

Youth resistance training: building strong foundations for a healthy future

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OVERVIEW

Resistance training for youth has greatly increased in popularity, particularly from an athletic development perspective. From a health perspective, current physical activity guidelines recommend strength-based exercise for the wider youth population; however, uptake in resistance training and opportunities to take part are limited. This article aims to showcase the broader impact of resistance training for youth, with particular focus on those less active and/or at risk of obesity. It will also illustrate a rewarding, alternative career path for strength and conditioning coaches, where the focus on improving physical activity and health has significant benefit for all.

The importance of resistance training for youth

In youth, a sufficient level of physical activity is fundamental for a healthy lifestyle, with regular participation having the potential to improve emotional, social, and cognitive well-being, as well as health and physical fitness.⁵ There is evidence to suggest that physical activity tracks from childhood to adulthood;²³ an up-to-date review of evidence states that appropriate levels of physical activity in adulthood reduces the risk of several diseases (eg, diabetes, cardiovascular disease) and contributes to the development of healthy tissues, a healthy cardiovascular system and neuromuscular awareness.²⁹

The current UK physical activity guidelines for those aged 5-18 recommend moderate-to-vigorous-intensity physical activity (MVPA) for an average of at least 60 minutes per day across the week. Additionally, there should be a variety of types and intensities of physical activity to develop movement skills, muscular fitness, and bone strength.² It

has been reported that in England, 55.4% of school-aged children do not meet the guidelines for MVPA;²⁰ for Scotland the figure is 31%; for Wales 49%, (from the age of 3);²¹ and for Northern Ireland 87%.⁴ Clearly, although there has been an increase in delivery of resistance training programmes for a sporting youth population, the engagement within the general youth population remains low.¹ This worrying level of physical inactivity has serious implications for the health of the nation; however, resistance training, in particular, may have an important part to play in tackling this issue.

The National Strength and Conditioning Association (NSCA), The United Kingdom Strength and Conditioning Association (UKSCA) and the British Association of Sport and Exercise Sciences (BASES) have all developed position statements which emphasise the benefit and safety of youth engagement in resistance training.^{6,13,22} Despite the mythology that still exists surrounding youth resistance training,⁹ research indicates that appropriately designed, and well supervised, resistance

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training programmes can safely benefit youth of all ages, with children as young as five years of age making noticeable improvements in strength.²⁸

Resistance training has been shown to improve bone health,¹⁰ and decrease cardiovascular disease risk,⁶ decrease metabolic risk factors, and improve body composition¹⁹ and self-esteem.¹¹ Motor skills (such as jumping, running, and throwing) have also been shown to be improved in youth after a period of resistance training.⁶ With these associated health benefits, the importance of resistance training as a mode of physical activity is apparent, which has led to the inclusion of activities to strengthen muscle and bone in the UK physical activity guidelines.²

Although research and physical activity guidelines demonstrate the benefit of engagement with resistance training for all youth, it may have a specific role to play in particular with youth who are inactive and/or at risk of obesity. To illustrate this, the Pediatric Inactivity Triad is a model that identifies a condition seen in physically inactive youth involving three separate but inter-related components: 1) exercise-deficit disorder (EDD);² 2) paediatric dynapenia, and 3) physical illiteracy.⁸ This conceptual model proposes that these three elements interact, and if interventions are designed to have a positive impact on these components, there is the increased likelihood of maintaining a healthy level of physical activity into adulthood.

EDD is defined as: 'A condition where levels of MVPA are below recommendations consistent with positive health outcomes (<60 minutes of MVPA daily).'⁷ Paediatric dynapenia is defined as: 'low levels of muscular strength and power not caused by neurologic or muscular disease',⁸ and physical illiteracy is defined as: 'the lack of confidence, competence, motivation, and knowledge to move proficiently in a variety of physical activities'.⁸ The latter two components are interrelated and treatable conditions which both affect, and are affected by, EDD.⁸ This is important because many interventions for inactive youth are focused on increasing MVPA,

but this might not be sustainable or have as much impact without consideration for the other two parts of the triad. For example, walking initiatives that attempt to increase MVPA in youth overlook the importance of enhancing neuromuscular fitness and improving physical literacy.⁸ Therefore, the suggestion is that delivering interventions that include activities that improve strength, movement competence and confidence (eg, resistance training) could be an effective strategy to improve physical activity levels.

As well as identified health benefits, there is evidence to suggest that resistance training could be an appealing and enjoyable activity for youth, implying that it could be a sustainable and valuable mode of physical activity. In particular, it has been suggested that overweight and obese youth are better in (absolute) strength exercises when compared with healthy weight youth, and that strength exercises are easier for them.²⁴ Furthermore, it has been reported that it is fun to engage in strength exercises.²⁴ In support of this, a desire for their child to lose weight and to gain confidence was reported during interviews with overweight children and their parents on the reasons why a parent would like their child to be involved in a resistance training programme.¹⁸ Additionally, the children said that they wanted the opportunity to build strength and improve fitness.¹⁸ These positive statements support how, in practical terms, resistance training could be an effective mode of activity for those who are overweight/obese, but there are still enduring negative misperceptions to take into consideration that could impact on the success of such programmes.

When exploring parents' attitudes to strength exercise in comparison to aerobic exercise, it has been reported that parents display a positive attitude towards aerobic exercises, but a less positive attitude to strength exercises.²⁵ Specifically, out of 314 parents, 29.6% indicated that they would not allow their child to participate in strength exercises, in comparison to just 4% for participation in aerobic exercise, explaining this by saying that they thought strength exercises could hinder optimal physical

development.²⁵ As this indicates that parents play a crucial role in recruitment to resistance training programmes, facilitating a better understanding of the benefits of this type of programme for youth is therefore fundamental. As part of this, scientific research is a fundamental component of this understanding.

Research into practice

To investigate the area of health benefits from resistance training for youth, as part of my PhD, I conducted a 10-week intervention study (with prior feasibility work) to explore the impact of resistance training on inactive and overweight/obese youth.³ With a small group of male and female participants aged between 8-10 years, qualified strength and conditioning coaches delivered two 45-minute sessions per week, with a coach to participant ratio of 1:3. The session content is shown in Table 1. The range of sets and reps followed recommendations by the UKSCA for a young beginner.¹³ There were four key exercises (Table 1) with variable core strength exercises and a 'hanging challenge' to finish. The use of body weight and free weight exercises were included to provide full body movement, challenging major muscle groups and requiring control of body mass in a variety of movements to develop foundational strength.¹² The exercises outside of the key exercises were varied and were sometimes a choice of the participant to encourage engagement; the initial load was the lightest available (broomstick or 5kg bar (with 2.5kg plates for deadlifts)). This load progressed by 5-10% once the coach deemed the participant competent at the

exercise and the load appeared insufficient to provide overload.⁶

Prior to finalising the programme content, there were several adjustments made during feasibility work. Originally the programme included more games and movement; however, the children often became disengaged. When traditional lifts were included (such as deadlifts and squats), the children became more focused and motivated. Specifically, for those who were overweight/obese, certain body weight exercises were too challenging, as were higher reps; therefore, although following appropriate guidance, the programme was adapted to suit the needs of the participants. It is important to note that, in a population less engaged in physical activity, monitoring these factors in addition to specific measures helps to shape successful programmes that aim to have high levels of adherence and longevity.

The main statistical finding from this study was a significant improvement of fundamental movement skills (FMS, measured by the Canadian Agility and Movement Skills Assessment (CAMSA)),¹⁴ and a large effect size for relative strength (measured by an isometric mid-thigh pull to assess peak force using a previously reported protocol).¹⁶ An explanation for improvement of FMS could be that neural adaptations (changes in motor unit coordination, firing and recruitment) occurred as a result of resistance training.¹⁷ This also supports the hypothesis that strength could be an underlying mechanism that would explain the change in FMS, due to the increase in relative strength. Importantly, for an overweight/obese population,



Table 1: Resistance training programme

EXERCISE	SETS/REPS
Warm up: a variety of active games, overhead broom stick squat (plus one warm-up set of each exercise)	5 minutes
Key exercise 1: Deadlift	2 x 6-8
Key exercise 2: Push press/TRX row	2 x 6-8 (alternate push/pull each session)
Key exercise 3: Back squat	2 x 6-8
Key exercise 4: Walking lunge/overhead lunge/side lunge	2 x 6-8 (each leg)
Front plank/dead bugs/hollow hold	Variable depending on the exercise
Hanging challenge: hang from a pull-up bar	Maximum hang time
Cool down: stretch of major muscle groups	Five minutes

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an improvement in strength promotes engagement in daily activities and physical activity, and subsequently improves their health-related quality of life.²⁶

In addition to the specific measures, it was important to get feedback to evaluate the success of the programme, and to gather useful information regarding wider implications of resistance training as a beneficial mode of physical activity. Informal feedback from the children involved, and their parents, provided supportive comments including: feeling positive to keep progressing, improved confidence, and a sense of achievement. Furthermore, comments were made that could support an impact of resistance training on physical activity levels: one child stated that he was encouraged to try other activities and another identified that he had gained strength, which had made running easier. The attendance over the 10 weeks was 93% and, due to the positive engagement observed in the children, a consultancy programme was developed which allowed these children to continue and new children to join. This is now a successful programme, with several children still attending almost four years after completion of the research study.

Overall, the research project and subsequent consultancy programme demonstrates that, with high levels of engagement and multiple health benefits, resistance training could be an engaging and valuable activity for those who are inactive and/or overweight/obese. The next challenge then is how we develop opportunities to deliver such programmes for those who may benefit the most.

What next?

Community-based venues such as universities and gyms are increasingly delivering resistance training programmes for youth. However, it does not yet appear to be as commonly accepted for these programmes to focus on health and enjoyment, in contrast to the priority focus on youth athletes or specific sports. Schools are beginning to demonstrate an appreciation of the importance of supervised resistance training for youth outside of athletic groups and this is supported by the fact there is now a UKSCA special interest group dedicated to this. Reinforcing this, the importance of strength and conditioning within schools for the purpose

of optimising health, fitness and physical activity has been emphasised, with the recommendation that schools invest in strength and conditioning provision.²⁷ This suggests that there is a shift towards an appreciation of resistance training as a mode of activity for all youth, rather than just for those involved in sport. Importantly, this provides an increase in career opportunities for strength and conditioning coaches which are only expected to expand as other community settings increase their provision in this area.

Evolving role of the S&C coach

Youth are a vulnerable and specialist group who require a safe and encouraging training environment. It is critical, therefore, to have appropriately qualified and experienced personnel delivering resistance training programmes, regardless of whether there is a performance or health-related focus. Although the current UKSCA accreditation process is predominantly aimed at performance sport, it provides a robust process that assesses the competency of a coach and which I strongly believe should be the level of coach leading on these types of programmes (understanding at the same time that there are other qualifications/experience which could be appropriate). However, it may be pertinent to review this process alongside additional specific skill development possibly required, considering the evolving role of the strength and conditioning coach and the variable groups they may be working with.

Increasing recognition of the value of health-related resistance training, and the need for using experienced and appropriately qualified coaches in this delivery will open up opportunities for UKSCA-accredited coaches to work in an impactful and rewarding environment outside of performance sport. Our challenge is to ensure that mentoring, training and professional development opportunities are available for this pathway to endorse the importance of this role. This will ensure that coaches choosing to work in this specialist area are as competent, experienced and empowered as strength and conditioning coaches working in any other area. As an experienced coach, the impact I have on the health and lives of youth is something of which I am very proud, and I hope this article inspires others to explore this alternative career option.



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