

The ASCA DVD and Guide on Progressing Body-Weight Exercise Difficulty for Child and Youth Resistance Training

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INTRODUCTION

The Australian Strength & Conditioning Association (ASCA) has identified in its Position Statement on Child and Youth Resistance Training that most injury incidents with child and youth athletes participating in resistance training occur mainly through accidents where dumbbells or weight plates contact the body (ie. weights are dropped onto feet/toes/chests/fingers, bumped heads etc) (2). The ASCA also recognized that resistance training with barbells, dumbbells and machines has also proven to be very safe for children and youth if the program is well designed, supervised and coached (1-3).

The existing situation in Australia, however is that most clubs and schools dealing with children (6-12yrs) or first stage youth (12-15 yrs) do not possess the physical resources (space, personnel, equipment) or qualified coaches to safely deliver a resistance program that includes barbell exercises or other hard external resistances (weight machines, dumbbells).

Accordingly it may be more appropriate in most circumstances (eg. such as situations with a high ratio of children or youth to coaches/teachers, under-resourced facilities etc) for child and youth athletes to use their own body-weight to provide the main form of resistance.

By limiting the use of hard, external weights the likelihood of injury resulting from resistance training participation, already very small when compared to other sports or physical activities (2), may be further reduced. As body-weight and the few external “soft” resistance devices advocated in this Guide and the associated DVD are free or inexpensive, the implementation of a child and youth resistance program can be seen as extremely cost effective. The strategy of using modified body-weight exercises to enhance physical development also corresponds to the concept of Long-term Athlete Development (LTAD) advocated by Giles and others (4, 5), which maintains, among other things, that the developing athlete should be able to control their own body before significant external resistances are added.

Consequently the ASCA suggests that body-weight training with an emphasis on developing body/limb control and joint stability and strength-endurance should form the basis of the training routine for children (6-12 yrs) and first stage youth of 12-15 yrs if they have no previous resistance training experience. Additional resistances can also be provided initially by elastic or rubber tubing/bands, dowel rods or so called “soft” weights such as light weight medicine balls and sand-filled socks or tubes, when it is deemed appropriate according to the child or youths capabilities and training experiences. Progression to heavier and/or free weight exercises (barbells, dumbbells, weight machines) at a later stage eg. 15-18 yrs, would then appear to be safer if the athletes are of the appropriate age, training experience and capabilities as outlined in the ASCA Position Statement and if the program is well designed and strictly coached/supervised (1-3).

THE ASCA DVD AND GUIDE WITH SUGGESTED LESSON PLANS

To aid coaches and teachers concerned with the training of child and youth athletes the ASCA has developed a DVD and Guide with Suggested Lesson Plans that illustrates how to progress the difficulty of body-weight exercises using the six methods detailed below for six key exercises types. The six exercise groups are the:

1. Push-up group
2. Pull-up group
3. Squat group
4. Split leg/lunge group
5. Hover/plank torso group
6. Sit-up group

These six exercises groups are chosen because they represent fundamental sports and life tasks ~ the ability to press or push away using the upper body (push-ups), the ability to pull with the upper body (pull-ups), the ability to squat, the ability to utilize the body in split leg situations (split leg exercises), the ability to stabilize the torso (hovers) and the ability to flex and/or rotate the torso (sit-ups).

There are over 100 exercise variations shown in the DVD that cover the most basic forms of those exercises to extremely difficult versions.

METHODS TO PROGRESS THE DIFFICULTY OF BODY-WEIGHT EXERCISES

Resistance exercise difficulty can be manipulated by altering the number of repetitions and sets, choice of exercise, amount of resistance, rest periods, order of exercises, speed of lifting and so on to achieve the overload necessary for attaining different resistance training outcomes. This appears quite well understood when using traditional resistance training modalities such as barbells, dumbbells and weight machines. However, while these variables can be manipulated also for body-weight exercises, the difficulty of body-weight exercises and training can also be manipulated via the following methods:

1. Moment of resistance or Leverage factors
2. Range of motion.
3. Plane of motion
4. Stability demands
5. Additional small resistances
6. Limb utilization (single limb, additional tasks)

Combining any of these methods further compounds the difficulty when performing body-weight exercises. The DVD titled “Progressing the Difficulty of Body-Weight Exercises for Child and Youth Resistance Training” illustrates how these methods can be used to progressively increase the difficulty of six basic body-weight exercises. The basic principles of manipulating difficulty that are gleaned from the study of exercise progressions in these six exercise groups could also then be applied to other bodyweight exercises not covered in the DVD.

HOW HEAVY OR DIFFICULT SHOULD CHILD AND YOUTH RESISTANCE TRAINING BE?

Before commencing resistance training, an understanding of the intensity or difficulty constraints for child and youth resistance training must be understood. The repetitions that can be performed largely dictates the level of difficulty of an exercise ~ if the appropriate amount of repetitions cannot be performed by a child or youth, then the exercise is deemed too difficult or “heavy” and should be modified accordingly. For example, according to the ASCA Position Statement children aged 6-9 years of age should train with resistances that allow for the performance of at least 15 repetitions, whereas for children and youth aged 9-12 years, 12-15 years and 15-18 years, the minimal repetition constraints are 10, 8 and 6 repetitions, respectively (1, 2). For exercises requiring an isometric hold, such as hovers or planks, a minimum

hold time of 45, 30, 20 and 10 seconds, respectively, could apply for the different age groups.

However, it must be noted that if a 15-yr old youth starts resistance training for the first time, they do not commence with resistances that only allow for 6 repetitions. Commencing resistance training, irrespective of age, should entail initially the use of the lower band of resistances (15 repetitions) with timely and appropriate progression in intensity based upon the child or youth displaying enhanced physical competency (1-3). Progression through this “repetition spectrum” for different age groups or experience levels is detailed in the Guide with Suggested Lesson Plans. Essentially it provides recommended time frames that older children (9-12 years) and youth should spend training at each “repetition spectrum” before they progress on to a lower “repetition spectrum” (eg. using ≥ 15 repetitions before progressing to 12-15 repetitions, to 10-12 repetitions, to 8-10 repetitions and so on).

YOUTH BODY-WEIGHT EXERCISE TESTING PDF AND THE PROGRESSION TO HIGHER INTENSITY OR BARBELL-ORIENTED TRAINING.

When youth aged 13-15 years are competent in lifting their body mass easily and with good muscular control in the six exercise groups, they may then consider progressing to resistance training with a greater emphasis on heavier external resistances such as barbells, dumbbells and resistance machines etc as well as continuing with some bodyweight exercises. While the ASCA Position Statement provides some age related competency tests, some of those tests require some equipment (eg. bench press, leg press, dumbbells etc), which may be beyond the budget or coaching resources of some schools or clubs. Accordingly, some coaches and teachers have requested even simpler methods of testing the physical and strength-related capabilities of youth.

Accompanying the DVD is a free PDF (titled Youth Body-Weight Exercise Testing) with a test battery and scoring system using one test from each of the six bodyweight exercise groups described above ~ the equipment requirements for testing are a pull-up (chin-up) bar and a sturdy box or bench. Below are a few examples of how test scores could be interpreted with regards to whether a youth progresses to higher intensity or barbell-oriented training.

For example, if a male youth cannot score at least 18 points for the 6 tests, then they may not be ready to progress to heavier barbell-oriented resistance training, as they do not yet possess adequate body/limb control, joint stability and strength-endurance. Rather than attempting to mimic the training of advanced or adult athletes with heavy barbell bench presses, greater control over their own bodyweight during push-ups, pull-ups and hovers may be warranted.

For example, if a youth, male or female, can full squat their own bodymass with an additional 10% resistance held upon their chest, for 40 repetitions in 1-minute as well as perform five full 1-leg squats, then clearly they possess good lower body control and strength-endurance. They should be able to progress further in athletic development by progressing to performing a well designed, coached and supervised program that entails appropriately heavier barbell squats, split squats, lunges etc while still continuing with some bodyweight exercises.

Conversely if a youth can only perform 15 full squats in 1-minute and no 1-leg full squats, what does that mean? Does this ability to perform only 1 full squat every 4-seconds and no single leg squats indicate good control over the body? Are they ready to progress to barbell lifting despite exhibiting such limited control and strength-endurance? It could be strongly argued that greater control over the body and limbs needs to be displayed before heavier external resistances such as barbells are considered being added to the program.

Clearly the Youth Body-Weight Exercise Testing Scoring Tables do not contain scores that are supposed to be indicative of elite athlete Talent Identification. They merely suggest that the youth has attained a level of physical competency or control with their own body-weight from which they should be able to safely and fruitfully progress to heavier resistance training.

Of course in reality there will be situations that are not so

clear-cut as the examples above and the ASCA recommends common sense and an understanding of the limitations that some body shapes and dimensions can have upon performance in body-weight tests. In some situations an experienced, qualified coach may use their discretion to determine if some youth who may score just under or borderline with 18 points, should progress to including some barbell oriented training in their overall resistance-training program.

Youth aged 13-15 years may also attempt the tests to determine their readiness for barbell training if so desired or deemed appropriate by an experienced, qualified coach. Youth aged 13-15 yrs who have been following an appropriate body-weight training program may be sufficiently advanced and competent and the inclusion of some barbell training could be a fruitful addition to their overall resistance-training program. However, even for those youth that display bodyweight competence, participation in barbell training still requires appropriate programming, experienced coaching and strict supervision to maintain safety and reduce the likelihood of injury (1-3).

A common question ASCA coaches receive (and which prompted the development of our Position Statement) is: "Is my teenager ready to lift weights yet / is it safe for my teenager to lift weights?"

Our answer could now be: "Until a youth can display a minimum level of competency in basic body-weight tests (which are outlined in a PDF accompanying the DVD), would they truly benefit from progressing to higher intensity training (ie. ≤ 6 RM resistances) or heavier barbell-oriented training?"

Essentially the ASCA recommendations is: "Learn to use your own body-weight with good control, stability and strength-endurance in basic, fundamental exercises before you progress to heavier intensities, add barbells or attempt to perform advanced or complex exercises."

1-LEG SQUAT TESTING (Excerpted from the Testing PDF that accompanies the DVD)

Figure 1. Start and Finish position for 1-leg squat



Figure 2. Midway Down



Figure 3. The bottom position for the 1-leg squat



CONCLUSION

A DVD that illustrates how to progress the difficulty of six key exercise groups via six methods other than traditional training variable manipulations (ie. sets, reps, rest periods etc) is available from the ASCA.

The ASCA DVD titled “Progressing the Difficulty of Body-Weight Exercises for Child & Youth Resistance Training” is not meant to be encyclopaedic or even exhaustive in nature nor does it contain explicit programs. The DVD is intended as a basic resource to guide the implementation of a child and youth resistance-training program using body-weight as the primary resistance modality. Used in conjunction with the associated Guide with Suggested Lesson Plans, they should allow coaches and teachers to safely and confidently implement child and youth resistance training with minimal equipment requirements and for large groups possessing disparate muscular capabilities. The Guide with Suggested Lesson Plans also details how to implement a program of body-weight conditioning in a simple manner, listing hundreds of exercise progressions that cannot be covered fully in the DVD and therefore is highly recommended for schools and clubs.

A PDF titled Youth Body-weight Exercise Testing details six body-weight tests derived from the DVD. This manual and scoring tables contained within it, offer a very simplified method to help determine if a youth has achieved some basic level of physical competence and is ready to progress from body-weight training to higher intensity or heavier barbell training under the supervision of an ASCA accredited coach.

Hopefully the DVD and accompanying Youth Body-weight Exercise Testing PDF will bring greater clarity to the concept of body-weight physical competence that was outlined by Giles for the ASCA (4).

REFERENCES

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5. Giles, K. Developing physical competence: The cornerstone of LTAD. Available at www.movementdynamics.com/uploads/pdfs/physical-competence.pdf. Last accessed 4-2-2009.