Overtraining & Managing Workload

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Overview

- Part 1 – Overtraining
  Symptoms & Factors
- Part 2 – Youth Physiology and Development
  Growth Considerations & Long Term Athlete Development (LTAD)
- Part 3 – Monitoring Workload
  Tools & Techniques
- Part 4 – Case Study
  State Academy Program

Key Points

- Less is more
- Keep it fun
- Variety
- Train according to maturation
- Monitor Key Variables
- Recover
- Communicate

Benefits of Sport

'Sport and exercise with young people should be viewed as a vehicle that promotes leadership, fair play, positive lifestyle adherence and global wellness (Brian Grasso, PT on the Net)'

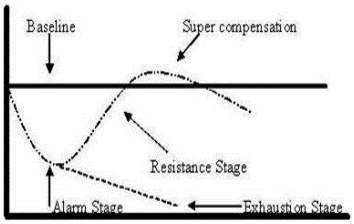
Part 1- Overtraining

Part 1- Overtraining

What is Overtraining?

- Training beyond the body's ability to recover
- Pushing too hard too fast means that the body fails to adapt positively to the training stress

Stress/ Recovery Imbalance



How prevalent is overtraining?

- More than 60 percent of elite distance runners at least once in their career
- 21 percent of the Australian swimming team after six months of training for a national competition

- More than 50 percent of players in a soccer team in a competitive season
- 28 percent of athletes competing in the 1996 Summer Olympics
- 10 percent of athletes in the 1998 Winter Olympics

Youth Overtraining

- Recently a study involving adolescent swimmers (13-18 year old) looked at the prevalence of overtraining across different countries (Japan, USA, Sweden and Greece) and found that 35% had been overtrained at least once (Raglin et al., 2000)
- 50 percent of youth athletes seeking medical care were diagnosed with an overuse injury

Team vs Individual Sport

Kentta and colleagues (2001) observed higher incidence rates for individual sports (48%) compared with team sports (30%) and less physically demanding sports (18%).

Overtraining Progression

- Overreaching
- Overtraining
- Staleness
- Burnout
- Injury/Withdrawal

What should we be looking for?

- Fry et al.'s (1991) review listed more than 90 different symptoms that are reported by overtrained athletes
- large inter individual variability found within athletes practicing the same sport (Verma et al., 1992)

Overtraining Symptoms

Physical	Psychological
Pain in muscles & Joints	Depression
Leg Heaviness	Insomnia
Headaches	Apathy
Sudden drop in performance	Lack of energy
Decreased immunity	Fatigue
Decrease in training capacity	Decreased Appetite
Increased incidence of Injuries	Loss of enthusiasm
Compulsive need to exercise	Moodiness & Irritability

Symptoms cntd.

Parasympathetic Symptoms	Sympathetic Symptoms
Low resting heart-rate	High resting heart-rate
Rapid post-exercise heart-rate recovery	Decreased post-exercise heart-rate recovery
Hypoglycaemia	Restlessness
Decreased blood lactate during exercise	Increased blood pressure
Staleness	Increased metabolic rate
Digestive upset	Increased respiratory rate
Depression	Loss of appetite
	Disturbed sleep

What drives people to overtrain?

How athletes react to initial signs of excessive stress or fatigue is determined by what they believe, what they have experienced, how they are being influenced by others, what situations might limit or motivate them, and how they are predisposed to socio-cultural factors.

Overtraining Risk Factors

- Physiological, Psychological, Emotional
- Past Experiences, Athlete Characteristics, Situational Pressures
- Poor communication – multiple coaches
- Poor Planning

Overtraining Factors

Overtraining often = emotional distress (reactive thinking)

Poor Decision Making

Conitinued OT behaviours

Consequences of OT

- Illness
- Injury
- Psychological Distress (anxiety, depression)
- Fatigue Syndromes (Chronic Fatigue)

Detecting Overtraining

Physical:

- Heart Rate Monitoring
- Muscle Soreness, Colds, Infections etc
- Reduced Work Capacity (testing)
- Body Weight
- Sleep
- Changes in RPE

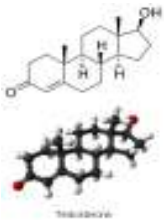
Detecting Overtraining

Psychological:

- Mood State – Changes
- Emotional Distress or reactivity
- Fears of failure
- Guilt about missed or reduced training
- Anxiety around communication with coaches or others about fatigue

Advanced Markers

- Testosterone/Cortisol Ratio
- Creatine Kinase (Muscle Damage)



- Physiological markers have generally not proven useful to monitor training and performance
- Self-awareness, i.e. making them more aware of physical or psychological stress, is better (Kentta and Hassmen, 1998; Kentta et al., 2001).

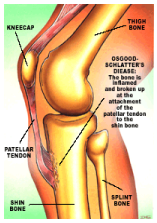
Overuse injuries

- An overuse injury is micro traumatic damage to a bone, muscle, or tendon that has been subjected to repetitive stress without sufficient time to heal or undergo the natural reparative process
- 50% of all injuries seen in pediatric sports medicine are related to overuse.

- The risks of overuse are more serious in the pediatric/ adolescent athlete. The growing bones of the young athlete cannot handle as much stress as the mature bones of adults.
- injuries tend to be more common during peak growth velocity

Common Injuries

- Osgood Schlatter's
- Sever's Disease
- Perthe's Disease
- Freiberg's Disease
- Osteochondritis Dissecans
- Scheuermans disease



Baseball's biggest "problem" -huge % of young pitchers with major-league arms never establish themselves as major-league pitchers because they suffer arm injuries that prevent them from reaching their potential (Rob Neyer, ESPN)

Factors Contributing

INTRINSIC	EXTRINSIC
Rapid Growth	Training too Progressive
Prior Injury	Inadequate Rest
Inadequate Fitness	Incorrect Skills
Postural Dysfunction	Adult Pressure
Motivation	
Menstrual Dysfunction	

Guidelines

- Limit each sport activity to 5 days per week
- Resting one day a week from all physical activity
- Increase training volume by no more than 10% each week
- Avoid training hard for the sake of it
- Re-assess and monitor

Common Sports

Long Distance Running

Age (years)	Distance (km)
Under 9	3
9-11	5
12-14	10
15-16	Half Marathon
17	30
18	Marathon

Common Sports

- Sprints
- Throwing Events
- Jumping Events
- Gymnastics

Common Situations

- Endurance events
- Weekend Tournaments
- Multi sport athlete

Children heat

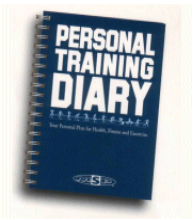
- Increase core temp much faster
- Sweat system not fully functional until after PHV
- Lower circulating blood volume
- More vulnerable to dehydration
- Less ability to dissipate heat

Tools

- Gather information on what has happened in the athletes past and then look at what is happening in the present to drive and maintain such behaviors
- Assessment is an ongoing process

Tools

- Training Diaries
- DALDA
- POMS



Treating Overtraining

- Rest for appropriate time
- Drink plenty of fluids, alter diet
- Cross training/ active recovery
- Sports massage
- Relaxation strategies
- Goal Setting
- Social Interaction

Summary

- Overtraining is very complex and beyond just the physical
- Overtraining may be avoided by putting together – and following – a sensible training program that takes into account age and physical ability
- Listen to your body's signals
- Prevent before damage is done

Part 2- Developmental Physiology

Children are not 'mini' adults

The Win at all Costs Mentality

A Functional Approach

- Chronological Age
- Physiological Age
- Structural Differences
- Psychological Development
- Emotional Development
- Individual Functional Efficiency

Common Questions

- How long?
- How much to increase?
- How hard?

Long Term Athlete Development

- Different training regimens are required for different ages
- Scientific research has concluded that it takes eight to twelve years of training for a talented athlete to reach elite levels (Bloom 1985; Ericsson et al. 1993; Ericsson and Charness 1994).

Long Term Athlete Development

- Long Term Athlete Development (LTAD) is about achieving optimal training, competition and recovery throughout an athlete's career, particularly in relation to the important growth and development years of young people.
- Poor training between 6-16 years of age cannot be fully corrected (athletes will never reach genetic potential);

Balyi's Theories

- Young athletes under-train, over-compete
- Adult competition & programmes superimposed on young athletes
- Male programmes superimposed on females
- Chronological age influences coaching rather than biological age

Giles' Theories

- At the senior level of elite performance the occurrence of injury or the failure of a skill under pressure can often be traced back to a mismanaged developmental stage.
- "Athletes in their mid to late-teens are presenting with increasing limitations in their Athletic, Functional and Training Development." (Movement Dynamics, 2005)

LTAD Models

Early Specialisation	Late Specialisation
Training to Train	Fundamentals
Training To Compete	Training to Train
Training to Win	Training to Compete
Retirement/Retaining	Training to Win
	Retirement/Retaining

Stage 1 – Fundamental Stage

- Structured and Fun
- Overall development of the athlete's physical capacities, fundamental movement skills and the ABCs of athleticism
- Participation in as many sports as possible is encouraged
- Correct running, jumping and throwing techniques are taught

Stage 1 – Fundamental Stage

Physical	Cognitive	Emotional
Large muscle groups developed	Short attention span	Developing concept of self
Heart size Increasing	Little reasoning ability	Centre of attention
Ligamentous structures are becoming stronger	Repetition is enjoyed	Influence of Peers
Movement patterns refined	Imagination is blossoming	
Basic coordination can be developed		

Stage 2 – Training to Train

Males 10 to 14 years old / Females 10 to 13 years old

- Learn how to train as well as the basics of a specific sport
- introduced to the basic technical/tactical skills and ancillary capacities
- the major focus of training is on learning the basics as opposed to competing

Stage 2 – Training to Train

Physical	Cognitive	Emotional
Change in Bone, muscle & Fat	Abstract thinking established	Influenced by Peers
Smaller muscle groups developed	Egocentric Thought	Tension with adults
Increase in red blood cells	Eager to perfect skills	Capable of cooperating & accepting responsibility
CNS more fully developed		

Stage 3 – Training to Compete

- The training to competition and competition-specific training ratio now changes to 50:50.

- During the Training to Compete stage, high intensity individual and sport-specific training is provided to athletes all year round

Stage 3 – Training to Compete

Physical	Cognitive	Emotional
Circulatory & Respiratory System reach maturity	Brain reaches adult size	Peer group influence a powerful force
Height and Weight slows	Critical thinking developed	Self Image balanced
Skeletal maturation continues		Opposite sex

Stage 4 – Training to Win

This is the final stage of athletic preparation. All of the athlete's physical, technical, tactical, mental and ancillary capacities are now fully established and the focus of the training has shifted to the optimisation of performance

Stage 5 – Retirement/Retraining

This stage refers to the activities performed after an athlete has retired from competition permanently

Bio-motor abilities

Speed

- Females: 6-8 & 11-13yrs old
- Males: 7-9 years & 13-16 yrs

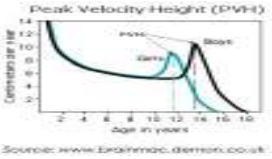
Speed endurance should be avoided

Aerobic Fitness

- Peak aerobic periods: 12-15 for females, 14-16 years for males

Peak Velocity Height

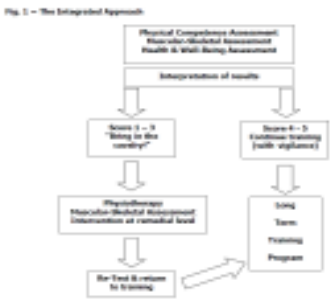
Due to differences in physical, cognitive and emotional development, research states that age is not a good indicator on which to base athletic development models for athletes between the ages of 10 to 16.



Source: www.brianmac.demon.co.uk

Giles, Movement Dynamics

- Training Age
- Biological Age
- Chronological Age



One size doesn't fit all

Kelvin Giles, 2006

Part 3- Managing Workload

Monitoring Workload

Why do we want to monitor workload?

- Prepare athletes for optimal performance at the right time
- previous research has shown links with training load and injury and illness

- Training loads (mainly the responsibility of coaches) are increasing, by some estimates, at a rate of 10 to 20 percent every five years.
- Mark Spitz vs 1995

Planning Training

- Training Load > Optimal Load = Injury and Illness
- Training Load < Optimal Load = Not prepared for competition

Planning Training

- At the beginning of a new season, athletes should be assessed
- Dynamic & Static Postural Assessment, Fitness Assessment
- Hard to do with youth athletes?

Periodisation

The division of the training year into smaller and more manageable intervals with the goal of managing and coordinating all aspects of training

- Macrocycle (long period)
- Mesocycle (monthly blocks)
- Microcycle (weekly blocks)

Fitness Principles

F – Frequency of training
I – Intensity of a training session
T – Type of training
T – Time of the session
E – Enjoyment

Principle of Recovery

- The body repairs and strengthens itself in the time between workouts
- The Greater the intensity, the greater need for recovery
- Performance = fitness - fatigue

- Match recovery efforts with the specific type of stressor
- Improve specific capacities, such as coping skills, to effect improvenet in stress tolerance
- Minimise psychological and social stressors

Methods of Monitoring Training

- RPE (Rate of Perceived Exertion)
- TRIMPS/ Heart Rate
- GPS
- Wellbeing Index

RPE

0	Rest	Rest
1	Very, very Easy	Really Easy
2	Easy	Easy
3	Moderate	Moderate
4	Somewhat Hard	Sort of Hard
5	Hard	hard
6		HARD
7	Very Hard	Very HARD
8		The Coach tried to kill us
9		I feel like death warmed up
10	Maximal	Oh S-----!

-Individual players rate a session from 1 -10

-Multiply RPE by Session length =Training Load

(eg. RPE of 6 * 60 mins = 360)

Calculating Training Load

Training load = Session RPE X time (mins)

Day	Training Session	Duration (min)	RPE	Load
Sunday	Cycle (100 km)	180	5	900
Monday	Weight training	120	7	840
Tuesday	Cycle 10 km	20	2	40
Wednesday	Inline roller intervals	90	6	540
Thursday	Plyometrics	75	7	525
Friday	Cycle (10 km)	20	2	40
Saturday	Weight training	120	7	840
Daily Mean Load				532
Daily standard deviation of load				367
Monotony (Daily mean/standard deviation)				1.44
Weekly load (daily mean load * 7)				3725
Strain (Weekly load * Monotony)				5397

Foster, 1998

Monotony & Strain

- Monotony considers the variation in training load
- Strain= Weekly Load * Monotony
- Provides insight to whether or not the athlete or team is overtraining

- Gabbett (2004) 69% of injuries occurred in first half season when loads highest
- Foster (1998) 84% of illnesses with experienced athletes –spike in load

RPE Advantages

- Session RPE enables the coach to accurately combine training loads from different modalities to give an accurate estimation of overall training load (Coutts, 2001)
- The major advantage is that it is simple and easy for coaches & athletes to understand & use

Heart Rate

- Must determine maximal heart rate
- Very individual
- Not reliable for some modes (eg. strength/power)
- Influenced by many factors (stimulants, heat etc)

GPS

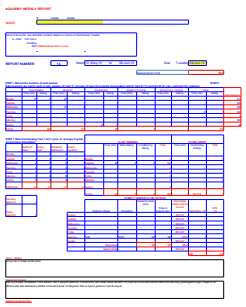
- Larsson (2003) indicated that GPS could enable a controlled monitoring of athletes & would allow for an easy comparison between sessions & athletes
- Indices that can be utilised with GPS are total distance, measures of high intensity, m/min, max speed, average speed

Part 4- Case Study

AFL Case Study

- 64 players selected in draft for first time last year & 38 made their AFL debut
- 15 of the 64 drafted players were limited (mostly due to injury) to 14 matches or less in AFL or State League System

AFL Vic Academy Diary



- Enhance Communication
- Training Loads
- Wellbeing Index
- Performance Review

Weekly Report

Name	Coaches Comment	Injury Comment	Weekly Exertion	Previous Week	Difference	Wellbeing Index	Previous Week Wellbeing Index	Difference	Self Rating	Game time	Accumulative Game time
John Doe	Flu	Had an awesome time in tasmania, got a lot out of the trip and a taste of whats expected at 18ns nationals, have been struggling to be able to find time for gym and core sessions lately will have to try and make some more time throughout this week.	3115	2900	7.41%	11.14285 71	11.4285 71	-2.50%	6	100	844
Matt Smith	Disappointed I didnt get a chance to play	Got gastro on Friday night in Tasmania as to why I didn't end up playing on Saturday.	1370	2800	-51.07%	13.28571 43	15.7142 86	-15.45%	#DIV/0!	0	724
Jack Black	Was really haapy with my game considering my preparation was interrupted.	Really good to get that week out of the way with 4 exams, and just had my Accounting exam which is the big one so happy that is now over. Didn't play very well on Saturday again and am looking forward to next weeks game. Not much else to report, but looking forward to catching up on some sleep over the next week or so.	1710	2010	-14.93%	10.57142 86	11.7142 86	-9.76%	5	80	986

Coach Obligation

- Provide a positive environment
- Educate
- Help create constructive attitudes
- Monitor
- Act (early intervention)

Industry Obligation

- Engage in Preventative Actions and Behaviours
- Improve education and awareness
- Enhance Communication

Thanks for listening