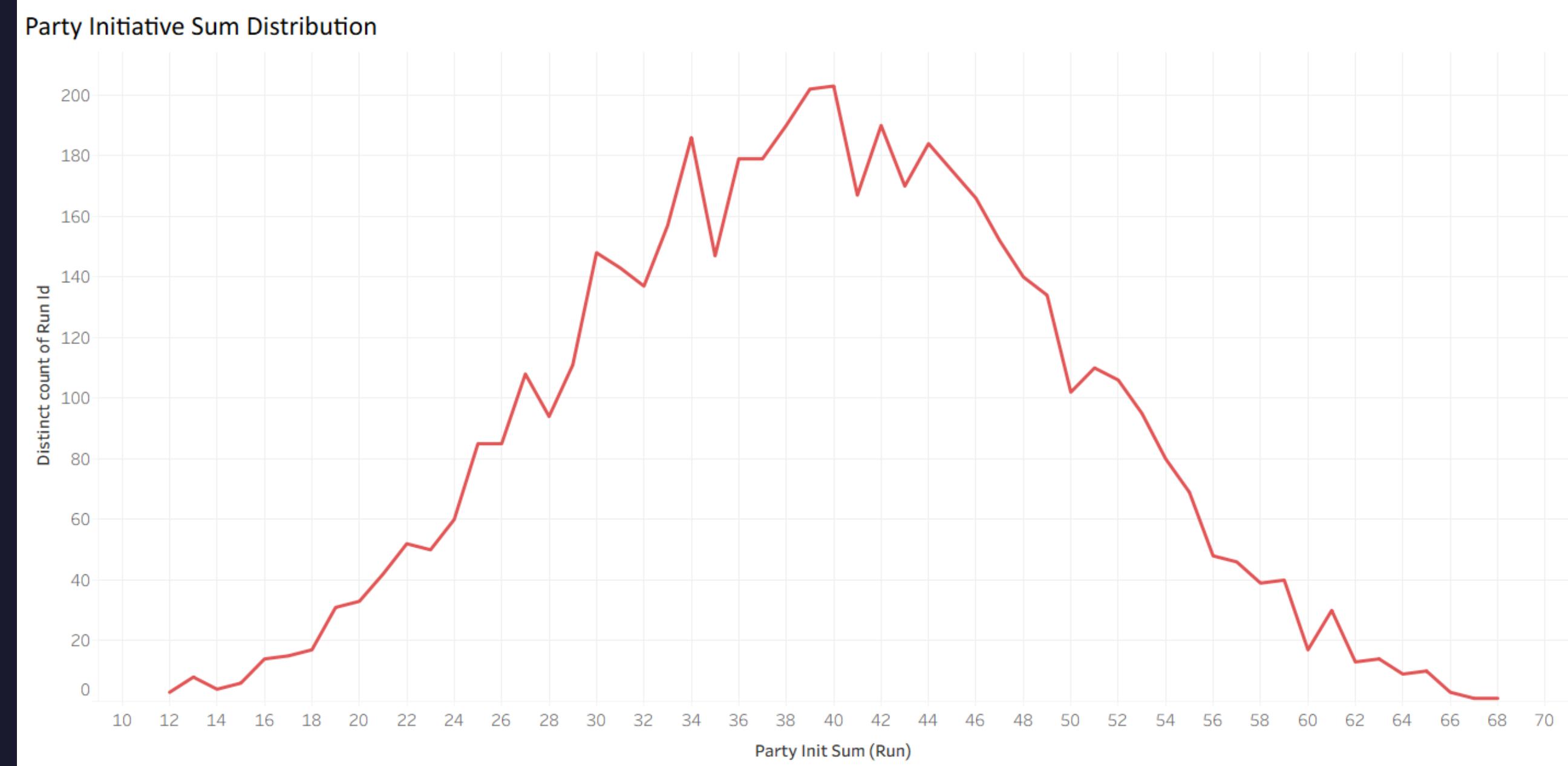


60.72%

Total party win rate

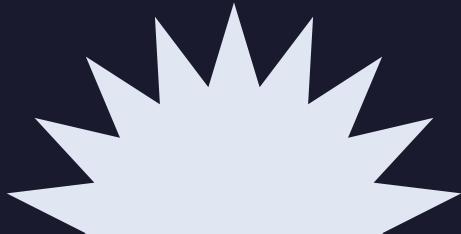
Winner	Run_time
Party	3036
Monster	1964

Initiative Distribution in D&D 5E



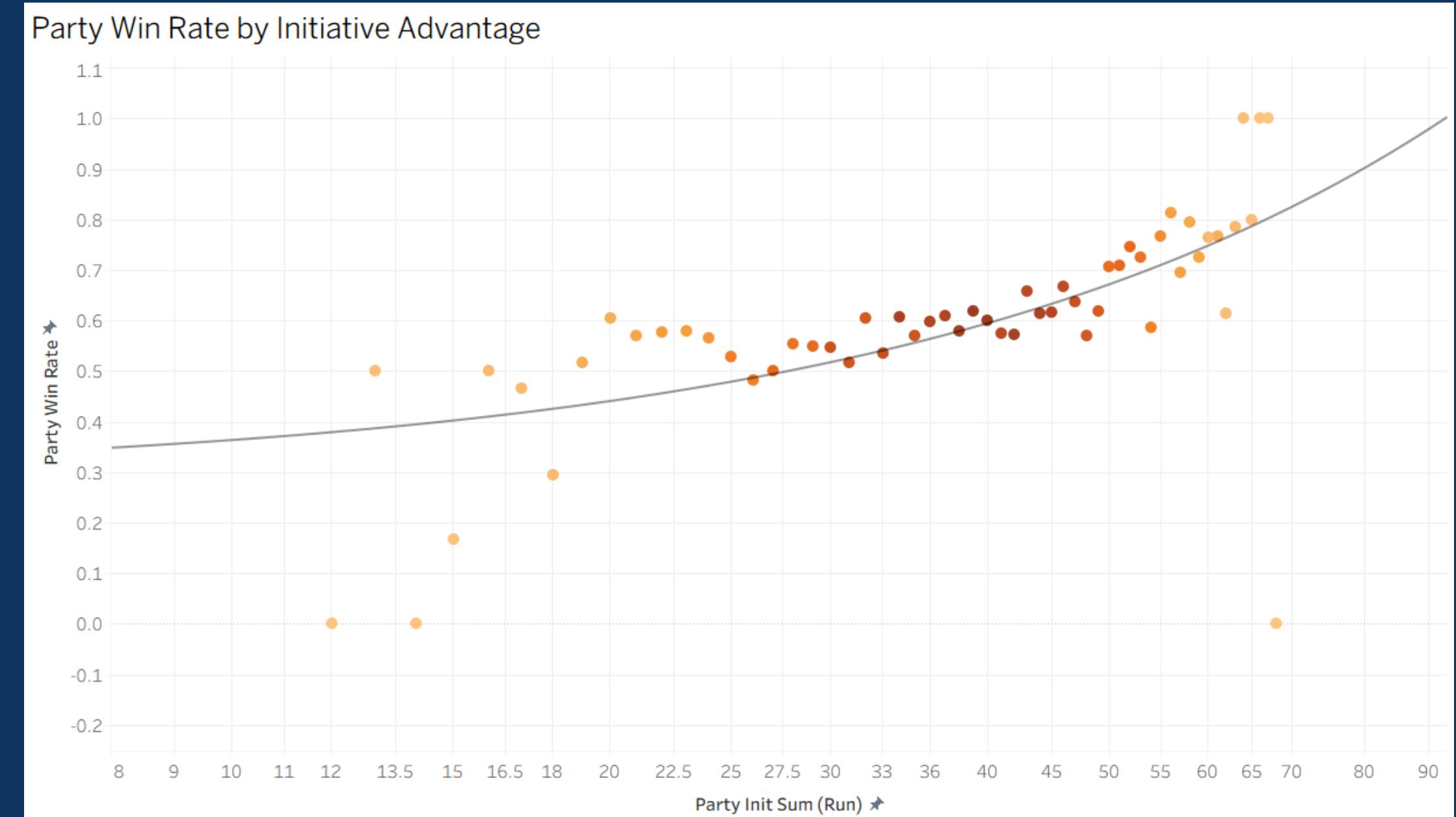
Bell-Shaped Distribution

Party initiative sums follow expected bell curve patterns.



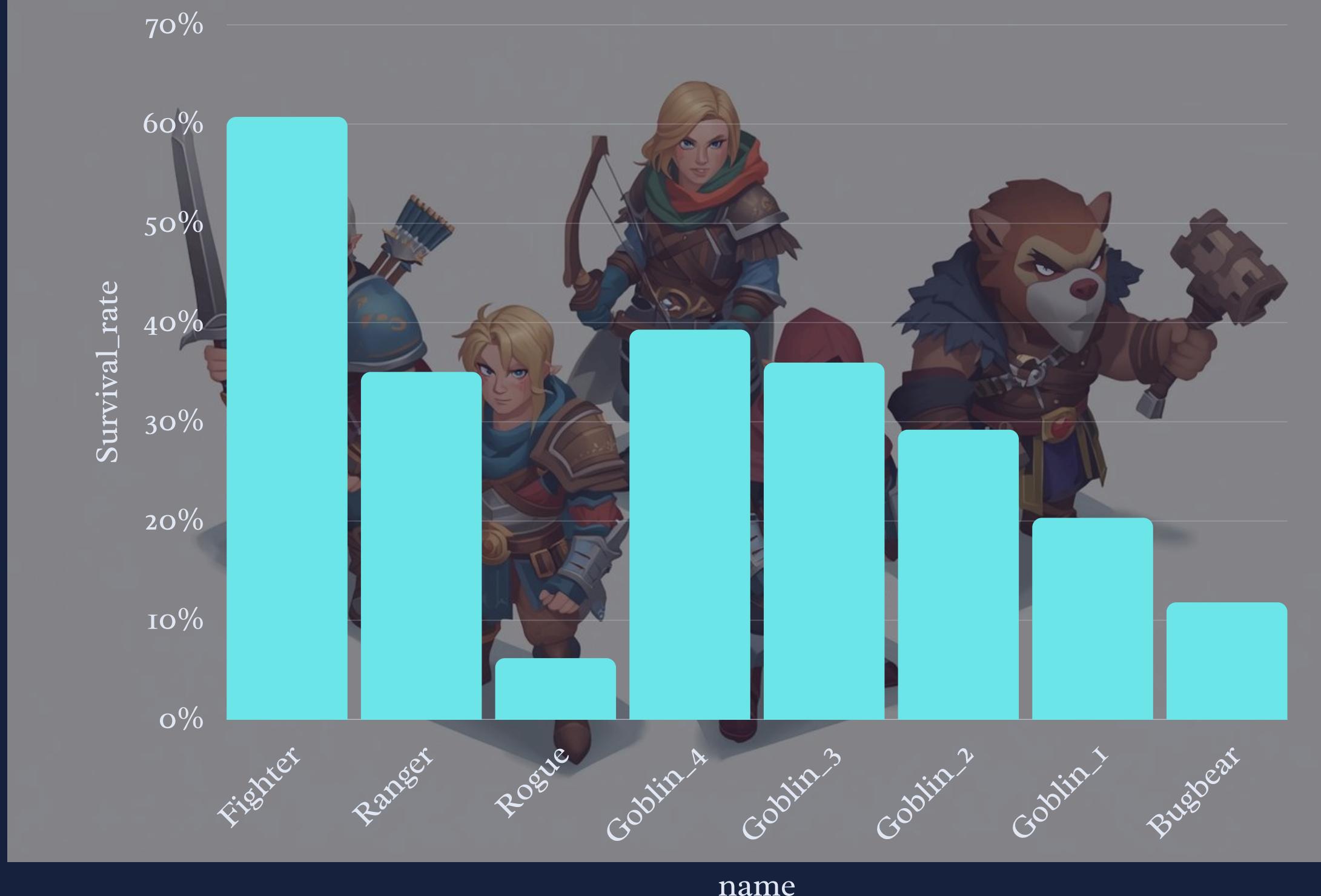
Initiative vs Win Rate

The chart illustrates a **positive correlation** between earlier initiative and win rates, demonstrating that acting first significantly increases the likelihood of success in combat encounters.



Scatter plot showing initiative order and win rates.

Survival Rate by Class in Combat

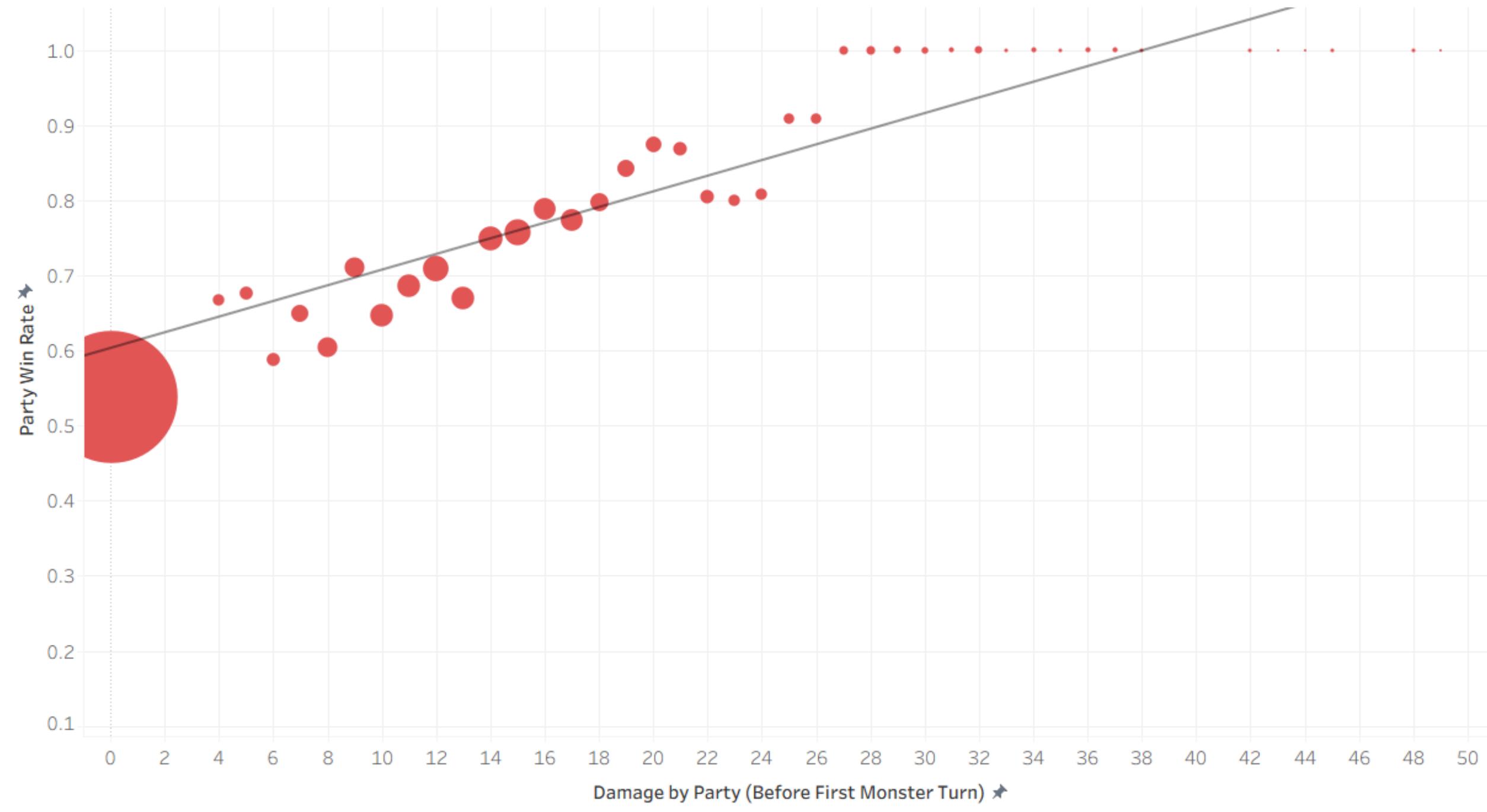


Class Survival Rates

The Fighter excels while the Rogue struggles significantly.

Alpha Strike Impact on Win Rates

Alpha Strike Scatter: higher damage before first monster turn, higher win rate



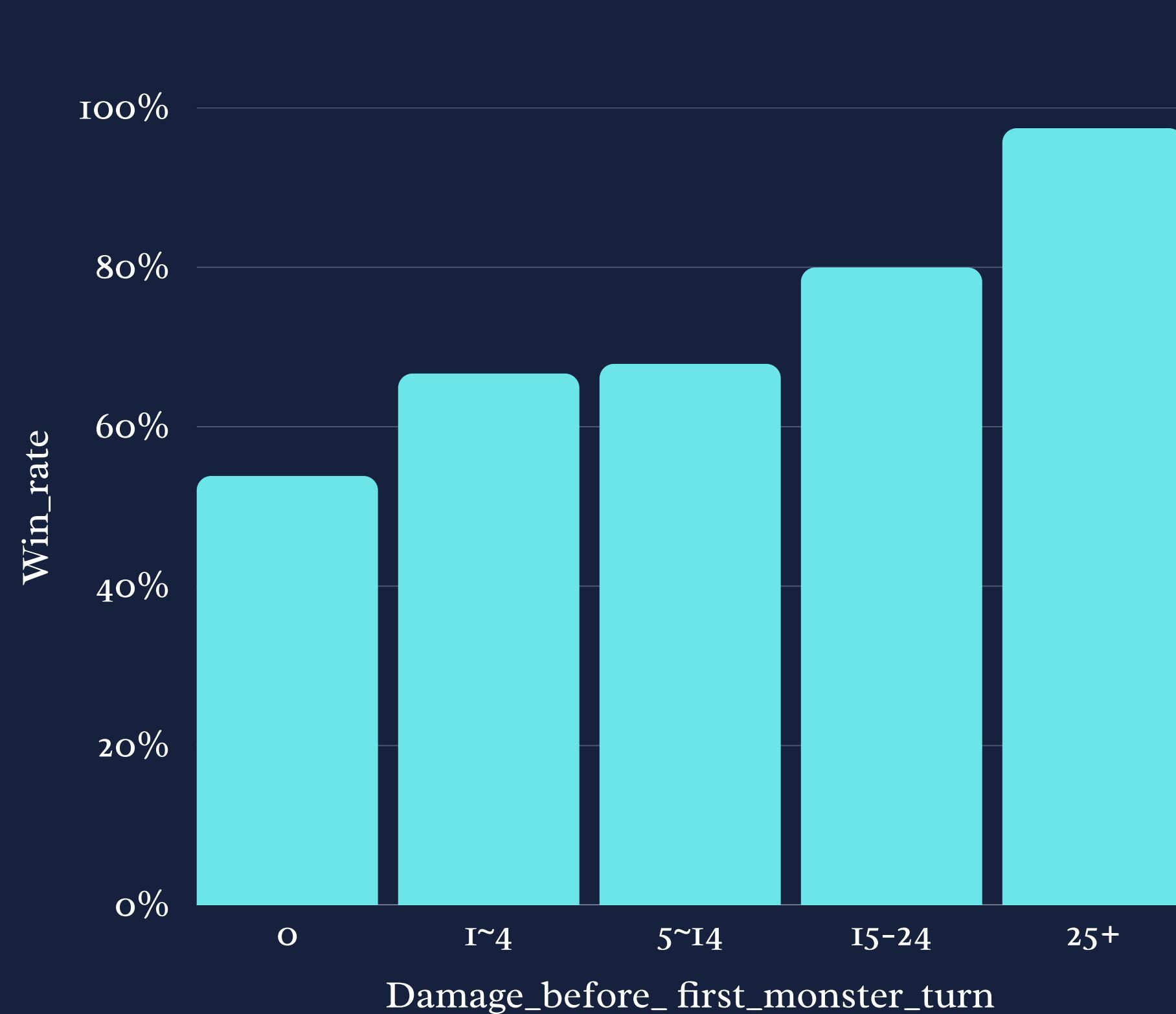
Early Damage

Early damage significantly influences overall combat outcomes.



Early Damage vs Win Rate

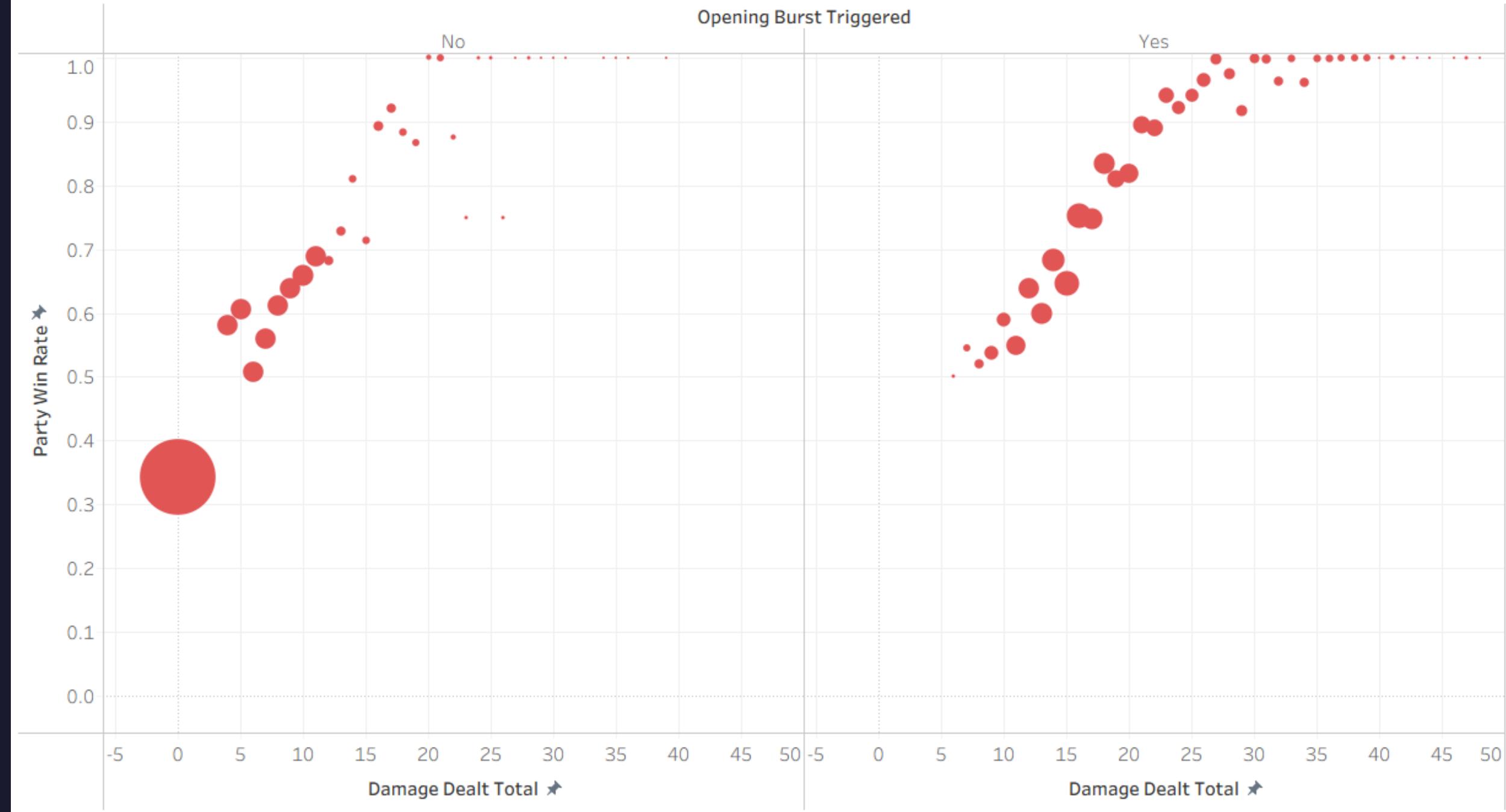
The chart illustrates a **strong correlation** between early damage dealt and win rates, demonstrating how higher damage outputs early in combat significantly increase the chances of victory.



Win rate by damage buckets chart visualization.

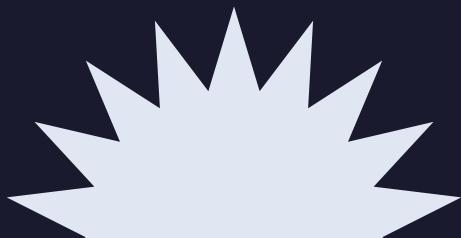
Impact of the Rogue Assassinate Feature

Rogue's opening burst: increase total damage and win rate



Assassinate Win Rate

Triggered wins significantly increase overall success rates



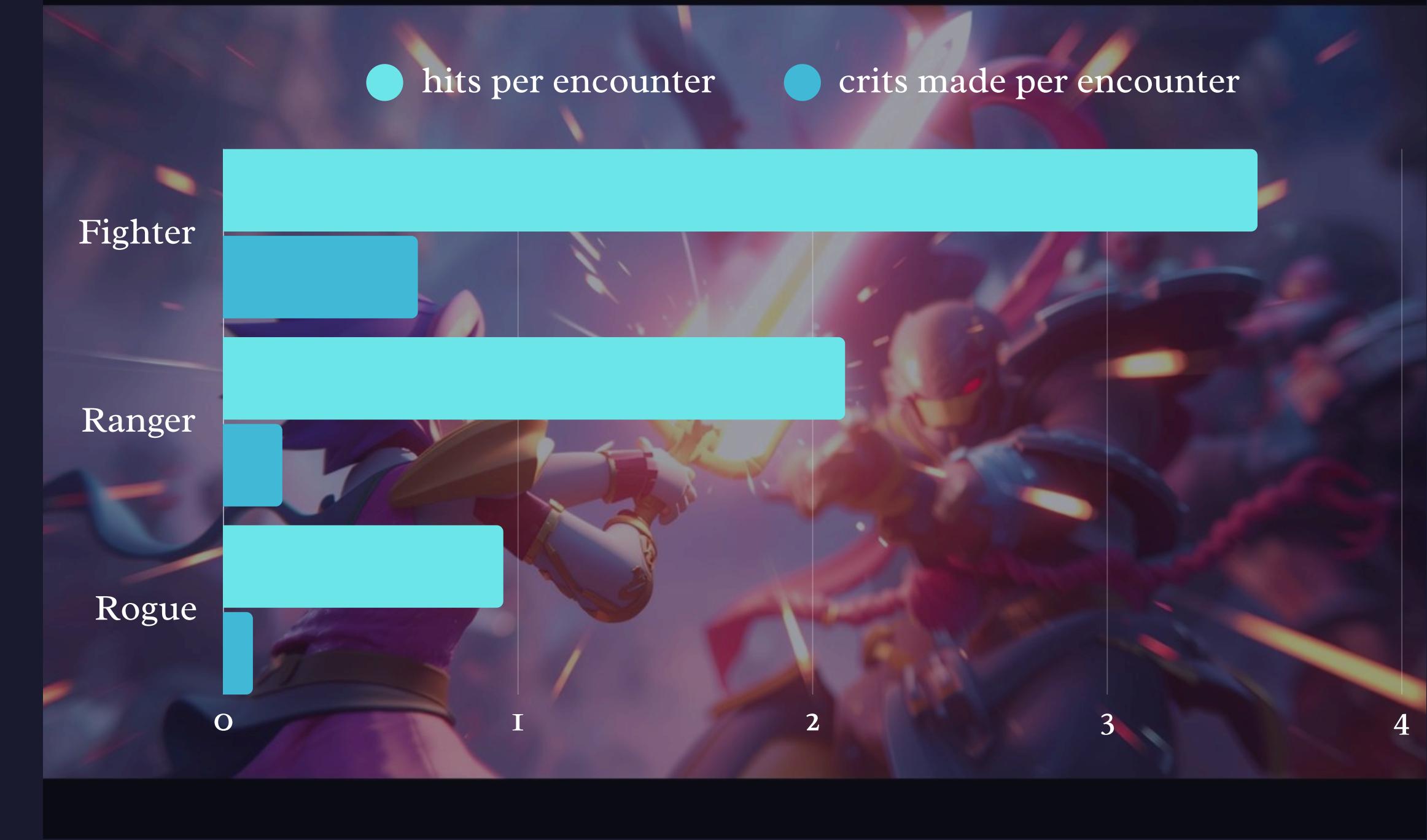
Average Damage per Participant

The chart illustrates that the **Fighter** significantly outperforms other classes in damage dealt, while the **Rogue** shows a stark contrast with minimal contributions during combat engagements.



Comparison of average damage dealt by participants

Critical Hit and Attack Frequency Analysis



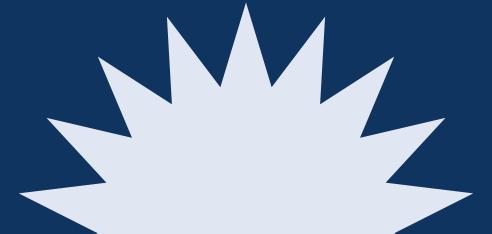
Critical Hits

Higher attack volume leads to increased crit count as crit chance per attack are expected.

Key Findings

Initiative advantage exists alongside early burst damage and survivability trade-offs

The analysis reveals that **acting earlier in combat** provides a measurable advantage, significantly influencing the outcome of encounters. Early burst damage is critical for success, while character survivability shapes the effectiveness of initiative. These findings enhance our understanding of combat dynamics in D&D 5E.



Limitations of the Study



Scenario Specificity

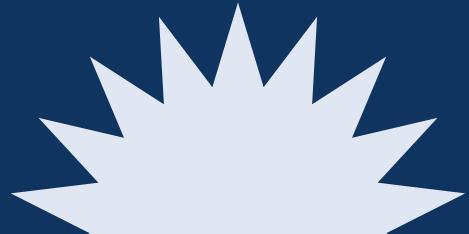
Results are constrained by fixed conditions and rules.

Threats to Validity in Research



Trade-off, or Potential Model Bias?

Rogue's low survival rate leads to low overall damage, creating snowball effect on the importance of early damage.

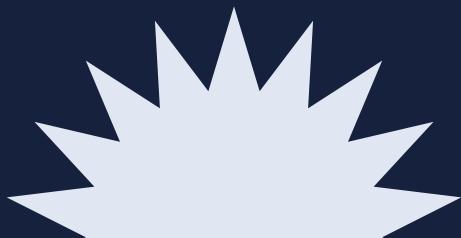


Future Research Directions in D&D Combat

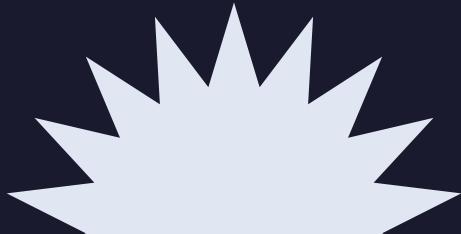


Tactical Enhancements

Incorporating movement and spells can greatly enhance gameplay.



Future Work — Analytical Extensions

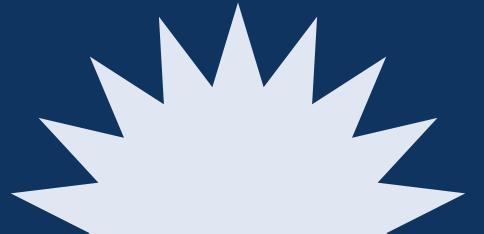


Sensitivity Analysis
Exploring the impact of variable targeting rules.

Conclusion

The impact of initiative on combat outcomes is significant and measurable

The analysis demonstrates that acting earlier in D&D 5E not only provides a **quantifiable advantage** but also interacts with damage and survivability factors. This rigorous simulation method offers insights that can shape future game balance and strategy, ultimately enhancing the player experience in turn-based combat scenarios.



Thank you for your
attention!

GITHUB

github.com/claraPochama/

EMAIL

clara900721@gmail.com