Musculoskeletal System—Paper 1

The structure and function of the Musculo-skeletal system



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The structure and function of the Musculo-skeletal system



Movement Analysis—Paper 1



Movement Analysis—Paper 1

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Movement Examples					- 0	Hip - Ball and S	ocket (Pelvis,	e-		Running / [orive phase			
Shoulder—Ball and socket joint (Scapula, Humerus)					and?	Knee - Hinge (F	emur, Tibia)		1	take off in	long jump			
Elbow - Hinge Joint (Humerus, Radius, Ulna)					Ankle - Hinge (Talus, Tibia, Fibula)									
لليہ					P	ress Up		Movement	Agonist	Type of	Antagonist	Plane	Axis	
	Movement	Agonist	Type of	Antago-	Plane	Axis				contraction	1	_		
			contraction	nist			Drive	Hip –Extension	Gluteals	Concentric	Hip Flexor	Sagittal	Transverse	
Elbow	Extension	Triceps	Concentric	Biceps	Sagittal	Transverse	phase	Ankle - Plantar flex-	Gastrocnemius	Concentric	Tibia anteriou	JS		
Down- wards								ion						
Walus	Flat in a	Time	Freedot	D ¹ · · · · ·	Continue	T	Recov-	Hip –Flexion	Hip Flexor	Concentric	Hip Flexor	Sagittal	Transverse	
Upwards	Flexion	Triceps	Eccentric	Biceps	Sagittai	Transverse	ery	Knee—Flexion	Hamstrings	Concentric	Hamstring	10		
							phase	AIRIE - DOISI-HEXION	Tiblans arterio	concentric		23		
		Hip - Ball and	Socket (Pelvi	s, Femur)	Squat	/ Upwards =	A	Shoulder—Ball and socket joint (Scapula, Humerus)						
		Knee - Hinge (Femur, Tibia)	Stand	ing vertical	de P	🖌 🔓 🖓 Elbow - Hinge Joint (Humerus, Ra			dius, Ulna) Cricket Bowling			
Ankle - Hinge (Talus, Tibia, Fibula)				Movement Agenist T										
Position A	Position B							wovement	Agonist	contraction	Plane	A	15	
	Movement	Agonist	Type of	Antagon	st Plane	Axis	Bowl-	Shoulder—rotation	Rotator cuff	Concentric	Transverse	Longti	udinal	
			contrac-				ing	Shoulder - Extension	Deltoids	Concentric				
Down-	Hip – Flexion	Gluteals	Eccentric	Hip Flex	or Sagitt	al Transverse								
wards	Knee—Flexion	Quadriceps	Eccentric	Hamstrin	ng									
	Ankle - Dorsi-flexion	Gastrocnemus	Eccentric	Tibialis ant	eri-				Warm up	and Cool [Downs			
	Hip –Extension	Gluteals	Concentric	Hip Flexe	or Sagitt	al Transverse	-11							
Upwards	Knee—Extension	Quadriceps	Concentric	Hamstrin	ng			Warm Up	1		Cool	Down		
	Ankle - Plantar	Gastrocnemius	Concentric	Tibialis ant	eri-		Dulas a	aiaan Ctuatahaa aki			te meintein e	امتر معرفة م	ath in a	
							Puiser	diser - Stretches - Ski	in based practi	ce Activity	to maintain e	ievaled bre	atning -	
	Elbow—Hinge Joint (Humerus, Radius, Ulna)						Time fo	Time for mental preparation			reduce intensity - stretches			
۹IJ							1			A 11				
A	₩.						Increas	e body temperature		Allows	recovery after	exercise		
Football Throw in					Increas	Increase range of movement through			Helps remove lactic acid, CO ² , waste prod-					
	Movement	Agonist	Type of	Antagoni	st Plane	Axis	stretch	ing	Ŭ	ucts				
			contrac-					5						
Elbow	Elbow – Flexion	Bicens	uon Concentric	Tricens	Sagitta	Transverse	Gradua	ally increase in effort		Helps p	revent DOMs			
bent	Listi Headin	2.0000	consentite		505111		Less ch	ance of injury						
Elbow	Elbow –Extension	Triceps	Concentric	Biceps	Sagitta	l Transverse		unce of injury						
Extended														

Cardio-respiratory System—Paper 1

Respiratory system—The mechanism of breathing



Cardio-respiratory System—Paper 1

Cardiovascular system—The mechanism of breathing



Paper 1—Aerobic and Anaerobic Exercise

Aerobic Exercise - with oxygen

- glucose + oxygen = energy + CO^2 + water
- long periods of time low intensity

Anaerobic exercise - without oxygen

- glucose = energy +lactic acid
- short periods of time high intensity

EPOC—Excess Post Oxygen Consumption

- Occurs during anaerobic activity .
- The body runs out of sufficient oxygen supplies so Glycogen stores are used
- Lactic acid builds up in the muscles causing fatigue

Oxygen debt—the additional oxygen taken in during recovery above what is normally needed at rest. This repays the debt

Recovery from vigorous activity

Cool Down - lactic acid disperses quickly. Helps keep breathing and heart rate high to aid recovery by helping to get rid of waste products quicker. Stretching also helps.

Manipulation of Diet - you need to rehydrate and take on carbohydrates for energy

Ice baths - helps prevent DOMs. Vasoconstriction of the blood vessels force blood back to the heart quicker helping to remove waste products from the muscles. The cold also helps to reduce the swelling from the small micro tears in the muscle.

Massage - rubbing and kneading of muscles can help to reduce DOMs







- Increase depth of breathing
- Increase rate of breathing
- Increase heart rate





Effects of Exercise

Short term

(24-36 hours)

Immediate

- (during)
- Tiredness / fatigue • Feeling light headed
- Nausea
 - Aching (DOMs)

traction

• Cramp—sudden involuntary muscular con-







- Long term (months—years)
- Changes to body shape
- Improved cardiovascular endurance
- Increased muscular strength
- Increased muscular endurance
- Increased speed
- Increased suppleness / flexibility
- Increased size of the heart- Hypertrophy
- Decreased resting heart rate -Bradycardia





Physical Training—Paper 1 - Components of Fitness and Testing



Physical Training—Paper 1 - Training Methods

Circuit Training

A number of different exercises or activities set out in stations with a rest between each station

Need to consider: space, equipment, number of stations, work/rest ratio, demand and how to change it and matching it to components of fitness

Advantages - can be targeted to any part of the body, changed for different ages/fitness, easy to monitor

Disadvantages - need space, need equipment, difficult to set work and rest periods

Good for RUGBY, NETBALL

Interval Training HIIT - High Intensity Interval Training

Periods of hard work followed by periods of rest or lower intensity exercise. 2-3 sessions per week 2:1 work ratio - 20 seconds work 10 secs rest



Advantages - burn body fat, changed for individual, completed quickly, work on aerobic and anaerobic fitness

Disadvantages - extreme work
 can lead to injury, feel lighthead ed and nausea, need high levels
 motivation

Good for SPRINTERS



Continuous Training



Need to consider: aerobic activity for a minimum of 20 minutes. Cycling, running, swimming, rowing.

Advantages - simple, need no equipment, improve aerobic fitness, can be done anywhere

Disadvantages - boring, cause injury, time consuming, does not mirror the activity you are training for.

Good for MARATHON RUNNERS

Static Stretching

This is used to improve *FLEXIBILITY* Stretch is held isometrically for up to 30 seconds



Advantages - increases flexibility, relatively sfe, can be done by anyone, can be done anywhere and at any time

Disadvantages - concentrates only on one component of fitness, overstretching can cause injury, time consuming

Good for GYMNASTS

Fartlek Training "Speed training"

Like continuous training but changes in speed, terrain (the ground)

Advantages - very easy and quick to set up, need no equipment, improve aerobic fitness.

Disadvantages - very specific type of training , isn't suitable for general fitness.

FARTLEK

Good for FOOTBALL HOCKEY

ALTERNATE FAST AND SLOW

SPRINT JOG

Plyometric Training

Bounding, skipping, depth jumping. Increases **POWER** Using an eccentric contraction followed by a larger concentric contraction.



Advantages - can be done anywhere and at any time, with no specific equipment, very well suited to personal training

Disadvantages - concentrates only on one component of fitness, if the incorrect technique is used it can cause injury. **Good for HIGH JUMPERS**

Weight Training

Using weights to help improve MUSCULAR ENDURANCE OR STRENGTH.



Need to follow safety procedures and use correct weights and have spotters where necessary, depending on outcome you will do different reps and sets.

Strength—low reps / high weights Endurance—high reps / low weights

Advantages - improve muscle tone, increase endurance, increase size and strength, help aid recovery.

Disadvantages - very specific type of training , heavy weights can increase blood pressure, risk of injuries if technique is incorrect. **Good for DISCUS THROWERS - strength**

Altitude training

Train at high altitude (2000m or more) Less oxygen in the air so you have less oxygen carrying capacity Body compensates and makes more red blood cells to carry oxygen

Advantages—helps improve endurance athletes

Disadvantages - difficult, fitess can be lost, sickness, benefits lost quickly

Good for ENDUR-ANCE ATHLETES



Physical Training—Paper 1

<u>Health</u> - A complete state of physical, mental and <u>Fitness</u> - Ability to meet the demands of the envir It is possible to be unhealthy but still have the ability to However you can lose fitness because of ill-health as yo	 Preventing injury Warm must be completed Avoid overtraining Appropriate clothing and footwear 			
Fitness Terminal Strengths / weaknesses Identify strengths / weaknesses Monitor improvement Dotted Strengths Show start point of fitness Inform training Compare against norms Motivate and set goals N Provide variety in training Provide variety in training Notivate and set goals N	sting Limitations Tests are not sport specific o not replicate movements in the sport Do not replicate competitive nature They do not measure directly Can be inaccurate Iust be carried out with correct procedures to increase validity	Data Qualitative Data in the form of opinions. It is more subjective and may link to the quality of a per- formance Quantitative Data in the form of numbers Times, scores, goals, can be compared to norms and national data	 Maintain hydration Use taping if necessary Stretches must not bounce or be overstretched Correct techniques Principles of Training specific to needs and sport Specific to needs to needs to vork. Working harder than normal Specific to needs to be varied to stop it getting boring T = Tedium Training needs to be varied to stop it getting boring Principles of overload To make training harder we have to use one or a neture of these principles F = Frequency - How often you train I = Intensity - How hard you train I = Intensity - How hard you train I = Time - How Long T = Type - What training you do 	
Calculating Intensities Heart rate training zones Max heart rate = 220-age Aerobic training zone = 60%- 80% of max heart rate Anaerobic training zone = 80%-90% of max heart rate Weight training One rep max - maximum amount you can lift once Strength - 70% ORM Endurance - below 70% ORM Circuit training Use the time, rest and content to change the intensity	Training seasons Training seasons Preseason / Preparation - aim focus on specific fitness needs Competition / Peak / playing and improve specific skills Post- season / Transition - res through light aerobic work.	easons n to improve aerobic fitness and s season - maintain fitness levels st, maintain level of fitness		

Skills and Information Processing

Skill v Ability

<u>Skill - A learned action with the intention of bringing about predetermined results with maximum certainty.</u>

Ability - Inherited abilities that are stable traits that determine an individuals potential to learn a skill



<u>SMART Targets</u>	<u>Visual</u>	Manual
S - Specific - meet the demands of the sport	Something you watch Demonstrations, video footage, pictures	Physically moving a performer, support for safety
M - Measureable - must be able to be measured to see if it has been achieved	Important for beginners needs to be clear, concise, quick, easy to understand, with verbal guidance	Helps beginner because makes them feel safe and they learn what the movement feels like. Not needed for elite
A - Accepted - agreed by the performer and between coach and performer	Guid <u>Verbal</u> Talk through a technique Highlight key points so im-	ance <u>Mechanical</u> Using equipment to guide per- formance or make performer
R - Realistic - must be possible to achieve	portant for beginners when used with ver- bal and guidance is short and simple	feel safe. Arm bands, harness,
T - Time bound - in a fixed period of time	Important for elite performers to make small changes in performance does not need to be linked to visual.	Helps beginner because makes them feel safe and they learn what the movement feels like. Not needed for elite
Energy use, Diet and Hydration Intake—calories from food (cal) Output—calories used during activity (kcal) Calories Depends on age, gender, height, energy expenditure Average man requires 2500 cal/day Average woman requires 2000 cal/day	Feedback Positive -what is good about the movement Negative - what was incorrect about the mo Knowledge of results - feedback about the o Knowledge of performance - feedback on th Extrinsic - feedback from an external source Intrinsic - feedback from within - used by eli	. Motivating and from other people vement. From other people outcome, important for beginners ne quality of technique used by elite —relied on by beginners te as they know how the movement feels
A Balanced Diet Eating the right amount of calories and different food groups to give enough vita- mins, minerals and nutrients Carbohydrates- 55-60% = main and preferred energy source Fats - 25-30% = provides energy at low intensity exercise Protein - 15-20% - Muscle growth and repair	Vitamins and Minerals Used for maintaining efficient working of th <u>Water</u> Keeps body hydrated Dehydration —excessive loss of body water the body Causes - blood to thicken, increase in boart	e body systems , interrupting the function of



Causes - blood to thicken, increase in heart rate, increased body temp

<u>Health</u>

A complete state of physical, mental and social wellbeing and not merely the absence of disease and infirmity

Physical health and Well being Mental health and well being Social health and well being Reduces stress and tension Improves heart function Releases a feel good hormone—serotonin Improves efficiency of body systems Improves ability to control emo-· Gives opportunities to make friends and socialise Reduces the risk of some illness Co-operation tions Avoids obesity Teamwork Improves ability to do everyday tasks Fitness - The ability to meet the demands of the environment **Somatotypes** Improves your ability to cope with the environment ٠ Reduces chances of injury Ectomorph Makes it easier to complete physical work Narrow hips and shoulders Tall and lean Sports - Endurance events, High jump Sedentary Lifestyle Obesity People with a large fat content Mesomorph A person tends to make a choice not to take part in BMI > 30, 20% above ideal weight Narrow hips, wide shoulders sport or exercise Caused by an imbalance in calories compared to en-High muscle content ergy expenditure Sports - Sprinters, Gymnastics Obesity will affect performance it limits stamina, flexi-Consequences Weight gain / obesity bility, agility and speed. Endomorph Obesity also causes ill health Heart disease Narrow shoulders and wide hips Physical - cancer, heart disease, diabetes, high choles-Hypertension Fat around middle, thighs, arms Diabetes terol Sports - Shot putt, Hammer throwing Poor self-esteem Mental - depression, loss of confidence **Social** - inability to socialise, lack confidence tiredness



Socio-cultural factors - Engagement Patterns

<u>Gender</u>	Race, religion, ethnicity, cu	tur <u>e</u>	<u>Family, Friends, Peers</u>		
 Stereotypes suggest women lack strength, endurance to take part in sport. Sport can affect ability to have children and that competition makes women unfeminine Media coverage of female sport is less Facilities for women has developed slower than men Less female role models A woman's role may make participation in sport harder. As they may be a mother, carer and manage the home 	 Different ethnic groups have different expectations Due to uneven representation in elitt Stereotypical views of some cultures sports they can take part in or are been ended black Caribbean and African have a getion of fast twitch fibres. 	t priorities and e sport. in relation to st at. ower and reater propor-	 Can influence positively or negatively by encouraging or discouraging performance. Can support by providing socio-economic support (paying for clubs, equipment) Some family and friends have different attitudes about exercise. Family members can be role models. If a member of your family takes part in an activity you may do it as its familiar. 		
 <u>Age</u> All school children take part in sport as it is composed of the post-school drop out especially with girls. Schools encourage sports that fit their facilities are tise no always what the students want. Sports participation is lower with older people, as are restricted due to physical fitness. Different activities suit different people and some there may not be the facilities for all age groups. Younger people have more leisure time than olde as have fewer commitments. 	Leisure time Educationaulsory.Factors that affect participationand exper- exper-Attitudes Role Models Accessibility Media coverage Stereotypes CultureetimesStereotypes CultureetimesEducation Socio-economic	 A person ability to Some sp Creation Barriers 	<u>Disability</u> In with some sort of impairment which may affect their to take part in an activity. Norts have been adapted while others are integrated. To fnew sports - Boccia, Goalball to participation could be: • Accessibility—lack of clubs, facilities or opportunities • Attitudes to activities may be difficult to change • Less media coverage on some activities in disability sport		

Commercialisation



stronger, more safety equipment

Materials - body suits are lighter, more streamline with footwear lighter and more hardwearing

Facilities - stadiums purpose built, all seated stadiums, specialist flooring and equipment.



Performance analysis - video cameras and software to analyse performance to help improvement. Also electronic timing, Hawk-Eye, video offi-

cials, goal-line technology

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Positives and Negatives of Technology

Positives	Negatives
Rackets are lighter meaning performers can get more power into shots	Equipment is expensive so not available to all so is only available to those with money.
Greater protection for performers in improved safety equipment	Increased risk of injury and more cheating in form of drugs or enhanced equipment by performers
Improved recovery and prosthetics for performers	
Improved equipment so sport is played at a higher standard.	Not equal to all sports as some get less funding and sponsor than others
Officials have support from hawk-eye and video officials so they are more informed	Officials may become over reliant
Increased spectator quality at home as more in- formed better display to watch	Spectator loses atmosphere at home
Better advertising for sponsors	Sponsors affected negatively if they have links with a cheating performer

Ethical and Socio-cultural issues in physical activity and sport

Etiquette - the unwritten rules concerning player behaviour

Sportsmanship - appropriate , polite and fair behaviour while taking part.

Gamesmanship - use of dubious methods that are not strictly illegal to get an advantage

Contract to compete - agreeing to play by the rules, trying to win but allowing your opponent to play.



Ethical and Socio-cultural issues in physical activity and sport - Spectator behaviour



<u>Hooliganism</u>

Rowdy, violent or destructive behaviour



It occurs because:

- Rivalries
- Hype of the event
- Alcohol / Drugs
- Gang culture
- Frustration from performance or officials decisions
 Display of masculinity

Occurs mainly in football due to intense rivalry, the importance or significance of the game, the fact that groups of people come together as a gang and are passionate about displaying their masculinity. Due to the rivalry when decisions or events go against them it can cause tempers to boil ver.

Hooliganism can be combatted by:

- Early kick off before pubs open and alcohol is consumed
- All-seated stadiums spectators behave better if seated and stops overcrowding
- Segregation of fans reduce clashes
- Improved security police presence, CCTV, Stewards
- Alcohol restrictions reduce amount drink before or during games
- **Travel restriction / banning orders** criminal prosecutions, grounds controlled, some known hooligans banned from games and travelling do them.
- Education educate about appropriate behaviour, campaigns (RESPECT)