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Kids & Weightlifting:
Dispelling The Myths

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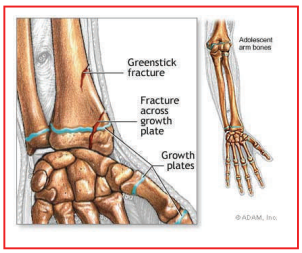
Weightlifting & Kids: Dispelling the Myths

Coach Jeff Martin & Cyndi Rodi

Common knowledge is sometimes neither accurate nor helpful. Case in point, the pervasive misconceptions and mythology pertaining to kids and weightlifting that have swirled around the health and fitness communities. For years, the ominous warning, "it is not safe for kids to lift weights" has been spoken with authority and rarely challenged. The customary rationale behind this point of view has been that lifting will hurt their growth plates. To hear the naysayers tell it, kids who lift weights are going to grow up to become misshapen dwarves.

This has not been our experience at CrossFit Kids HQ. Nor is it what is being reported by CrossFit Kids programs around the world. Looking at the active kids we are raising and training, we see the opposite effect. We see strong, lean, healthy kids, standouts in PE who are able to adapt to a wide range of sports. Okay, some of them around here may be short, but that is due to genetics, not weightlifting.

What is a Growth Plate and Why Should We Worry?



A growth plate, also known as the epiphyseal plate or physis, is an area of developing tissue located near the ends of long bones in children and teens. Each long bone has at least two growth plates located at each end "between the widened part of the shaft of the bone (the metaphysis) and the end of the bone (the epiphysis)" (1). It is at these ends that growth takes place. Growth plates are weaker than the ligaments and tendons which connect the bones to one another, and as such are extremely vulnerable. "The energy-absorbing capability of the growth plate is lower than that of bone, ligament, or tendon, which explains why the open growth plate is the preferential site for failure when the joint is injured" (7). Trauma to the joint is more likely to cause a growth plate fracture than injury to the bone or connective tissue. Because "the growth plate is the last portion of the bone to harden (ossify)" (1), damage to this soft tissue is always a concern in the event of impact and/or trauma.

Several factors determine the prognosis of a growth plate injury. Severe injuries that cause the cessation of blood flow to the end of the bone can stunt growth. A shattered or crushed growth plate increases the likelihood that abnormal growth will occur resulting in a shortened or deformed limb, and infection is always a risk when open wounds are present. The age of the child plays a key role since "younger bones have a greater ability to remodel" (9). This is why an adolescent who is near the end of the growth phase is at greater risk for long-term problems. Finally, the location of the injury and its type (classified by such factors as blood supply, nerve damage and degree of separation) determine the ability of the body to heal itself. The presence of rapid growth means the bones of children heal faster than those of adults. If not promptly and properly treated, a growth plate injury can lead to lifelong difficulties created by abnormalities in bone development. Clearly this gives us reason to pause when considering loading our children and adolescents with weights.

This may account for past assumptions and attitudes regarding weightlifting and kids. In

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1983, the American Academy of Pediatrics published a position statement which concluded that weightlifting should be avoided by preadolescents due to its high injury rate. This opinion was reinforced in a paper published by Sewell and Micheli (1986) in the Journal of Pediatric Orthopedics. **Despite a later paper by Micheli (1988) that reversed his stance regarding preadolescent weight training, the earlier publication continued to influence perceptions and beliefs.** A second American Academy of Pediatrics position paper was published in 1990 which added prohibitive language for adolescents in weight training, stating that, "Unless good data becomes available that demonstrate safety, children and adolescents should avoid the practice of weight lifting, power lifting, and body building…" (12). Such policies resounded through the medical and fitness communities and set the tone for subsequent studies and publications for many years. Unfortunately these men and women were forwarding bad policy based on erroneous and unfounded assumptions.

Anecdotal Observations

CrossFit Kids have soundly demonstrated this position is a fallacy. Our kids routinely lift weights and have experienced none of the injuries or negative effects historically attributed to childhood and adolescent weightlifting.

Connor is sixteen and has been CrossFitting for four years. During this period of time, he has progressed from working movements with PVC to lifting numbers that grown men envy. He has had no broken bones, regularly spars full contact and has been competing in varsity high school wrestling since his freshman year. Connor is a fierce competitor who aggressively works to achieve his many goals and holds the record at Brand X for several benchmark workouts. No evidence of injury in him.

Keegan is fourteen and has been CrossFitting twice a week for three years. He is a top-notch soccer player who has been recruited to play for older intra teams, and he is an accomplished climber whose advice on "the wall" is sought by kids and adults alike. Keegan is routinely one of the fastest players on his soccer team and possesses the stamina to play hard into the final minutes of the game. In the past year, Keegan has been able to up the ante on his weightlifting regimen and has achieved several body weight and over-body weight lifts with no injury or growth issues.

Keegan M. 14 deadlifts

David is seventeen and is the quintessential athlete. He is a talented soccer player who was invited to play soccer overseas and on the La Jolla Nomads in southern California. As a freshman in high school, he lettered in 3 sports. He has been training with Connor from the beginning, four years ago. David has made remarkable strides that are the combined result of his natural athletic talent and his incredible work ethic. He routinely challenges himself and has come to embody the promised potential of the CrossFit method. Through

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it all, David has remained free of injury and continued to grow in a normal manner.

Each of these young men competed in the 2007 CrossFit Games. Though CrossFit Kids does not recommend or condone max efforts for the majority of children and teens, we felt it was both safe and appropriate to allow them to participate in the CrossFit Total due to their lengthy CrossFit histories and carefully supervised training protocols. In addition, all three boys were exhibiting secondary sex characteristics associated with increasing testosterone production, a benchmark for gradually shifting to maximum lifts. Prior to making the decision to allow them to train and compete at this level, we had taken great pains to scour the current literature to determine the legitimacy of claims that adolescents are at greater risk for growth plate injury. We found no data to support such claims. In fact there is evidence that one-rep max lifts are safe IF (and it's a big if) the teen has demonstrated a mastery of the technique. All three of these athletes had been participating in CrossFit since their preadolescent years and demonstrated the knowledge and skills necessary to compete. Each had a fantastic showing at The Games while incurring no injuries or physical problems as a result of their participation.

This makes for a great story, and we are very proud of their efforts. However, the truth of the matter is, even if we hadn't allowed these young men to compete at such a level, they would still have been lifting on a regular basis. Kids are exposed to lifting whether they like or not.


Duncan M. 9 Push Presses a 15 # Bar during FGB

Duncan is nine and has been CrossFitting for 3 years. He lifts weights in CrossFit Kids classes but, more importantly, he lifts in his daily life. Every day, Duncan has to lug his ten-pound backpack to school. In the process he performs multiple lifts and strength movements. He lifts it from the floor (deadlift), carries it on his back, picks up the things that drop out of it onto the ground (lunge/squat), climbs into the truck with it on his back (weighted pull up) and delivers it safely to his classroom. When he returns home in the afternoon, he stows his backpack on the counter by overhead pressing/push pressing it into place. He routinely lifts half his body weight as a course of his normal activities and continues to move his limbs unimpeded by growth plate problems.

The same experiences are true for most kids. Girls and boys alike encounter daily experiences that dictate their participation in unsupervised weight training. It is not possible to get through life without performing some sort of lifting. This is why we decided several years ago to teach our kids to properly and safely perform lift movements. In the true spirit of CrossFit, our goal was to simply give the kids the skills they required to meet the demands of daily life and to improve their health and fitness. The added benefit was the phenomenal gains our CrossFit Kids began to make, growth plate injury free since our inaugural workout nearly three years ago.

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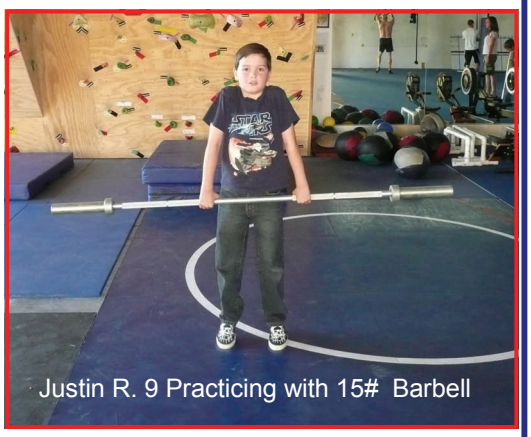
Our kids are testimony that weightlifting is a safe and positive activity for kids. Not only are we seeing injury free strength gains and increased coordination. We are witnessing perceptual changes in what they believe about themselves and their abilities. These things didn't happen by chance. We have taken great pains to design a program that is safe and effective. Each child or teen has been carefully supervised and trained. Each one has been treated as an individual, their strengths and special needs considered and addressed. As a result, their individual stories are uniquely compelling.



Justin R. 9 Practicing with 15# Barbell

Justin is 9 years old and has been CrossFitting for 3 years. Justin came to us shy and lacking confidence. He was physically capable but afraid to risk looking silly. We brought Justin along slowly, helping him to recognize his potential. Justin has gone from using PVC pipe to low weight dumbbells and barbells, each step made only after demonstrating a solid understanding of technique. He recently completed a set of 45 beautiful hang squat cleans with a 15# bar. Justin has sustained no injuries as a result of his lifting efforts.

Darby T. 12 warming up for some dumb bell swings

Darby is a 12 year-old female who has always worked hard but came to us with profound flexibility issues. We spent time working individually with her, performing a number of drills to help her improve in this area. Darby participated in the 2007 Fight Gone Bad benefit at the "C" level which required her to perform the push press and sumo deadlift highpull with a 35# bar. Darby accumulated 203 points in FGB and has not demonstrated any pain or injury from these or her other weightlifting efforts.

Delaney is 9 years old and has, from the beginning, demonstrated a penchant for detail. Her movements are often flawless, and her efforts have been impressive. Delaney attended Coach Burgerner's Olympic Lifting Certification at the age of seven. Our efforts with Delaney have been to keep her enthused and continually challenging herself. Delaney is a healthy, injury free CrossFitter.

McKenna is 7 years old and, like all these kids, has been with us from the beginning. Always devoted to CrossFit Kids, McKenna has only recently begun to demonstrate the physical and emotional maturity to move beyond PVC or low-weight dumbbells to actually perform slightly higher weighted movements. McKenna has had to weather the storm of watching her older peers achieve beyond her abilities and is gradually finding her own path. She is currently using eight to fifteen pound bars and dumbbells and a 12 kilogram kettlebell. McKenna is injury free and, in fact, is much taller than many of the older kids.

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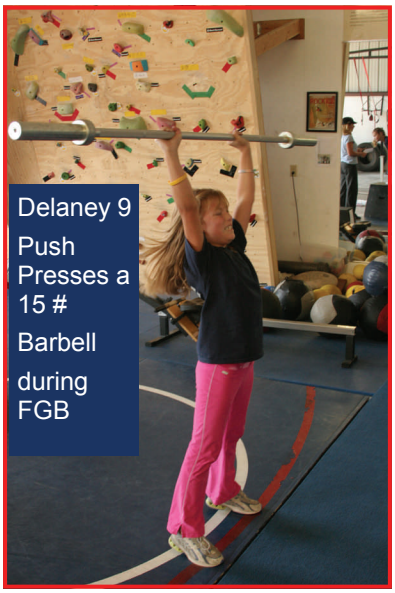
Courtney is 10 years old and has been a CrossFitter for two years. She is bold and fearless, willing to challenge boys and adults alike. We immediately realized Courtney's potential but knew we needed to temper her enthusiasm with realistic expectations. Courtney worked with the kids' class for a number of months until we felt confident her technique was proficient. We then moved her to the advanced kids' class where we continue to hone her lifting skills and monitor her maturity. By her last summer break, we felt comfortable giving Courtney permission to workout beside her parents in adult classes. Courtney has become a top performer at Brand X. She recently completed "Jackie" in record time, then went on to participate in a weekend soccer tournaments. No injuries here.

All our kids regularly appear in the CrossFit Kids Journal and on our website demonstrating proper form and recording stellar efforts in weightlifting and other strength training. We regularly include videos on the CrossFit Kids website of children ranging in age from four to eighteen performing weighted movements; thrusters, shoulder presses, cleans, etc. Each of these was sent to us by proud parents who are willingly subjecting their children to this type of training. Is there simply an abundance of "bad" parents in the CrossFit community? Or is it possible that weight training does not pose a danger to children and teens? Significantly, none of the kids in these videos show signs of abnormal growth patterns or obvious injuries.



Delaney 9 Push Presses a 15 # Barbell during FGB

As parents, we want what is best for our kids, and we take our roles as trainers and programmers very seriously. Of course we don't want to encourage something that could potentially harm the development of any child. So in spite of anecdotal evidence to the contrary, we were compelled to ask the question, "Is it true that kids who lift weights have a disproportionate amount of growth plate injuries compared to the rest of the population?"

Looking for Empirical Data

CrossFit is by nature a community grown by anecdotal evidence. This does not, however, preclude the careful review of available empirical data. We searched numerous peer reviewed journals, and our efforts to clarify the role of weightlifting in growth plate injuries yielded no evidence to support previous claims. In fact we found a mound of evidence that challenges and disproves the once commonly-held beliefs about kids and weightlifting. A host of articles generated by the scientific community fail to mention weightlifting as a cause of growth plate injuries and, in fact, clearly state that **strength training is safe and beneficial for children and teens.**

Strength training has been found to be an important part of fitness training for children and teens, contributing to improvements in multiple aspects of health and life. There has been much discussion about the ability of children to improve strength and enhance muscular development. Critics believe a lack of testosterone renders weight training with children useless. This is a ridiculous notion. There are a plethora of studies which

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document impressive strength gains and increases in muscle mass via weight training in both women and the elderly, two populations that are not known for their high testosterone levels. Dr. Avery Faigenbaum (et al.), one of the foremost experts on strength training with kids, has published numerous articles that "have revealed significant increases in muscle strength and mass in preadolescent boys and girls" (13), and similar findings were reported by other researchers as early as the mid-1980's (15).

Beyond the benefits of strength gains and enhanced muscle mass, "Reports indicate that youth resistance training may improve motor performance skills, may reduce injuries in sports and recreational activities, and may favorably alter selected anatomic and psychosocial parameters." In 2005, a study was presented to the American College of Sports Medicine (ACSM) which offered **sound evidence that resistance training brought about significant increases in strength and "favorable body composition changes in overweight and obese children."** The accompanying press release stated that such training can safely play a role in "a comprehensive health-enhancement strategy" for girls and boys alike, "including those with a disinterest in physical activity." The statement went on to say, "Parents and coaches who are concerned about the safety of resistance training for kids, and even young athletes, should know that it is a safe and effective activity for this age group, provided it is well designed and supervised." Strength training has been shown to protect muscles and joints from injury, boost heart and lung function, and lower cholesterol (8).

Weight training increases bone density. According to the American Institute of Arthritis and Musculoskeletal and Skin Diseases, weightlifting produces healthier children who are less prone to injury. It also helps fend off bone degeneration in later life. Osteoporosis has been called "a pediatric disease with geriatric consequences." The amount of bone mass that is created during childhood and adolescence is "an important determinant of lifelong skeletal health" (11). Healthy habits that contribute to increased bone density (e.g. bank bone), like weightlifting in the early years, can help to fend off such degenerative diseases.

McKenna 7 works on Thrusters for the kids Fran competition

The positive effects of strength training go beyond the physical. Some experts report that strength training may boost self confidence and improve social skills in young people. The Mayo Clinic concurs; calling on studies that suggest strength training can improve self-esteem and decrease the chance of depression in children and teens (8). According to Dr. Faigenbaum, lifting weights offers positive feedback in the form of "visual reinforcement" which becomes a tangible marker of how much progress is being made. He discusses the positive impact weight training can have on the psyche of an obese child.

> Because weight lifted is positively related to bodyweight, heavier children typically train with heavier weight-loads than their lighter peers. Unlike most athletic activities in which extra bodyweight is undesirable (e.g., running, jumping, soccer, basketball), strength training actually favors the larger

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youth and gives them a much needed sense of physical achievement (6).

In 2001, the American Academy of Pediatrics (1) issued its new policy statement regarding strength training by children and adolescents. Recommendations of this new policy include: "Strength training programs for preadolescents and adolescents can be safe and effective if proper resistance training techniques and safety precautions are followed," and specifically with regard to growth plate injuries, "Such injuries are uncommon and are believed to be largely preventable by avoiding improper lifting techniques, maximal lifts, and improperly supervised lifts." Dr. Bernard Griesemer, collaborative author of the AAP statement, was later quoted as saying, "We support anything that gets kids to become active and *stay* physically active – and that doesn't cause injuries – and strength training can be all those things" (5). A complete reversal of previous policy, the AAP statement paved the way for positive changes, limited only by the hold prior beliefs maintain upon educators, trainers and the medical community. So why the shift in perception and recommendation?

Dewey H. 8 Practices the Movements for the Clean

It turns out, it's not weightlifting that is hurting our kids. One large study showed that the majority of growth plate injuries in children resulted from a fall, "usually while running or playing on furniture or playground equipment." Competitive sports accounted for one-third of all injuries, while recreational activities such as bicycling, skateboarding and skiing contributed one-fifth of all cases (9). There is a dearth of empirical data regarding growth plate injuries and weightlifting. It simply does not exist. To the contrary, several studies have shown the risk of growth plate injuries to be "LESS during weight training compared to other sports," and "in published literature, all incidences of injury were attributed to either poor training design or lack of supervision" (15). Furthermore, **the American College of Sports Medicine has stated that "50 percent of preadolescent sport injuries could be prevented in large part by youth strength and conditioning programs" (13).**

The relevance of such statistics lies in which sports are being linked to growth plate injuries. We don't hear physician's counseling parents against letting kids play soccer. Nor do we see the American Academy of Pediatrics issuing a policy statement recommending that parents not let their kids ride bikes until they have reached puberty. Yet these sports have statistically high injury rates including fractures, dislocations and sprains, exactly the types of injuries that pose a danger to growth plates. The concern with these activities is not necessarily the risk of severe trauma but in minor injuries that can negatively impact the growth plates. "An injury that would cause a sprain in an adult can be associated with growth plate injury in a child" (9). Weightlifting does not appear among the ranks of those activities which pose such a danger and, clearly, is not the high risk behavior it was once thought to be. Empirical data has successfully confirmed our anecdotally derived conclusions.

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It is important to note that current recommendations do not condone strict weightlifting that calls for exposure to extreme loads and max efforts. Neither the empirical nor anecdotal data support carte blanche in applying weight training to children and adolescents. This distinction cannot be overemphasized. It is these types of activities that can produce the strain and torque necessary to cause growth plate injuries. Instead, strength training is defined as "resistance training" which incorporates the use of "free weights, weight machines, elastic tubing, or body weight" (1). Recommendations for this type of training with children and teens are very clear: **Strength training should emphasize well-trained, low-weight reps under highly controlled and supervised circumstances.**

CrossFit Kids Policy

CrossFit Kids believes in and endorses this type of weightlifting for kids. We utilize body weight exercises and free weights to build strength, improve muscle tone and enhance performance. We do not endorse max effort lifts for kids. We believe in using the smallest stimulus possible to achieve the training effect desired, whether young or old. Due to their still developing neuromuscular systems, **kids receive a training effect from sub maximal efforts**. Ignoring this is foolish, reckless and exposes kids to the same risk of injury that other age groups risk when going for max efforts. It is the hallmark of a bad trainer to expose young clients to this risk. Gradual exposure provides significant results while avoiding the pitfalls of excessive loading and max efforts in children and teens. A properly managed training regimen is imperative to both safety and efficacy.

Weightlifting allows our kids to be successful and safe. It is, by design, the art of moving an object without injuring oneself. Children, who engage in weightlifting, learn the proper fundamentals when they are young enough to still be developing neural pathways. Motor recruitment patterns become engrained movements for life. They will be able to draw on those patterns to become better athletes and safer individuals, coordinated and able to lift objects safely whether in sport or daily life.

The task, then, is to create a template for safe and effective weight training.

Age Appropriate Training

Recommendations regarding the appropriate age to begin weightlifting with children vary widely. There have been studies that demonstrate the safety and efficacy of weight training with children as young as four years old (14). However, weight training with kids is not simply a scaled version of what we use for adults. There are special considerations which apply to young children that will adapt and increase in complexity as they grow into experienced adolescents.

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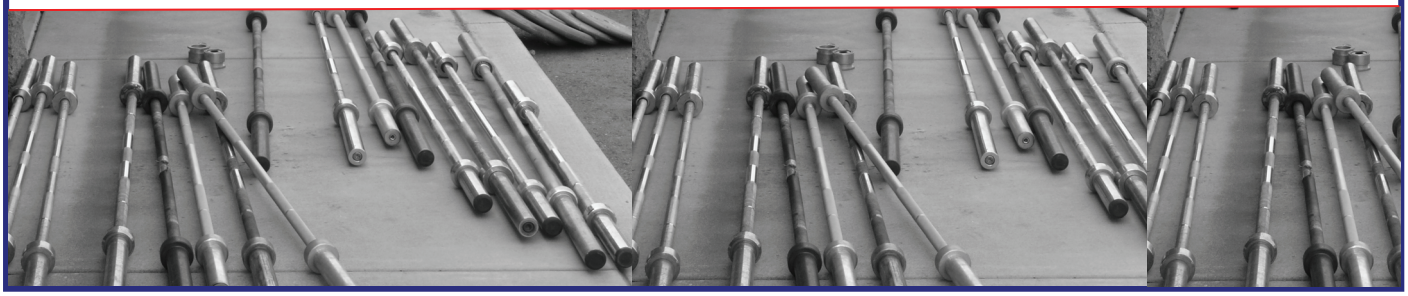

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Weight training with young children should be fun and informative at their level of understanding. The object is "to introduce the body to the stresses of training and to teach basic technique and form" (14). No kids' workout program will succeed if you cannot keep them interested. Thus, training sessions should be short and basic. Use weightlifting as skill work or as part of a short WOD to avoid boredom. Five to ten minutes, depending on the age group, will probably be the cutoff for their attention spans. Break complex movements into separate segments of focus work. After each portion has been mastered, link the movements together. Always begin young children's training with un-weighted or PVC movements. This allows them the luxury of comprehending and perfecting technique without the dangers associated with loading. Once trainer and child are confident in the child's abilities, move to low weight dumbbells. Motor pathways, once developed, become the foundation for future increased efforts.

Increasing loads should never be the goal with young children. Strength gains at this age are neurological rather than a result of hypertrophy. Training with multiple reps at low weights "allows children to build a physiological pathway for their technique" (14). This ripens the child for positive adaptations that occur as a result of repetition rather than heavy loading. Increases in load and intensity should be gradual and should never be prioritized ahead of safety and efficacy. Gradually increasing the demands being placed on a child's body creates a training protocol that

is both safe and effective. This same principle applies to older kids who have not yet received qualified and carefully supervised training.

Advanced weight training with kids still has safety and efficacy as its focus. Though weights can be increased at a greater rate during adolescence, the primary goal continues to be perfect form. Unlike earlier years when weights are light and "perfect is relative," meaning each child's performance is rated only on their

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abilities for that day, utilizing heavier loads in adolescence demands a strict definition of perfection. This is an integral part of advanced training that can often times be met with resistance. Kids who are watching their peers lift superior amounts of weights may have a difficult time understanding and/or accepting a training protocol that moves at a slower rate. However, the clock and a focus on numbers can become a hindrance to a safe and effective training program-a fact that must be repeatedly driven home to teenagers.

The increased possibility of injury means training teenagers to accept small gains and to value good form over heavy lifts is of utmost importance. A good and responsible trainer will find a way to effectively hold this ground while maintaining the interest of a teen. Delayed gratification has become a little-known entity. Weight training requires trainer and trainee alike to step back and view the bigger picture. The eventual gains to be made when good form is deeply entrenched in movement patterns are immeasurably greater than those achieved in a premature rush for big numbers. We learned this the hard way at CrossFit Kids HQ and had to spend an entire frustrating year backing off the weights and retracing our training steps with two of our teenage boys. The results of this arduous journey, however, have been performance gains and weightlifting increases beyond what we could have imagined. By considering safety first, we managed to also improve both the efficacy and efficiency of our program.

Conclusion

Weightlifting with children and teens has gotten a bad rap over the years. Unfounded allegations dominated and directed the attitudes and policies of the fitness and medical communities for nearly twenty years. Fortunately, the myths surrounding this activity have been dispelled, and policies have gradually been rewritten as mounds of research have demonstrated that weightlifting is not only safe but offers numerous positive benefits. Research has confirmed the observations of CrossFit parents and trainers around the world. Weight training is good for our kids.

Connor 16 works on his deadlift form

Weight training with kids should be a highly supervised, methodical process of developing motor pathways followed by small incremental increases with experienced adolescents. No amount of "glory" brought about by an overly ambitious lift can justify the inherent danger in moving kids along too quickly. Helping children and teens to appreciate the value of small gains should be of primary concern to a trainer, just as demonstrating perfect form should become a coveted source of satisfaction for kids. The goal of a weight lifting program should not focus entirely on strength gains. "Teaching kids about their bodies, promoting safe training procedures, and providing a stimulating program that

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gives participants a more positive attitude towards resistance training and physical activity are equally important" (16). A sense of self worth, feelings of competence, life long improvements in overall motor skills-these are but a few of the benefits to be gained from weight training with children and teens. Learning to appreciate little victories while looking with anticipation for the rewards of later years help to hone the physical, emotional and social skills of a child. Train them to do it correctly, teach them the value of doing it well, and the big lifts will come.

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