

## Appendix A: Terminology and definitions

Term	Definition
Injury	Any physical complaint that results from competition or training, regardless of its consequence on sports participation or performance (adapted from Fuller et al., 2006[1]).
Illness	A new or recurring symptomatic sickness or disease, or the presence of sub-clinical immunological precursors of symptomatic illness, that was incurred during competition or training, and either receiving medical attention or was self-reported by athletes, regardless of the consequences with respect to absence from competition or training (adapted from Engebretsen et al., 2013[2]).
Load	The sport and non-sport burden (single or multiple physiological, psychological or mechanical stressors) as a stimulus that is applied to a human biological system (including subcellular elements, a single cell, tissues, one or multiple organ systems, or the individual).
External load	Any external stimulus applied to the athlete that is measured independently of their internal characteristics.[3]
Internal load	Load measurable by assessing internal response factors within the biological system, which may be physiological, psychological, or other.[3]
Competition load	The cumulative amount of stress placed on an individual from a single or multiple competitions over a period of time, including stress imposed directly by exertion in a single sport or competition and indirectly by factors such as the frequency or saturation of events, the duration of the season or the number of days of the competition, and travel associated with competition.
Training load	The cumulative amount of stress placed on an individual from a single or multiple training sessions (structured or unstructured) over a period of time.
Non-sports load	The cumulative amount of stress placed on an individual from non-sport activities, including any physiological and psychological stimuli / stressors outside of sport.
Absolute load	Load applied to the biological system from training, competition and non-sport activities, irrespective of rate of load application, history of loading or fitness level.
Relative load	Load applied to the biological system from training, competition and non-sport

activities, taking into account the rate of load application, history of loading or fitness level.

Acute load	Absolute load that is applied over a shorter period of time (e.g. days). It is recognised that this period may vary, but for the purposes of this consensus a standard of 1 week or less to define acute load has been adopted, as this is the most commonly used practical measure of acute load as defined in the literature.[4]
Chronic load	Absolute load that is applied over a longer period of time (e.g. weeks or months). It is recognised that this period may vary, but for the purposes of this consensus a standard of 4 weeks or longer to define chronic load has been adopted, as this is the most commonly used practical measure of chronic load as defined in the literature.[4]
Acute:chronic load ratio	A ratio comparing the load that the athlete has performed at, or been exposed to, relative to the load that he or she has been prepared for (reflecting “athlete readiness”).[5] This parameter may be used to assess relative risk of injury; i.e., if an athlete is at a relatively fit (low-risk) or fatigued (high-risk) state. For example, if the acute (e.g., weekly) training load is low (i.e., the athlete is experiencing minimal ‘fatigue’) and the rolling average chronic training load (e.g., over 4 weeks) is high (i.e., the athlete has developed ‘fitness’), then the acute:chronic load ratio will be around 1 or less, indicating that the athlete is in a well-prepared state. If the acute load is high (i.e., training loads have been rapidly increased from one week to another) and the rolling average chronic training load (e.g., over 4 weeks) is low, then the ratio of the acute:chronic load will exceed 1 and the athlete is likely to experience increased fatigue.[5]
Load management	The appropriate prescription, monitoring, and adjustment of external and internal loads.
Load mismanagement	Inappropriate prescription, monitoring, or adjustment of external and internal loads, leading to maladaptation in the athlete.
Excessive loading	Single or repeated load cycles (incl. physiological, psychological, travel load and other) with inadequate recovery or rest that manifests as maladaptation, injury, or illness.
Repetitive load	Repeated, sequential application of a load to a biological system, characterised by a lack of variation in type, intensity, duration, or frequency. The load may or may not allow for adequate recovery between single load applications.

Adaptation	A positive change in the biological system in response to external loading and adequate subsequent recovery.
Maladaptation	A negative change in the biological system in response to external loading and/or inadequate recovery.
Recovery	The full return of the biological system to homeostasis without maladaptation.
Fatigue	Tiredness resulting from mental or physical exertion or illness, in sport often manifested as failure to maintain the required or expected force (or power output) (adapted from the Oxford Dictionary[6] and Edwards, 1983[7]).
Functional overreaching (overreaching)	A deliberate accumulation of load during a training cycle aimed at enhancing performance. The accumulated training load can result in a short-term decrement in performance capacity; however, when appropriate periods of recovery are provided, physiological responses will compensate the training-related stress and lead to enhanced performance compared to baseline levels, often labelled ‘super-compensation’ (adapted from Meeusen et al., 2013[8]).
Non-functional overreaching	Intentional increased loading or training that results in physiological or physical maladaptation. It is a state of extreme overreaching, which will lead to a stagnation or decrease in performance that will not resume for several weeks or months. Eventually, after sufficient rest, the athlete will be able to fully recover.[8]
Overtraining syndrome	Prolonged maladaptation of the athlete, with negative changes in markers of performance and several biological, neurochemical and hormonal regulation mechanisms, occurring in some athlete after periods of excessive loading and non-functional overreaching; however, with a multifactorial aetiology (adapted from Meeusen et al., 2013[8]).
Load monotony	The repetition of the same load over an extended time period (usually days to weeks), measureable as <i>the mean acute load / standard deviation of the acute load</i> . [9]
Load strain	A measure of the intensity of load monotony and is defined as <i>the weekly load multiplied by load monotony</i> . [9]
Capacity	The actual or potential ability of an athlete to accept load. This is affected by various factors including fitness status before load, loading rate, psychological factors and various other internal and external factors. [10]
Reserve capacity	The measure of available capacity over and above the capacity needed to meet routine or current load demands. [11]

Readiness	The relative preparedness of an athlete to accept a load.
Training	The physical and mental preparation athletes undergo in an effort to optimise performance.
Training volume	The product of duration and frequency of training.
Training intensity	The level of effort an individual exerts during exercise relative to his or her maximum effort, measurable using objective (e.g., heart rate/oxygen consumption) or subjective tools (e.g., rating of perceived exertion).
Periodisation	A framework for planned and systematic variation of training parameters with the goal of optimising training adaptations specific to a particular sport, often targeting a specific timeframe or date.[12]
Calendar saturation	A measure of the concentration of competitive events (individual or team) over a defined period of time (usually week or months).
Calendar congestion	An overly saturated calendar schedule with reduced time periods between events allowing less time for recovery.
Psychological load	The cumulative amount of stress placed on an individual from psychological stimuli / stressors.
Travel load	The cumulative amount of stress placed on an individual related to total travel time, distance, frequency, and across time zones.

*Unreferenced definitions were developed by the consensus group*

### Reference List

- 1 Fuller CW, Ekstrand J, Junge A, et al. Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. *Br J Sports Med* 2006;40:193-201.
- 2 Engebretsen L, Soligard T, Steffen K, et al. Sports injuries and illnesses during the London Summer Olympic Games 2012. *Br J Sports Med* 2013;47:407-14.
- 3 Halson SL. Monitoring training load to understand fatigue in athletes. *Sports Med* 2014;44 Suppl 2:S139-S147.

- 4 Hulin BT, Gabbett TJ, Blanch P, et al. Spikes in acute workload are associated with increased injury risk in elite cricket fast bowlers. *Br J Sports Med* 2014;48:708-12.
- 5 Gabbett TJ. The training-injury prevention paradox: should athletes be training smarter and harder? *Br J Sports Med* 2016;50:273-80.
- 6 Oxford Dictionaries. "Fatigue". Oxford University Press. Date accessed: 9.6.2016. Available from: <http://www.oxforddictionaries.com/definition/english/fatigue>.
- 7 Edwards RHT. Biochemical basis of fatigue in exercise performance: catastrophe theory in muscular fatigue. In: Knuttgen HG, Vogel JA, Poortmans JR, eds. *Biochemistry of exercise*. Champaign, IL: Human Kinetics 1983.
- 8 Meeusen R, Duclos M, Foster C, et al. Prevention, diagnosis, and treatment of the overtraining syndrome: joint consensus statement of the European College of Sport Science and the American College of Sports Medicine. *Med Sci Sports Exerc* 2013;45:186-205.
- 9 Foster C. Monitoring training in athletes with reference to overtraining syndrome. *Med Sci Sports Exerc* 1998;30:1164-68.
- 10 Goldstein RE. Exercise capacity. In: Walker HK, Hall WD, Hurst JW, eds. *Clinical methods: the history, physical, and laboratory examinations*. 3rd edition ed. Boston: Butterworths 1990.
- 11 Tate C, Franklin N. Reserve capacity. In: Rippe JM, editor. *Encyclopedia of lifestyle medicine & health*. Thousand Oaks, CA: Sage Publications 2012.
- 12 Gamble P. Periodization of training for team sports athletes. *Strength & Conditioning Journal* 2006;28:56-66.