

# The Competitive Season as an Experiment: Benefits, Limitations and Future Directions

*Editorial*

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## The Season as an Experiment

In a high-performance environment, the season can be framed as an experimental research design that includes multiple groups and time points, rigorous methods, and valid and reliable tools. However, a high-performance environment is complex and susceptible to change throughout a season resulting in timelines that are not tightly controlled unlike laboratory research. Nevertheless, the data resulting from a season is applicable to performance coaches and sports medicine professionals alike. From an analysis standpoint, a mixed research design is automatically built into team sports and other competitive events. A competitive season (e.g., football, basketball, soccer, etc.) or competition event (e.g., mixed martial arts, boxing, powerlifting, etc.) consists of strategically scheduled practice sessions that lead up to competitive games or an event. In team sports, the different positions are the between-subject variables or grouping variables and the practice and game sessions are the within-subject variables because every group (position) is exposed to the practice or game. Additionally, a combination of quantitative and qualitative measures are recorded daily or perhaps even weekly. While there is a lot of debate in the validity and scientific process of reporting “real-world” sports science data, it is a goal of the Journal of Exercise and Nutrition (JEN) to encourage authors to analyze and report the competitive season or event as a means of enhancing the scientific literature.

It is imperative to strategically measure various internal (physiological and psychological) and external (work applied to the athlete) training responses throughout the season and if the altered responses influence performance. The main objective of sports science is to identify factors that influence various internal and external workloads. The ultimate goal of practitioners is to decipher if these workloads influences in-game performance. While performance is most often referred to as an athlete’s physical and cognitive measures, performance to a practitioner and coaches implies winning and losing, as many jobs ultimately rely on this bottom line outcome.

## Benefits

There is great value in quality analytical and statistical assessments of workloads and performance throughout a competitive season. Elite athletes are psychologically different than most recreationally fit individuals, yet research in this population is relatively limited. Additionally, elite athletes engage in rigorous, day-to-day workloads throughout a competitive season or training camp that impact their performance, physiology, and psychology. For practitioners and researchers, it is of the utmost importance to better understand an elite athlete’s workload and its potential effect on his or her physical and psychological performance in sports. These workload variables cannot be replicated or manipulated in any type of controlled research setting as they are considered “real-world” data. Therefore, reporting of the elite athlete population, and any type of physiological and performance changes due to a competitive season is critical toward advancing knowledge in the sports science field, regardless of true reproducibility and limited sample sizes.

## Methodological Limitations within the Season

As with any type of research design, there are limitations when measuring and reporting sports science data throughout the season. The challenge is to attempt to control the uncontrollable environment on a daily, weekly, and monthly basis. Regardless of the challenges, it is critical to have standardized tests before, during, and after the season. Any uncontrollable factors should be reported and documented as well within any methods sections. Although, much of the “real-world” sports data cannot be reproduced due to uncountable daily factors (e.g., stress, academics, travel schedules, nutrition, etc.), the data can be used to advance knowledge in the field of sports science.

As previously mentioned, it is of the utmost importance to be consistent when reporting what can be controlled and what cannot be controlled. In addition to daily workloads, non-daily measurements (e.g., muscle ultrasound, heart rate variability, countermovement jump, etc.) should be consistently measured based on a certain number of days prior to competition. For example, consistent measurements taken one to three days before or after competition can allow for a methodologically sound analysis. However, head coaches can change practice times and alter training sessions almost instantaneously and adjustments may be required. These spontaneous adjustments can sometimes lead to the inability to record daily and predetermined non-daily measurements for that day or week. In theory, these missing data points can complicate the research analysis and conclusion, however, it is a realistic challenge researchers can face when collecting sports data in high performance environments. It is recommended to accurately describe any missed measurements and data recording challenges within a methods section and continue reporting and analyzing the data. These types of methodological complications in high performance environments can also be included in a limitations section, but should not be grounds for rejection of a manuscript.

### **Future Directions**

The JEN welcomes manuscripts that includes complex and rigorous “real world” methods. The idea is to advance research and literature in the elite athlete populations. Although, sometimes imperfect, detailed methodologies from high-performance environments need to be reported since the season can be framed as an experimental design. To advance the field of sports science, detailing methods and reporting the data is invaluable.

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