



PDHPE - Improving Performance

PDHPE OPTIONS – Improving Performance

1. Two training types; Flexibility and Strength Training

Flexibility Training (FT)

- ◇ Range of motion through which joints and body parts are able to move through
- ◇ Flex. Tr. Requires muscles stretch/lengthen safely. Total length of muscle stretched is proportional to no. of fibres stretched.

Benefits of FT training

- Injury prevention and rehab
- Improved skill execution (e.g. able to kick a ball further/higher away from body)
- Minimisation of post-exercise soreness / removal of waste / improved circulation
- Reducing musculoskeletal discomfort → postural improvement
- More flexible → more mobile. Enhanced movement, greater ease, knowledge of self.
- Works in conjunction with strength training.

Factors in flexibility; age, sex, temperature, exercise, specificity

Safety Guidelines;

- ◇ Ensure adequate warm-up before stretching
- ◇ Stretch into slight discomfort but not into pain
- ◇ Do not aim for excessive flexibility, do not overstretch → can mean joint instability
- ◇ Ballistic can be dangerous for inexperienced → bouncing can cause injury
- ◇ Ensure balanced adequately while stretching
- ◇ 3-4 times a week ideal

Overload principle used for FT → muscle must be stretched beyond normal length for improvement

- ◇ Static FT

Safe form, stretch held for approx. 10-30 sec. Gradual, no need for equipment. Used in warm-ups, cool-downs, rehab. Improves static flexibility. Static FT beneficial in almost all performance reqts. AFL → flex in hamstrings, calf, gluteals allow foot to go higher in kick therefore more powerful.

◇ Dynamic FT

Extensive muscular movements causing joints to go thru' full range of motion. Specific parts moved → e.g. shoulder in arm circling. Should be gradual, controlled, and increase slowly in speed/range. Should not have jerky movements. Dynamic advantages → raises body temp, prepares for forceful tr., safer than Ballistic. E.g. of benefit → ready body for tennis serve by arm circling so less chance of injury when performing movement.

◇ Ballistic FT

Repeated movements such as punching/bouncing → gain an extra stretch. Used in prep. For explosive movements. Forces body parts beyond normal ROM. Can activate *stretch reflex*, causing tears/injuries. Movements must be controlled, rhythmic. Ballistic FT to be used after warm up and another type of stretching done. E.g. static for hamstring then slowly move into ballistic. E.g. benefit → bouncing at angles with knee's bent in prep for squash game where bouncing will be done to reach ball)

(Stretch Reflex: An involuntary action which causes the muscle to contract. If being forcefully stretched, contraction will cause tears in muscle of varying degrees.)

- ◇ Training adaptations can be measured by examining improvements made in the flexibility of specific muscles. E.g. sit and reach test for hamstrings. Also can measure just by seeing visual improvement. E.g. closer to being able to do splits. Can monitor / measure as much as needed or wanted

◇ Sources:

2006 study → stretching does not impact strength gains. Flex. Increases when also doing resistance training.

2010 study → More flexible is more mobile, but no benefit to stretching after training for soreness. (Still benefits after for circulation, cool-down, removal of waste)

◇ Specific Training Program

Sprinter → will also undertake strength training for explosiveness.

Stretches done 3-4 times a week, as well as in warm-up and cool-down. Stretches to be held 10-30 sec. Muscles should be warm before stretching. Muscles in pairs → stretch both.

- Quadriceps. Standing, holding one leg bent at knee towards posterior
- Hamstring, sitting, touching toes, with knees slightly bent
- Triceps. One hand behind neck, pulling other at wrist downward.
- Knee hug. For hip, gluteals, Iliopsoas. Lying on back, knee to chest.
- Adductors; sitting, knees bent inwards, soles of feet together. Put resistance on knees.
- Calf; leaning against wall and one foot further away, push on foot.

In preparation for performance → dynamic to ready. Arm –circling, mimicking running, high knees.

Strength Training

- ◇ Exert force against resistance. See the notes already on this area.
- ◇ Specific Training Program:

Sprinter – Power is main objective for performance.

- Plyometrics; box jumps, squat jumps, push ups
- Weighted lunges, weighted squats → develop power in legs
- Heavy weights → 6-12 reps, 3-6 sets, high speed, short time between sets (1-3mins). Should be working with lactic acid in system to help tolerance.
- Exercises: squats, bench press, leg extensions, pec fly, sprinting with weights on back.

Planning Considerations for Improving Performance

2. Initial planning considerations

Individual needs, team goals, events, environment, skills, fitness. Tr. Programs to be thoroughly planned, → optimise performance. Short-term tr. Sessions to be linked to training plans + goals.

1. Performance / Fitness Needs

Effective programs → based off previous sessions, current performances. Both **individual** and **team** reqs, to be addressed.

2. Schedule of Events / Competitions

Planning req.s overview of all major E/C.Plans to ensure → peaking at intended time (weekly, for finals, certain events). Training volume, intensity, rest, intervals to be effectively managed.

3. Climate / Season

Need → acclimatise to heat, wind, rain, humidity, appropriate clothing and equipment.

Planning a Training Year – Periodisation

Periodisation: Structuring training into manageable phases. Purposes

- Train. Vol/intensity can be flex. When necessary
- Time periods programmed to allow adaptations
- Over/Under training should not occur.

Phases of Competition

1. Preseason / Preparation

- ◇ High volume training and moderate intensity
- ◇ Develop plan to;

Develop all areas fitness (e.g. strength, flex, aerobic endurance), biomechanics, technique. Strategy; gain advantage in comp. Mental training to consolidate physical performance.

- ◇ Use continuous, fartlek, interval circuit, resistance work.
- ◇ Aim for adequate physical condition, quality of skill ex, by end of this phase.

2. In-Season / Competition Phase

- ◇ Aims: maintain fitness, increase intensity, reduce volume, practise and improve tactics/strategies, perfect skill execution, continue mental skills.
- ◇ Best achieved → specific skill practises, small-sided games, resistance to increase intensity.
- ◇ No. Of tr sessions depends on → ability to **load** (train) and **unload** (regenerate), so as to prevent overtraining and peak when desired.

3. Off-season / Transition Phase

- ◇ For physical + mental recovery from tr / comp, allows both mental and physical abilities to recuperate / refresh
- ◇ Characterised by

One week total rest, then active rest for remainder.

AR should include; reduction of no. Of training sessions, volume and intensity. Change in environment for variety, e.g. cross training.

Diet modified for decreased work load. Aspects of fitness should be maintained (e.g. strength, flex. [working on reversibility concept]) Weaknesses should be improved e.g. any injuries, poor skills.

This phase important to prevent staleness, being burnt out, loss of motivation.

Sub phases (Macro and Microcycles)

- ◇ Yearly plans → organise season, ensure balance, peaking at right time.
- ◇ Smaller, more specific training periods, macro and micro.
- ◇ Macrocycles; long-term planning overviews that identify all comps, events, vol, intensity for long-term planning/preparation
- ◇ Microcycles; short-term training cycles of about 7 days, contain specific details. E.g. skills, activities, session info.

Peaking

- ◇ Phase of training → performance optimised, meet demands of comp
- ◇ Months of prep leading up → short tapering period. Gives optimal physical and mental condition for the most gruelling event /competition.
- ◇ Indicators of peak; excellent health, heightened rate of recovery, superior coordination, functions of body systems superior. Pshych; high motivation, confidence, arousal, alertness, ability to react positively.

Tapering

- ◇ Vol + Int reduced, in period immed before competition
- ◇ Allows → tissue rebuild/repair, fuel replacement, energy stores. Results in strength/power going up.
- ◇ Variables in tapering; length, volume change, intensity change, exercise change.

Sports Specific Sub Phases

- ◇ Target specific areas that require further development, specific to sport. One may need more technique (soccer) than fitness (triathlon).
- ◇ Testing, evaluation, loading, vol, int all considered and implemented.

Elements to be Considered when designing a Training Session

- Health and Safety Considerations

Injury Prevention → warm-up/cool-down/equip./supervision/technique/stretching/knowledge

Protective Equipment → during practise + games, e.g. mouthguards, helmets

General Equipment → regular checks, e.g. bats, javelins, bikes

Apparel → Protection/comfort/footwear/for temp.

Environmental Hazards → Sun/snow protection, eg. Hats, sun cream

Illnesses → Preventing spread of cold/flu

Safe entry and exit from venue

- Overview of the Session – Beginning (3min)

Provide quick overview of what is expected → ensure understanding/intentions

Specific issues addressed → player presence/injuries/discuss prev.

Performance/tactics/goals.

- Warm – Up and Cool – Down (5-10 min)

Phase 1 → General warm-up to raise body temp e.g. jogging

Phase 2 → Stretching (reqd muscle groups extended, raise muscle temp, circulation)

Phase 3 → Callisthenics – general body exercises that involve large muscle groups used in sport (not to be exhausting)

Phase 4 → Skill Rehearsal – some routines later in game, e.g. passing, dribbling, emphasis on maintain body heat, readiness for performance.

- Skill Instruction (45-50 min)

Delivery of knowledge by coach(es) to players. Reqs prior org, communication skills.

Well-planned, guidance for fundamental skills, skills to be practised in drills.

Instruction on other areas of session e.g. tactics/strategies

Effective instructions: brief, well-timed, specific, constructive, clear, informative, demonstratable.

- Skill Practise (time included in 4)

Backbone of training, difficult skills broken down, can be done continuously as learnt and can be implemented into open play/pressure sit's.

- Conditioning (20 min +)

Fitness in integral → must reach training zone intensity for at least 20 mins, but not to over fatigue

Sessions → thorough/challenging, not totally exhausting. **Effective coaches can implement fitness into skills practise.** Regular testing should be a part of the fitness program for feedback/mot/knowledge.

- Evaluation (up to 5 mins)

Appraisal of performance, can be done during cool-down. Players given feedback. Should address goals during session, performance outcomes, reminder of next session, reflect on session.

Should point to what is going to be done next → coaches should internally evaluate successfulness of session.

- Cool – Down (5 mins)

Return body to pre-exercise state. Like warm-up (but less intense) Benefits, improved recovery, circulation, distribute waste, prevent injury.

Planning to avoid Overtraining

Overtraining; chronic psychological and physiological condition caused by training loads too demanding to manage. Can be caused by poor scheduling, expectations that can't be met, stress.

- Amount + Intensity of Training

Adjustments need to be made; team and ind factors to be considered (e.g. time available, environmental stress, sleep, nutrition etc

Intensity level to be changed from session to session, some as recovery sessions e.g. strategy, skill, team building. Vol can be varied by manipulating freq / duration

To prevent overtraining → do not exceed stress tolerance levels, adapt previously stated.

- Physiological Considerations

Lethargy/injury/higher blood lactate levels/higher blood pressure/fatigue → symptoms of overtraining. Adjust where necessary

- Psychological Considerations

When physical stability threatened → emotional factors assume greater magnitude.

Motivation most important consideration. Symptoms → irritability, depression, concentration problems, motivation problems.

Strategies to improve mental wellbeing → active rest, relax. Tech, variety, 'releases' from sport when needed.

- How much Training is too much? - That which draws symptoms of overtraining.
- How can you avoid overtraining?

Don't subject already fatigued to high intensity tr, balance work req with appropriate recovery periods (use recovery strat). Make adjustments to volume + intensity
Address ind needs, provide variety.

What ethical issues are related to improving performance?

Use of Drugs

- Used to gain competitive advantage → ergogenic aid
- Can carry health risks, jeopardise future
- E.g.s HGH, Anabolic steroids, EPO (Erythropoietin), diuretics, alcohol (to mask drugs).
- Physical effects can include: high blood pressure, damage to sexual organs, change in behaviour (mood swings/aggression), baldness, premature aging etc.
- Other effects include; loss of reputation, income, sponsorship.

For strength

- Human Growth hormone: increase rate at which amino acids are transported to skeletal muscle cells. Also mobilises fat earlier, glycogen sparing. Artificial forms taken.
- Increase size + strength.
- Long-term effects; overgrowth, gigantism, joint problems, heart disease.

- Steroids: derivatives of testosterone. Aids; muscle building, speed, power, strength. Allow reduction in recovery time
- Long-term effects; infertility, liver damage, high blood pressure, increased masculinity (this can mean aggression, facial hair, deep voice, clitoral hypertrophy on women)

For Aerobic Performance

- EPO: natural hormone that stimulates red blood cell production.
- EPO injected into blood → form of blood doping. Allows more O₂ avail → better VO₂ max in performance.
- Long-term effects → poor circulation, fatigue, joint pain, heart problems.

Drugs to Mask other Drugs

- Alcohol + diuretics used. Dilute urine → also decrease excretion of other drugs.
- Diuretics increase fluid leaving body, can clear evidence of drugs quicker. Effects: dehydration, loss of coor, heart/kidney failure
- Alcohol can mask drugs. Effects → slowed reaction time, coor. Used in low doses in some sports such as archery.

Benefits and Limitations of Drug testing

- Done by Aus Sports Anti-Doping Authority. Supposed to allow to compete in doping-free environment, can be tested at any time, deters athletes from drugs.
- Limitations → athletes need to know banned substances, constantly changing, testing process can be uncomfortable, testing is costly.

Use of Technology

- Has gained considerable attention.

-Training innovation → new methods of measuring and analysing progress. Lactate threshold training and biomechanical analysis are main areas of testing.

Heart rate monitors used to train close to anaerobic threshold, with training this point is at a higher intensity. Biomechanical analysis uses video, photos, slow motion, to make athletes more biomechanically efficient.

-Equipment Advances → e.g. swim suits. Low drag/friction, streamlined. Evidence in effectiveness → amount of world records broken. Ethical issues → natural progress or unfair advantage. Do we consider modern athletes better just because access to better technology.

Golf balls: max. elevation, distance, speed.