

The Safety of Resistance Training in Children—What Do We Really Know!

Bareket Falk
Brock University

How many times have you been confronted by the statement that resistance training¹ is unsafe for growing children, due to the susceptibility of their growing bones or connective tissue to injury? How many times have you tried to explain that it is an unfounded myth?

I have lost count . . .

In every one of my courses, I strive to dispel this apparent myth. I refer to numerous position or consensus statements of reputable professional organizations (2,4–6,9), which actually advocate for resistance training in childhood. In all of these statements, resistance training is cited as safe for children and adolescents, as it is for mature adults.

But is it? What are those statements based on? To a great extent, they rely on the fact that prospective studies of resistance training in children and adolescents rarely report any such injuries or adverse events. Most reports of resistance-training-related injuries stem from retrospective studies or anecdotal reports. There is a saying that “the plural of anecdote is not data.” Actually, it *is* data. But is it reliable and valid evidence?

A retrospective study that analyzed “weightlifting”-related emergency-room visits between 2002 and 2005 found children to incur less sprains and strains compared with adults. However, children sustained more accidental injuries, due to improper weights and equipment handling (12). The authors reasonably argued that the accidental injuries could be prevented with proper supervision.

The relevant question is *not* whether there is a risk of injury for children and adolescents in resistance training, or any sport or physical activity for that matter. There is some inherent risk of an adverse event in any physical activity. Given proper supervision, there are two pertinent questions in this regard:

- (1) In children and adolescents, is the risk of an adverse event in resistance training greater than in other sports or physical activities?
- (2) Is the risk of an adverse event in resistance training greater in children and adolescents than in adults?

There are other related questions. For example, what is the prevalence of mild, moderate, or severe adverse events among children and adolescents engaged in resistance training? Are these adverse events linked to dosage (volume and intensity of training) and are some youth more susceptible than others (eg, those with specific chronic conditions)? And importantly, do any incurred injuries in children and adolescents have long-term adverse consequences?

To properly address these questions, one needs to examine detailed reports of rates, types, severity, and circumstances of adverse events related to resistance training and other activities, in youth as well as in adults. As a first step, researchers need to report any occurrence of an adverse event related to a resistance training intervention. Such reporting is currently found in a very small proportion of published studies. Most researchers do not report adverse events at all. In a report of resistance-training studies in older adults, Liu and Latham (8) indicated that, of the 121 trials identified, 43% provided no mention of adverse events. No study I am aware of has performed a similar analysis in children and adolescents. This lack of reporting might reflect the fact that there were no adverse events to report or that minor events were viewed as too benign. Typically, however, researchers do not realize the importance of such reporting and are not aware of the recommended reporting methodologies. Reporting of no adverse events is as important as the reporting of any intervention-related injury. Otherwise, how can resistance training be claimed as safe for youth?

There are various recommendations for the reporting of interventions in general and exercise interventions in particular (see www.equator-network.org for a comprehensive list). These recommendations include the reporting of adverse events. As researchers, we are aware of the importance of detailed description of our experimental design and methods, so that these can be replicated and our results validated. Such reporting is also instrumental for our findings to be translated into practice. An essential part of detailed description ought to be the reporting of any adverse events or their absence. Although a training protocol might be highly effective in increasing strength or other capacity, omitting injured or otherwise adversely affected participants from the results prevent the readers from evaluating the pros and cons of employing such protocol in future research or practical applications.

The Consolidated Standard of Reporting Trials statement was originally developed for the reporting of randomized controlled trials (1) and has subsequently been updated for more specific designs (11). It includes a checklist of 22 items aimed at enhancing reporting quality, one of which is reporting “All important harms or unintended effects in each group.” Recently, an exercise-specific reporting template was developed by Slade et al (14,15) to facilitate the interpretation, translation, and implementation of exercise interventions. The 16-item Consensus on Exercise Reporting Template comprises key exercise descriptors including adverse events (ie, “Describe the type and number of adverse events that occurred during exercise”).

Detailed reporting is essential for knowledge users who may translate the findings into their own work or practice. It is also essential for researchers who conduct systematic reviews or meta-analysis. Several journals include some reporting checklist in the

Falk (bfalk@brocku.ca) is with Brock University, St. Catharines, Ontario, Canada.

editorial policy (eg, *International Journal of Sports Physical Therapy* [13]). However, systematic reviews of exercise intervention studies in diverse populations (eg, older population [10], athletes [3]) reveal that current reporting is still inadequate and does not generally adhere to the reporting guidelines.

The guidelines described previously, and most other reporting guidelines, include checklists for authors to ensure that important details and descriptors are provided. However, the effectiveness of such guidelines is dependent on their adoption and use by the research community (10). Hopewell et al (7) found that when journals require authors to review checklists as part of the manuscript submission process, the result is increased quality of information and number of reported items. If we are to refute the myth of resistance training being dangerous for children and adolescents, the reporting of adverse events, or lack thereof in any resistance-training study, is essential.

Endnote

¹For the purpose of this editorial, the term “resistance training” is used to describe training involving work against resistance, aimed at increasing or maintaining muscle strength or function. This is sometimes termed “strength training” and can take the form of weight training, plyometric training, etc.

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