

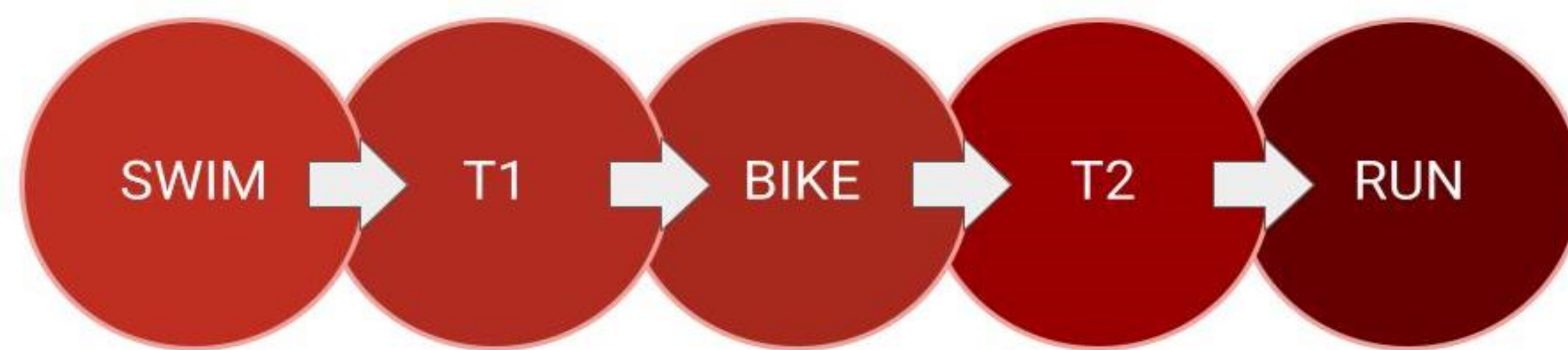
# Modeling the Relationship Between Collegiate Triathletes Split Times and Race Performance

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## INTRODUCTION

- Triathlon is a multidisciplinary endurance sport that demands proficiency in swimming, cycling, and running, along with efficient transitions between these disciplines.
- Extensive research has examined the physiological determinants of endurance performance—such as maximal oxygen uptake (VO2 Max), lactate threshold, and exercise economy [1].
- Existing predictive models often derive from data collected under laboratory conditions, which could lack validity due to dynamic race environments [2].

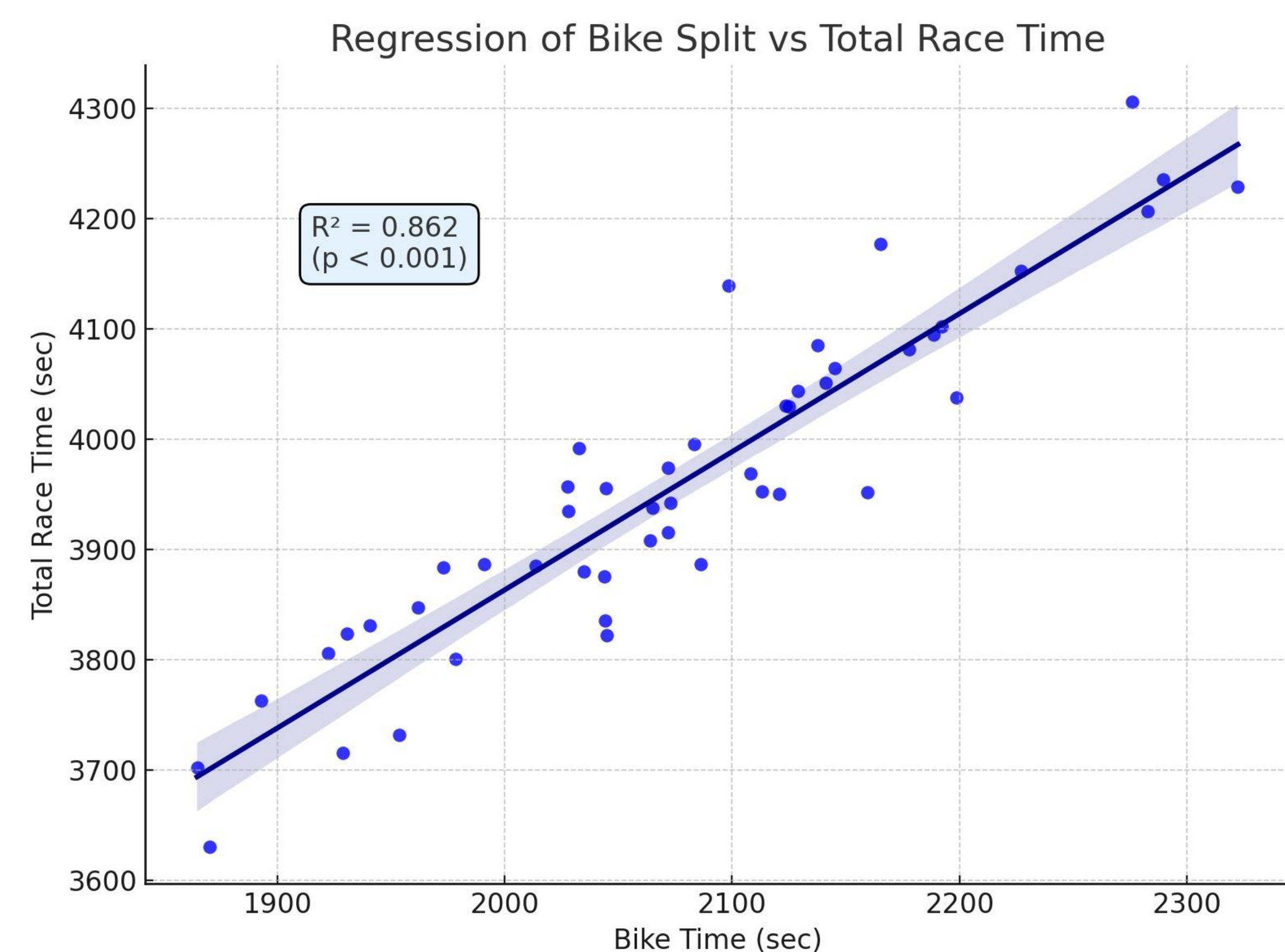
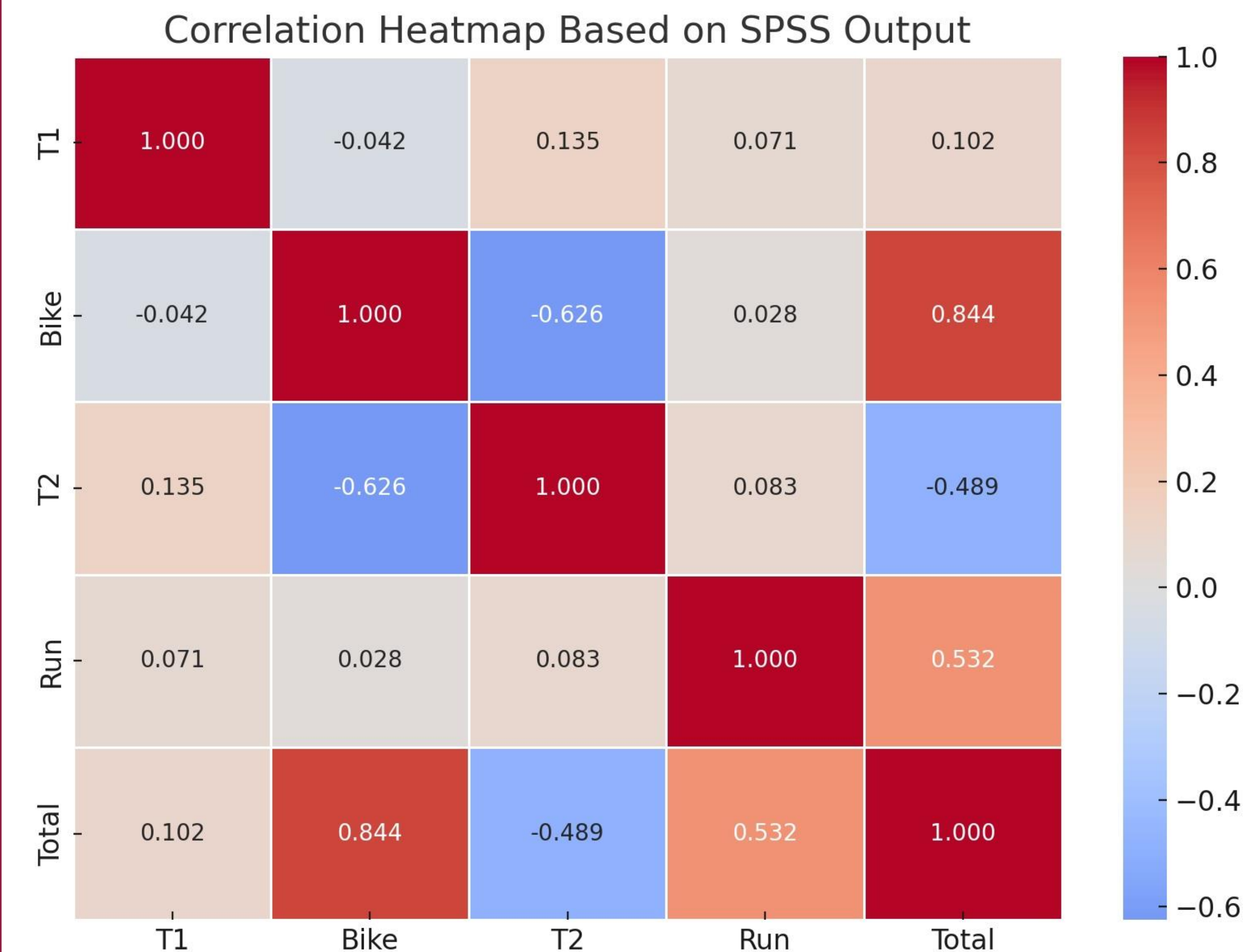
### Race Order of Sprint Triathlon



## METHODS

- This study focused on race-day performance analysis of the ASU Women's Triathlon Team during 3 consecutive competition seasons (2022-2024).
- Data was collected from 9 different athletes over 9 different races.
- Split times (swim, T1, bike, T2, and run) and total race times were extracted from official publicly available race results.
- Physiological data, like heart rate and power output, were sourced from TrainingPeaks, a performance monitoring software utilized by the ASU team.
- Athletes wore GPS watches and had bike-mounted power meters to obtain these metrics.

## RESULTS



### Interactive Predictor Produced from Code

Bike (min)  34.75

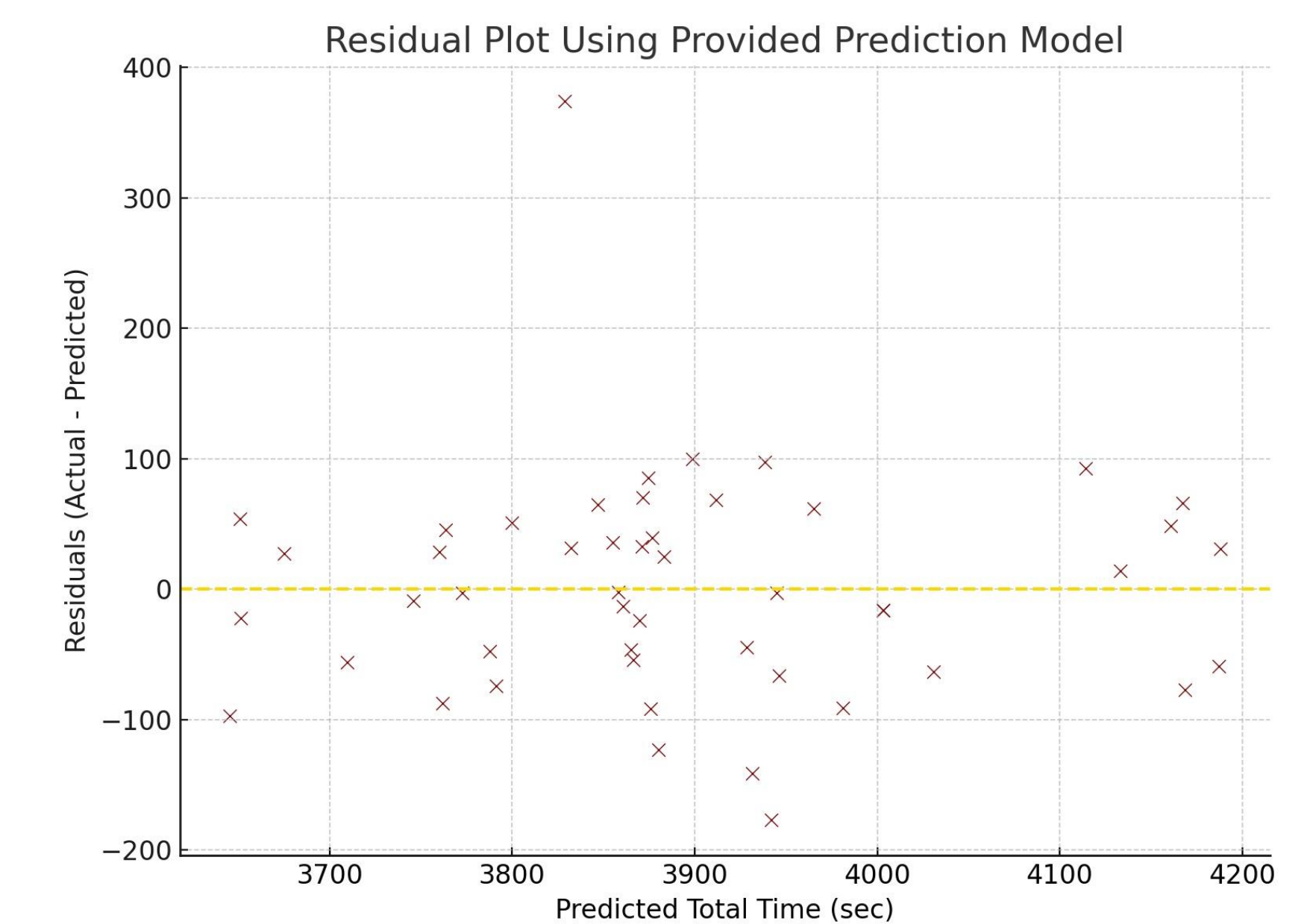
T1 (sec)  68

T2 (sec)  28

Target (min)

⚙️ Predicted Total Time: 63:50 (min:sec)  
⚠️ You are 65 seconds over your goal.

## RESULTS



## SUMMARY, CONCLUSIONS AND FUTURE DIRECTIONS

- This research demonstrates that race-day performance metrics, especially bike and transition times, can effectively predict triathlon outcomes and inform strategic planning.
- The interactive tool is broadly applicable across different levels of triathlon performance because the model is based on fundamental components.
- Future iterations of the model could integrate more detailed physiological metrics and could expand the dataset to include male athletes.

## REFERENCES

- [1] Joyner MJ, Coyle EF. Endurance exercise performance: the physiology of champions. *J Physiol.* 2008;586(1):35–44.
- [2] Peeling P, Binnie MJ, Goods PSR, Sim M, Burkett B. Evidence-based supplements for the enhancement of athletic performance. *Int J Sport Nutr Exerc Metab.* 2018;28(2):178–87.
- [3] Sousa CV, Aguiar SS, Santos PA, Barbosa LP, Sales MM, Campbell CS, et al. Predicting sprint triathlon performance with split and transition times: a machine learning approach. *Front Physiol.* 2021;12:654552.

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