
TEMASEK POLYTECHNIC

SNC WORKSHOP

By Kingsley Tay

BACKGROUND INFORMATION



KINGSLEY TAY

- Temasek Polytechnic Alumni
- Certified Strength and Conditioning Coach
- Team Singapore Beach Volleyball Athlete
- Competed in 2015, 2019 & 2022 SEA Games



SESSION OUTLINE

INTRODUCTION TO SNC

Why Strength and
Conditioning?

INJURIES & MYTH

Trends and Solution

WARM-UP & COOL-DOWN

RAMP Principle

TRAINING CONCEPT

Training Principle,
Variable and
Periodisation

TRAINING INTERVENTIONS

Periodisation Plan,
Exercise Progression
Table and Training Plan

Learning Outcomes

State the aim of an S&C session

Fundamentals of a periodisation plan

Basic knowledge of progression and regression exercises

Describe 4 stages of a warm-up and 3 stages of cool-down

WHY STRENGTH AND CONDITIONING?



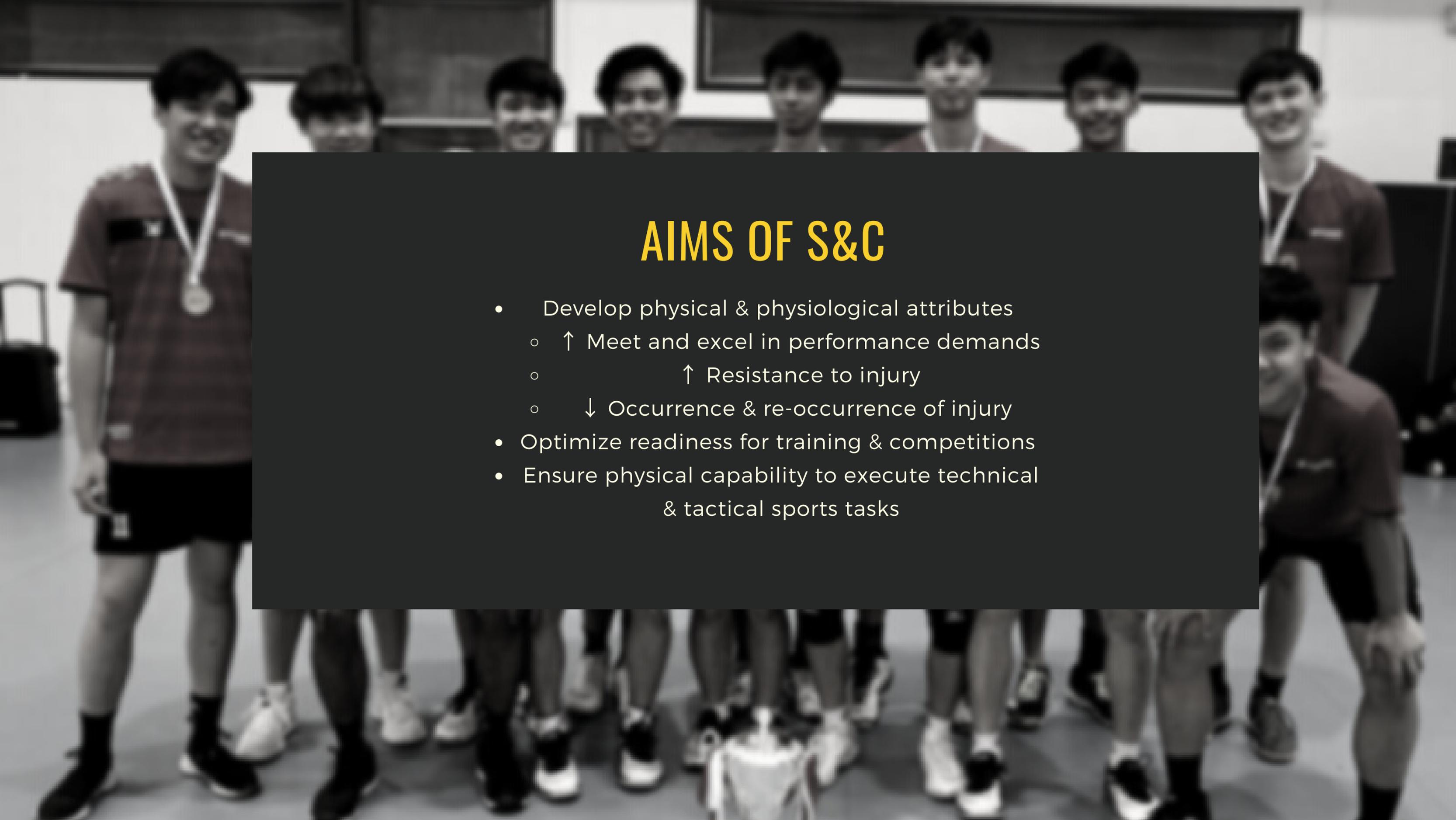
FORCE APPLICATION/PROPULSION

Kick, Pass, Accelerate, Jump



PREVENTIVE MAINTENANCE

Tackle, Catch, Decelerate, Land

A group of athletes in maroon uniforms standing in a line, with a central text overlay. The athletes are smiling and looking towards the camera. The text overlay is a dark grey rectangle with white text. The background is a blurred indoor setting, possibly a gymnasium or sports hall.

AIMS OF S&C

- Develop physical & physiological attributes
 - ↑ Meet and excel in performance demands
 - ↑ Resistance to injury
 - ↓ Occurrence & re-occurrence of injury
- Optimize readiness for training & competitions
- Ensure physical capability to execute technical & tactical sports tasks

Injury Trends and Prevention in Youth Resistance Training

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SUMMARY

RESISTANCE TRAINING HAS BECOME A POPULAR METHOD OF CONDITIONING FOR CHILDREN AND ADOLESCENTS IN SCHOOLS, RECREATION CENTERS, AND SPORTS TRAINING FACILITIES. HOWEVER, THE GROWING POPULARITY OF YOUTH RESISTANCE TRAINING AND THE COMPLEX NATURE OF SOME TRAINING PROGRAMS RAISE NEW QUESTIONS AND CONCERNS ABOUT THE SAFETY OF THIS TYPE OF TRAINING FOR YOUTH. IN THIS ARTICLE, THE INCIDENCE, SEVERITY, AND ETIOLOGY OF YOUTH RESISTANCE TRAINING INJURIES ARE REVIEWED, RISK FACTORS FOR RESISTANCE TRAINING-RELATED INJURIES ARE IDENTIFIED, AND INJURY PREVENTION STRATEGIES FOR YOUTH WHO PERFORM RESISTANCE EXERCISE ARE DISCUSSED.

INTRODUCTION

Resistance training is a popular activity that is performed by a growing number of children and adolescents (8,34). Current public health initiatives now aim to increase the number of youth who engage in "muscle-strengthening" activities, and contemporary physical education curricula include lessons that improve

muscular strength (31,40). Moreover, training programs specifically designed to enhance sports performance have become a popular fitness trend among young athletes (39). Yet there is substantial interest from youth coaches, physical education teachers, and sports medicine professionals regarding the best techniques to maximize safety and improve the efficacy of resistance training for young lifters.

At present, there is a need to review the incidence, severity, and etiology of youth resistance training injuries and examine the relative safety of resistance training activities for children and adolescents. Furthermore, it is important to identify risk factors for resistance training injuries and discuss injury prevention strategies for youth who perform this type of training. The purposes of this article were to review the latest evidence regarding the safety of youth resistance training and provide general guidelines for reducing the risk of injury associated with resistance exercise. This information will aid professionals who instruct youth to participate in resistance training activities as part of physical education, sports training, or recreation.

In this article, the term "resistance training" refers to a specialized method of physical conditioning that uses a wide range of resistive loads, different movement velocities, and a variety of training modalities, including weight

machines, free weights (barbells and dumbbells), elastic bands, medicine balls, and body weight. The terms "weightlifting" and "powerlifting" refer to sports in which athletes attempt to lift maximal amounts of weight in competition. The term "children" refers to boys and girls who have not developed secondary sex characteristics (a period of development called "preadolescence"), and the term "adolescence" refers to a period between childhood and adulthood (generally girls aged 12–18 years and boys aged 14–18 years). For ease of discussion, the term "youth" refers to both children and adolescents.

INCIDENCE AND SEVERITY OF YOUTH RESISTANCE TRAINING INJURIES

In the 1970s and 1980s, resistance training was not often recommended for children and adolescents because of the presumed high risk of injury associated with this type of exercise. A few retrospective case reports published during this era highlighted the potential for injury to the growth cartilage from resistance exercise and contributed to the misperception that this type of training was unsafe for young lifters (1,16,20,36,41). However, improper lifting techniques, poorly

KEY WORDS:

strength training; weightlifting; injury prevention; children; adolescents

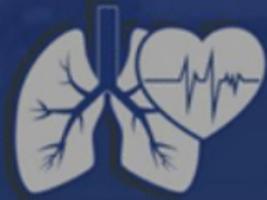
INJURIES IN YOUTH

YOUTH 12-18 YRS. INJURE THEMSELVES BY ATTEMPTING TO LIFT TOO HEAVY, THROUGH POOR TECHNIQUE - MAINLY IN UNSUPERVISED SETTINGS

1. Adopt proper technique
2. Establish movement competence before progressing loads

R.A.M.P

Warm-Up Protocol - *Jeffreys (2007)*



RAISE

Low-intensity activities, often aimed at developing movement patterns

- ↑ Body Temperature
- ↑ Heart Rate
- ↑ Blood Flow
- ↑ Respiration Rate
- ↑ **Joint Fluid Viscosity**



ACTIVATE

Often involves 'prehab' associated exercises to activate key muscle groups e.g. hips & shoulders via:

- Mini-Band Drills
- Glute Bridges
- Overhead Squats
- **Rotator Cuff Exercises**



MOBILISE

Mobilise key joints & **ranges of motion** used in the sport through dynamic movements

- Focus is on Movement
- Movement Specificity
- **Mobility & Stability**



POTENTIATION

Activities that improve the **effectiveness** of subsequent performance

- ↑ Intensity & Excitation
- Post-Activation Potentiation (**PAP**)
- Enhance Performance
- ↑ **Strength/Power**



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WARM-UPS

1. ↑ H/heart rate and core body temp.
2. Mobilise joints to ↑ ROM of joints (Hips, hamstring, thoracic spine)
3. Stimulate psychological readiness
4. Sports specific drills/movement patterns - Enhance short to long term performance

WARM-UPS (PRACTICAL SUGGESTIONS)

HEAT/ HEART RAISES

- Jog/ bike/ skip
- Multi-directional movement
- Crawling

MOBILISE

- Hip and thoracic spine
- Surrounding areas

ACTIVATE

- Low intensity exercises targeting specific muscle groups
- Low intensity jumps and hops

POTENTIATE

- Speed Work
- Change of Direction
- Contact Prep

FORCE-VELOCITY CURVE

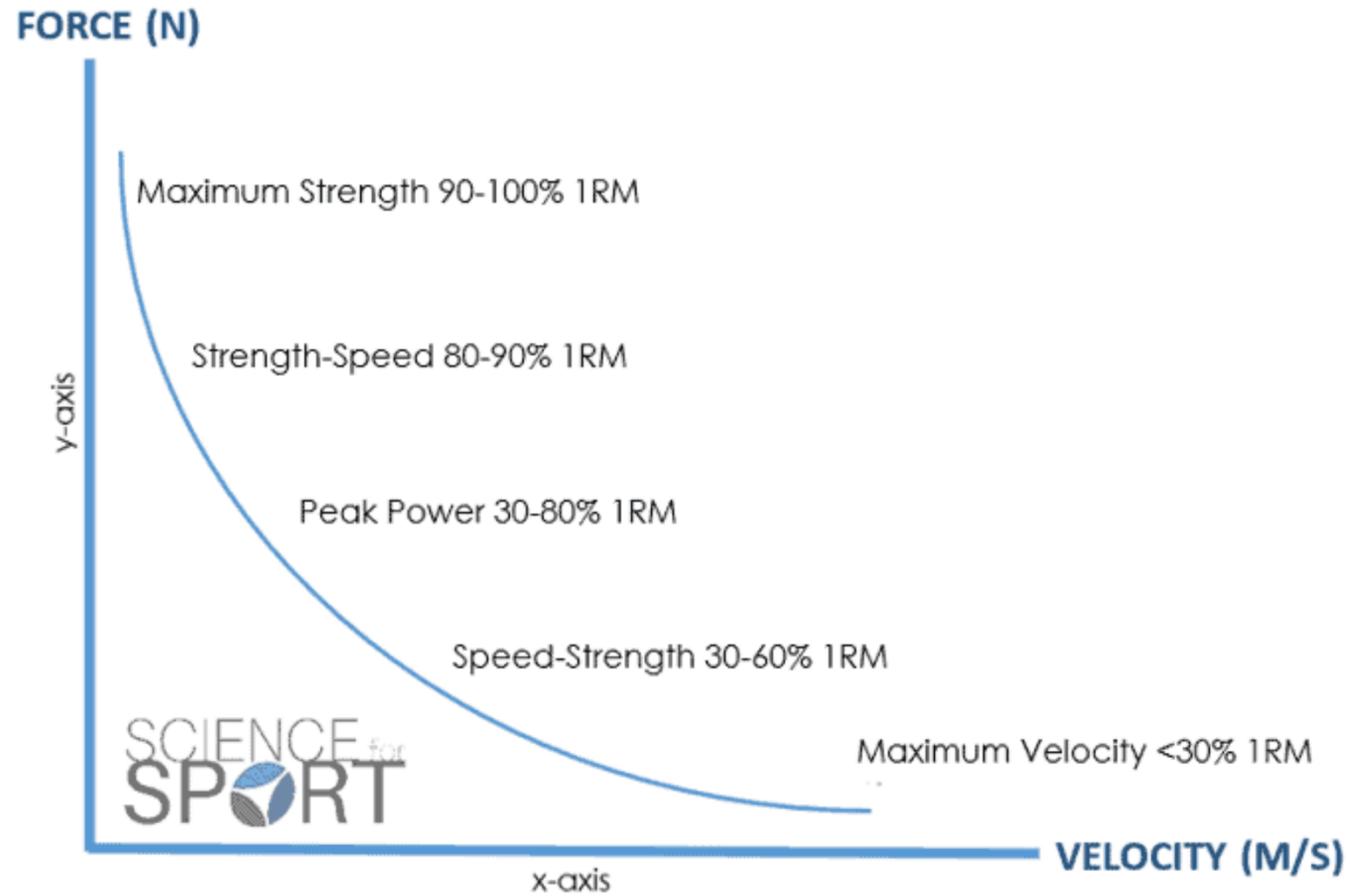


Figure 1. The Force-Velocity Curve

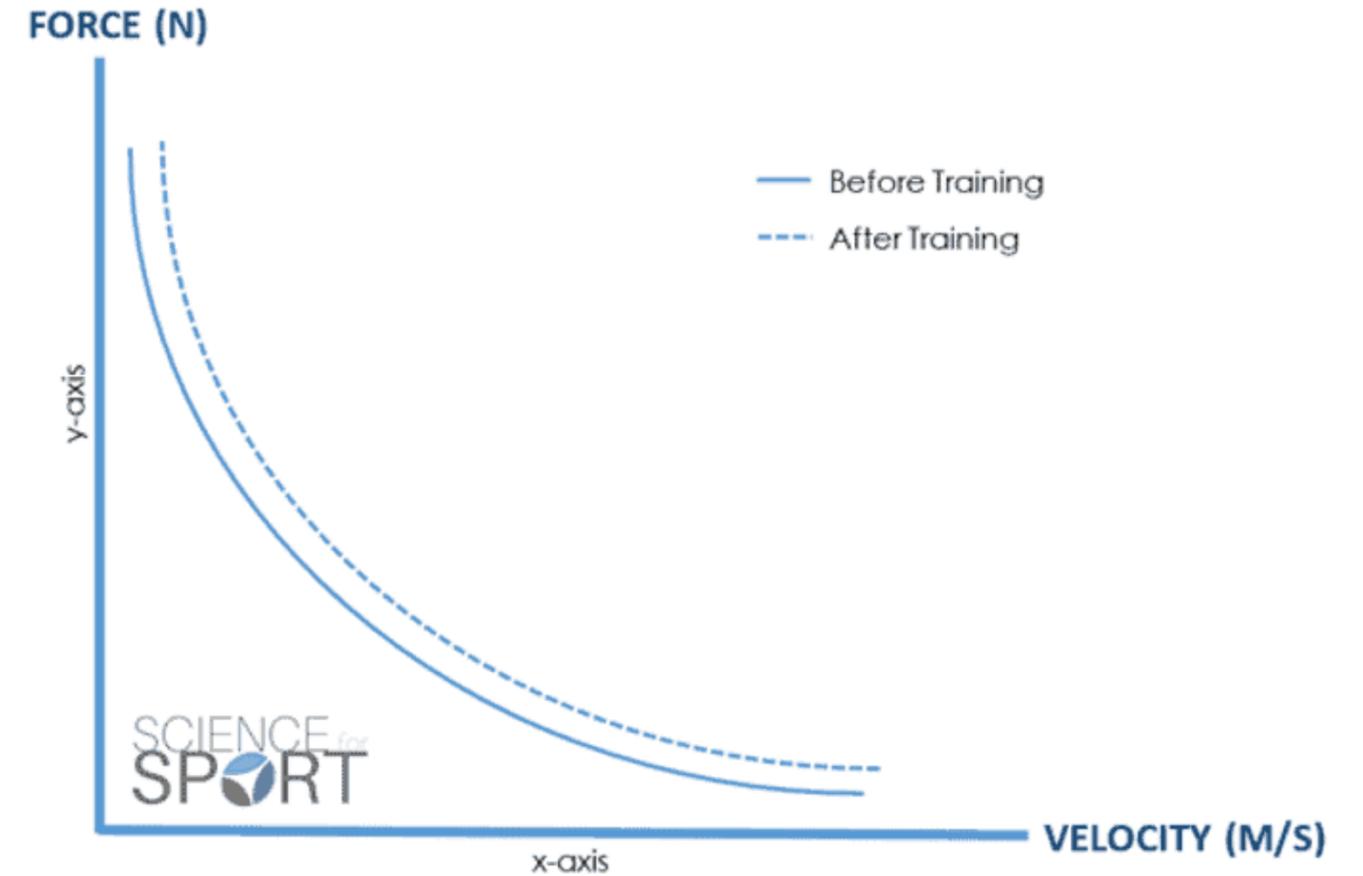


Figure 2. Shift in the force-velocity curve after an effective training programme.

TRAINING PRINCIPLES

PROGRESSIVE OVERLOAD

A gradual and continual increasing in training stress

SPECIFICITY

Specific stress = specific adaptation

VARIETY

to avoid training monotony, burnout

RECOVERY

important part of training for adaptation/super-compensation to occur

REVERSIBILITY

use it or lose it

INDIVIDUALITY

Tailoring to suit the individual

Training Variables

TYPE

The what? Mode of exercise specific to sport

INTENSITY

How hard? Amount of effort exerted in training

FREQUENCY

How often? Number of training sessions (day/week)

VOLUME

How much? Amount of work in training

DURATION

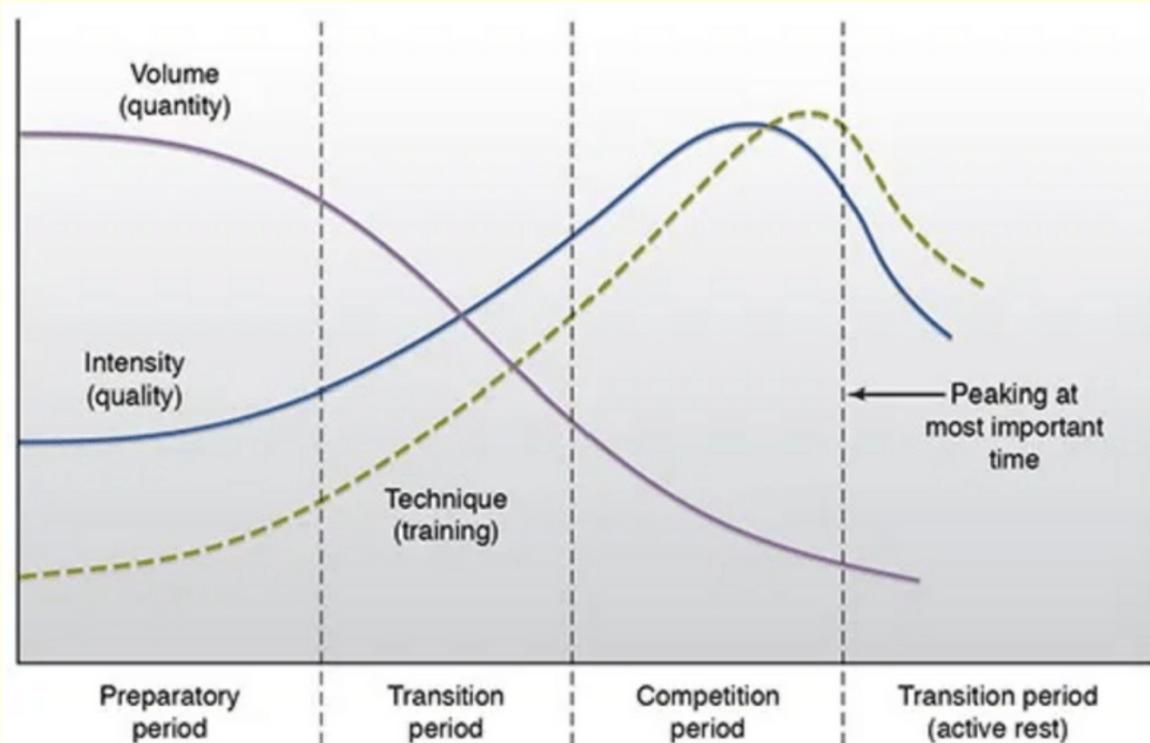
How long? Duration of training session

PERIODISATION

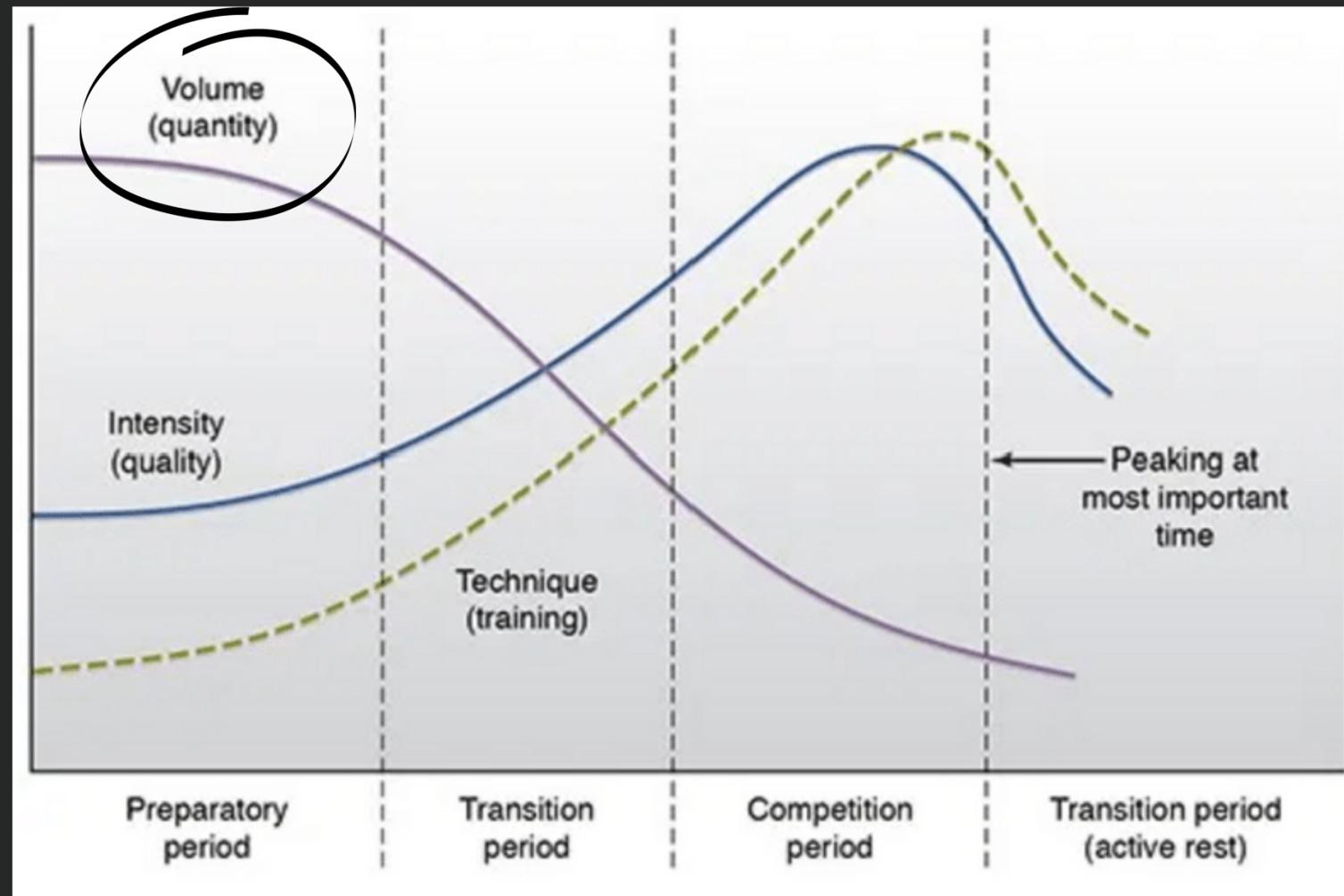
SYSTEMATIC PLANNING OF PHYSICAL TRAINING

- Plan around athlete goals
- Organisation of an annual plan into smaller, manageable training phases around competitions
- For example, Linear Periodisation Plan (Mono/Bi Cyclic Periodisation plan)

The Annual Plan													
Phases of training	Preparatory					Competitive					Transition		
Sub-phases	General preparation		Specific preparation			Pre-competitive		Competitive			Transition		
Meso-cycles													
Micro-cycles													



Stage	First Stage					Second Stage						
Season	Off		Pre	In	Pre	In	Off		Pre	In		
Month	5	6	7	8	9	10	11	12	1	2	3	4
Schedule	Test		Tr Camp	Game		Game	Test		Test	Tr Camp	Game	
Performance						Peak					Peak	



Month	Jan				Feb				Mar				Apr				May				Jun				Jul			
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Competition	Asian Games 2022																											
Phase	General Prep												Specific Prep				Pre-Comp		Comp		General Prep							
Strength Development	Rest		Endurance		Hypertrophy								Max Strength				Speed/Strength				Maintain		Hypertrophy					
Physical Assessment																	STR						PW					
Workload Overview																												
S&C Frequency								2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2
Sets				2	2	3	3	3	3	3	2	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	3
Reps Range				20-15	20-15	15-12	15-12	12-10	12-10	10-8	10-8	8-6	8-6	6-4	6-4	4-2	4-2	Velocity based				Maintain	20-15	20-15	15-12	15-12		
TUT				321	321	321	321	321	321	211	211	201	201	201	201	201	Velocity based				Maintain	321	321	321	321			
Set/Rep Volume (-)				270	270	350	350	350	320	320	300	300	220	200	160	120	160	140	120	120	120	120	120	120	120	270	270	
%1RM				60	60	70	70	75	75	80	80	85	85	90	95	95	100	50	40	40	40	40	40	40	40	60	60	
Velocity Range (m/s)				~0.75m/sec				~0.75-0.60m/sec				<0.5m/sec				1-1.20m/s				Maintain	~0.75m/sec							



EXERCISE PROGRESSION TABLE

Train according to your Level!

Levels	Lower Body				Upper Body				Mid Body		
	Squat (Bilateral)	Squat (Unilateral)	Split Leg	Hinge	Push (Horizontal)	Push (Vertical)	Pull (Horizontal)	Pull (Vertical)	Plank (FWD)	Plank (Side)	Bridge
1	Body Weight Squat	Step-up	Floor To Stand Split Squat	Hip Hinge	Push Up w knee on the ground	Pike Walk	TRX Pull (High)	High Bar Jump and Hold	Low Plank Hold	Side Plank Hold Bott Knee 90 degrees	Hip Raise
2	Goblet Squat	Crossack Squat	Split Squat	Single Leg RDL	Push Up	Pike Push Up	TRX Pull (Low)	High Bar Jump To Eccentric	Low Plank Hold Leg Raise	Side Plank Hold	Hip Raise Alt Knee Exend
3	BB Squat	Step Ecc & Concentric	Lunge (FWD, REV ,SIDE)	Nordic Curl/ DB or BB RDL	BB or DB Bench Press	Handstand Push Up/ Vert Press	TRX Inverted Rows	Pull Ups	Low Plank Hold Arm Raise	Side Plank Leg Move Up/Down	Single Leg Hip Raise/ Hip Thrust

SNC Programme Plan Example

SESSION 1

RAMP Warm-up

- 1) Goblet Squat
- 2) Single Leg RDL
- 3) Push Up
- 4) TRX Pull
- 5) Low Plank Hold Leg Raise

SESSION 2

RAMP Warm-up

- 1) Cossack Squat
- 2) Hip Raise Alt Knee Extend
- 3) Split Squat
- 4) Pike Push Up
- 5) High Bar Jump to Eccentric
- 6) Side Plank

Levels	Lower Body				Upper Body				Mid Body		
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COOL-DOWN

PRACTICAL SUGESTIONS



RELAXATION

- Breating technniques - 4,7,8

FOAM ROLLING/STRETCHING

- Restore/increase range of motion

OFF-FEET LOWIMPACT CARDIOVASCULAR WORK

- Increase blood circulation with reduced joint impact



Q&A
PRACTICAL TIME!

POST-WORKSHOP QUESTIONNAIRE

