

Appendix 7 – Conference Presentations

Conference: BASES 2021 Conference

Location: Virtual Conference Year: 2021 Format: Poster

International Survey of Training Load Monitoring Practices in Competitive Swimming: How, What and Why Not?

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Training load (TL) monitoring is a key element of competitive sporting environments and involves the product of an intensity measure and volume/duration measure. Previous research into training load monitoring and competitive swimming highlights a reliance on external measures (volume/duration) and may include internal measures (heart rate and lactate). This study aimed to identify the training load monitoring practices being used in real-world competitive swimming environments, while also exploring how data collection and analysis is implemented and what metrics are considered effective. The barriers to training load monitoring were also examined. Ethical approval was granted by the University's Ethics Committee and participants gave informed consent to their information being used for research and publication purposes. Thirty-one responders working in competitive swimming programmes participated in an online survey. A total of 84% of responders acknowledged using training load monitoring, with 81% of responders using a combination of both internal and external measures, in line with current consensus statements. Swim volume (96%) and rate of perceived exertion (RPE) (92%) were the most frequently used measures used in training load monitoring, with athlete lifestyle/wellness monitoring also being a prominent feature. Three key themes associated with barriers to training load monitoring were generated through thematic analysis. Stakeholder engagement, resource constraints or functionality and usability of the systems available were shared barriers amongst responders. Findings show there is a research-practice gap. Future approaches to training load monitoring in competitive swimming should focus on selecting methods that are valid and reliable in the swimming environment but also allow the same method and measures of training load monitoring to be used across the whole programme, (pool-based training, dryland training and competition). The implementation of a training load monitoring system should focus on overcoming the barriers associated with athlete adherence and coach /National Governing Body buy-in prior to its implementation.

International Survey of Training Load Monitoring Practices in Competitive Swimming: How, What and Why Not?

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Introduction

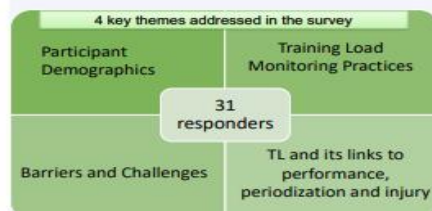
Swim competitions are scheduled over several days and typically incorporate heats, semi-finals, and finals. However, despite the majority of events last no longer than two minutes and twenty seconds, high volume training practices remain [1]. Careful planning and periodization are at the forefront of achieving success at elite performance levels [2].

Training load (TL) monitoring is widely used in most sporting environments and has many different applications relating to injury and illness risk reduction, informing training prescription and optimising tapering strategies [3]. Modern developments in technology and analysis enable practitioners to quantify TL in greater detail than ever before [4]. However, these methods come with their own barriers and challenges, including maintaining a standard of reliability and validity, time demands and drawing meaningful inferences from the data [5].

Objectives

- ✓ **Identify:** the TL monitoring practices being used in competitive swimming environments.
- ✓ **Explore:** how data collection and analysis are being employed.
- ✓ **Investigate:** what measures are considered effective.
- ✓ **Examine:** the barriers and facilitators to TL monitoring in a competitive swimming environment.

Methods



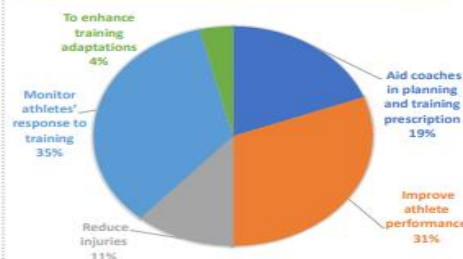
Cross-sectional survey, circulated to swimming NGBs from Ireland, Great Britain, Spain, Australia and New Zealand, as well as a number of coaching associations.

Results

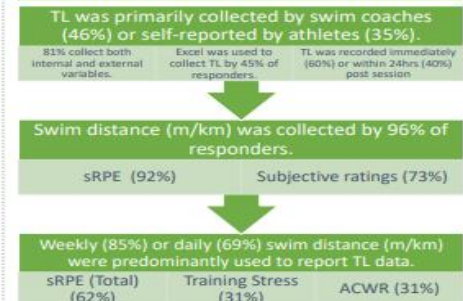
1) Is training load monitoring used in competitive swimming?



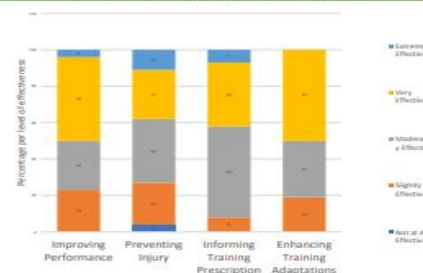
2) What is the No.1 goal of TL monitoring?



3) What methods are used in competitive swimming?



4) How effective is TL monitoring?



5) Barriers to TL Monitoring



Practical Applications

Those wishing to implement a TL monitoring system should consider that the:

- **NGB** needs to be invested in the TL requirements of the programme.
- **Coaches** need to create a culture of importance regarding the collection and utilisation of TL data.
- **Athlete** adherence to reporting the data can be improved through individualised feedback.

Findings showed that TL data is used to monitor the athlete's response to training and to improve performance. This would suggest that TL data needs to be athlete specific and reviewed with training and competition performance in mind.

The use of sRPE should be prioritised in competitive swimming dryland activities, competition and swim training loads can be quantified utilising the same method.

Conclusions

Much of the research into competitive swimming relies heavily on external training load and rarely features the use of RPE. However, the findings of this survey highlight that both internal and external training loads are frequently collected by practitioners. The frequent use of sRPE as a TL measure is a welcome finding and it does highlight that there is a gap between research and real-world application. Those wishing to design a TL monitoring system for competitive swimming should prioritise the use of sRPE. sRPE is beneficial in competitive swimming as it can transcend all aspects of a modern-day swim programme. Dryland activities, competition and swim training loads can be quantified utilising the same method, allowing for an accurate measure of total TL.

References

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Title: Epidemiology of Injury in Ireland's Performance Level Swimmers; The Race to the Tokyo Games.

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To examine the incidence of injury in Ireland's high-performance swimmers during the 2020-2021 season, in the build-up to the Tokyo Games. Injury surveillance was carried out in two National Centres across one season (N=14 swimmers, 15-28yrs) from September 2020 to September 2021. Competition and training injury data were recorded using an online system by trained injury recorders. Training load was also recorded using the session rate of perceived exertion (sRPE) method. Athlete seasons lasted an average of 314.9 ± 33 days (Max = 367, Min = 231). Season training load for all aspects of the programme averaged $17,1762.9 \pm 34,007.5$ AU, with 85% of that load coming from swimming. A total of 29 injuries were logged with 28% of injuries being time loss, with a mean severity of 3.3 days lost. Time loss injuries lasted a duration of 14.8 ± 18.8 days, with non-time loss injuries lasting an average of 9 days longer at 23.7 ± 22.9 days. Three injuries were left unresolved at the end of the season, indicating an injury with intra-season management. Acute (sudden onset) injuries accounted for 45% of all incidence, with the remaining 55% being repetitive sudden or gradual onset. A high proportion of injuries were non-contact (83%) and occurred during swim training (48%), dryland training (28%), non-training related activities (21%) or training preparation (3%). An index injury occurred in 45% of the cases, with a recurrent injury (21%), subsequent new injury (10%) or local injury (7%) making up the remaining injury classifications. The most common injury was to the shoulder (21%), closely followed by the ankle (17%), lumbar spine (17%) and knee (14%). Our findings are consistent with previous literature showing that the shoulder is typically the most commonly injured body site, particularly during swim training. Overuse injuries are typically associated with swimming; however, our results show a more balanced incidence of acute and repetitive injuries. The smaller proportion of time-loss injuries showing a mild severity rating is also consistent with existing literature. The presence of three unresolved injuries highlights the need for multi-season injury surveillance otherwise the real impact of chronic injuries will be underestimated on a season by season basis.



Epidemiology of Injury in Ireland's Performance Level Swimmers: The Race to the Tokyo Games

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ABSTRACT

PURPOSE: To examine the incidence of injury in Ireland's high-performance swimmers during the 2020-2021 season, in the build-up to the Tokyo Games.

METHODS: Injury surveillance was carried out in two National Centres across one season (N=14,15–28yrs) from September '20 to September '21. Competition and training injury data were recorded using an online system by trained injury recorders. Training load (TL) was also recorded using the session rate of perceived exertion (sRPE) method.

total of 29 injuries were logged with 28% of injuries being time loss, with a mean severity of 2.3 days lost. Time loss injuries lasted a duration of 14.8 ± 18.8 days, with non-time loss injuries lasting an average of 9 days (range from 23.7 ± 22.9 days). Three injuries were left unswatched at the end of the season. Acute (sudden onset) injuries accounted for 45% of all incidence, with the remaining 55% being repetitive sudden or gradual onset. A high proportion of injuries were non-contact (82%) and occurred during swim training (48%), dryland (28%), non-training related activities (22%) or training preparation (2%). An index injury occurred in 40% of the cases, with a recurrent injury (21%), subsequent new injury (20%), and a new injury (11%). The most common injury was a shoulder injury (22%), closely followed by the ankle (12%), lumbar/neck (17%) and knee (16%).

CONCLUSION: Our findings are consistent with previous literature showing that the shoulder is typically the most injured body site, particularly during swim training. Overuse injuries are typically associated with swimming; however, our results show a balanced incidence of acute and repetitive injuries. The smaller proportion of time-loss injuries showing a mild severity rating is also consistent with existing literature. Three unresolved injuries highlights the need for multi-season injury surveillance, otherwise the real impact of chronic injuries will be underestimated on a season-by-season basis.

INTRODUCTION

Injury prevention is a multimodal process which requires a robust framework to act upon ⁽¹⁾. The Translating Research into Injury Prevention Practice (TRIIPP) framework outlines that the underpinning process of injury prevention is high-quality injury surveillance data ⁽²⁾. A competitive swimming season is a year-round process with high training stress placed on the athlete. These significant demands lead to a higher incidence of injury during training than in competition ⁽³⁾. Also, these demands result in the athlete training and competing with persistent health problems ⁽⁴⁾. Performance decrements stemming from injury can have a significant influence on a competitive swimmer's career ⁽⁵⁾, often leading to retirement from the sport ⁽⁶⁾.

OBJECTIVES

- ✓ **Investigate:** the incidence of injury
- ✓ **Identify:** the training load demands
- ✓ **Explore:** the nature of injuries experienced
- ✓ **Examine:** the key findings of injury surveillance

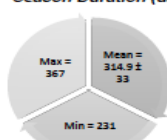
METHODS

Two Swim Ireland National Training Centres
(N=14 swimmers, 15-28yrs)

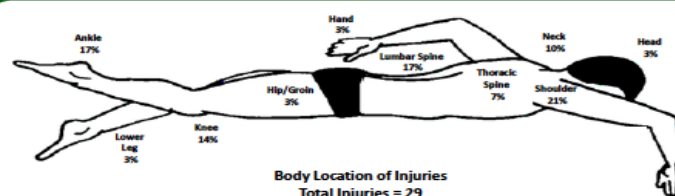
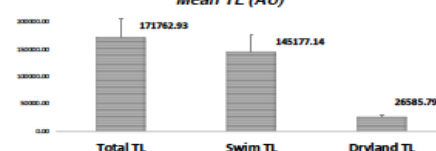
Injury Surveillance

Training Load Monitoring

Season Duration (days)



Mean TL (AU)



Mechanism of Injury

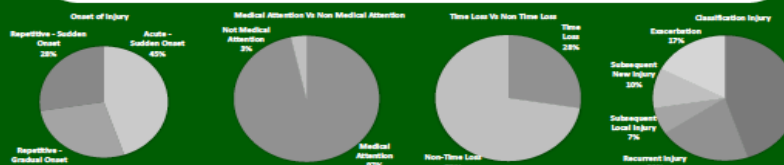


Orchard Classification of Injury (Frequency)

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CONCLUSION

- Results are consistent with previous literature
- Shoulder is the most common injury site
- Most injuries occur during swim training
- Equal incidence of acute and repetitive injuries
- Unresolved injuries (3) at the end of the season show the need for multi-season injury surveillance
- 85% of TL comes from swimming with the remaining 15% allocated to dryland activities

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Training load and injury/illness surveillance in competitive swimmers; a case study example.

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Training load (TL) monitoring and injury/illness surveillance are crucial aspects of a competitive swimming environment. The goal of this study is to outline the design and implementation of an integrated training load and injury/illness surveillance system designed specifically for competitive swimming using a case study approach. training load monitoring and injury surveillance were carried out in Swim Irelands National Centres across two seasons. The participant, an elite male breaststroker (age = 18yrs, body mass = 84.5kg) was prospectively observed over a period of 19 months. Daily monitoring consisted of training duration (minutes), intensity (sRPE), swim volume (km) and load (sRPE-TL), as well as self-reported measures of soreness. Medical attention injury/illness surveillance were also monitored. Preliminary data analysis shows the athlete attended 855 training units (swim/S&C) out of a possible 885 giving an attendance of 96%. Of the 30 training units missed, 1 was related to an injury while, 21 were related to illness. All instances of illness occurred during the second season, including one incidence of non-symptomatic COVID19. Weekly training volume ranged from a high of 55km to a low of 11.1km (Mean \pm stdev:38.5 \pm 9.5km). training load ranged from 6895AU to 1340AU (Mean \pm stdev:4232 \pm 1137.2AU). The highest percentage of S&C training load in any given week (58%) occurred during the pre-season phase, with an average of 10% occurring during the long course season. This system is designed in conjunction with consensus guidelines, allowing for the data to be suitable for use in both the practical and research environment. The findings highlight areas where planned training prescription deviates from what actually occurred. It also allows for the visual representation of training load distribution and the interaction between all metrics monitored by the system. This system allows for effective training load prescription and facilitates the review process, ultimately improving the health and welfare of competitive swimmers.

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