

Strength and Conditioning Facility Framework

Northern Territory Sports Academy

Acronyms	Reference
AIS	Australian Institute of Sport
ASCA	Australian Strength and Conditioning Association
BPP	Best Practice Principles
BTN	Broadening the Net
CG	Commonwealth Games
FTEM	Foundations, Talent, Elite and Mastery
HP	High Performance
IDPP	Individual Development and Performance Plan
MLRCA	Minimum Level of Resourcing for Categorised Athletes
MOU	Memorandums of Understanding
NACF	National Athlete Categorisation Framework
NHPSS 2024	National High Performance Sport Strategy 2024
NIN	National Institute Network
NSO	National Sporting Organisation
NTSA	Northern Territory Sports Academy
PCAS	Professional Coach Accreditation Scheme
PD	Physical Development
PL	Physical Literacy
PMS	Practitioner Minimum Standards
PSS	Performance Services Support
RM	Repetition Maximum
RTB	Race to the Bottom
S&C	Strength and Conditioning
SCF	Strength and Conditioning Facility
SDF	Service Delivery Framework
SPPM	Sport Participation Pathway Model
SSO	State Sporting Organisation
SSSM	Sports Science Sports Medicine
TIDS	Talent Identification and Development Systems
WADA	World Anti-Doping Agency

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1. Introduction

The Department of Territory Families, Housing and Communities' (the Department) Northern Territory Sports Academy (NTSA) Strength and Conditioning Facility (SCF) and programs provided by the NTSA strength and conditioning (S&C) staff are designed to maximise athletic potential and performance. As a member of the National Institute Network (NIN) and signatory to the National High Performance Sports Strategy 2024 (NHPSS-2024) [1], the NTSA SCF design and staffing arrangements cater for the S&C training needs of High Performance (HP) athletes categorised within the National Athlete Categorisation Framework (NACF) [2].

The SCF also serves as one of many facilities and venues where programs associated with the NTSA Service Delivery Framework (SDF) 2022-25 [3] are delivered. These programs, and accompanying resources, support and contribute towards a greater community awareness of physical literacy and appropriate S&C training for young people.

In achieving these dual functions, the NTSA is guided by contemporary concepts concerning:

1. **Literature relating to sport for children and youth development, and Talent Identification and Development Systems (TIDS).**
2. **The Foundation, Talent, Elite, Mastery (FTEM) Framework.**
3. **The National Athlete Categorisation Framework (NACF).**
4. **The National High Performance Sport Strategy (NHPS) 2024 and the following NHPSS resources:**
 - a. **The Australian Institute of Sport (AIS) Sport Sciences and Sport Medicine (SSSM) Best Practice Principles (BPP) and;**
 - b. **National Institute Network (NIN) Minimum Level of Resourcing for Categorised Athletes (MLRCA).**
5. **Recommendations from the Australian Strength and Conditioning Association (ASCA).**

The purpose of this document is to describe these guiding concepts as important background information for the NTSA SCF Access Policy and Access Procedures documents.

2. Literature relating to sport for children and youth development, and Talent Identification and Development Systems

The term 'sport for children and youth development' is used interchangeably with the term 'holistic athlete development' and refers to the concept that sport participation for all children and youth should be encouraged as it enhances personal development which translates into positive values and behaviours as adults. Additionally, sport participation can be a primary prevention strategy to limit the development of at risk youth behaviours such as anti-social behaviour, acts of violence and aggression, theft, alcohol and other illicit drug use [4-7, 8-10].

Off the back of this concept, and focusing on early and middle childhood, is the Physical Literacy (PL) movement. PL is defined as:

“The lifelong holistic learning acquired and applied in movement and physical activity contexts. It reflects ongoing changes integrating physical, psychological, social and cognitive capabilities. It is vital in helping us lead healthy and fulfilling lives through movement and physical activity. A physically literate person is able to draw on their integrated physical, psychological, social and cognitive capabilities to support health promoting and fulfilling movement and physical activity – relative to their situation and context – throughout the lifespan” [11].

Contemporary coach development literature promotes the achievement of PL as the goal of any coach working with children 6-12 years old:

“The primary aim of a participation coach working with children is to assist the development of essential physical literacy skills and create a passion for long-term participation by promoting the social benefits of sport” [12-14].

Sport for children and youth development concepts are supported by a significant amount of empirical data that shows children and youth sport participants, compared to their non-sporting peers:

- I. Display higher levels of self-esteem, self-confidence and problem solving ability [15, 16].
- II. Display higher levels of critical life skills (the physical, behavioural and cognitive skills required to cope with the challenges of everyday life) [17, 18].
- III. Have more refined fundamental movement patterns and superior physical literacy skills and are more likely to sustain engagement in sport participation and develop physical activity habits that reduce risk of diseases associated with a sedentary lifestyle.
- IV. Have superior physical attributes [19-21] such as coordination [22], muscular endurance [23], muscular strength [24, 25], flexibility and aerobic capacity [25, 26].
- V. Have improved academic achievement and lower likelihood of school dropout [27, 28].
- VI. Have improved body weight management [29], healthy eating habits [30], and are more likely to abstain from smoking [31].

These concepts, however, have been disputed by an equally significant volume of data showing children and youth sport participants experiencing negative developmental outcomes such as:

- I. Overtraining, athlete burnout, disordered eating, substance abuse, stress, school drop-out, negative interactions with peers, coaches, support staff and family members.
- II. Heightened levels of anxiety, low motivation, restricted social time, reduced social development.
- III. Excess linking of identity to athletic persona, feelings of guilt following unsatisfactory performance [32-34].
- IV. Low levels of self-confidence and self-esteem associated with perceptions of poor sporting ability [35,36] which contribute to high adolescent dropout rates [37,38].

- V. Increased occurrence of overuse injuries [6,39,40].
- VI. Use of performance-enhancing drugs and engagement in anti-social behaviour [41,42].
- VII. Excessive alcohol intake [42,43].
- VIII. Acts of violence and aggression [44,45].

Such negative outcomes are more common in sports applying 'talent identification and development systems' (TIDS). TIDS is the term used to describe all the processes involved in supporting youth athlete development and progression towards HP status in a sport [46]. They are traditionally associated with a focus on winning and progression with compromised attention to personal development as a means to achieving the ultimate aim of progressing as many athletes as possible to the highest levels. Sport organisations tend to organise their TIDS around certain age groups and/or stages of development and performance [46] which attracts other descriptors such as 'performance pathway' or 'talent pathway' with specific programs being labelled 'talent academy', 'high performance academy', 'centres of excellence', etc.

Associated with many TIDS are the 'race to the bottom' (RTB) and 'broadening the net' (BTN) practices. RTB is the practice of selecting younger and younger athletes (10-15years of age) into highly structured performance services support (PSS) programs, with a year-round competition focus featuring limited rest periods (i.e. programs that essentially mimic, all be it 'watered down', the programs of HP athletes before the children and youth are physically and psychologically ready). BTN is the practice of selecting as many participants as possible (around 10-19years of age) to lock in and commit to progressing along a sport's TIDS in structured PSS programs before they choose another sport. Both practices have been driven by competition amongst sports for a limited talent pool. The former has been more common in individual sports and the latter has been more common among team sports, but often sports employ both practices. Characteristic of such strategies are children and youth receiving sustained inaccurate talent feedback from educated PSS staff and coaches – also known as the 'talent curse'. This is despite the well-known fact that children and youth sporting success is the least accurate predictor of HP sporting success in all but a few sports [47-50].

Youth development and TIDS research shows that both the RTB and BTN are counterproductive to producing elite athletes, optimising personal development and long term participation outcomes, and are highly correlated with negative youth development outcomes [47-50]. Some of the 'old school' adult behaviours that have been identified as inappropriate within Sport Integrity Australia's Child Safe Policy are common place in TIDS [46, 51]. These include:

- application of training practices and loads that are inappropriate for the psychological and physical development of the child [including supplement misuse];
- use of stereotypes, innuendo, sarcasm, humiliation, intimidation and denigration in front of their peers (e.g. body shaming);
- punishment of poor performance with practices that caused pain and discomfort; and
- forcing training practices against their will.

As one example, and probably the most pertinent example for this policy, the NTSA (formerly the NT Institute of Sport) supported both practices when it led TIDS in the NT from 1996 to 2015 as the 'centre for sporting excellence'. Former staff, coaches, athletes and administrators have anecdotally reported numerous examples of many scholarship athletes achieving 'success in sport and in life' which was the underlying ethos. In contrast, however, and despite the highly knowledgeable and experienced coaches and PSS staff employed at the time, it was not able to prevent several athletes each year experiencing negative developmental outcomes such as overtraining, athlete burnout, drop out, stress and anxiety, disordered eating, increased rates of overuse injuries, low motivation, excessive feelings of guilt following unsatisfactory performance, and negative interactions (including harassment and body shaming) with peers, coaches, support staff and family members.

To better achieve both performance and positive children and youth development outcomes, sport system leaders have been encouraged to adopt contemporary research informed practices within TIDS. Several models have received considerable support such as the '*Personal Assets Framework*' [52], the '*Development Model of Sports Participation*' [53, 9] (which, has recently been adopted by the Australian Rugby League Commission), and the '*Sport Participation Pathway Model*' (SPPM) [54]. The SPPM, and its well defined drop-out and retention trends in competitive club sport for example, has been adopted by the NTSA as a guiding model for the SDF 2022-25.

Despite the prevalence of negative developmental outcomes described above, TIDS are not inherently bad. Providing that the TIDS is appropriately tailored to the age and developmental stage of athletes involved, and managed by appropriately trained and qualified personnel responsible for overseeing the implementation and monitoring of carefully designed individual development plans, programs and workloads, and practices are regularly reviewed by relevant experts, then TIDS can achieve both personal development and performance outcomes in children and youth [46, 52].

It has been research guided models, along with the awareness of Australia's declining Olympic Games and world championship performances from 2004-2012, which led the AIS and the NIN to implement its own system wide strategies to address TIDS across Australia. These strategies include the FTEM Framework [55] and the NACF [2].

3. Foundations, Talent, Elite, Mastery (FTEM) Framework

FTEM [55] is a well-researched talent development framework launched in 2012 that incorporates lifelong involvement in sport and an active lifestyle as complementary and parallel pathways to the sporting excellence pathway. See Figure 1.

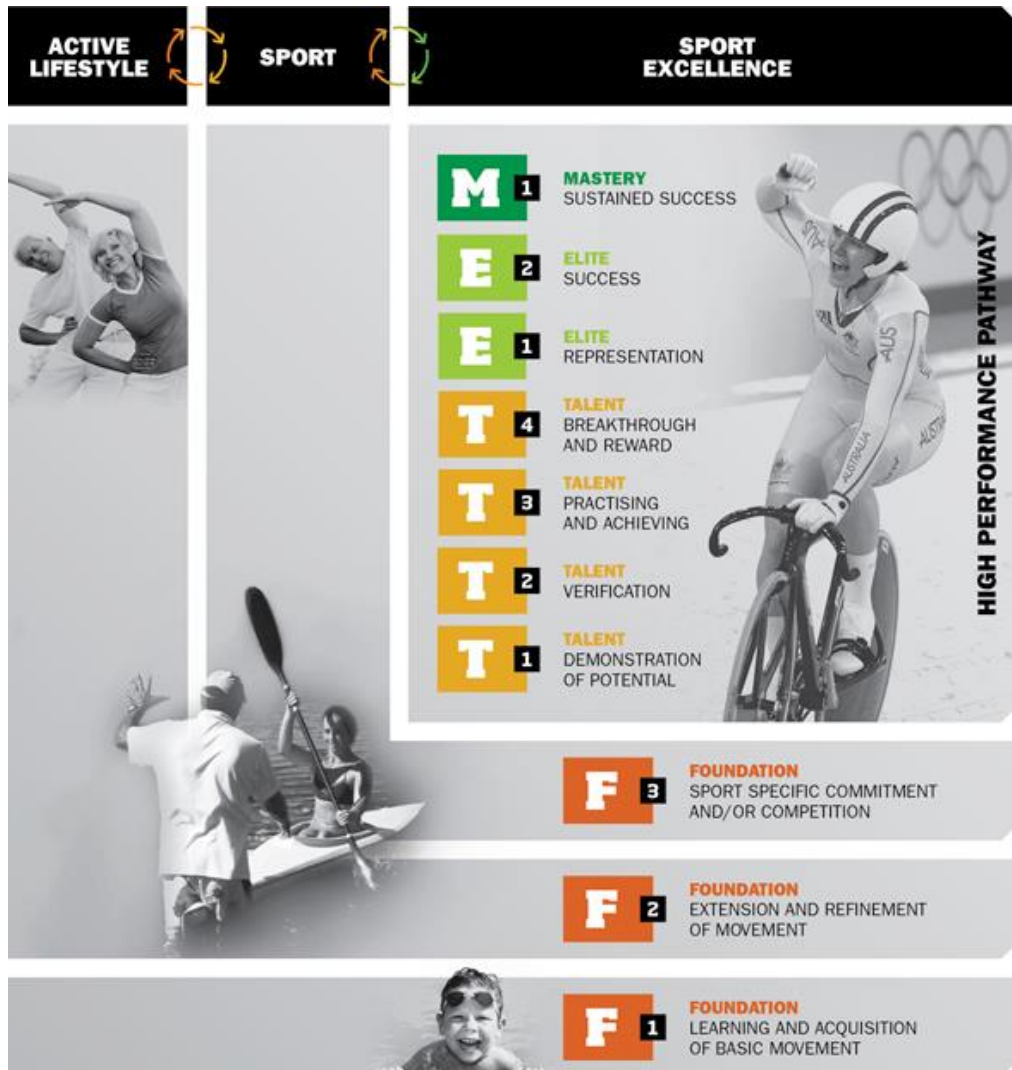


Figure 1. Foundations, Talent, Elite and Mastery (FTEM) Framework.

The FTEM Framework promotes contemporary best practice sophisticated talent identification processes at the Talent 1 (T1) and Talent 2 (T2) stages of the pathway so the system can be more efficient at achieving the dual goals of sporting excellence pathway progression and lifelong involvement in sport and physical activity. The model encourages a verification or trial process for athletes in the T1-T2 stages with purposeful exposure, assessment and review of all HP sport talent attributes.

The T1 and T2 stages, although not tied to chronological age, are based on biological development and maturation stages. If young people are going to consciously choose to ‘invest’ and ‘specialize’ to improve their performance in a given sport, it will likely occur during late adolescence (16-19 years). Some argue that it can occur earlier and this may also be true. However, it is increasingly difficult to determine who is

doing the 'choosing' at younger and younger ages, knowing that the ages children and youth typically develop autonomous rational, logical thought processes will generally occur after adolescence, especially for late developers.

FTEM and other participant development models promote academy and representative programs for late adolescents having a greater emphasis on preparing them for the rigors of consistent higher-level competition and developing capabilities that contribute to enhanced sport performance [56, 57]. It is at this age that young people may be inspired by the exalted rewards provided to elite HP athletes and they should be encouraged to chase their dreams and develop attributes of those who have made it all the way. However, predictions about sporting excellence potential and using those predictions as justification to impose specialised, advanced PSS imposed training and competition loads, practices, and high levels of commitment to achieving sporting excellence have proven to be problematic even for this age group. This is especially the case in smaller populations, thereby countering any potential advantages smaller populations (e.g. 50,000 to 100,000) may have in regards to producing talent [52].

As such the FTEM framework recommended that only after verification in the Talent 3 (T3) stage, athletes should be further challenged with the pressure and expectation of HP sport investment and imposed purposeful commitment to individualised performance progression focused training and competition programs integrating PSS. For Olympic Games and world championship sports the investment was usually facilitated through joint funding agreements between respective state and territory governments, institutes/academies of sport, state/territory sporting organisations and the National Sporting Organisations (NSOs) receiving HP funding from the AIS.

T3 and T4 are critical stages where athletes capabilities to perform under the pressure of being 'owned elite HP sport commodities' are challenged. It was these stages where the bulk of the athletes in the HP sport pathway had accumulated and stagnated in 2008-2012 begging the question whether they were legitimately confirmed as T3 to begin with and whether or not extra coaching and PSS was the 'magic pill' to progress athletes, let alone convert them into a champion. Given the need to attend to these risks (i.e. lack of progress and potential negative developmental outcomes, coaches and staff being held to account to athletes progressing) coaching and PSS had become concentrated at these levels. So called T3/T4 athletes struggling to progress as was the case at the NTSA at the time, were receiving more coaching and PSS than E1, E2 and M level athletes who were already providing a return on the investment.

4. National Athlete Categorisation Framework (NACF)

The NACF [47] was first developed in 2010 to decrease NSOs and the NIN incorporating RTB and BTN practices within TIDS to better target the limited available HP sport funding and PSS. More 'accurately assessed as talented' athletes were needed to ensure a better return on investment, reduce the accumulation within the system of athletes not progressing and experiencing associated negative developmental outcomes. Through 2012-2020, NSO HP sport funding grants and levels of PSS servicing support were contingent upon NSOs defining and aligning TIDS to the FTEM Framework and NACF.

Athlete categorisation requirements have progressed under the NHPSS 2024 [1], which now requires NSOs to develop more sophisticated, valid, reliable and rigorous talent identification and selection metrics aligned with more graduated and time framed progressions of HP investment and PSS aligned to performance improvements.

The NACF (as at June 2022) has 5 levels:

- **Level 1 – Podium**
 - **Olympic/Paralympic Pathway** - Athletes have won a medal at an Olympic/Paralympic Games, world championships or agreed event in the previous 24 months AND are assessed against the sport-specific matrix as being capable to win a medal at the next Olympic/Paralympic Games.
 - **Commonwealth Games (CG) Pathway (CG-only sports)** – Athletes have won a medal at the most recent CG, world championships or agreed event AND must be assessed against the sport-specific matrix as being capable to win a medal at the next CG.
- **Level 2 – Podium Ready**
 - **Olympic/Paralympic Pathway** – Athletes have placed 4-8th at the most recent Olympic/Paralympic Games/world championships OR by exception and agreed equivalent alternative (i.e. objective, data verified performance or world ranking) AND must be assessed against the sport-specific matrix as being capable to progress to PODIUM level, targeting a medal at the next Olympic/Paralympic Games.
 - **CG Pathway (CG-only sports)** – Athletes have placed 4-8th at the most recent CG, world championships or agreed event AND must be assessed against the sport-specific matrix as being capable to progress to PODIUM level, targeting a medal at the next CG.
- **Level 3 – Podium Potential**
 - **Podium Potential:** Athletes will have achieved agreed performance benchmarks, which, alongside international competition performances, reliably indicate their future potential for podium success. Athletes are assessed against the sport-specific matrix as being capable to progress to at least PODIUM READY level within the agreed sport-specific matrix timeframes.

- **Level 4 – Developing**
 - Athletes have progressed through a reliable national talent confirmation phase and placed within a dedicated national development program. Athletes must be assessed against the sport-specific matrix as being capable to progress to at least 3. PODIUM POTENTIAL level within the agreed sport-specific matrix timeframes.

- **Level 5 – Emerging**
 - Athletes have been identified by an NSO via a valid and reliable talent identification profiling method (agreed in advance and with future podium potential characteristics identified) and are going through a set, time-limited talent confirmation period.

The NACF clearly defines the HP sport pathway as beginning at Level 5 categorisation and where HP sport investment and PSS should commence. With reference to FTEM, T1 ‘demonstrating potential’ (i.e. talent identification) and T2 ‘talent verification’ (i.e. talent confirmation) occur prior to categorisation as Level 5 (i.e. prior to entering the HP pathway). T1 and T2 stages occur at state/territory academy and representative program levels. After a period of training time and comparison with national/international talent metrics an athlete may be confirmed as Level 5 Emerging which is equivalent to T3 ‘practicing and achieving’. Level 4 Developing is equivalent to T4 ‘breakthrough and reward’.

5. National High Performance Sport Strategy (NHPSS) 2024

The NHPSS 2024 [1] focuses on Olympic, Paralympic and Commonwealth Games outcomes. The NHPSS 2024 is a joint strategy of NSOs, the NIN and other system partners which the NT Government is a signatory to.

Sports linked to the NHPSS 2024 are listed in Table 1.

Table 1. NHPSS 2024 Sports [58].

Archery*	Cycling (all disc)*	Netball	Swimming*
Athletics*	Diving	Rowing	Table Tennis
Badminton	Equestrian*	Rugby*	Taekwondo
Baseball (men)	Football (women)	Sailing	Triathlon*
Boccia**	Golf	Shooting*	Volleyball (beach)
Bowls*	Gymnastics	Skate	Water polo
Boxing	Hockey	Softball (women)	Weightlifting
Basketball*	Judo	Squash	Winter sports*
Canoeing*	Modern Pentathlon	Surf	

*= Includes para disciplines. **= Para discipline only.

NHPSS 2024 has seven guiding principles designed to define, progress and improve the national HP sport system. The principles reflect the prime responsibilities and shared commitment of sports and federal state and territory government agencies to develop and operate a world leading HP system for Australian sport.

Principles 3, 5 and 6 are the key principles relating to the NTSA SCF Access Policy and Access Procedures documents:

- **Principle 3**
 - The state and territory institutes and academies of sport within the HP sport system will strive to provide a nationally consistent minimum level of resources to categorised athletes.
- **Principle 5**
 - The state and territory institutes and academies of sport will support identified sports to develop and deliver HP pathways for categorised athletes within their jurisdiction and available resources.
- **Principle 6**
 - The state and territory institutes and academies of sport will work in collaboration with sport to align support for athlete pathways that facilitates progression/development of athletes to categorised status.

There are 7 core operational roles and responsibilities (R&R) for national HP system partners under these guiding principles.

The key R&R related to NTSA SCF policies and procedures are 4, 5, 6, and 7:

- **R&R 4**
 - Sports are responsible for leading the alignment of the NIN and other system partner support to implement their high performance athlete pathway strategy and programs that support the objectives of the NHPSS.
- **R&R 5**
 - The NIN, under the leadership of the AIS, will be responsible to deliver world-leading performance support services to be positioned as the preferred provider to sports and athletes.
- **R&R 6**
 - NIN members are individually responsible for confirming their jurisdictional level of investment in each sport's HP plans.
- **R&R 7**
 - Resources from a NIN member may be invested at their discretion to support additional performance or capability enhancing initiatives complementary to sports' national HP plans.

5.1. AIS Sport Sciences and Sport Medicine (SSSM) Best Practice Principles (BPP)

The AIS SSSM BPP [59] were finalised in 2018 following recommendations from the National Integrity in Sport Unit (now Sport Integrity Australia) after the investigation into SSSM practices in Australia in response to the performance enhancing drugs saga involving the Australian Football and National Rugby Leagues in 2014.

The key principles from the AIS SSSM BPP related to the NTSA SCF Access Policy and Access Procedures documents are:

- SSSM staff members and contractors should meet the mandatory requirements of the AIS SSSM Practitioner Minimum Standards (PMS) [60] which outlines discipline specific standards for professional qualifications and accreditation;
 - For S&C staff and contractors in the national HP system the minimum standards are:
 - Professional Qualifications – Bachelor's Degree in Exercise, Sport or Movement Science or equivalent.
 - Professional Accreditations – ASCA Professional Coach Accreditation Scheme (PCAS) Professional Coach [or higher] [60].
- Supplement Policy;
 - It is recommended that an organisation's Supplement Policy be aligned with the AIS Sports Supplement Framework whereby supplements are classified into groups according to their effectiveness, safety and current status on the World Anti-Doping Agency's (WADA) Prohibited List.

5.2. NIN Minimum Levels of Resourcing for Categoricalised Athletes (MLRCA)

This document supports system partners to adhere to Guiding Principle 3 of the NHPSS 2024. It is attached as Appendix 3 to all Memorandums of Understanding (MOUs) entered into between participating NSOs and NIN under the NHPSS 2024.

As it pertains to the NTSA SCF Access Policy and Access Procedures documents it states the level of S&C servicing support provided to categoricalised athletes is influenced by:

- The agreement between the NSO and the NIN (NSO-NIN MOU and individual NSO-NIN-SSO Partner Agreement);
- The performance support framework agreed between the NSO and NIN partner, with the input of the NIN Head Coach (or another Program Leader where relevant);
- The individual athlete's categorisation level, with a general guide that;
 - As athletes progress through categorisation levels, performance support delivery will be of a more individualised nature.
 - Performance support delivery for Developing and Emerging athletes, will be of a more group based delivery format.
- The athlete's individual development and performance plan (IDPP).
- Individual NIN partners may support the implementation of these principles with specifics that provide further clarity to the NSO regarding jurisdictional constraints and available resources.

6. Australian Strength and Conditioning Association (ASCA) Recommendations

In 2017, ASCA updated its 2007 position statement on “Resistance Training for Children and Youth” [61]. The document provides 16 recommendations. The key recommendations influencing the NTSA SCF Access Policy and Access Procedures documents are numbers 3, 5, 8, 9, and 11.

- **Recommendation 3**

- Throughout their training period youth should be instructed by competent strength and conditioning coaches who can ensure correct lower back lifting technique involving the adoption of the natural lumbar curve and effective use of the abdominal and lower back muscles when lifting.

- **Recommendation 5**

- Technical competence in the performance of resistance training exercises is the primary focus for children, youth and adolescents prior to any progression in loading or training volume.

- **Recommendation 8**

When training children and youth the long term athletic development of the child needs to be of paramount concern and various logical progressions in the training cycle are required to be systematically imposed throughout the child’s development which are age related but also muscular function dependent. It is the position of ASCA that the following training loading intensities, exercise selection strategies, and progression standards be adopted when training children and youth:

- Level 1; 6-9 years of age; modification of body weight exercises and light resistance (brooms and bands etc.) work only for relatively high repetitions (e.g. 15 or more repetitions).
 - At the end of this stage children at least 9 years of age and should be able to:
 - Hover in a horizontal position with feet, elbows and forearms touching the ground and straight back position for 60 seconds.
 - Perform 10 well controlled back extensions to horizontal.
 - Perform 10 well controlled full range double leg squats, with hands behind the head and feet flat on the floor.
 - Perform 10 well controlled push ups off their toes, chest to touch the ground and arms achieve full extension.
 - Perform 5 well controlled lunges each leg with back knee touching the ground and good balance.
 - Wall squat at 90 degrees for 60 seconds.
 - Touch their toes in the sit and reach test.
- Level 2; 9-12 years of age; 10-15 Repetition Maximum (RM); maximal loading approximately 60% maximum using predominantly simple single joint exercises with dumbbells and machine exercises where the machine is an appropriate size for the child.
 - At the end of this stage children at least 12 years of age should be and able to:
 - Satisfy the requirements for Level 2.

- Hover in a horizontal position with feet, elbows and forearms touching the ground and straight back position for 90 seconds.
- Perform 10 well controlled repetitions of barbell bench press using a load of 40% of body weight.
 - Alternatively 20 well controlled push ups off their toes, chest to touch the ground and arms achieve full extension.
- Perform 10 well controlled repetitions of dumbbell rowing using a load of 15% of body weight in each hand.
- Perform 10 well controlled pull ups with legs out straight using an underhand grip.
- Perform 10 well controlled lunges each leg with back knee touching the ground and good balance holding a load of 10% of body weight in each hand.
- Reach 5 centimetres beyond their toes in the sit and reach test.
- Level 3; 12-15 years of age; 8-15 RM; maximal loading approximately 70% maximum using progressively more free weight exercises but avoiding complex lifts such as cleans, snatches, deadlifts and squats etc., unless competent coaching is available from a coach with at least a Level 2 ASCA strength and conditioning accreditation.
 - At the end of this stage athletes at least 15 years of age should be able to complete the following.
 - Hover in a horizontal position with feet, elbows and forearms touching the ground and straight back position for 120 seconds.
 - Perform 5 well controlled full range single leg squats each leg.
 - Perform 5 well controlled Nordic hamstring exercise repetitions.
 - Perform 10 well controlled parallel bar dips for boys and 10 bench dips for girls with legs out straight.
 - Perform 10 well controlled chin ups for boys and a 30 second arm hang at 90 degree elbow angle for girls (underhand grip).
 - Perform 10 well controlled repetitions of barbell bench press using a load of 70% of bodyweight for boys and 50% of body weight for girls.
 - Alternatively well controlled push ups off their toes chest to touch the ground and arms achieve full extension (greater than 30 for boys and greater than 20 for girls).
 - Level 4; 15-18 years of age; 6-15 RM; maximal loading approximately 80% maximum progressively moving towards an advanced adult program involving split routines where appropriate and complex multi-joint movements provided sound technique has been developed under competent coaching by a coach with at least Level 2 ASCA strength and conditioning accreditation.

NOTE: These are ideal age groups to be progressing in this manner. The underlying theme is 'competency based progressions' meaning that a 16 year old athlete that has not been progressed through levels 1-3 needs to start at level 1 and be progressed based on competence, not on the assumption that the athlete is ready for a level 4 program because they are 16 years old.

- **Recommendation 9**

- Children and youth in the first 3 stages (i.e. Levels 1-3) benefit most from programs that improve body/limb control and joint stability. These programs also improve other outcomes (e.g.

strength-endurance, general strength) without specifically training for them. With a solid foundation of training emphasising body/limb/joint control and stability and technical mastery during resistance exercises, athletes entering the fourth stage (i.e. Level 4) may more safely embrace training aimed at improving other resistance training outcomes such as strength and hypertrophy.

NOTE: Coach Accreditation courses in most sports teach a level of S&C and other sport science discipline content. This is based on the expectation that coaches develop all aspects of sport performance (i.e. physical, technical, tactical and psychological). As such, levels 1-3 body weight exercises, programing and progressions can easily be taught to sport coaches who can integrate them into field/court/track/pool deck/etc. sessions. Body weight exercises can be progressed through Level 4 as well. A coach can then circumvent the need and cost of finding a gym and accredited S&C coach as well as the need to add additional training sessions and loads (for gym-based workouts) which, if not appropriately catering to the physical and psychological stage of development of the athletes, may contribute to negative developmental outcomes including burnout, drop out and body shaming.

- **Recommendation 11**
 - All programs performed by children must be strictly coached by an adult with at least a Level 1 ASCA S&C coaching accreditation. To coach youth in Levels 3 and 4 in the more complex lifts, ASCA Level 2 accreditation would be required as a minimum, with a preference for such coaches to be progressing to ASCA Pro Structure Level. Further, when supervising groups of children, the ratio of coach to children is recommended to be 1 coach for every 10 children.

NOTE: As of February 2022, Level 2 accreditation mandates ASCA PCAS membership as an 'Associate' or 'Professional.'

7. Definition of Terms

Body Weight Only Exercises

- Used to describe exercises where the resistance to muscular contraction is applied **ONLY** by the weight of the body and/or its parts (e.g. push ups, pull-ups, lunges).
 - Increasing or decreasing the level of challenge to an athlete performing body weight only exercises is done easily and safely without the use of external resistance or equipment (e.g. by altering the base of support, speed and timing of the movement, time under tension, etc.).

Developmental Stages of Childhood

- Early childhood - birth to 6 years (yrs).
- Middle childhood - 6yrs to onset of puberty (11-13yrs girls/12-14yrs boys).
- Adolescence - onset of puberty to adulthood usually defined as 13-19yrs.
 - The terms 'children' and 'youth' refers to young people going through the stages of middle childhood and adolescence respectively.

External Resistance Exercises

- Used interchangeably with 'External Loading' to describe exercises where additional external resistance is applied to muscular contraction with equipment and devices (e.g. barbells, dumbbells, pin loaded machines, bands, chains, weight vests).
 - Gravity is an external resistance acting on the human body at all times and is multiplied in certain activities (e.g. ground reaction forces of running, jumping, landing and change of direction can reach up to 12 times a person's body mass).
 - 'Repetition Maximum' (RM) is a common way to measure ones strength. It is the most external mass that can be lifted for a defined number of exercise movements. For example, a 10RM would be the heaviest mass lifted for 10 consecutive exercise repetitions.
 - The magnitude of the resistance moved in external resistance training exercises also includes the mass of the whole body (e.g. double leg and single leg squats) or body parts (e.g. bench press). These masses are not typically recorded in measures of absolute strength unless the exercise is body weight only.
 - 'Relative strength' (i.e. the maximum mass lifted relative to one's body mass) is the most important measure for sport performance in many sports.

High Performance Sport

- High Performance (HP) sport is used interchangeably with 'elite sport' to describe sport at the highest levels of competition nationally and internationally, where the emphasis is on winning, such as professional leagues, world cups, world series, world championships and the Olympic Games and Paralympic Games.
 - This differs from 'sub-elite' sport which is used to describe second or third tier competitions.

HP Athletes and Coaches:

- Used interchangeably with 'elite athletes' and 'elite coaches' to describe athlete and coaches at the highest levels of competition nationally and internationally. HP athletes and coaches generally represent less than 1% of all athletes and coaches who participate in sport.

Performance Services Support

- Performance Services Support (PSS) is a term used to describe sports science and sports medicine (SSSM) discipline personnel used by HP coaches in an integrated way to prepare HP athletes for performance. These include but are not limited to:
 - Sport Physicians, sport physiotherapists, sport psychologists, sport dieticians, sport and exercise physiologists, sport biomechanists and skill acquisition specialists, sport performance analysts, and strength and conditioning (S&C) coaches.
- Like all other PSS disciplines, S&C has its own governing body, the Australian Strength and Conditioning Association (ASCA) which quality assures the accreditation and professional qualifications of S&C coaches working in HP environments.
 - Fitness industry governing bodies implement less scientifically rigorous accreditation requirements for fitness trainers/instructors and personal trainers to provide services to the general population.
 - Sport/exercise science/human movement undergraduate tertiary education qualifications are insufficient to be accredited in any one PSS discipline, including S&C. Most require specific undergraduate qualifications (e.g. psychology, physiotherapy, and nutrition), further specialist post graduate study, and accreditation through respective governing bodies.

Physical Development

- Physical development (PD) is the biological growth and development of both brain and body and involves developing control of muscles and physical coordination. PD occurs at differing rates throughout the developmental stages of childhood.
 - The term PD is also referred to (along with technical, tactical and psychological development) as an area of growth contributing to sport performance.

Resistance Training

- Used interchangeably with the terms 'strength training' and 'weight training' to describe the application of resistance to a muscular contraction for the purpose of enhancing the force skeletal muscles can produce.

Strength and Conditioning:

- Strength and conditioning (S&C) describes training undertaken by athletes to improve 'athletic' aspects of sports performance. It includes all manner of training methods to improve general and sport specific athleticism that can be incorporated into existing technical/tactical skills training sessions (e.g. on the field/court) or as stand-alone sessions on the field/court or other venue (e.g. park, oval, beach, home), or in a weight training facility.
 - The NTSA S&C Facility (SCF) is designed and equipped with equipment and staff to meet the general and sport specific S&C training needs of athletes from all sports.

- 'Physical' 'technical', 'tactical' and 'psychological' aspects of performance are inseparable. The execution of technical skills for example is underpinned by physical and psychological capabilities. Therefore, moving the mass of the body against gravity whilst playing and training the sport itself is a primary modality to enhance athleticism, especially for children and youth.

Talent

- There is no universally agreed definition for "talent" in the sporting context. The NTSA uses the following broad characterisation.
 - A set of personal characteristics that enhance one's ability to achieve expertise in an accelerated manner. It is, therefore, not how good one is right away, it is how good one can become in a perfect world taking into account innate or learned traits that have allowed and will likely continue to allow improvement at quicker rates than others in their field that are the same level of expertise/fitness/skill etc. The most important sub categories therefore are: innate (before training) ability; the mental and physical capabilities to spend time and effort trying to improve whilst not losing motivation or getting injured (although mental toughness and injury resilience can be improved there is a genetic component to both) and; the amount of improvement that happens with a given amount of practice (i.e. the rate in which the body adapts or the mind masters).
 - HP sport success is a product of talent and environment. The physical and mental abilities that develop from one's socialisation and upbringing are critical, particularly the ability to overcome difficult situations that develops willpower, perseverance and hunger for success. Without this ability to tolerate discomfort and adversity, the athletes will not last long enough to develop the skill set required for HP sport. Therefore, talent only exists with deliberate interest which will become apparent only after moderate amounts of practice as this is when one's ability to adapt and improve is more clearly visible. This is a primary reason why attempts to identify it at young ages typically fail.

8. NTSA Contacts

For further information on NTSA SCF policies and procedures please contact:

NTSA Pathways Services

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