

## **Kids' Core: Core strengthening Program for Children**

Rodna Bordner, MOT, OTR/L

Imagine wanting to play a game with other children, but not feeling confident enough about motor skills to join in. Or, being involved in sports programs, but wishing your timing was a bit better.

Kids Core was developed to promote physical development augment sports programs and encourage smooth, coordinated movement patterns. It is an aquatic program based upon principles of core development (strengthening, endurance, and flexibility) with two additional components seen frequently as educational concerns: sensory processing and rhythm.

Any child can benefit from organized and well supervised play. For children who do not regularly engage in active movement or play, **Aquatic Kids Core** can be a starting point to improve participation at home, school or community. The program was initially designed to assist children who demonstrated gross and fine motor challenges due to fluctuations in muscle tone, poor coordination, inability to produce rhythm patterns or inefficient sensory processing. The program has expanded to include children who exhibit behavioral concerns, poor endurance and performance in the classroom.

Identified diagnoses have included Asperger's syndrome, Traumatic Brain Injury, Developmental Coordination Disorder, Hypotonia, Down syndrome, Fetal Alcohol Syndrome, and Cerebral Palsy. Participation in Kids' Core should not be limited to specific diagnoses, but should include any child age 6 and up who want to improve life skills at home or school.

### **AQUATIC KIDS CORE PROGRAM COMPONENTS DESCRIPTION**

**Core stability:** When muscles of the core are strong and work together, a child can effectively engage in balance movements of running, jumping, climbing to more coordinated and rhythmical movements such as running, skipping, completing obstacle courses, jump rope games, hide and seek. Fine motor and gross motor manipulative skills such as throwing, catching, kicking, using sign language, writing, manipulating toys, and building rely on a strong, stable core. Core training is typically comprised of

strength, endurance, and flexibility exercises. For this aquatic program, rhythm and sensory has been added for a well rounded program for children.

**Strength:** Strength training uses resistance exercises to help increase the ability to exert or resist force<sup>1</sup> Young children participating in strength training do not gain muscle bulk, instead improve nerve activation, and promote muscle adaption which improves motor coordination and muscle strength. Strength training supports ligament growth and bone density. Strength training has many benefits including improved mental health, socialization, self esteem as well as improved motor control and fitness, leaner body, decreased risk of obesity or type 2 Diabetes, lower blood pressure and cholesterol levels Children as young as 7 or 8 can become involved in strength training in a safe and highly supervised setting. Daily strength development occurs when a child plays on jungle gyms, plays tug o war, ball games, swing, pushes a merry-go-round, help with household chores. The aquatic environment is one of those safe and highly supervised areas to begin strength training. For young children games that incorporate long lever activities and increased resistance from turbulence and resistance toys promote strengthening. For older children using aquatic techniques such as Burdenko's deep and shallow water exercises as well as exercises using buoyancy resisted equipment enhances strengthening.

**Endurance:** During play and physical exercise, children develop physical endurance. As endurance, or the ability to play for longer periods increase, muscles become stronger, which in turn helps control weight gain and potentially limiting the development of weight related diseases such as hypertension, diabetes or obesity. Endurance increases during regular aerobic exercise such as swimming, jump rope and bike riding. When developing endurance, exercises should focus on increasing the length of exercise time before increasing resistance or intensity.

**Flexibility:** Flexibility is the ability of joints to move through full range of motion. Factors that influence flexibility are joint structure, age and gender, connective tissue, muscle bulk, proprioceptors, the internal environment (health, affects of exercise), injury. Flexibility is achieved through stretching. Exercises that are designed for flexibility while actively engagement in daily activities (reaching for toys, putting on clothing, grooming) will benefit very young children. As children age, physiologic changes occur

---

<sup>1</sup> \_\_\_\_\_. *Strength training for children and teenagers*. Downloaded from fitnessvenues.com on 6-10-11.

in strength and body mass which may lead to limited flexibility. Between ages 6-10, hip and shoulder mobility declines. Maximum flexibility of the spine occurs by age 8 or 9.<sup>2</sup> Young children should avoid static stretches, but can engage in tasks that are naturally found in the environment (reaching for toys, bending over to tie shoes, stretch in prone or supine or do somersaults in the pool). Flexibility training during the teen years focuses on rapid growth. Pain occurs during growth due to slower growth of muscle and connective tissue compared to bone. Training focuses on hips, lower back, hamstrings, shoulders, scapula to protect posture.<sup>3</sup> Injury during sports or reduced movement due to sudden physical changes may also occur. Beyond mid teens, flexibility training may focus on sport specific training.

Use of dynamic stretching before sports or exercise routines may assist in reducing injury. Dynamic stretches can be incorporated into the school day at recess or study breaks and by engaging in home activities like playing Twister, Wii games. Static stretches can be included in programming for older children but only when muscles are warm.

**Sensory:** A child's ability to process sensory information affects motor control and movement patterns. Ultimately efficient movement increases a child's engagement in play and social interaction. **The vestibular system**, working in harmony with the auditory and visual system affects balance and position in space. Movement and balance, auditory/language processing, muscle tone, bilateral integration, motor planning, emotional security, gravitational security, and visual spatial perception, are influenced by the vestibular system **The proprioceptive system** processes information for spatial orientation, body position and timing of movements by determining how muscle force is exerted and how much muscles stretch with active movement, primarily extensor movement. Motor control and motor planning grading of movement, postural stability, emotional security are also facilitated through the proprioceptive system. It works closely with the vestibular system, which is a source of specialized proprioceptive input through active movement. When the proprioceptive and tactile systems work together, it is referred to as *somatosensory processing*. **The tactile system** functions are protection and

---

<sup>2</sup> Grasso,B. *Flexibility-Are We Hurting Kids?*. Developing Athletics.  
[www.developingathletics.com/articles/flexibilityarticles/flexibility.html](http://www.developingathletics.com/articles/flexibilityarticles/flexibility.html). Downloaded on 2/27/11.

<sup>3</sup> Ibid., p.2

discrimination. Stimulation comes from touch on the surface of the skin; light touch stimulates a protective response, deep pressure provides discrimination. Deep pressure input affects body awareness, motor planning, emotional security, social skills, gross motor (positional activities, movement within the environment), fine motor (use of small muscles of the hands, fingers, tongue, lips, mouth, toes) manipulation of materials, articulation, and academic learning.

**Rhythm:** Rhythm simply defined is “the regular recurrence of an action or function, as of the beat of the heart...” or “regular recurrence of elements in a system of motion”<sup>4</sup>. Rhythm adds smoothness and efficiency to movement. We experience rhythms in our environment—the circadian rhythm (the 24 hour rhythm of life including sleeping, eating, eliminating), sinus rhythms (heart beats), rhythm of tides (high, low, neap), rhythms of seasons (fall, spring, summer, winter) just to name a few. Our daily lives follow a rhythm including dressing, eating, moving around the house, community and work places. Skilled athletes demonstrate rhythm in movement and are often participate in music and dance classes to improve or refine rhythm and balance.

Two of the most highly rhythmic activities are music and language. The development of rhythm begins in infancy with parents bouncing, jiggling and moving children in rhythmical patterns. This provides sensory input and begins to regulate systems. In early childhood, simple games like patty cake and itsy bitsy spider builds timing circuits and as a child grows games such as jump rope, hop scotch, bouncing on beds/furniture further increases rhythm development. In teen years and beyond, dancing, athletics, playing a musical instrument, horse riding and swimming all promote rhythmic development.

Rhythm is around us, about us and guides our daily lives.

### **PROGRAM DESIGN**

A well designed aquatic program can promote growth in strength, flexibility, endurance, rhythm and sensory processing. The Kids’ Core program is designed to be 8 weeks long. Time during the first and last weeks is for pre and post testing. Testing for fitness and motor development is completed on deck and a general water skills test is administered to determine safety and independence in shallow and deep water. Each week, a topic is introduced and aquatic exercises focuses on that area as well as reinforcing previously

---

<sup>4</sup> “rhythm”. Dictionary.com

learned exercises. Home programs are designed to increase awareness of the topic area and engaging the whole family in activity. For example: Week 2 Topic:*Rhythm*. Deck work: *Bucket drums*. Pool work: *Step patterns on the aqua steps, braided sponge pull, water blasters*. Home program: *Identifying rhythms in the environment* Each home activities record sheet includes the rhythm (*birds*), the location (*city park*), the person(s) who assisted (*mom and dad*), the time spent (*15 minutes*).

Kids' Core promotes healthy fit children with or without identified disabilities. It can be easily adapted to therapeutic or recreational programs, sport clinics or health courses.

For more information, contact ATRI for upcoming presentations.

## **KIDS' CORE BIBLIOGRAPHY**

About.com Sports Medicine. Core Training-God Core Training Takes More Than Ab Exercises” Elizabeth Quinn, About.com Updated January 21, 2009.  
<http://sportsmedicine.about.com/od/abdominalcorestrength1/a/NewCore.htm>  
(downloaded 7/17/2009)

Cowden, J.E., Sayers, L.K. and Torrey, C. C.(1998). *Pediatric Adapted Motor Development and Exercise: An Innovative, Multisystem Approach for Professionals and Families*. Charles C Thomas., Springfield, IL.

“Strength Training by Children and Adolescents”. Council on Sports Medicine and Fitness. *Pediatrics*, 2008;121:835-840. DOI: 10.1542/peds.2007-3790.  
Downloaded on February 27, 2011. Online article is located at  
<http://www.pediatris.org/cgi/content/full/121/4/835>.

*Core Strength* Posted December 31, 2008 by Nima Zarabbi.  
[Http://www.youthfitnessmag.com/core-strength](http://www.youthfitnessmag.com/core-strength)

*Core Strength Training for Kids*. <http://www.livestrong.com/article/174296-core-strength-training-for-kids/> downloaded 2/27/2011.

Winders, P.C. *Gross Motor Skills in Children with Down Syndrome: A Guide for Parents and Professionals*. (1997). Woodbine House, Bethesda, MD.

Mauer, C. *Programming for Children: “Little Swimmer” Fitness Classes and Aqua Play Groups*. The AKWAletter, August/September 1998-7, 38.

Hill, H. (2002). *Aqua Core Training-A Practical Application*. AKWA 16(2).11

### **STRENGTH**

Bundonis, J. (2007). “Pediatric Strength Training”. , PT, PCS, ATP. Rehabpub.com  
*Strength Training and Your Child*. KidsHealth from Nemours.

[http://kidshealth.org/PageManager.jsp?dn=KidsHealth&lic=1&ps+107&cat\\_id=147&articl....](http://kidshealth.org/PageManager.jsp?dn=KidsHealth&lic=1&ps+107&cat_id=147&articl....) Download on 10/3/2010.

Strength Training for Children and Adolescents. Excerpt by Holly J. Benjamin, MD, MPH and Kimberly M. Glow, MD.

### **ENDURANCE**

Brian Grasso. *Endurance Training and Kids-Part Two*  
www.DevelopingAthletics.com downloaded on 2/26/2011 at <http://www.y-coach.com/forums/indx.php?showopic=347>.

*Endurance Exercises for Kids* <http://www.livestrong.com/article/107189-endurance-exercises-kids/>

*Endurance Exercises for Children* <http://www.livestrong.com/article107412-endurance-exercise-children/>. Download on 2/26/2011

### **SENSORY**

Ayres, J.A. (1983). *Sensory Integration and the Child*. Western Psychological Services, Los Angeles, CA.

Berger, D.S. (2002). *Music Therapy, Sensory Integration and the Autistic Child*. Philadelphia, PA.

Blakley, S. *Through the Lens of Sensory Integration: A different way of Analyzing Challenging Behavior*. Young Child. November 2001.

Campbell, D. (2001). *The Mozart Effect: Tapping the Power of Music to Heal the Body, Strengthen the Mind, and Unlock the Creative Spirit*. HarperCollins Publishers, NY, NY.

Cuomo, N. (2007). *Integrated Yoga: Yoga with a Sensory Integrative Approach*. Philadelphia, PA: Human Kinetics

Heller, S. (2003). *Too Loud, Too Bright, Too Fast, Too Tight: What to do if you are sensory defensive in an overstimulating world*. Quill HarperCollins Publishers, NY, NY.

Kranowitz, C.S. (1998). *The Out of Sync Child*. Skylight Press, Berkley Publishing Group, NY, NY.

Kranowitz, C.S. (2003). *The Out of Sync Child Has Fun*. Skylight Press, Berkley  
Wilson, D.E., Heiniger-White, M.C. (2008). *S"cool Moves for Learning: Enhance Learning Through Self-Regulation Activities*. Integrated Learner Press, Shasta, CA.

On-line resources:

[www.tsbvi.edu/Outreach/seehear/fall97/sensory.htm](http://www.tsbvi.edu/Outreach/seehear/fall97/sensory.htm) *Sensory Integrative Dysfunction in Young Children* by Linda C. Stephens, MS, OTR/L. FAOTA.

[www.keystoneblind.org/kidsclub/exercises](http://www.keystoneblind.org/kidsclub/exercises). *Sensory Integration Exercises*

[www.coping.org/intervention/sensory/sensintegact.htm](http://www.coping.org/intervention/sensory/sensintegact.htm). *Sensory Modulation and Sensory Integration Activities for Home and School*.

[www.comeunity.com/disabilitysensory\\_integration/sensoryintegrationschool.html](http://www.comeunity.com/disabilitysensory_integration/sensoryintegrationschool.html)  
Suggestions for Teachers and Parents Helping School Children with Sensory Integration Issues.

[www.memorialhospital.org/SensoryIntegration.htm](http://www.memorialhospital.org/SensoryIntegration.htm) *Sensory Integration Therapy*.

## **RHYTHM**

*Rhythm and Tempo Training* The ICA Fitness and Conditioning Course. ICA Fitness <http://www.soccerclinics.com?ICAFitnessMembers/6766/with-flias/html/Rhythm/Rhythm.../30/2009>

*rhythm* <http://dictionary.reference.com/browse/rhythm>

*Movement/Rhythm Interactions*. <http://rhythmex.com/MovRythInt.html>

Download on 6/30/2010

*Movement Awareness*. Pillar of Light Movements.

<http://rhythmex.com/MovAwareness.html>

Cuomo, N. (2007). *Integrated Yoga: Yoga with a Sensory Integrative Approach*. Philadelphia, PA: Human Kinetics

*Motor coordination, emotions, and cognitive functions: Rhythm, movement exercise and academic performance*. Rhythmex Rhythmic Exercises.

<http://rhythmex.com/MovEmoCog.html> downloaded 6/30/2010.

*Basis of Changes in Left-Right Coordination of Rhythmic Motor Activity during Development in the Rat Spinal Cord*. Kiyomi Nakayama, Hiroshi Nishimaru and Norio Kudo. *The Journal of Neuroscience*.

<http://www.jneurosci.org/cgi/content/full/22/23/10388>. Downloaded 7/24/2009

## **FLEXIBILITY**

Grasso, Brian J *Conditioning: Flexibility- Are We Hurting Kids?*. . excerpt from Grasso, B. (2004), *Flexibility- Are We Hurting Kids?*, Brian Mackenzie's Successful Coaching (ISSN 1745-7513) Issue 17.

*Flexibility training: the role of stretching in sports performance*  
<http://www.pponline.co.uk/encyc/flexibility-training-the-role-of-stretching-in-sports-performance> Download on 2/27/2011

Brian Grasso *Flexibility Training for Young Athletes*. ,May 4, 2009.  
<http://iyca.org/flexibility-training-for-young-athletes/>

*The Physiology of Flexibility*. Sports Fitness Advisor.  
<http://www.sport-fitness-advisor.com/flexibility.html>

*Flexibility Exercises for Young Athletes*. (2010) American Academy of Orthopaedic Surgeons. <Http:///orthoinfo.aaso.org/topic.cfm?topic=A00038>

*Stretching for Flexibility* <http://www.shapefit.com/stretching-exercises.html>  
"The Benefits of Flexibility Training" Sports Fitness Advisor. [http://www.sport-fitness-advisor.com/flexibility\\_training.html](http://www.sport-fitness-advisor.com/flexibility_training.html)

Coleman, J.(1998). *Water Yoga: Water-Assisted Postures and Stretches for Flexibility and Well-Being*. Eglantine Press. Owings Mills, MD.

Cuomo, N. (2007). *Integrated Yoga: Yoga with a Sensory Integrative Approach*. Jessica Kingsley Publishers, Philadelphia, PA.

Betts, D.E. and Betts, S.W. (2006). *Yoga for Children with Autism Spectrum Disorders: A Step-By-Step Guide for Parents and Caregivers*. Jessica Kingsley Publishers. Philadelphia, PA.

Luby, T. (1998). *Children's Book of Yoga: Games and Exercises Mimic Plants and Animals and Objects*. Clear Light Publishers. Santa Fe, NM.

