C RE A·I·M

Connect - Challenge - Elevate

An educational resource for growing youth athletes

Unit 2 – Core A.I.M.™: A Systematic Approach to Youth Athlete Management

Unit 2 – Objectives

Understanding the Core A.I.M.™ systematic approach to managing youth athletes.

1. The background and need for development of a systematic approach.
2. Introduction to tools developed: The Foundational Screen and the role it plays in the G.R.O.W.T.H. Framework for youth athlete management.
3. The indications for utilization for The Foundational Screen as an adjunctive tool.
4. The questions they provide answers regarding your athlete
5. A position and phase specific breakdown of the Foundational Screen's interpretations.

Athlete's are getting stronger, faster and more powerful, yet there is a rising concern that they are potentially missing out on key movement pre-requisites. Without core stability, movement accessibility and movement sequencing, a body does not have the proper foundation to control and support higher intensity athletic movements. As such, tissues may end up breaking down from repetitive overloading. With this in mind, we have developed an athletic integrated movement screening process called the Foundational Screen that provides practitioners, coaches and athletes insight on foundational movement. Specifically, the Core A.I.M.™ Foundational Screen provides a quantitative scoring system on how an athlete is able to obtain and sustain body positions, transition into and out of these positions and move with awareness and dynamic control. The Foundational Screen focuses on three functional positions to capture an athlete's movement tendencies – SQUAT stance, STRIDE stance and STRETCH stance (both vertical and horizontal).

Core A.I.M.™: A Systematic Approach

These positions can be observed across a wide range of sports. Practitioners, coaches and athletes can easily identify these three positions, and the assessment components within each of these provide valuable, three-dimensional perspectives on the athlete's movement. The data collected and the information gained is easy for all to understand, enhancing the opportunity for integration and communication during athlete management. We know that success comes when teams work together. Teamwork requires a common understanding and a unified direction, so we developed the Foundational Screen to take into account all perspectives. This ensures that all key members can easily relate, and therefore integrate and communicate which allow connection – the key to success.

Once trained in the Core A.I.M.™ Foundational Screen, you will have a systematic approach to score athlete integrated movement that is quantitative, easy-to-administer, convenient and cost-effective. This is not meant to replace motion capture analysis or biomechanics, both of which are extremely valuable in our field but not easily accessed and interpreted by all. Instead, this Foundational Screen empowers you to develop your coaching eye and enables you to use your movement analysis skills to recognize patterns in an athlete's movement. It is also more easily understood by coaches and athletes increasing buy-in at all levels. The assessment process is broken down into positions, which vary in their bases of support. We recognize that sport is neither stationary nor confined to these positions, but the ability to isolate and sustain, as well as transition through these foundations enables your athlete to then layer on variability and increase movement capacity in all positions and planes.

When reviewing your athlete's data, the recording system allows you to view trends in a number of different ways. In addition to breaking it down into the SQUAT, STRIDE and STRETCH stances, observable trends may appear in the body's capacity to obtain and sustain these positions, or in the body's awareness and control in all three planes of movement. This enables you to analyze the athlete and identify any potential for break down. From this data, if an inability to obtain a position is identified, you have the option to dive into the orthopaedic assessment.

Core A.I.M.™: A Systematic Approach

The style of the Foundational Screen is practical and efficient, which allows the opportunity to look at a variable across all positions and see any movement trends. Conveniently during re-assessment, you can choose to complete the entire screen, or you can choose to simply identify an area of weakness, be it position-based or variable-based, and then re-assess that portion on its own. Administered in either a clinical or a team setting, the Foundational Screen directs your athlete programming, helping to build foundations to support your explosive athletes. Exercise prescription options are offered but with room for creativity when developing a program to address and target the identified movement deficiencies within each athletes' current movement profile.

The Core A.I.M.™ Foundational Screen is about the journey. The system is engaging and athlete-friendly, as they enjoy capturing their baseline scores. It gives athletes an easy visual target that they can feel, see and transfer to their sport, which motivates them to pursue their goals and succeed in improving their overall movement and athletic performance.

Becoming trained in the Core A.I.M.™ Foundational Screen and the SWEAT Stance™ movement training system empowers practitioners, coaches and athletes to adopt an understanding of movement foundations and progressions, giving them the ability to challenge athletes in both stationary and dynamic positions required in sport. The system provides quantitative scoring for athlete integrated movement that is easy to administer, clearly communicates results, guides athlete programming and achieves team member buy-in.

Core A.I.M.™: A Systematic Approach

An Adjunct Assessment Tool

G
R
O
W
T
H

For years, research has identified the evaluation of movement quality & motor control as important contributing factors in ACL rehabilitation & RTP decision making. Still, there is little contribution from assessments, screens or objective tests in this area. Core A.I.M.™ has developed the Foundational Screen with the intention of filling this gap, & aiding in athlete movement analysis. It has been designed for use as an adjunct to the current testing batteries that exist in the realm of performance & rehabilitation.

Gather knowledge.

- Know your athlete's profile; complete the Foundational Screen; know your own skill set

Relay & relate it.

- Create accountability; make it meaningful for 3 perspectives – athletes, coaches & practitioners

Outline the process.

- Common process with set expectations for everyone involved; optimize results through role clarity & buy-in

Work with purpose.

- Recall stages & intentions – motor learning, rehab, performance? Work the purposeful plan laid out

Teach & train together.

- Integrated approach with all 3 perspectives – athletes, coaches & practitioners; evaluate, collaborate, sustain, repeat

Highlight successes.

- It's about the journey – celebrate progress; evolve & adapt as required

A Framework for Athlete Management

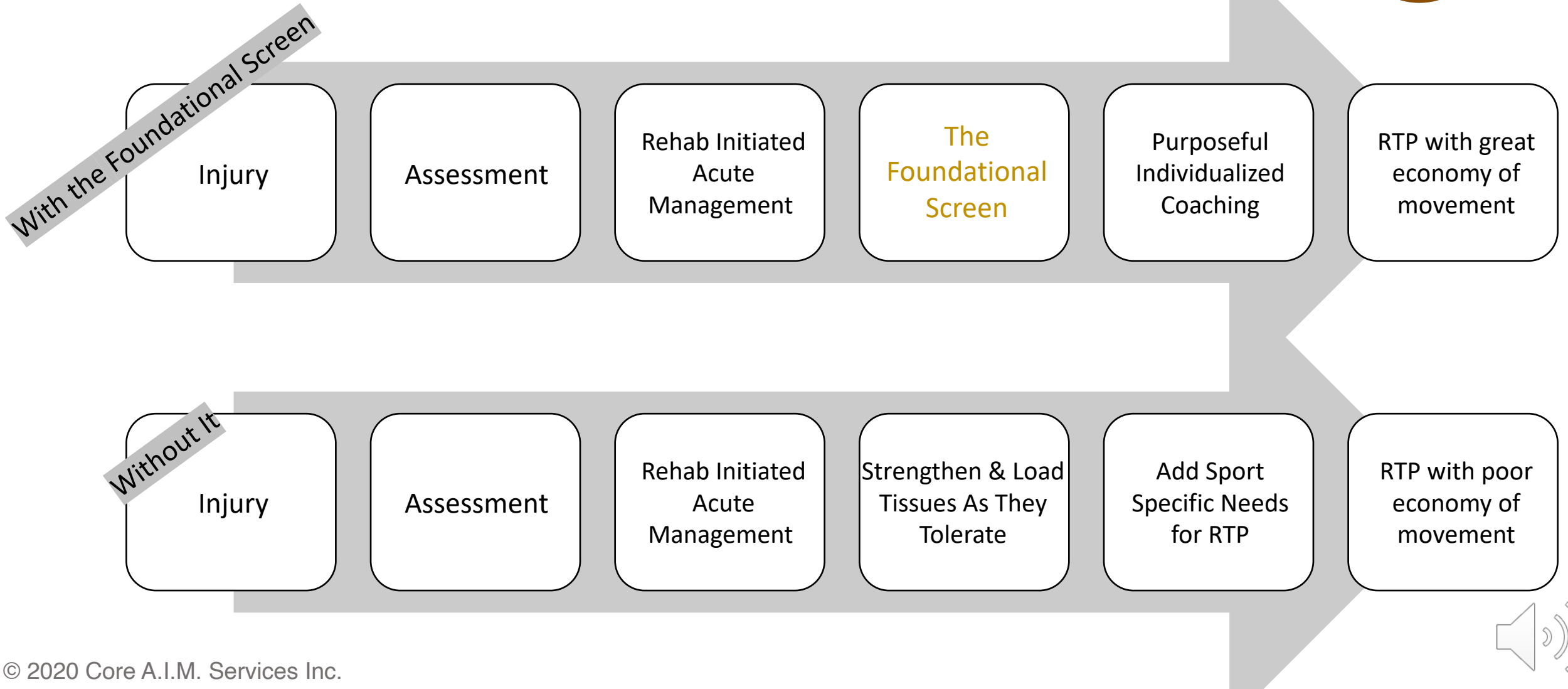
A Framework for Athlete Management

G – Gather knowledge.
R – Relay & relate it.
O – Outline the process.
W – Work with purpose.
T – Teach & train together.
H – Highlight successes.

The Foundational Screen – Utilization

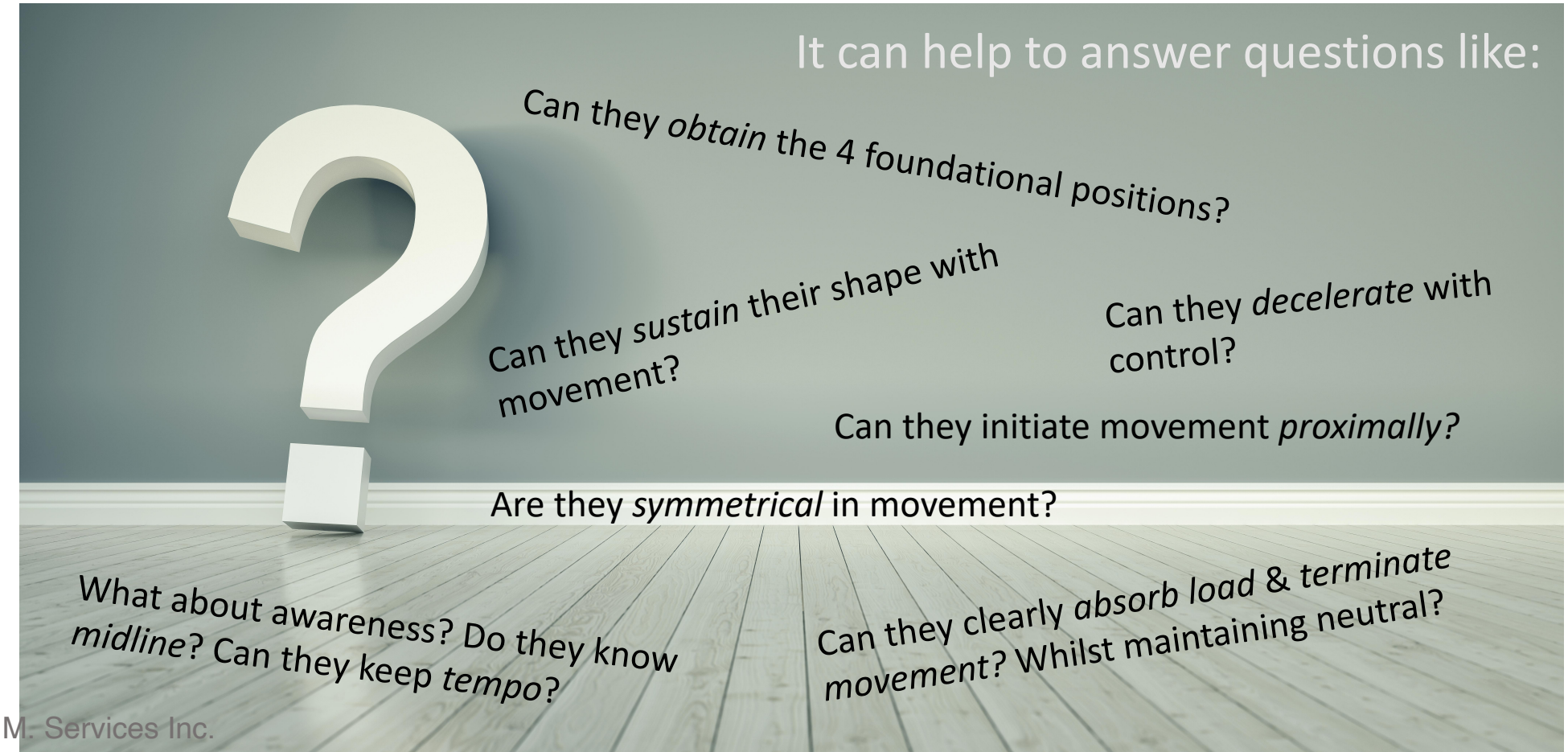
- To fill a gap in accessible & therapist-reliant movement assessment tools
- To perform as an adjunct assessment tool for objective strength testing whilst contributing valuable information concerning the athlete's foundational movement control tendencies to add to a comprehensive testing battery
- To act as a teaching tool to help coaches develop their eye for movement quality
- To motivate athletes to build foundational & sequential movement patterning
- To obtain baselines for an individual athlete, using a systematic & quantitative approach for movement observation
- To engage coaches, trainers, therapists & athletes alike in a collaborative, novel & eclectic process of athlete development, bringing all parties back to basics & propelling them in the right direction for management of growing youth athletes

The Foundational Screen – Rehabilitation Pathway

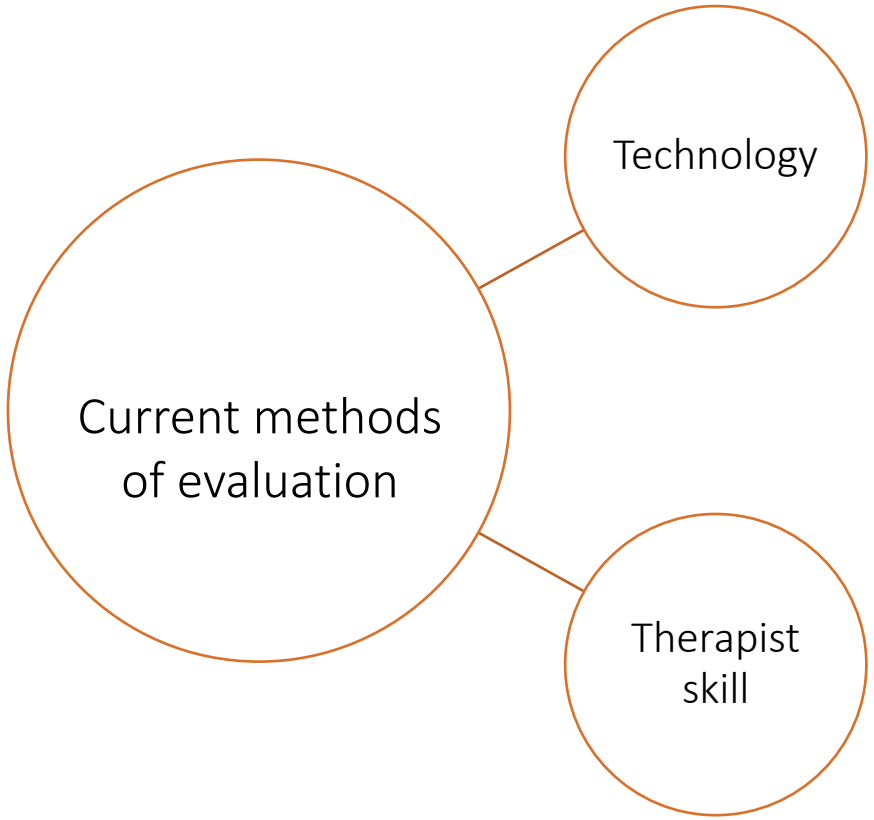


What Does the Foundational Screen Capture?

The screen captures the movement *tendencies* of the athlete



Where Does the Foundational Screen Fit?



- 3D biomechanics**
- 2D motion analysis (Dartfish, VALD, etc)
- Video recording – playback
- Force platforms
- Jump mats

- Coaching eye

Systematic review looking at criteria used for RTP decision-making:

- 209 reviewed studies
- 20% of the studies used performance-based criteria test to clear athletes to RTP

(Burgi et al., 2019)

- It is an ADJUNCT to what already exists. It is a missing piece of the complex puzzle.
- It is NOT a replacement for technological gold standards for biomechanical assessment.
- It is NOT a measurement of the athlete's kinetics or kinematics.

Connecting Research & Clinic

Articles to CHECK OUT related to *Movement Quality, Maintaining Shapes & Impact on Injuries*:

1. Proximal neuromuscular control & running mechanics relating to HS injuries in soccer players – these studies reinforce the importance of keeping shapes & how that relates to muscle positioning (Schuermans et al., 2017a; Schuermans et al., 2017b)
2. A study highlighting that *how* an athlete performs the SL hop test for distance is key; it's not just all about the final distance measurements (Kotsifaki et al., 2019)
3. The importance of proximal movement strategy in youth female soccer players (Celebrini et al., 2014)

Body Specifics

- Metrics
- Default Postures

Static Body Positions

- Obtain
- Sustain

Phase 1

Phase 2

Dynamic Body Awareness

- Spatial
- Temporal

Dynamic Body Control

- Directions
- Forces

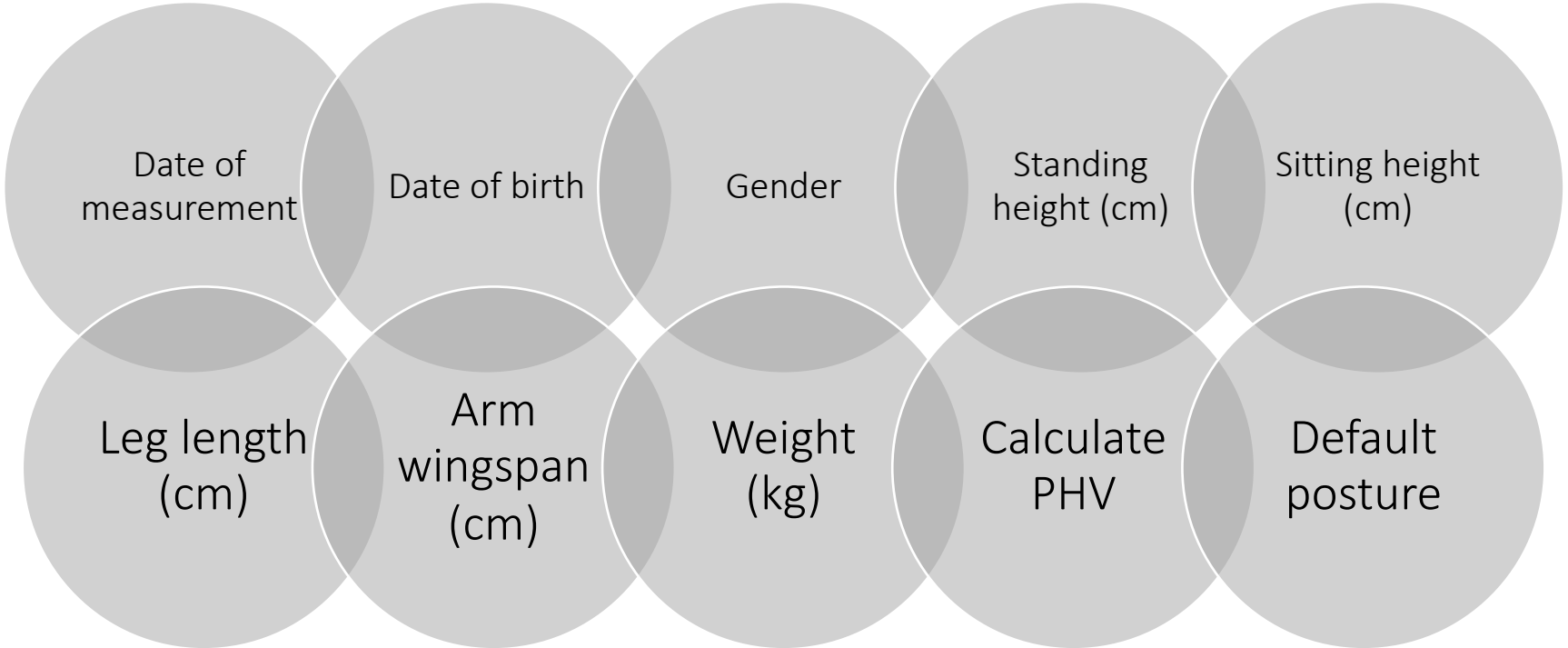
Phase 3

Developing Your Athlete's Profile:
Diving Deeper

Body Specifics

Measure approx. every **3-4 months** as it gives a snapshot of that moment in time, but recognize that these are constantly changing. The key body metrics are listed below:

Sport for Life protocols ([Balyi & Way, n.d.](#))



Body Specifics – Maturation Measurements

Somatic Age

- Indirect
- Measures changes in body size & proportions
- Requires longitudinal data
- Can determine early or late maturers from the data
- Non-invasive
- Little equipment required

Sexual Age

- **Not appropriate in this context**

Skeletal Age

- Gold standard
- Needs equipment
- Requires experienced assessors
- Involves radiation

(Faigenbaum et al., 2020)

Maturity Offset

- To predict PHV
- Advantages: immediate & non-invasive
- Disadvantages: level of error & lack of sensitivity to early/late maturers
- (Mirwald et al., 2002)

Simplified Maturity Offset

- Simplified equation
- Same advantages & disadvantages
- (Moore et al., 2015)

Body Specifics – Somatic Age

- Plotting height in longitudinal measurements shows linear growth that will eventually plateau
- Plotting *increase* in growth (cm/year) will demonstrate how nonlinear growth actually is
  - From this, we can retrospectively see PHV (greatest growth rate in adolescent period)
  - But the disadvantages of plotting growth increases in cm/year are:
    - We only know PHV after it has occurred
    - We require multiple data points to start the graph
- In order to best help our athlete we need to be able to determine if our athlete is pre-PHV or post-PHV from one data point & also figure out whether they are an early, average or late maturer. This means we need to be able to *predict* the PHV
  - This requires the use of a maturity offset calculation (Mirwald et al., 2002; Moore et al., 2015)
    - Can estimate maturity & immediately identify an individual as pre-PHV (if calculation is <0) or post-PHV (if calculation is >0).
    - Subtract their chronological age from their maturity offset # to get the predicted age of PHV for that particular individual at that one point in time
      - Doesn't require multiple data points, although this is still helpful
      - Allows predictions of growth & maturation that helps you gather more knowledge about your athlete
      - Plus, there are websites that will do the math for you!

(Faigenbaum et al., 2020)

Body Specifics – What to Measure & How?

[Mirwald et al., 2002]

Boys Maturity Offset Calculation

$$= -9.236 + (0.0002708 \times (leg\ length \times sitting\ height)) - (0.001663 \times (age \times leg\ length)) + (0.007216 \times (age \times sitting\ height)) + \left(0.02292 \times \left(\frac{mass}{height} \times 100\right)\right)$$

Girls Maturity Offset Calculation

$$= -9.376 + (0.0001882 \times (leg\ length \times siting\ height)) + (0.00022 \times (age \times leg\ length)) + (0.005841 \times (age \times sitting\ height)) - (0.002658 \times (age \times sitting\ height)) - (0.02658 \times (age \times weight)) + (0.07693 \times \left(\frac{mass}{height}\right))$$

Maturity Offset is a prediction of the number of years *until PHV* & is an indication of whether the athlete is pre-PHV (*calculation < 0)* or post-PHV (*calculation > 0)* ([Faigenbaum et al., 2020])

[Moore et al., 2015]

Boys Simplified Maturity Offset Calculation

$$= 7.999994 + (0.00036124 \times age \times height)$$

Girls Simplified Maturity Offset Calculation

$$= -7.709133 + (0.0042232 \times age \times height)$$

Other options of measuring somatic maturity include:

- **PWV** (Peak Weight Velocity) ([Faigenbaum et al., 2020])
  - Youth grow in length first, then in width or weight
- **Ratio of leg length/sitting height (in %)** ([Faigenbaum et al., 2020])
  - Highlights how proportions change throughout growth – increases early when legs grow then decreases when trunk catches up, which occurs after PHV
- **Predicted adult height & using a window of 85-96%**
  - Parr et al., ([2020]) found increased success in predicting PHV using this method (compared to Mirwald et al., 2002)

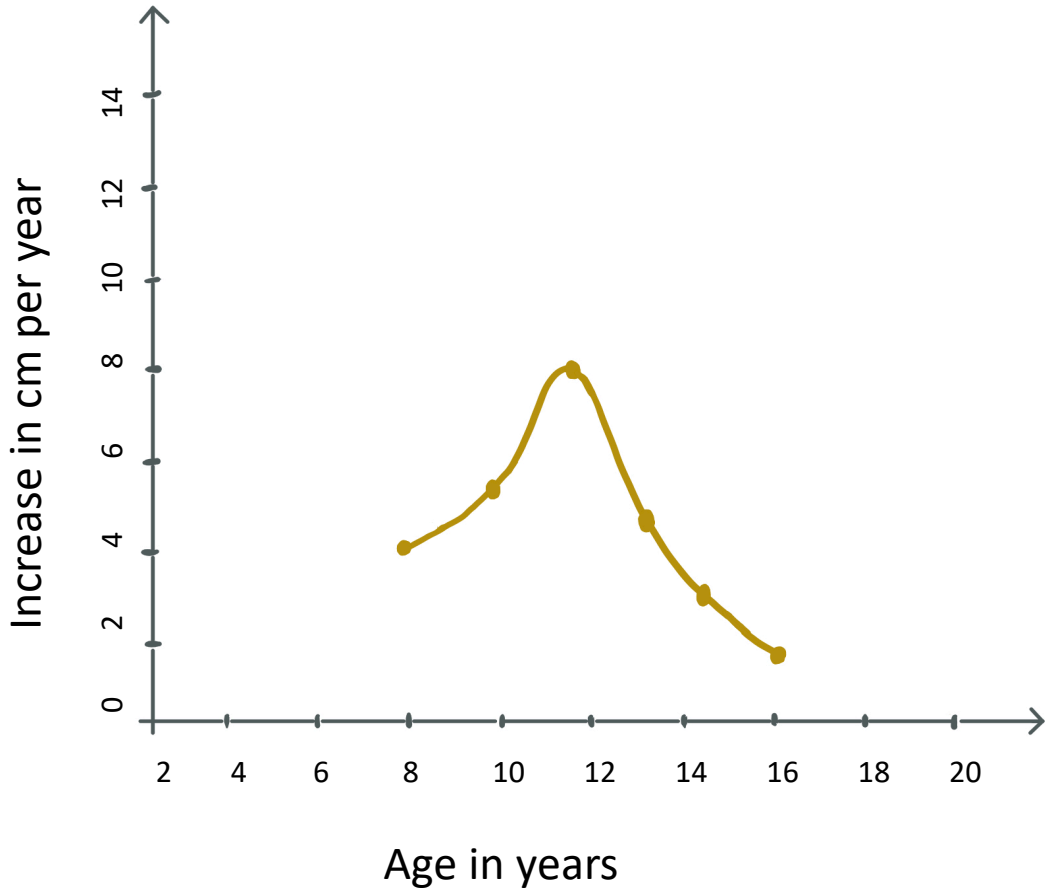
Body Specifics – Female Example

CORE A·I·M						
Athlete Name:				Gender:	Date of Birth:	
Age (years)						
Date of Measurement						
Weight (kg)						
Standing Height (cm)						
Increase in Standing Height (cm) from previous year						
Sitting Height (cm)						
Leg Length (cm)						
Leg Length/Sitting Height (%)						
Maturity Offset Calculation						
Arm wingspan (cm)						

Girls Simplified Maturity Offset Calculation (Moore et al., 2015)

$$= -7.709133 + (0.0042232 \times age \times height)$$

Body Specifics – Female Example



16 year old female athlete (based on hypothetical data).

For an 'average' female

- PHV usually occurs around 12 years old
- At PHV, the greatest rate of growth is about 8cm/year

Body Specifics – Female Example

Girls Simplified Maturity Offset Calculation (Moore et al., 2015)

$$= -7.709133 + (0.0042232 \times age \times height)$$

= -7.709133 + (0.0042232 x ***11*** years old x ***140*** cm)
= -1.205404
* this hypothetical data would mean an 11 year old female of 140cm in height measured at that one point in time is likely to be about 1.2 years away from PHV.

Then, use this subtracted from chronological age to estimate whether she is early/average/late maturing:

= 11 - (-1.2)
= 12.2
* this hypothetical data means she is predicted to have a PHV of 12.2 years (which means she is considered an 'average' maturer as this predicted PHV is within 1 year of the average of 12 years for girls)

(Faigenbaum et al., 2020)

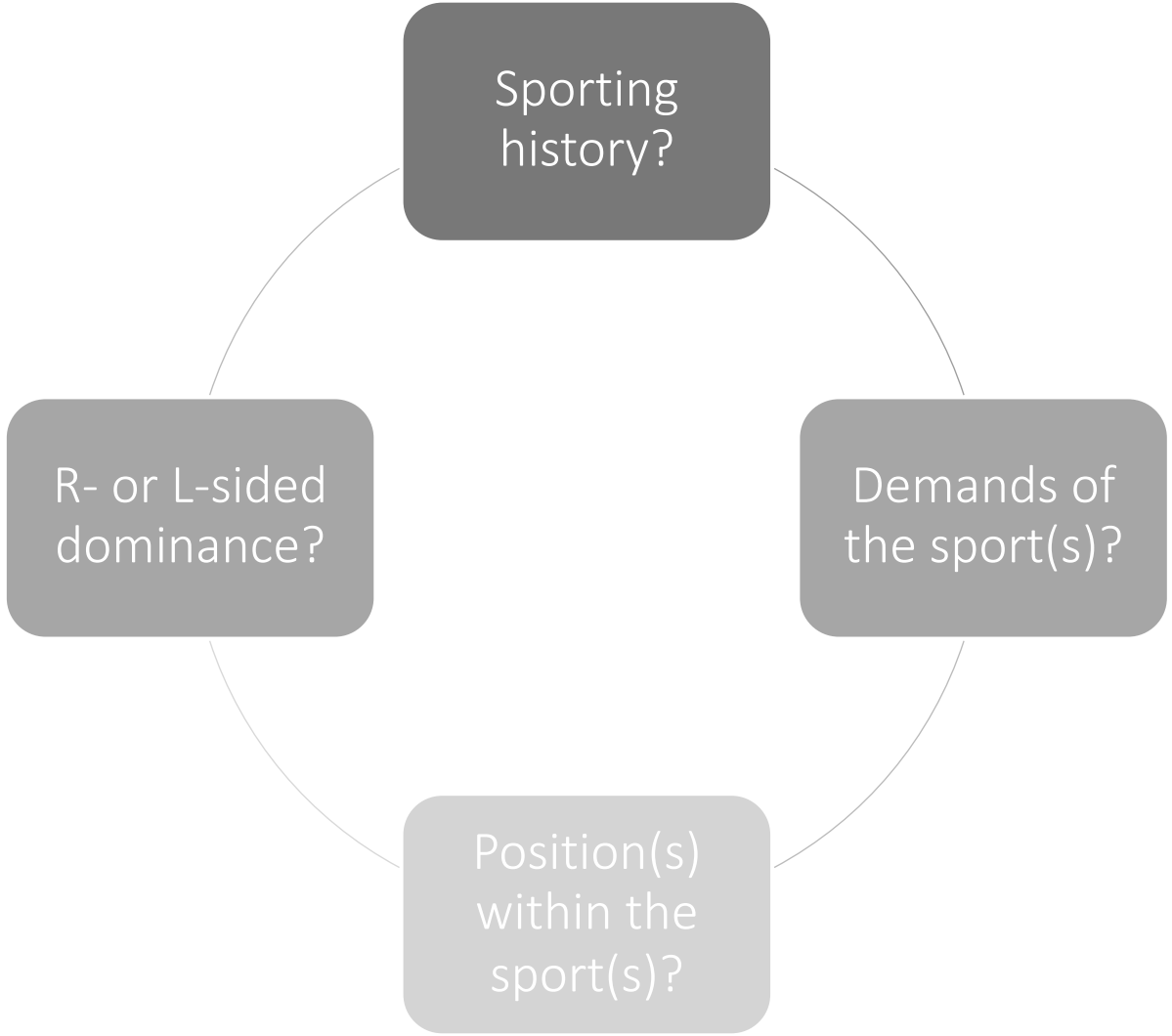
"...[E]ach sport has its own distinct loading pattern and therefore your body adopts a specific position and a distinct overuse injury to go with it."

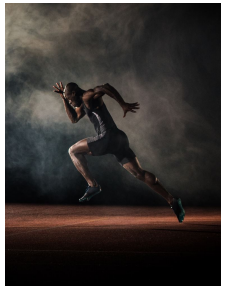
– AOSSM's Consensus Statement

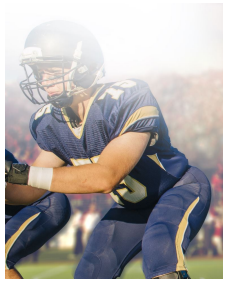
(LaPrade et al., 2016, p. 6)

Body Specifics – Identification of Default Postures

This information comes from taking a *detailed history*







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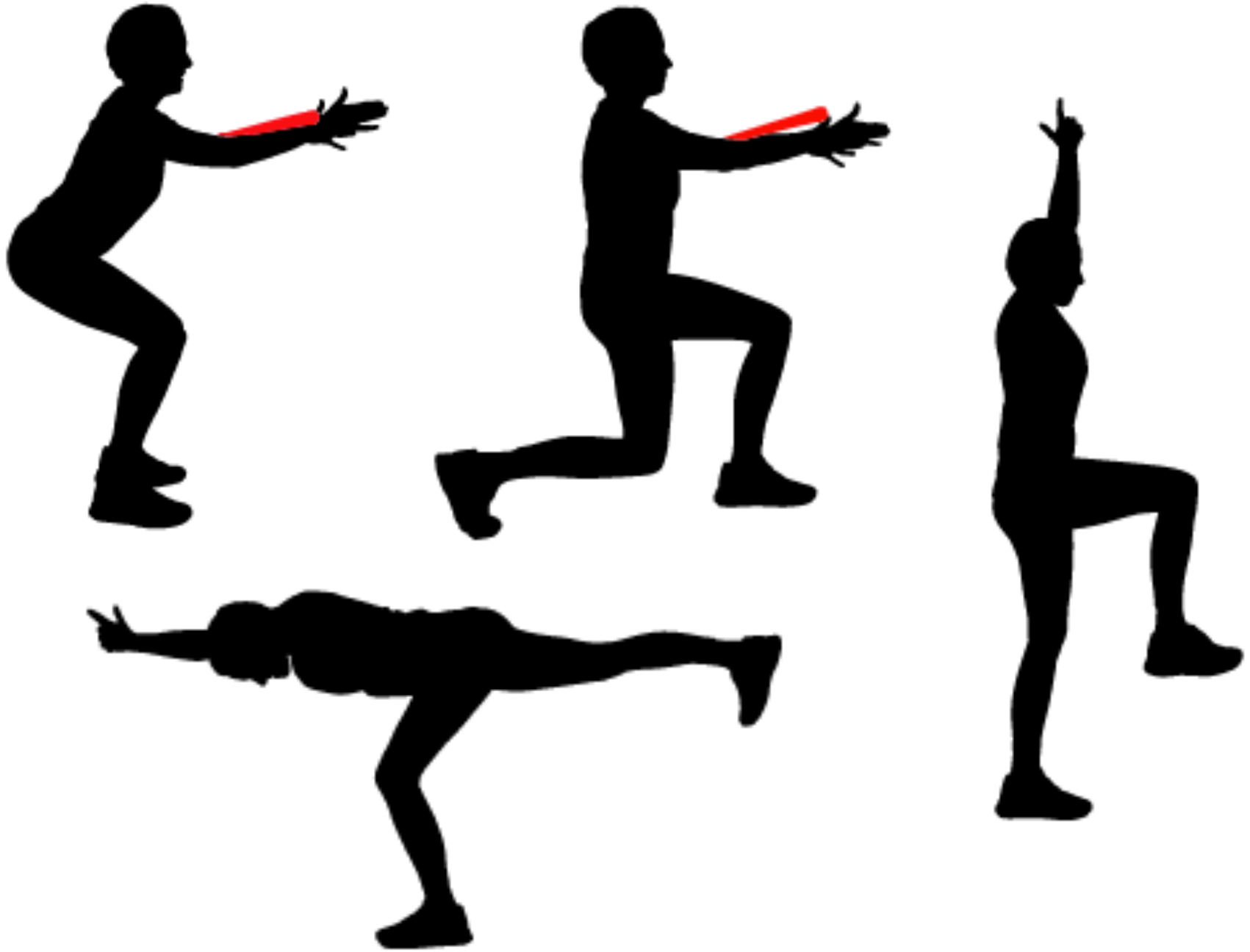

4 Foundational Positions

A.I.M. SQUAT STANCE

SQUAT stance is a foundational position seen in a variety of sports. It involves initiating movement from proximal to distal, meaning working from your centre of gravity (within your pelvis) and pushing down through your legs to create force into the ground (GFR). Often utilized for jumping, landing and lateral movements, an athlete needs strength, symmetry, balance and stability in this position. In addition, they need proper sequencing to control dynamic movement in and out this position. SQUAT stance involves two parallel feet as the base of support.

FOUNDATIONAL POSITION GOAL:

Ear, shoulder and ankles on vertical plumb line as seen from the side. SQUAT to a depth of 90 deg.

A.I.M. STRIDE STANCE

STRIDE stance is a foundational position seen in a variety of sports. This is a position that is often utilized when an athlete accelerates, decelerates and changes direction. An athlete needs strength, symmetry, balance and stability in this position. In addition, they need proper sequencing to control dynamic movement in and out of this position. STRIDE stance involves 2 staggered feet as the base of support.

FOUNDATIONAL POSITION GOAL:

Ear, shoulder, torso & knee of the back leg in line with vertical plumb line as seen from the side. Front leg depth of 90 deg.

A.I.M. STRETCH STANCE

STRETCH stance is a foundational position seen in a variety of sports. This position emphasizes length. It can be utilized when reaching for or blocking an object, or when working to gain positioning. It can take place horizontally or vertically. It can occur on one or two legs as a base of support.

FOUNDATIONAL POSITION GOAL #1 - SL VERTICAL (SLV) STRETCH STANCE:
Hands, shoulder, torso, and standing leg to ankle all straight and on vertical plumb line as seen from the side. Create 90 deg box of hip, knee and ankle dorsiflexion by lifting leg

FOUNDATIONAL POSITION GOAL #2 – SL HORIZONTAL (SLH) STRETCH STANCE:
Straight line made from hands, shoulder, torso, leg to ankle all straight on horizontal plumb line. Standing leg driving down can bend but vertical line of hip to foot.

Foundational Position	Phase 1 – Static Body Positions	Phase 2 – Dynamic Body Awareness	Phase 3 – Dynamic Body Control		
SQUAT stance 	Static SQUAT 20s	Tempo SQUAT 40 bpm	Lateral Drive SQUAT	Pivot Drive SQUAT	DL SQUAT Landing
STRIDE stance 	Static STRIDE 20s	Tempo STRIDE 40 bpm	Standing Step Forward to STRIDE	Standing Thx Rotation	Deceleration STRIDE Stop
STRETCH stance 	Static SLH STRETCH 20s Static SLV STRETCH 20s	Tempo SLV-SLH STRETCH 30 bpm	SL to Lateral Drive Hop	SL to Pivot Drive Hop	SL SQUAT Landing

The Core A.I.M.™ Foundational Screen – Overview

The Foundational Screen – Phase 1

Static Body Positions

- Ability to obtain & sustain static positions for 20s holds
- Functional mobility
- Accessibility to position
- Core endurance
- Isometric contraction

A.I.M. requires building proper foundations – strength is one

Muscular strength & it's role in motor skill performance

Static position holds

Phase 1

Dynamic Body Awareness

Phase 2

Dynamic Body Control

Phase 3

The Foundational Screen – Phase 2

Static Body Positions

Phase 1

Dynamic Body Awareness

Metronome to set tempo

Assessed in this phase:

- Timing & ability to coordinate to follow tempo
- Symmetry
- Ability to find midline (neutral)

Not only is this a testing technique, but it also serves as a useful motor learning technique.

Phase 2

Dynamic Body Control

Phase 3

The Foundational Screen – Phase 3

Static Body Positions

Phase 1

Dynamic Body Awareness

Phase 2

Dynamic Body Control

This involves the athlete's ability to control his/her body in a variety of planes:

- Sagittal
- Frontal
- Transverse

In this phase, we look at varying types of muscle action:

- Concentric (shortening)
- Eccentric (lengthening)
- Isometric (maintaining)

With the scoring criteria, we can focus in on the quality of movement control & sequencing of the athlete.

Phase 3

Practitioners are lacking methods of *systematically evaluating* how an athlete moves.

- This impacts the risk of multiple injury types
- It is a key adjunct in RTP decision making

The Core A.I.M.™ Foundational Screen evaluates an athlete's ability to *obtain & sustain* positions, as well as to move with *awareness & control* into and out of 4 foundational positions that can be seen across a variety of sports.

Developing a systematic method for monitoring growth and maturation of *youth* is vital to properly understanding & programming for these athletes.

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