

Case 4: Impact of Dietary Supplements on Marathon Performance

This study examines the effects of three different dietary supplement regimens (BCAAs, Carb-loading, and Electrolyte-focused) on marathon completion times (in seconds) for recreational runners. The study tracked 90 runners with similar experience levels during a series of marathons over a 6-month period, and Table 5.4 shows the first two and the last two observations. Do these three dietary supplement regimens differ significantly and which one improves marathon performance the most?

TABLE 5.4: Supplement Data Table ([download data](#)).

Supplement	Completion Time (seconds)
Carb-loading	14091
Carb-loading	15860
...	...
Electrolyte	15013
Electrolyte	14667

Initial Questions

1. What are the research objectives?
2. What are the statistical questions?
3. What is the response variable, and what is the data type of the response variable?
4. What are the explanatory variables of interest?
5. Are there covariates?
6. What is the population of interest?
7. What is the subject, and what is the number of distinct subjects?
8. Are there subject-level data?
9. Are response variables dependent (repeated measures / clustered subjects)?
10. Are the subjects selected randomly?
11. Are the subjects randomly assigned to different groups?

Initial Thoughts