Physical Fitness Development in the Adolescent Gaelic Games Athlete

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Lucozade

HANDBALL LIATHRÓID LÁIMHE

LGFA LADIES GAELIC FOOTBALL

Comhairle Cluiche Corr na hÉireann GAA ROUNDERS

Presentation Format

- General Introduction
- The Adolescent Athlete
- Long Term Athlete Development (LTAD)
- Adolescent-Adult Comparative Data
- Components of Fitness & their Development
- Sample Exercises
- Summary
- Q&A

Key Take-Home Message!!!

General Introduction

Performance in Gaelic Games

- Both Gaelic Football & Hurling/Camògie are inherently high intensity, multi-sprint, contact field sports
- Both rely on a variety of different performance-related, or fitness-related, components or attributes
- Examples of such attributes include speed, power, agility, reaction time, coordination, strength, aerobic & anaerobic endurance
- It is critical that the team trainer/coach can develop such attributes in conjunction with the sport-specific skills (& tactics) associated with the game itself ...

… INTEGRATED PRACTICE!!!

Rather than this …

Optimising Player Performance

Optimal Player Performance

PHYSICAL

MENTAL

TECHNICAL

TACTICAL

Integration & Balance

- Any sport, by its inherent nature, may predispose athletes to adapt solely to the specific demands of that game
- This reduces exposure to other performance attributes that may be very important to overall development & progression … leading to limitations in performance & possible movement restrictions
- Very often, physical limitations can lead to technical or perceived tactical weaknesses
- Therefore, ensure there is a balance between physical training & game-related contexts where appropriate

The Adolescent Athlete

Critical Understanding

- Effective & appropriate training programmes for adolescent athletes must take into account variables such as :
  - Age
  - Sex
  - Maturation
- In addition, training variables such as frequency, duration & intensity need to be carefully considered relative to the factors above

Critical Understanding

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  - Age

  - Sex

  - Maturation

- In addition, training variables such as ***frequency***, ***duration*** & ***intensity*** need to be carefully considered relative to the factors above

Multi-Sport/Activity Approach

- Adolescents should be encouraged to participate in a broad & varied selection of activities & sports

- Sport-specialisation (single-sport focus) should not take place until such athletes are in their mid-late teenage years …

… e.g. Paul O' Connell (rugby, swimming, golf)

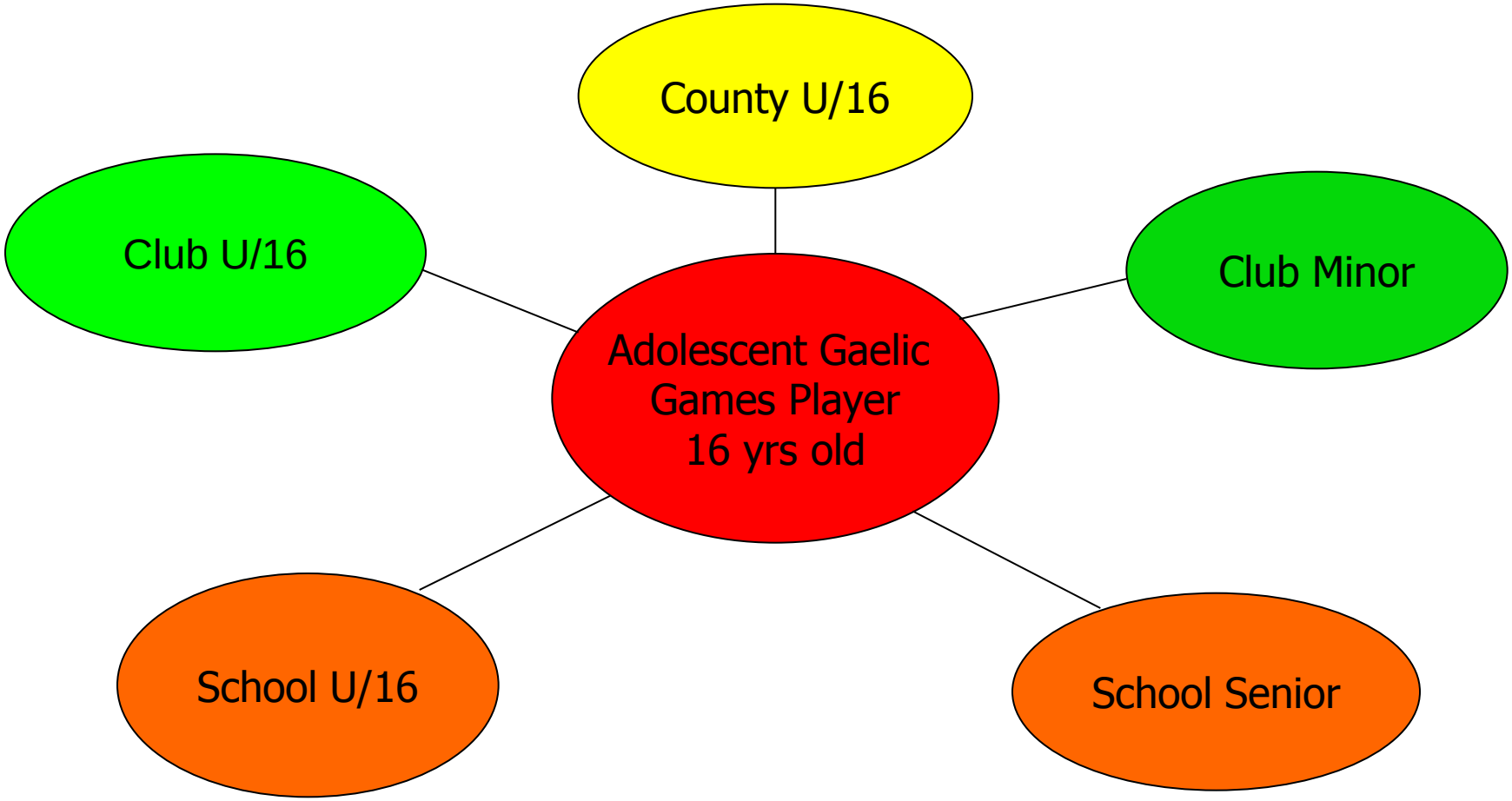
… e.g. Roy Keane (soccer, boxing)

… e.g. Michael Jordan (basketball, baseball, American football)

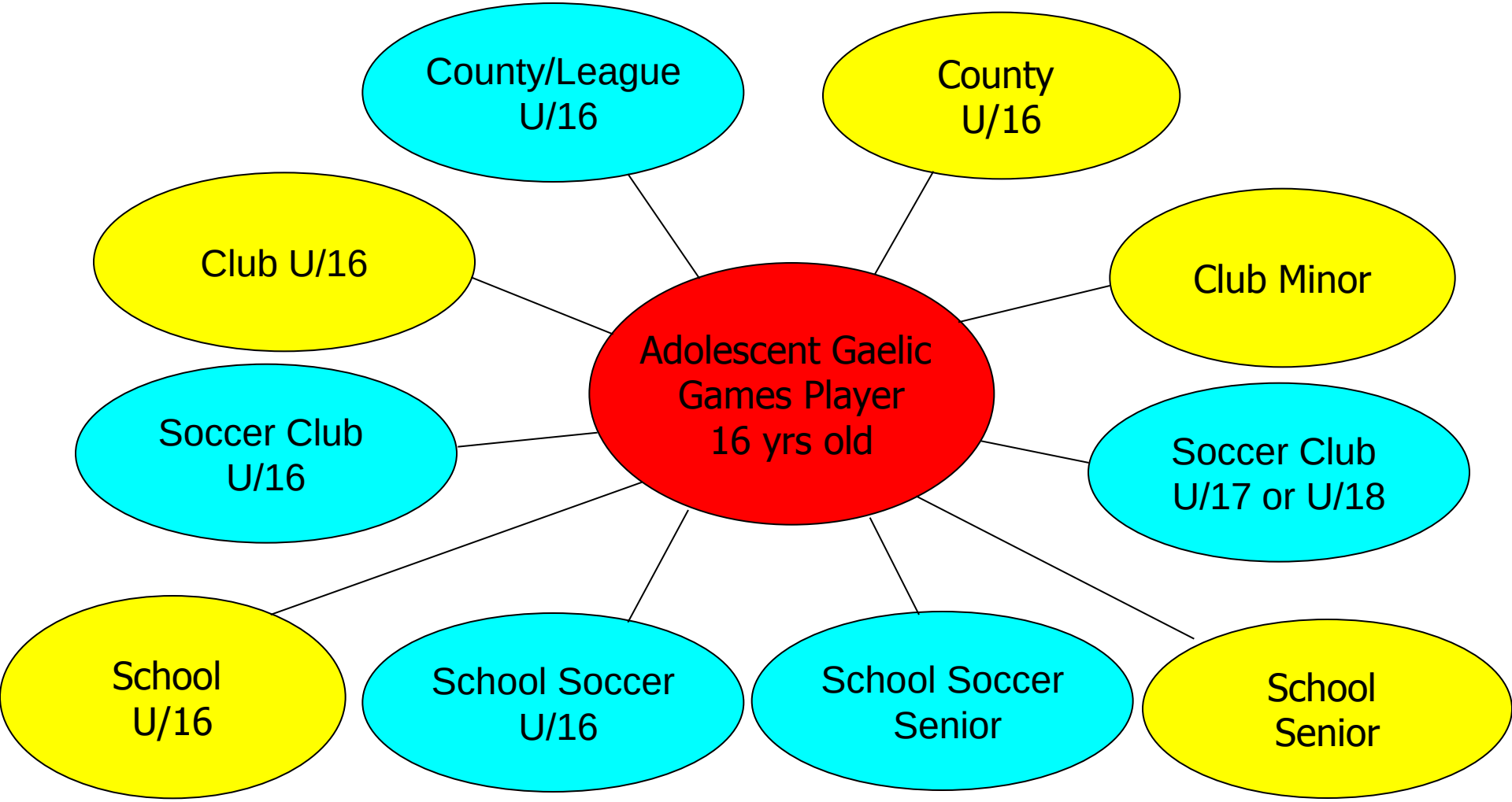
… e.g. Setanta O' hAilpìn (hurling, Gaelic Football, Aussie Rules)

- How does this tie in with the prevailing concern of over-training in the young athlete?

GAA Team Affiliation for a Typically Talented 16 Year Old Gaelic Games Athlete



…Who also Plays a 2nd Sport



Long Term Athlete Development Framework

(LTAD)

Long Term Athlete Development

(LTAD: Balyi, 1999)

Observations of Youth Athletic Development Worldwide

- Young developmental players under-train & over-compete
- Adult competition schedules are imposed on young players
- Adult training programmes are imposed on young players
- General motor skills are not learned before age 11 for females & 12 for males
- Training is geared for outcomes & not for the ‘process’ for the developmental players

Balyi, 2005

Fundamental Requirements

(Giles, 2005)

… a full comprehension of the fact that physical competence is inextricably linked to skill development

… physical competence should be developed slightly ahead of the skills at each training stage

"*you must have the physical competence to do the technical stuff & the technical qualities to do the tactical stuff … in that order*"

Movement Dynamics, 2005

Key Limitations

(Giles, 2005)

1. Flexibility

… greatest negative influence on progress across al exercise streams & progressions (functional flexibility)

Key Limitations

(Giles, 2005)

1. Flexibility

2. Inefficient Running Action

… both acceleration & maximum velocity (see Flexibility)

Key Limitations

(Giles, 2005)

1. Flexibility

2. Inefficient Running Action

3. Lack of Ability in Force Reduction

… exercise selection & progression must see force production, force reduction & force stabilisation developed via multi-joint, multi-direction & multi-plane activities

Movement Dynamics, 2005

Key Limitations

(Giles, 2005)

1. Flexibility

2. Inefficient Running Action

3. Lack of Ability in Force Reduction

4. Poor Exercise Technique

... in terms of progression, think (a) static to dynamic, (b) slow to fast, (c) simple to complex, d) unloaded to loaded

Movement Dynamics, 2005

Key Limitations

(Giles, 2005)

1. **Flexibility**
2. **Inefficient Running Action**
3. **Lack of Ability in Force Reduction**
4. **Poor Exercise Technique**

Athletic & Functional Development: Teens vs Adults

Table 1 ~ Results of a 20 test battery of Athletic Competence in 117 14-16 year-old athletes in Field and Court sports.

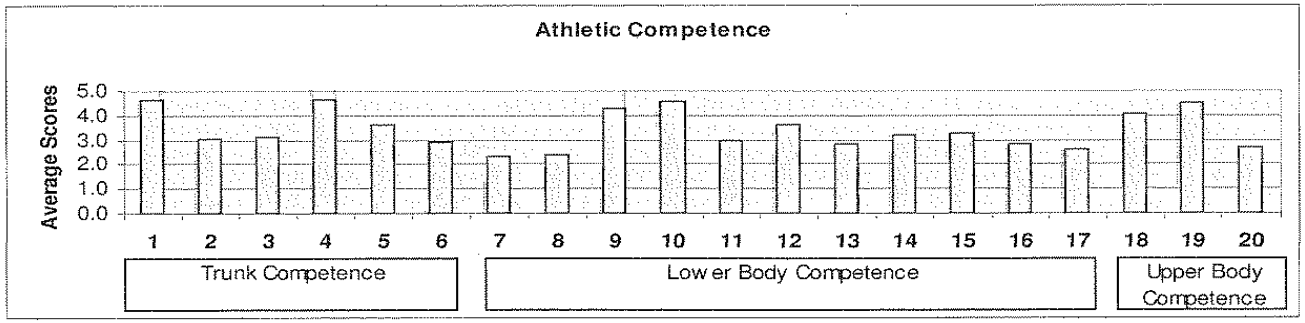


Table 2 ~ Results of a 17 test battery for Functional Competence in 117 14-16 year-old Athletes in Field and Court sports

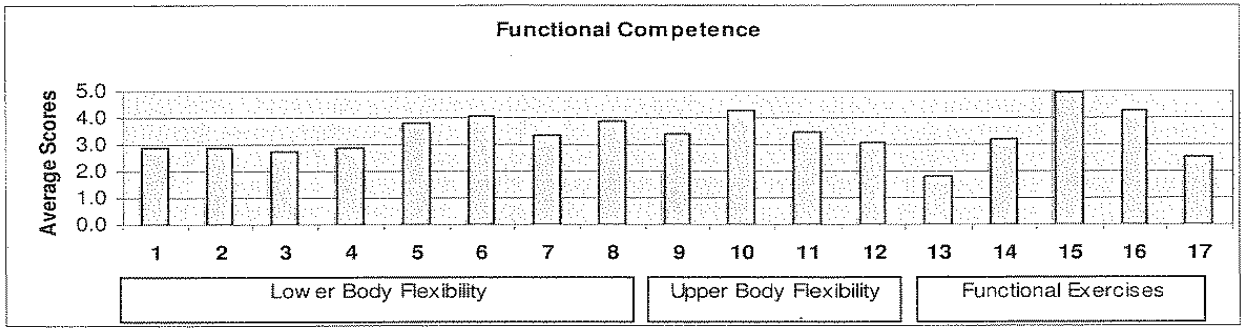
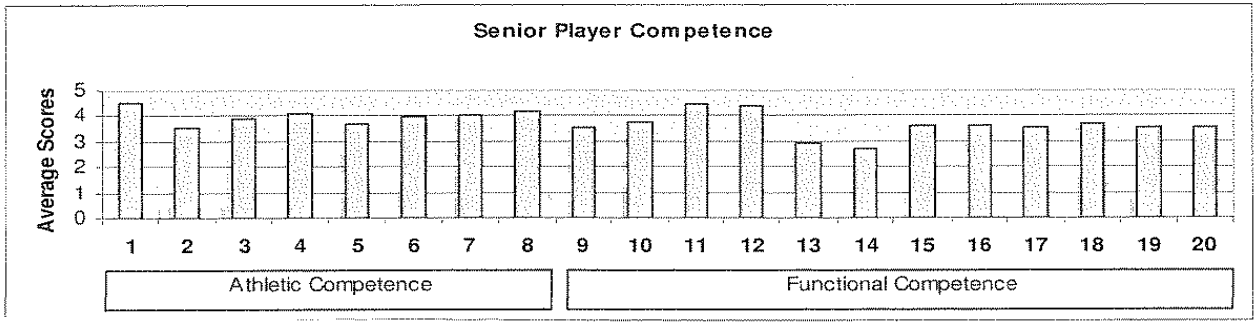


Table 3 ~ Results of a 20 test battery of Athletic and Functional Competence in twenty-five 18-32 year old male professional football players.



Adolescent-Adult Comparative Data

PhD Thesis Title

Seasonal Variation in the Physical Performance Attributes of Hurlers at Different Levels of Participation

Mr. Andrew Murphy BSc.
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University of Limerick

Study Introduction

- Human performance measurement widespread in all the major field sports
- Dearth of research in the sport of hurling in particular the youth athlete
- Relationship between physical performance indicators & level of playing performance
- Monitoring of physical performance across the season

Rationale & Purpose

1. Bridge the gap in the literature

2. Establish physical performance standards specific to hurling for coaches

3. Determine whether physical performance indicators distinguish between level of playing performance

4. Establish the physical performance indicators required to progress the youth player along the development pathway

5. Monitor the changes in physical performance indicators throughout the season

Methods

- 3 squads:
  - 1 senior inter county ….. n= (34)
  - 1 minor inter county …... n= (33)
  - 1 senior club …….... n= (28)

- tested at beginning of pre-season and again at pre-competitive phase of the season

Performance measures involved:

- Height, Mass,
- Broad jump, vertical jump, med-ball throw, triple bound,
- 10m speed,
- Max push up reps, 150 m shuttle & 20mst

Minor Inter County vs. Senior Club

(Pre-C/Ship)

Variable		Minor Inter County	Senior Club	Δ Difference	
Height	(m)	1.78	1.79	**-1**	**(cm)**
Mass	(kg)	78.8	82.9	**-4.1**	**(kg)**
Broad Jump	(m)	2.02	2.1	**-8**	**(cm)**
Vertical Jump	(cm)	34.44	35.17	**-0.73**	**(cm)**
Med-Ball Throw	(m)	5.22	6.44	**-1.22***	**(m)**
Triple Bound	(m)	7.06	6.96	**+0.1**	**(m)**
10m Sprint	(secs)	1.81	1.80	**-0.01**	**(sec's)**
Push Ups	(reps)	50.1	39.6	**+10.5***	**(reps)**
150m Shuttle	(m)	726	691	**+35***	**(m)**
20 MST	(level)	12:5	11:3	**+1:2***	**(level)**

Minor I/County vs. Senior I/County

(Pre-C/Ship)

Variable		Minor I/County	Senior I/County	Δ Difference	
Height	(m)	1.78	1.83	**-5**	**(cm)**
Mass	(kg)	78.8	85.3	**-6.5***	**(kg)**
Broad Jump	(m)	2.02	2.28	**-26***	**(cm)**
Vertical Jump	(cm)	34.44	35.61	**-1.17**	**(cm)**
Med-Ball Throw	(m)	5.22	6.56	**-1.34***	**(m)**
Triple Bound	(m)	7.06	7.56	**-50***	**(cm)**
10m Sprint	(secs)	1.81	1.73	**-.08***	**(sec's)**
Push Ups	(reps)	50.1	51.3	**-1.2**	**(reps)**
150m Shuttle	(m)	726	715	**+11**	**(m)**
20 MST	(level)	12:5	12:10	**-0:5**	**(level)**

Conclusion

- With regard to **local muscular**, **aerobic** & **anaerobic endurance**, inter-county minor hurlers demonstrate no sig. differences to those levels present in senior inter county players pre-competition
- However, measures of **speed** & **power** differentiate significantly between youth & senior inter county athletes
- With regard to club players (outside of height & mass), there were no sig. differences in 4/8 measures; with the minors demonstrating sig. greater scores in 3/8 measures
- Future structures & programmes should target the development of speed & power measures in conjunction with the previous development of endurance performance

Components of Fitness & Their Development

Components of Fitness

Health Related

- Cardiovascular Endurance
- Muscular Strength
- Muscular Endurance
- Flexibility
- Body Composition

Skill Related

- Speed
- Power
- Agility
- Reaction
- Coordination
- Balance

A Closer Inspection of Such Physical Demands

A Closer Inspection of <u>Such Physical Demands</u>

1. General Aerobic Capacity

… ability to sustain 70+ mins of game time

A Closer Inspection of Such Physical Demands

1. General Aerobic Capacity
2. Anaerobic / Speed Endurance

… ability to perform repeated sprints at max. intensity

A Closer Inspection of Such Physical Demands

1. General Aerobic Capacity
2. Anaerobic / Speed Endurance
3. Speed - Sprinting

… ability to cover ground in the shortest possible time

A Closer Inspection of Such Physical Demands

1. General Aerobic Capacity
2. Anaerobic / Speed Endurance
3. Speed - Sprinting
4. Speed - Agility

… ability to negotiate obstacles at speed & with accuracy

A Closer Inspection of <u>Such Physical Demands</u>

1. General Aerobic Capacity
2. Anaerobic / Speed Endurance
3. Speed - Sprinting
4. Speed - Agility
5. Power

… the speed at which we can exert force – explosion!!!

A Closer Inspection of <u>Such Physical Demands</u>

1. General Aerobic Capacity
2. Anaerobic / Speed Endurance
3. Speed - Sprinting
4. Speed - Agility
5. Power
6. Reaction Time

… time elapsed between stimulation & the reaction to it

A Closer Inspection of Such Physical Demands

1. General Aerobic Capacity
2. Anaerobic / Speed Endurance
3. Speed - Sprinting
4. Speed - Agility
5. Power
6. Reaction Time
7. Strength / Strength Endurance

… maximal force that can be exerted once/several times

A Closer Inspection of Such Physical Demands

1. General Aerobic Capacity
2. Anaerobic / Speed Endurance
3. Speed - Sprinting
4. Speed - Agility
5. Power
6. Reaction Time
7. Strength / Strength Endurance
8. Flexibility

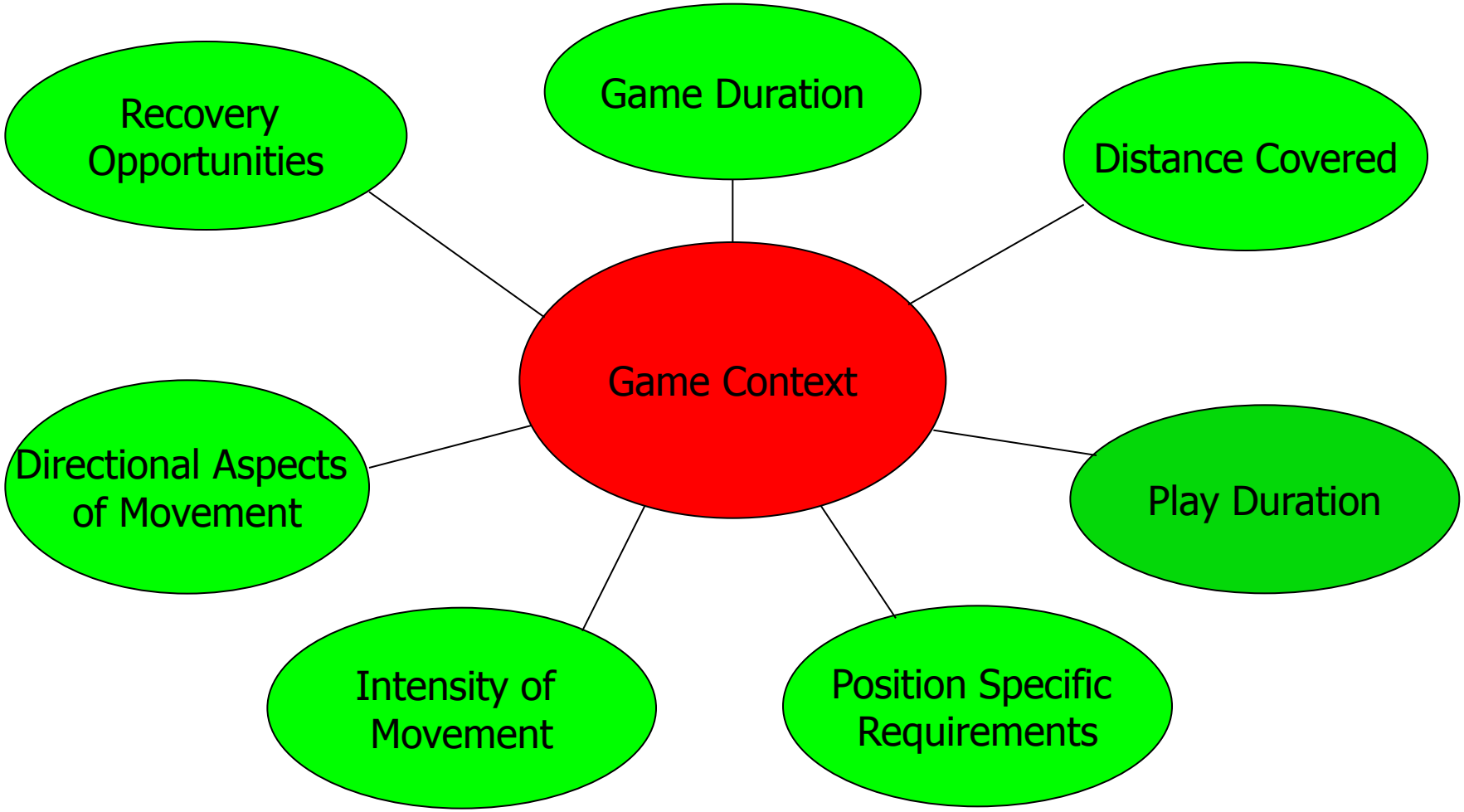
… the ROM available at a joint or multiple joints

A Closer Inspection of <u>Such Physical Demands</u>

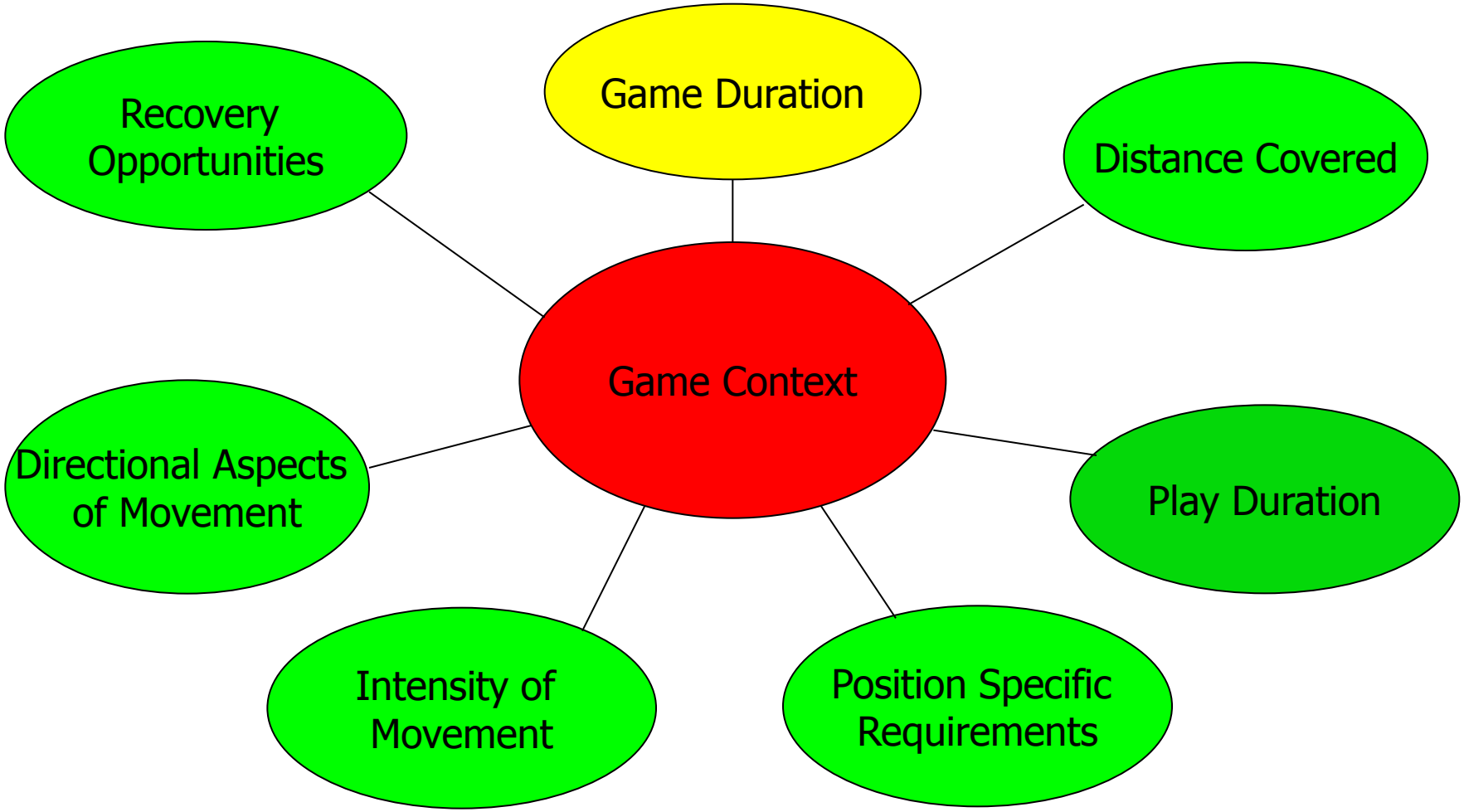
1. General Aerobic Capacity
2. Anaerobic / Speed Endurance
3. Speed - Sprinting
4. Speed - Agility
5. Power
6. Reaction Time
7. Strength / Strength Endurance
8. Flexibility
9. Body Composition

… the ratio of fat to fat free mass in the human body

General Game-Related Issues that ***should*** Influence Programme Prescription



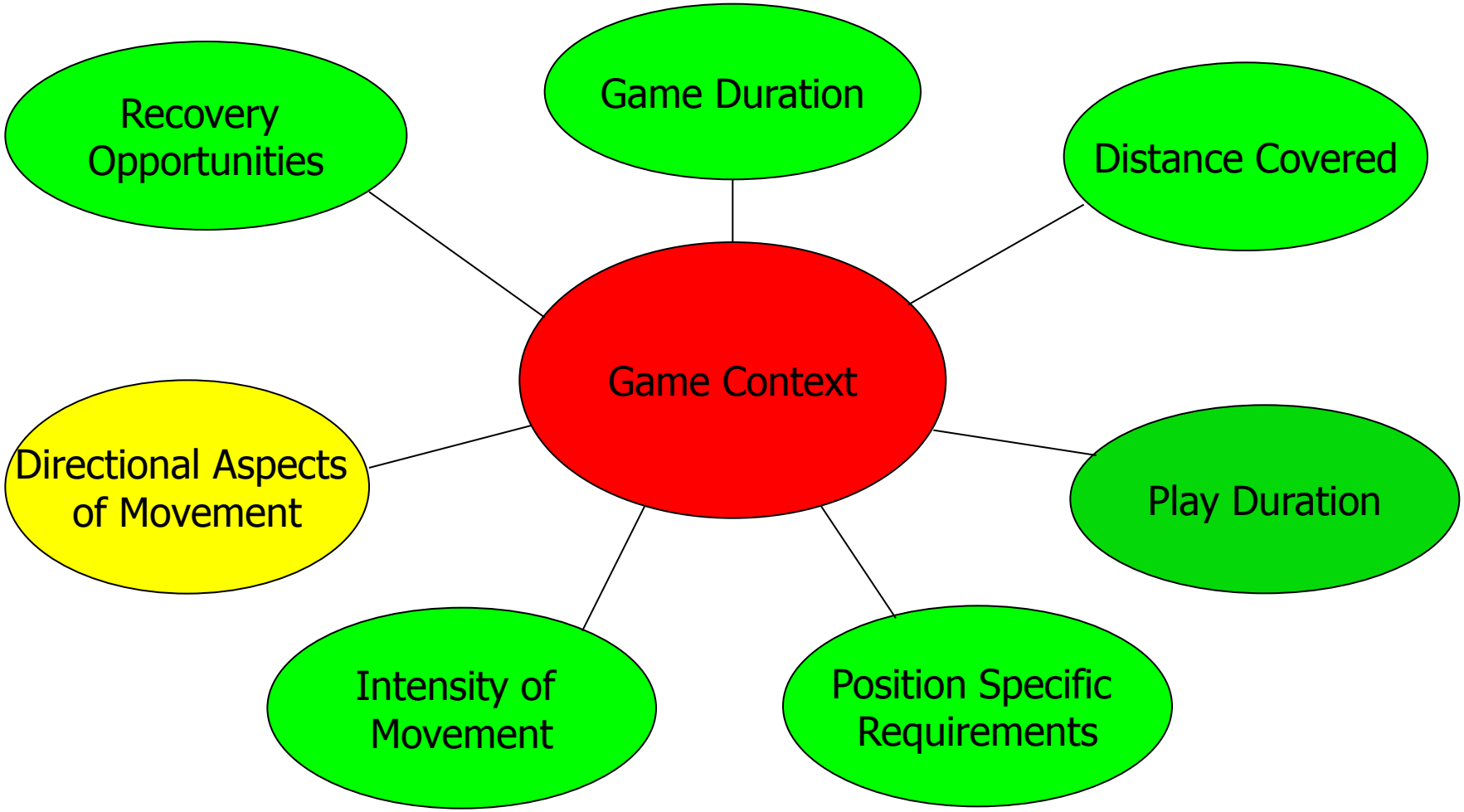
General Game-Related Issues that ***should*** Influence Programme Prescription



Non-Scientific … Common Sense Approach

1. Game Duration … does your training time exceed this in an excessive manner?

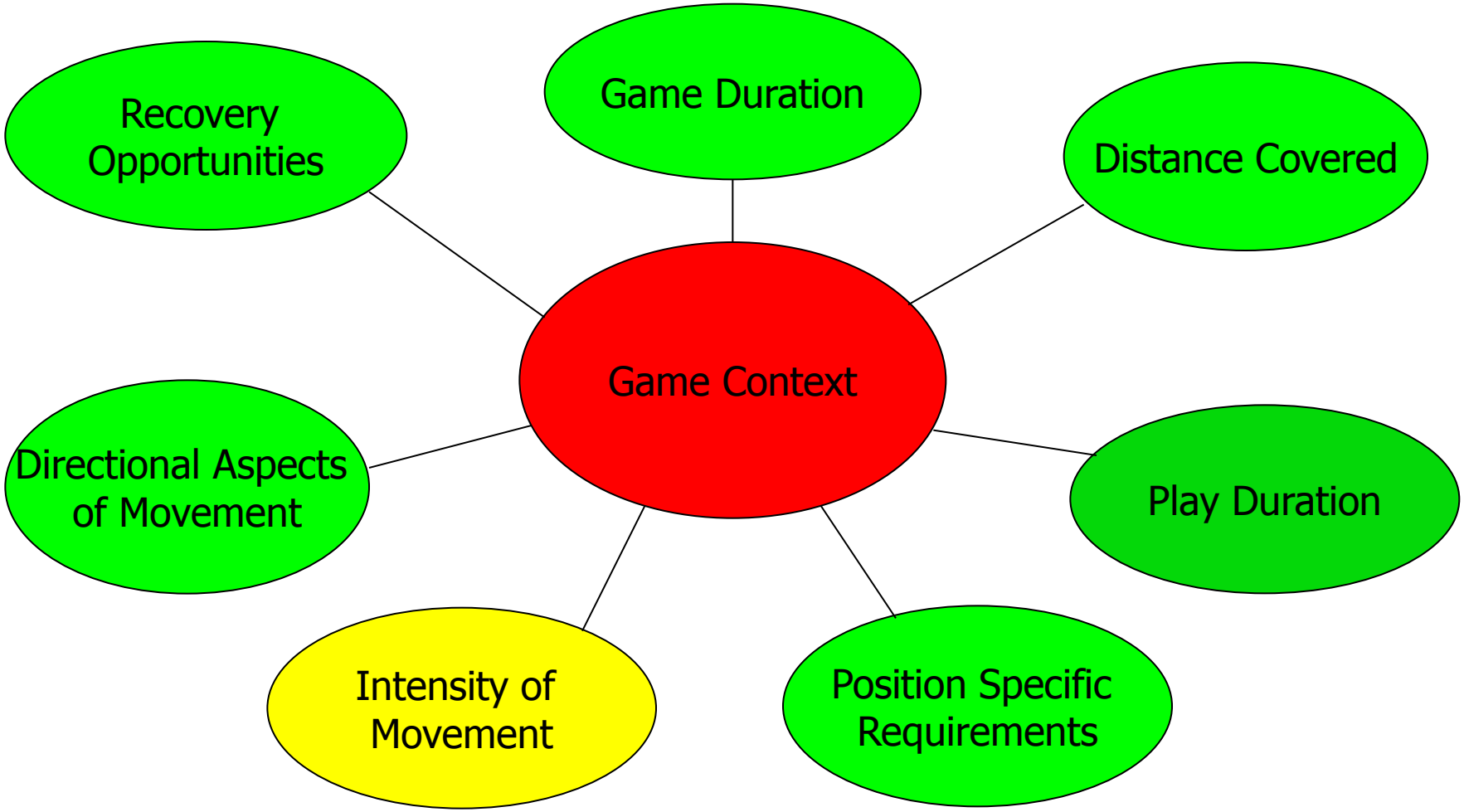
General Game-Related Issues that ***should*** Influence Programme Prescription



Non-Scientific … Common Sense Approach

1. Game Duration … does your training time exceed this in an excessive manner?
2. Directional Aspects of Movement … what movement patterns/spatial awareness challenges do you incorporate into your session?

General Game-Related Issues that ***should*** Influence Programme Prescription



Non-Scientific … Common Sense Approach

1. Game Duration … does your training time exceed this in an excessive manner?

2. Directional Aspects of Movement … what movement patterns/spatial awareness challenges do you incorporate into your session?

3. Intensity of Movement … what is the general intensity of your sessions? See (1) above

Sample Training Exercises

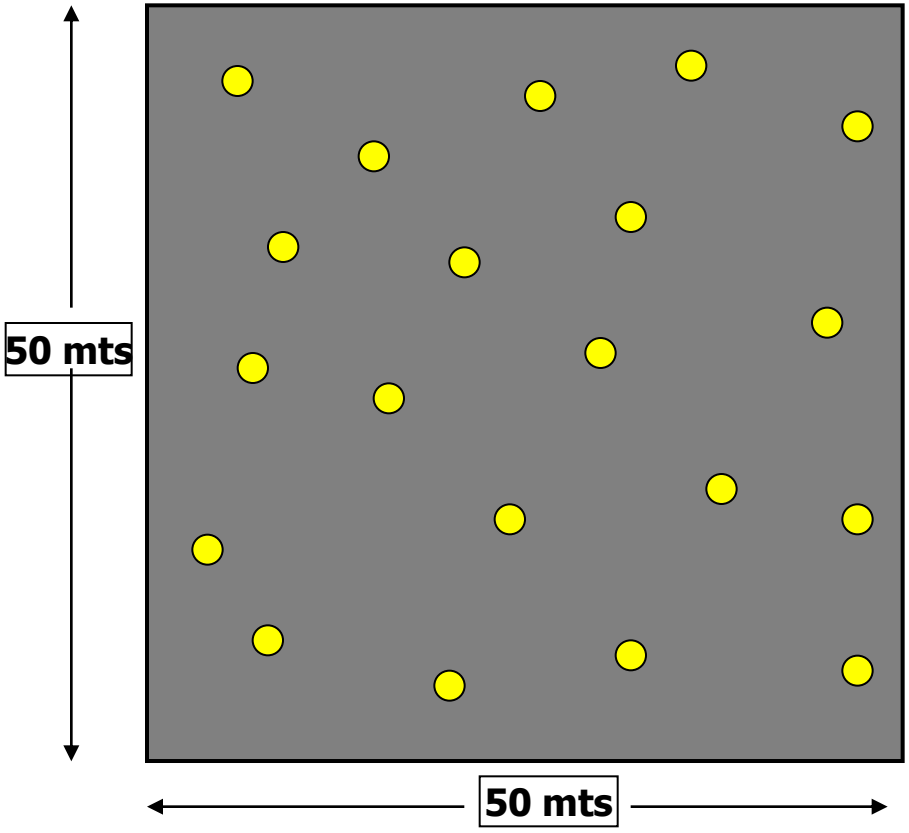
General Aerobic/AnAerobic Capacity

- Conditioned games at the most basic level (e.g. possession retention) to more complex challenges (e.g. game restrictions) can be incorporated into a session in an interval training type fashion

- The important factor here is the work to rest ratio (W:R), as with all interval training

Sample Conditioned Game

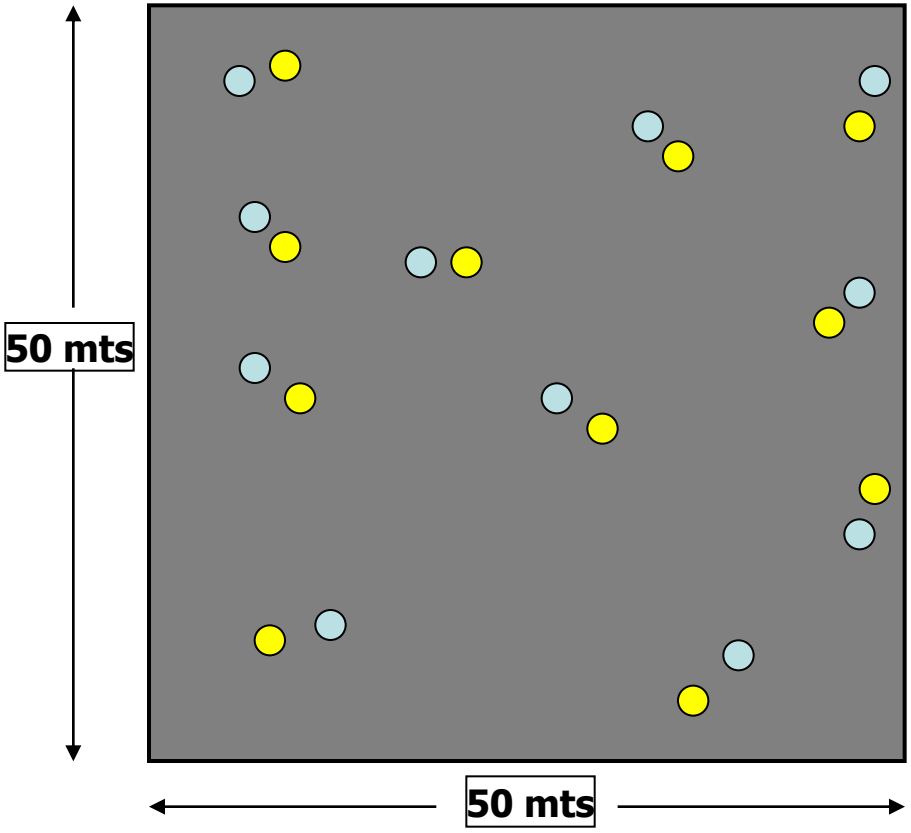
(Aerobic – 1a)



- Straight striking or hand pass game
- W:R ratio 1:2, e.g. 30 sec's @ 50%, recovery jog 1 min.
- Progress with either (a) work increase in time (b) recovery time decrease, (c) intensity increase or (d) repetitions / sets
- Introduce rules &/or restrictions to increase the game-specific challenge

Sample Conditioned Game

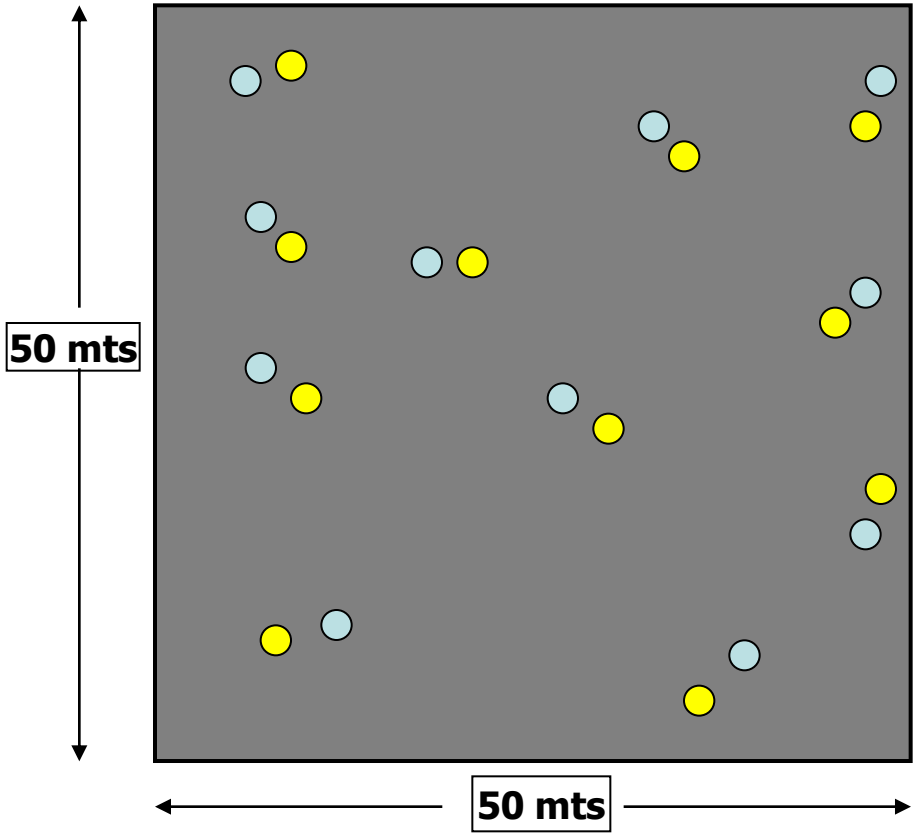
(Aerobic – 1b)



- Possession-based conditioned game versus opposition
- W:R ratio relative to the challenge imposed by the rules
- Progress as recommended in Conditioned Game (1a), as you deem appropriate
- Introduce rules &/or restrictions to increase the game-specific challenge
- Scoring mechanisms critical for opposition-based games like this

Sample Conditioned Game

(AnAerobic – 2a)



- The key differences in this context are:

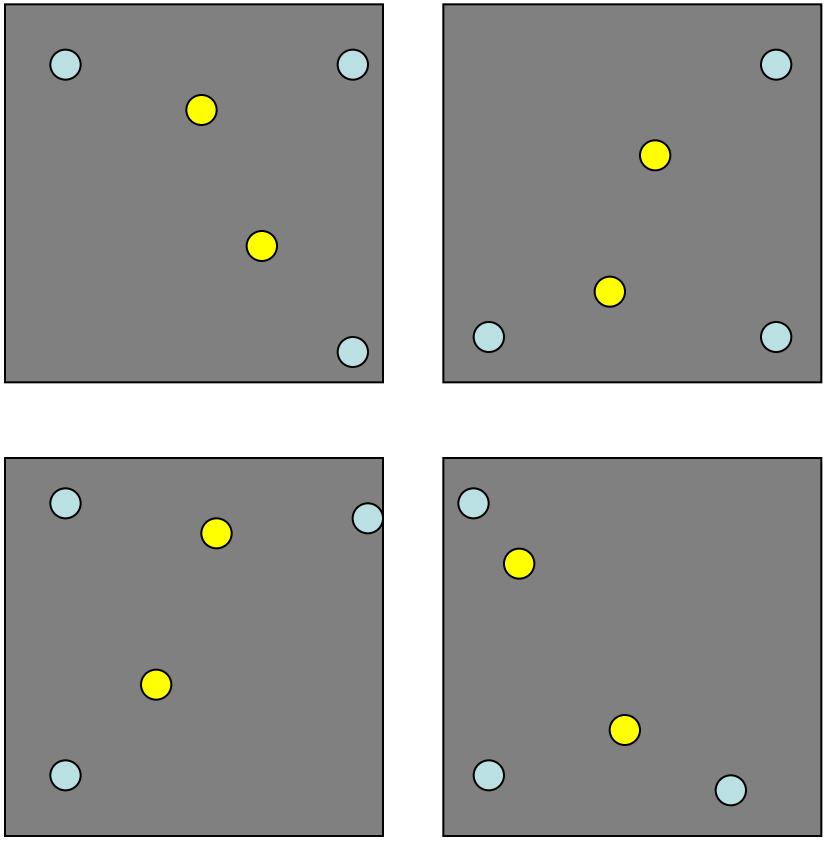
1) the W:R ratios & respective time allotments

2) the intensity of such conditioned games

3) the space in which these conditioned games are played

Sample Conditioned Game

(AnAerobic – 2b)



- The key differences in this context are:

1) the W:R ratios & respective time allotments

2) the space in which these conditioned games are played

… simple modifications to make the game more high intensity-based

- Introduce more varied game specific challenges, e.g. tackling

FLEXIBILITY

Fundamental Flexibility Development

- Flexibility is the ability to move a single joint or series of joints smoothly & easily through an unrestricted, pain-free ROM ...

- ... in a game specific context, sub-optimal flexibility can impact on speed mechanics, multi-directional movement & even gaining possession from various levels

- Therefore the 'type' of flexibility recommended for the Gaelic games athlete is that which is required to complete game-specific challenges optimally (see Agility)

SPEED

Fundamental Speed Development

- Due to the numerous & varied mechanics associated with ‘speed’ training, I will focus more on the development of the raw talent on a very basic level

- The emphasis needs to be placed on maximum effort over short distances, with maximum recovery

<u>For Example:</u>

Exercises : 2-3 (depending on developmental level)

Distance : 10-20m (with max recovery)

Sets : 2-4 (depending on complexity of exercises chosen)

Reps : 3-5 (per exercise)

Integrated Speed Development

Variables

Starting Positions

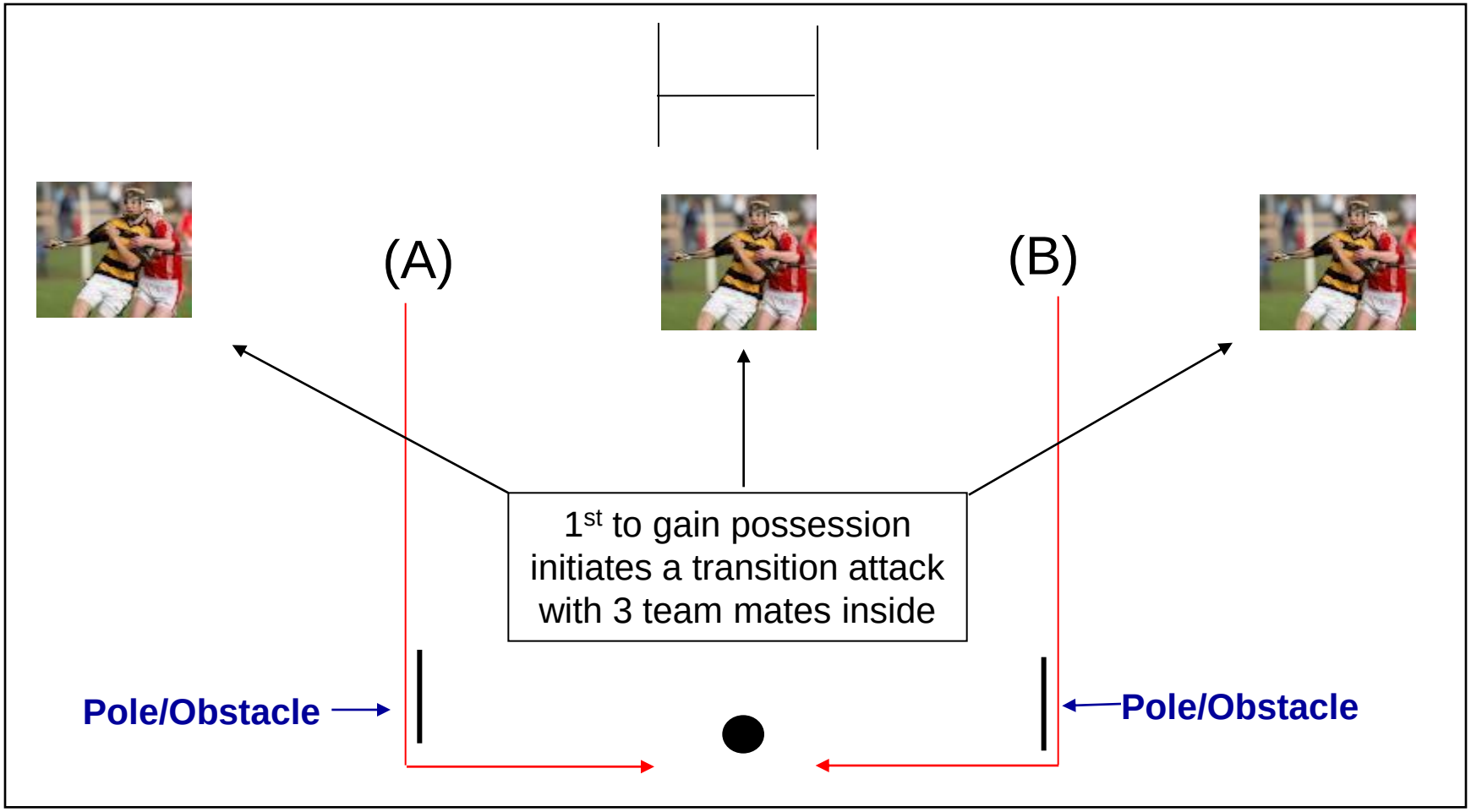
- ✓ Standing face forward
- ✓ Standing face away
- ✓ Sitting face forward
- ✓ Sitting face away
- ✓ Lying face forward
- ✓ Lying face away
- ✓ Resisted by partner

Game-Related Focus

- ✓ Sprint/pick/travel
- ✓ Sprint/pick/pop pass
- ✓ Sprint/pick/strike
- ✓ Sprint/receive/travel
- ✓ Sprint/receive/return pass
- ✓ Sprint/turn/receive/sprint
- ✓ Sprint/turn/receive/pass

THEN LINK WITH GAME-RELATED CHALLENGES!!!

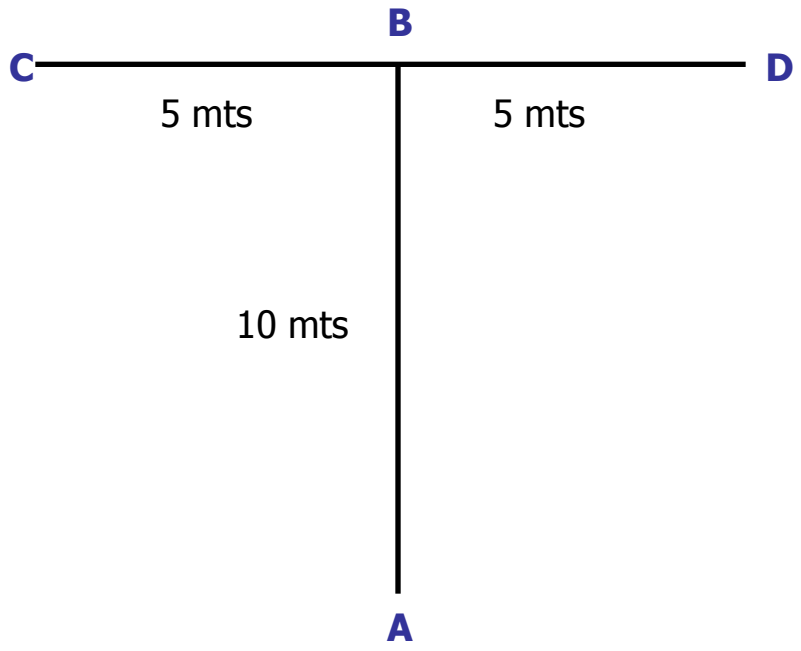
For Example …


(A)
(B)
1st to gain possession initiates a transition attack with 3 team mates inside
Pole/Obstacle
Pole/Obstacle

AGILITY

Integrated Agility Development

T-Drill



Options

a) Sprint A-B, slide left B-C, slide the opposite direction C-D, slide back D-B, sprint reverse B-A

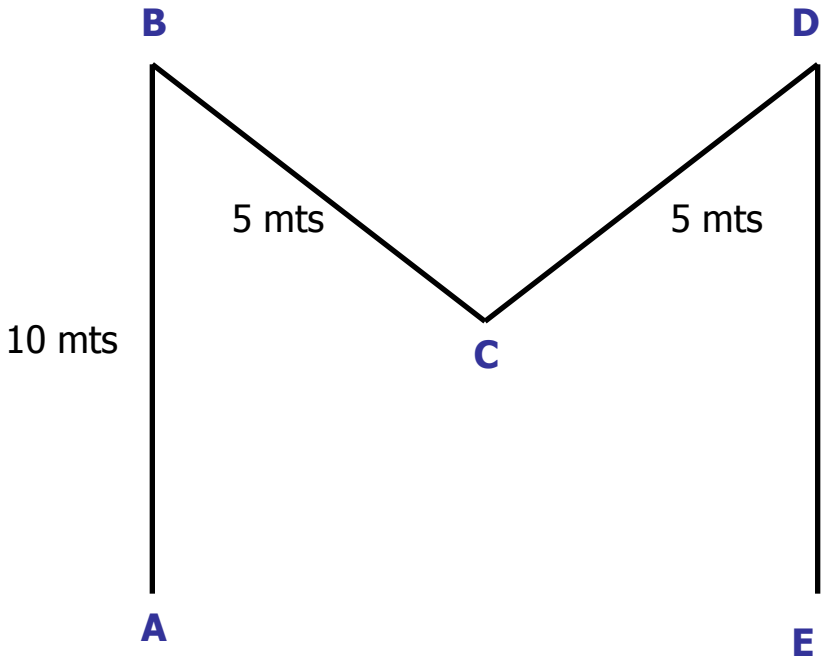
b) Same pattern but with a straight sprint

c) Sprint solo with a drop before each turn & pick up after each turn

d) Receive a pass following each turn while on the move at speed

Integrated Agility Development

M-Drill



Options

a) Sprint A-B, reverse sprint B-C, sprint forward C-D, reverse sprint D-E

b) Same pattern but with a straight sprint

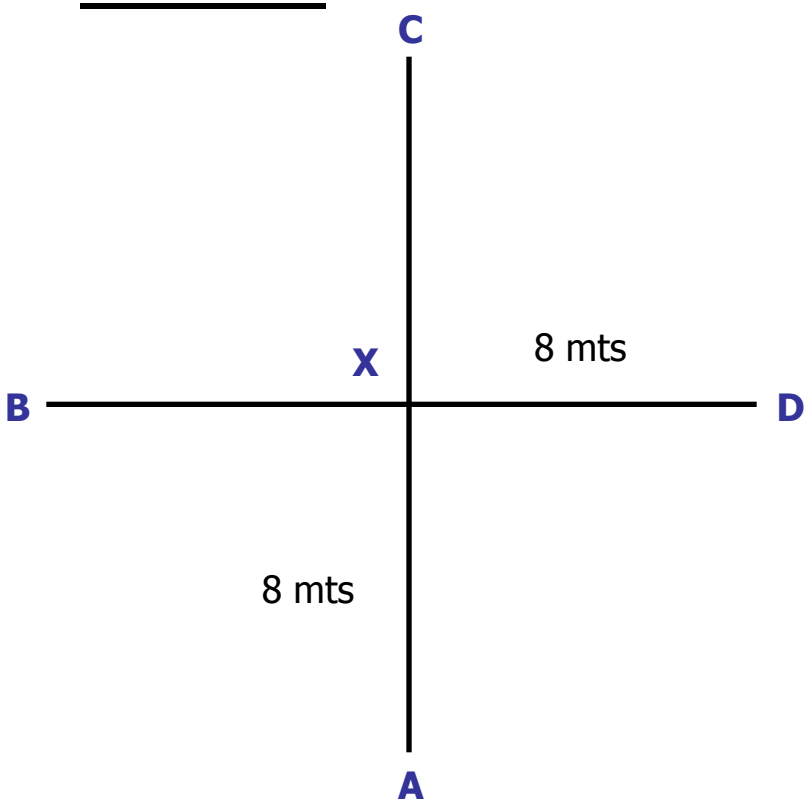
c) Sprint solo with a drop before each turn & pick up after each turn

d) Receive a pass following each turn while on the move at speed

Note: Remember to alternate sides

Integrated Agility Development

Star-Drill



Options

Note: Always turn off ‘the same’ foot at the centre & the ‘other foot’ at the periphery

a) Same pattern but change turns at both the centre & periphery

b) Sprint solo with a drop before each turn & pick up after each turn

c) Receive a pass following each turn while on the move at speed – return pass at the centre

P O W E R

19 September 2010; The four midfield players, Alan O'Connor and Aidan Walsh, right, Cork, and Peter Fitzpatrick, left, and Kalum King, all jump for a dropping ball. GAA Football All-Ireland Senior Championship Final, Down v Cork, Croke Park, Dublin. Picture credit: Ray McManus / SPORTSFILE

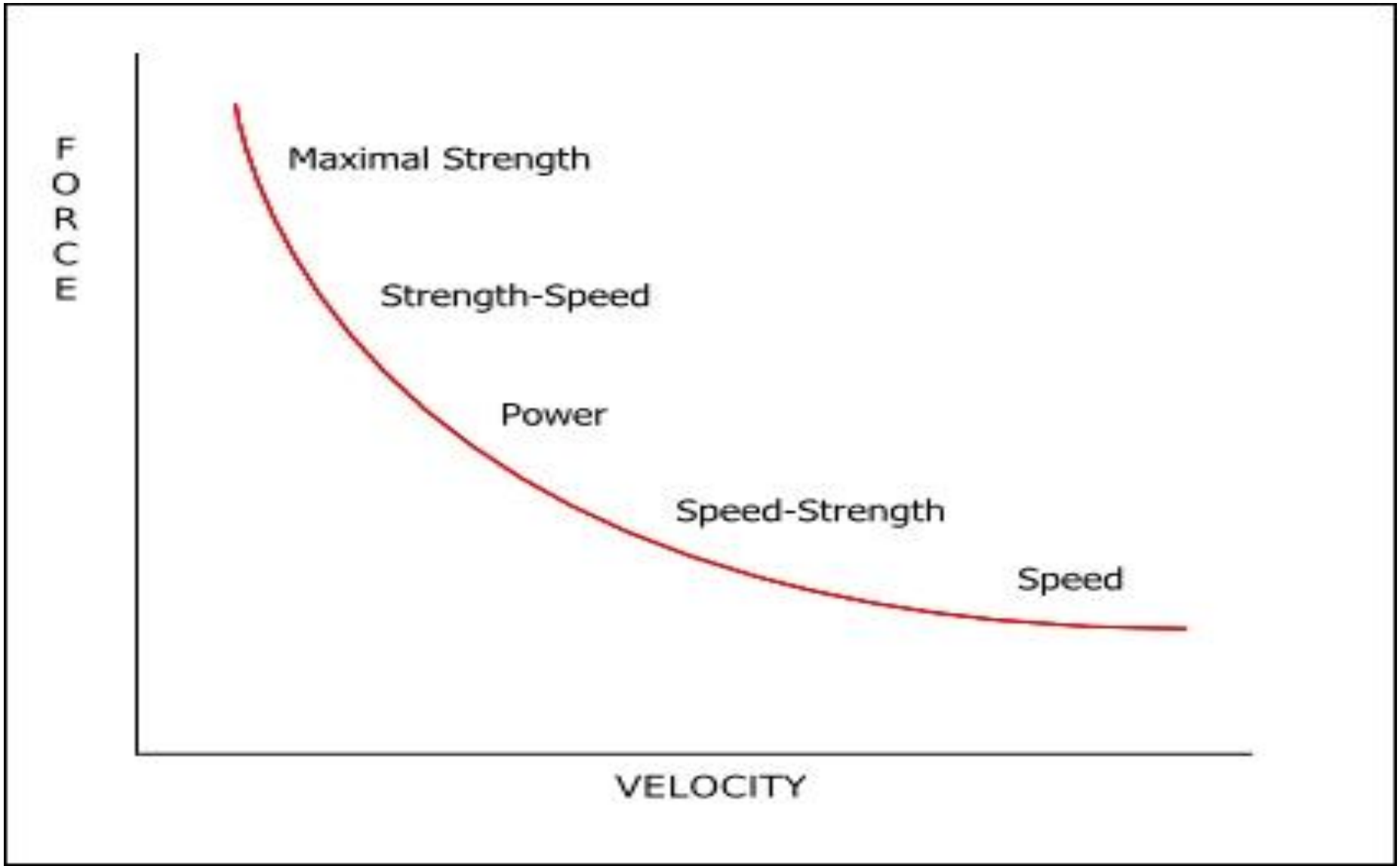
Fundamental Power Development

- A fundamental definition of power may be described as the force one exerts **X** the speed of the force exerted …

… in a games context, this could be related to the explosive force utilised to field a high ball & the speed of such an action

- Power-based training creates specific increases in muscle activation & rates (speed) of force development

Force-Velocity Curve



Power-Based Training Guidelines

- Particularly emphasis must be played to ‘force absorption & reduction’

- The emphasis should always be placed on the ‘**quality**’ of movement rather than ‘**quantity/complexity**’ of movements

For Example:

Exercises	:	3-5 (depending on state of readiness)
Sets	:	3-5 (depending on complexity of exercises chosen)
Reps	:	3-5 (per exercise)

Sample Power Exercises

Hoops

- ✓ Hops
- ✓ Leaps
- ✓ Bounds
- ✓ Directions
- ✓ Patterns
- ✓ Reaction Work

Body Weight

- ✓ Squat Jumps
- ✓ Tuck Jumps
- ✓ Split Squats
- ✓ Plyo Hops
- ✓ Plyo Bounds
- ✓ Plyo Push Ups

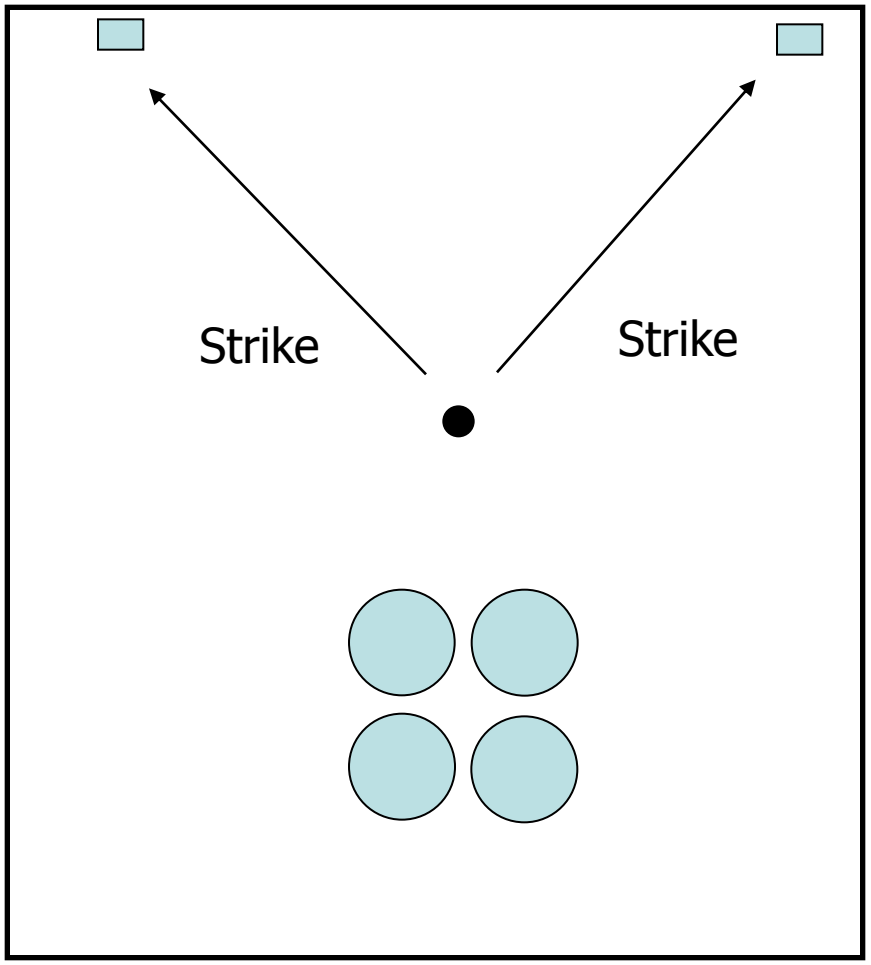
Med. Balls

- ✓ Overhead
- ✓ Chest
- ✓ Rotation*
- ✓ Plyo Throws
- ✓ Unilateral
- ✓ Bilateral

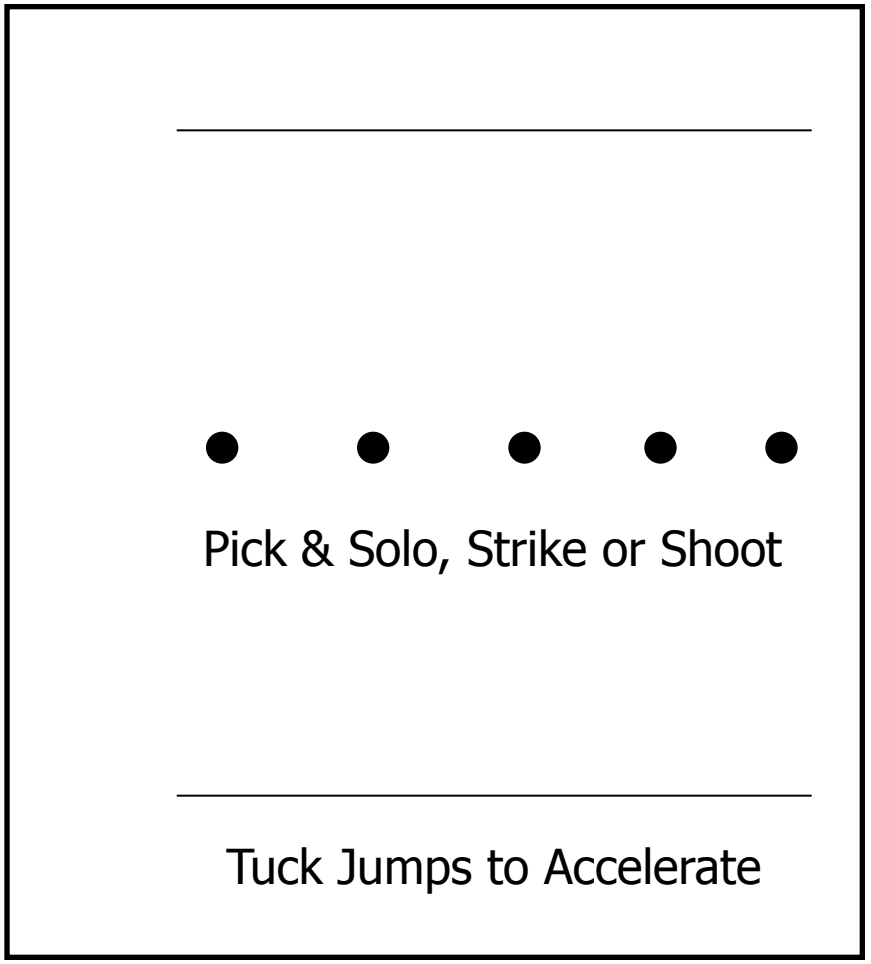
THEN LINK WITH GAME-RELATED CHALLENGES!!!

For Example …

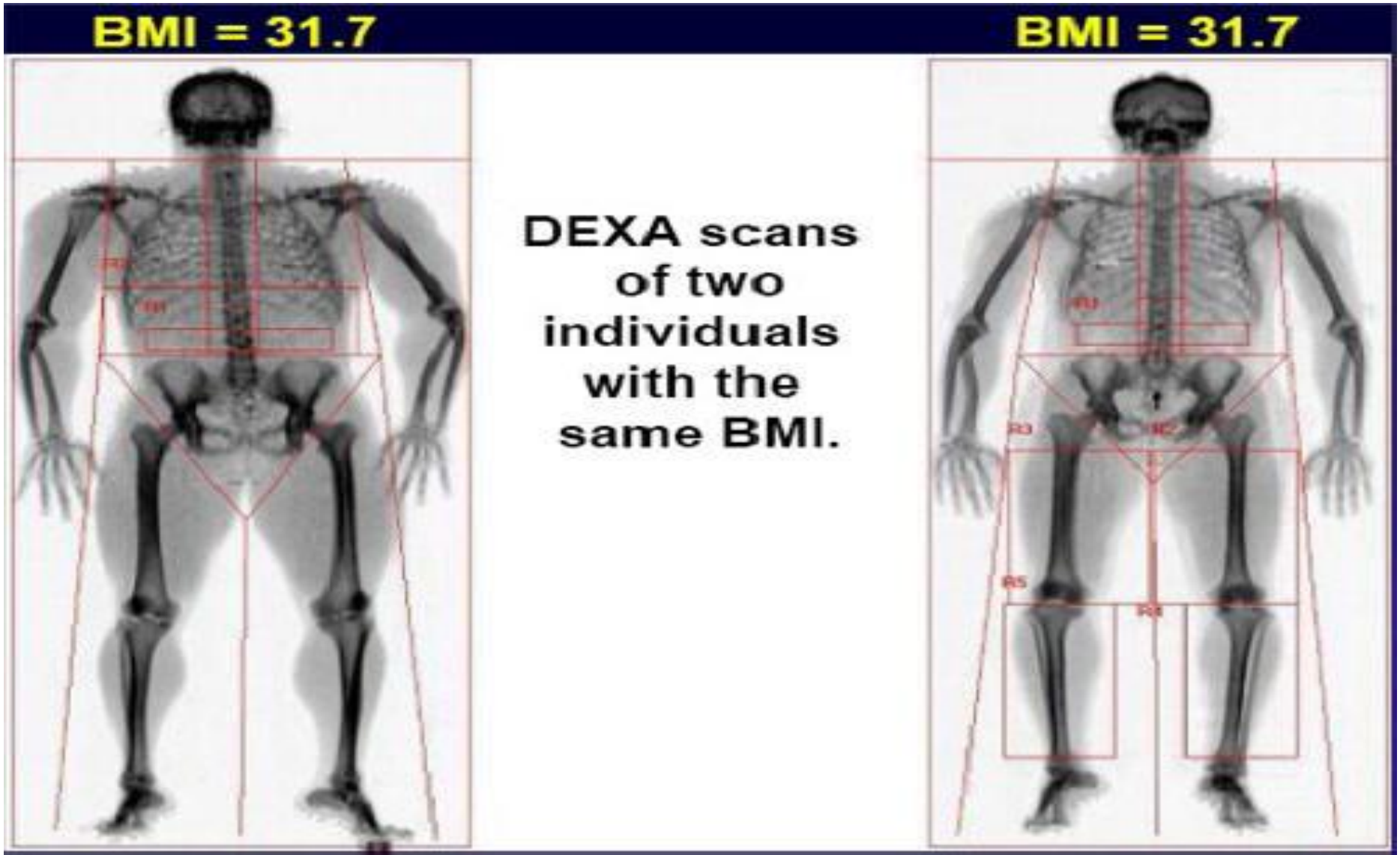
(a)



(b)



Body Composition



Body Composition

- If all the other fitness components are being developed appropriately, & positive diet, nutritional & lifestyle habits are adhered to …
- In short, excess body fat will hinder performance as it does not contribute to muscular force production, & it is additional weight that requires energy to move about
- On the other hand, muscle mass is one of the prime contributors to force production & also helps to withstand heavy tackles & other contacts

Seasonal Body Comp. Data

Sample Player Categorised Data

	Tissue Type	Pre-Season	Post Pre-Season	Mid-League	Pre-C/Ship	Pre-All Ireland
Well Conditioned	Fat Tissue	9.6	9.3	10.0	9.3	10.3
	Lean Tissue	68.1	68.5	69.8	67.6	68.6
Un – Conditioned	Fat Tissue	31.1	30.4	28.4	25.7	23.1
	Lean Tissue	67.9	70.1	69.4	70.6	72.0
Post Injury	Fat Tissue	26.0	26.6	24.9	20.9	21.3
	Lean Tissue	63.0	63.1	62.7	67.7	65.5

Summary

Fitness Components Summary

- The primary components of fitness are broad & varied
- As a trainer/coach/manager, you must decide upon how to approach your training season in terms of the what's/how's/when's … this is known as periodisation
- Once you have done this, you can then decide on the specifics in terms of what your priorities are
- But remember, your training programme ***should*** reflect what happens in a standard game of Gaelic football / hurling / camogie & not on what you think 'might' be going on

Integrated Training Summary

- Ensure that there is a balance between physical training & game-related contexts where appropriate

- Very often, physical limitations can lead to technical or perceived tactical weaknesses

"*you must have the physical competence to do the technical stuff & the technical qualities to do the tactical stuff … in that order*"

Movement Dynamics, 2005

The Adolescent Athlete

- Effective & appropriate training programmes for adolescent athletes must take into account variables such as :

  - Age

  - Sex

  - Maturation

- In addition, training variables such as **frequency**, **duration** & **intensity** need to be carefully considered relative to the factors above

Key Take-Home Message!!!

Adolescents are

NOT

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… so don't treat

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