Creating Supportive Environments

The Active Classroom
Supporting Students With Attention Deficit Hyperactivity Disorder Through Exercise

Christopher F. Mulrine
Mary Anne Prater
Amelia Jenkins

Ms. Kau's students are full of life and energy but many have trouble staying focused and are easily distracted. Several are diagnosed with attention deficit hyperactivity disorder (ADHD). She read an article suggesting that regular movement could assist students with concentration as well as helping them control impulsivity. Intrigued with this idea, Ms. Kau started incorporating classroom transition exercises, lesson energizers, and structured movement games for recess. She even talked with the physical education teacher to explore using structured physical movement games in her students' gym class. As a result of these changes, all of her students, not just those with ADHD, are focusing better and paying closer attention in class.

Teachers face many challenges in their daily effort to meet the needs of and ensure success for a diverse group of students, including students who are inattentive and have trouble staying focused and on task. All students, especially those with ADHD, need exercise; it assists them with concentration and provides an outlet for healthy impulsive discharge, helping to control impulsivity. Establishing a classroom environment that encourages beneficial movement throughout the school day—during content lessons, transitions, and via specialized games for recess and indoor rainy day activities—can improve results for students with ADHD, help reduce problematic classroom behavior, and better focus students' attention on content instruction.

ADHD is defined as a “persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequently displayed and more severe than is typically observed in individuals at a comparable level of development” (American Psychiatric Association, 2000, p. 85). Such inattention, hyperactivity and/or impulsivity make it difficult for students with ADHD to focus their attention long enough or well enough to learn. Students with ADHD often exhibit deficient study skills and general disorganization that cause significant academic, behavioral, and social problems stemming from the inability to pay attention (Slavin, 2003). More specifically, typical behaviors include inattentiveness during work or play, not completing assigned tasks, not listening to or following directions, losing materials, inattention to details resulting in mistakes, and difficulty awaiting turns (Prater, 2007).

Students with ADHD are easily distracted and teachers may find themselves constantly redirecting the students' attention. Students have difficulty staying on task and, as a result, may not complete assignments on time. Teachers often require students with ADHD to make up these assignments during nonacademic classes, recess, gym time, or after school. This, unfortunately, does not allow the students the opportunity to engage in physical activities that provide them appropriate time for movement and give their minds a needed rest from academics. There is even evidence that indicates keeping students with ADHD from exercise may actually cause some classroom-related problems (Holtkamp et al., 2004). Ms. Kau, the teacher in our opening sce-
nario, might be on the right track: Incorporating physical movement activities into her classroom routine helps all of her students, including those with ADHD, to be better focused and to stay on task for longer periods of time.

**Benefits of Exercise for All Students**

There is research evidence that implementing exercise activities throughout the day can help improve academic performance and reduce disruptive classroom and social problem behaviors (Barkley, 2004; Majorek, Tuchelmann, & Heusser, 2004). The physical education literature base is replete with studies stating the benefits of exercise and its effects on learning (see box, "Benefits of Exercise on Student Learning"). Exercise helps students to cope more effectively with stress, and promotes positive self-image, clearer thought, and improved memory (Akande, VanWyk, & Osagie, 2000). In addition, exercise can increase activity in the parts of the brain involved in memory, attention, spatial perception, language, and emotion (Olsen, 1994); there are indications that movement can strengthen learning and memory and boost learner motivation and morale (Jensen, 2005). Exercising just 30 min a day, 3 to 5 days a week has been shown to have advantages (Jambor, 1999).

**Benefits of Exercise on Student Learning**

An experimental group got four times more exercise per week than the control group, but their "loss" in study time did not result in lower academic scores (Dwyer, Blizzard, & Dean, 1996).

In a Canadian study of more than 500 school children, those who spent an extra hour each day in a gym class far outperformed at exam time those who didn’t exercise (Hannaford, 1995).

Among three test groups, the one that had vigorous aerobic exercise improved short-term memory, reaction time, and creativity (Michaud & Wild, 1991).

Children engaged in daily physical education showed superior motor fitness, academic performance, and attitude towards school as compared to their counterparts who did not participate in daily physical education (Pollatschek & O’Hagan, 1989).

Keeping students with ADHD from exercise may actually cause some classroom-related problems.

However, despite these findings, exercise for students in this country appears to be on the decline, corresponding to obesity rates for children unparalleled in any other time in history. A lack of physical exercise has resulted in American children becoming more obese since the 1960s (Hinkle, 1992). There also has been a dramatic increase in the number of children with Type 2 diabetes—a disease once limited to sedentary, overweight adults (Mayo Clinic, n.d.). Research further suggests that children’s cardiovascular health and fitness suffer when they are deprived of physical activity, or play, for long periods of time (Pellegrini & Smith, 1998). How does this impact education? Teachers should not only be concerned with the physical health benefits derived from exercise, but also need to be aware of the positive impact of exercise and movement on classroom learning for all students, especially for those with ADHD.

**Benefits of Exercise for Students With ADHD**

If, indeed, our bodies are designed to move and to learn while moving (Samaras, Straits, & Patrick, 1998), have these findings on exercise and learning been assimilated into the special education literature base as a viable strategy for teaching students, especially those with ADHD? Harvey and Reid (2003) reviewed 49 empirically based studies published between 1949 and 2002 on movement skill performance and physical fitness of children with ADHD. Their review of the literature found that: (a) children with ADHD are at risk for movement skill difficulties, (b) children with ADHD are at risk for poor levels of physical fitness, (c) there is comorbidity between ADHD and developmental coordination disorder, and (d) few interventions have focused on movement performance and physical fitness of children with ADHD. In a related study, Barkley (2004) concluded that physical exercise, which has received limited attention for management of disruptive behavior for children and adolescents with ADHD, needs further and more rigorous study as a relatively harmless, socially acceptable form of treatment.

Neuroscience, through the use of brain imaging studies, is providing additional information on the topic of physical activity and learning. Brain imaging—examining differences in blood flow to various brain regions—is being used to study the impact of exercise on learning performance in children with ADHD (Murray, 2000). Exercise impacts oxygen levels in the brain, with resulting effects on brain chemistry, cerebral metabolism, and growth and development, establishing the link between exercise and learning (Coco & Sweigard, 2004; Dustman, Emmerson, & Shearer, 1990; Putnam, 2001). Oxygen is essential for brain function, and enhanced blood flow increases the amount of oxygen transported to the brain. Physical activity and exercise increase blood flow and allow for more oxygen and nourishment to flow to the different parts of the brain through the blood vessels, arteries, capillaries, and veins (Hannaford, 1995; Jensen, 2005).

Related research on neurochemical reactions in the brain is investigating how exercise affects the behavioral and dopaminergic-like responses in children with ADHD. In preliminary findings, Tantillo, Kesick, Hynd, & Dishman (2002) cautiously stated that vigorous exercise might have the potential for treating the management of behavioral features of ADHD, but they suggested that further study is needed. Further, Wendt (2000) found that 40 min per day of exercise 5 days a week for 6 weeks significantly improved the behavior of ADHD students; students who run or jog may reduce the incidence of conduct and oppositional problems, in addition to helping them modify their disruptive classroom behaviors (Wendt, 2001).
Neuroscience research clearly indicates a link between physical activity and brain function, and further indicates a relationship between physical activity and improved educational performance (Jensen, 2008; Labounty, 2007; Pierson, 2004). Additional studies have suggested a link between physical activity and behavior and academic performance of children with ADHD (Hall, 2007; Van Puymbroeck, 2006). These results have clear implications for classroom practice, and can be translated into everyday teaching activities to improve chances for success for students with ADHD.

Incorporating Exercise Activities Into the Daily Classroom Schedule

How can teachers translate these findings into effective classroom learning activities? It is especially important to allow the student with ADHD opportunities for controlled movement and to develop a repertoire of physical activities for the entire class (such as stretch breaks; LD Online, 1998). Sitting quietly in a chair and staying focused requires effort for all students, especially those with ADHD. Conventional wisdom tells us that students need breaks from learning and can focus better when provided breaks throughout the day; unstructured breaks from demanding cognitive tasks seem to facilitate both learning and social competence (Pellegrini & Bohn, 2005). Incorporating movement into classroom life can be accomplished by creating a classroom environment that encourages beneficial movement throughout the school day, during subject transition times and content lessons, as well as structured movement games for recess and gym (see box, “Tips for Creating an Active Learning Environment”).

Incorporate Movement Activities During Transition Times

Transitions from one lesson or class to another are particularly difficult for students with ADHD; if prepared for these transitions, students are more likely to stay on task (U.S. Department of Education, 2004). Students, especially those with disruptive classroom and social problem behaviors, are more likely to exhibit behavior problems during subject area transition times. Effective classroom transitions between learning activities need structure and boundaries to help students mentally prepare for task shifts and to be better positioned for learning. In many elementary classrooms, transition time is spent sitting at one’s desk, and any physical activity is curtailed to bathroom breaks or a short walk to complete a classroom chore—then it is back to the seat for the next lesson. Remember: Students with ADHD may have difficulty sitting still, so teachers need to plan productive physical movement. Why not use more organized and structured movement activities during these times? Teachers can easily incorporate some simple movement activities during subject area transitions to get their students moving. Movement activities that become a part of the everyday classroom routine will soon become familiar to students and serve as a cue to transition from one subject area to the next, as well as provide an opportunity for appropriate movement. It is critical, however, to establish a structure and boundaries for the movement activities (such as limita-

---

**Tips for Creating An Active Learning Environment**

- Don’t sit at your desk. Move around as you teach.
- Discuss your own personal exercise routines with your students.
- Have students stand up and move around—give them the job of collecting and handing out papers.
- Don’t allow your students to sit for more than 30 minutes at a time.
- When giving instructions, have your students stand or sit on the carpet.
- Allow students to run errands within the school building (not just the well-behaved students).
- Limit student time on computer games and limit the use of videotapes. Go outside instead!
- Have your students use music, movement, and dance when cleaning or tidying up the classroom.
- Allow students to pick some type of movement activity for the entire class after lunch. Some ideas might include walking, running in place, yoga exercises, or playing catch.
- Hold classroom parties outside.
- Have your class design a mini “field day” full of noncompetitive fun. Create stations such as obstacle courses, games, dance activities, or tag. Make certain to include rest stations and water breaks! Enlist the help of your school’s physical education teachers.
- Don’t melt when it rains! Seek indoor opportunities for physical activity on days that the weather doesn’t permit outdoor play. Play indoor movement games like Duck, Duck, Goose, or have a dance party.
Incorporate Lesson "Energizers"
Incorporating movement through role play and other curricular responses is an effective strategy for managing students with excessive activity (Carbone, 2001). "Energizers" are short (10-min) activities that integrate physical activity with academic subjects—another method by which teachers can help students become more physically active throughout the school day (see Table 1). Energizers can be targeted to lessons in math, science, language arts, and social studies; Table 2 provides an example of a social studies energizer (Mahar, Kenny, Shields, Scales, & Collins, 2006).

Specific Accommodations for Students With ADHD
Even though children with ADHD can vary considerably in their characteristics and skills, they all share the inability to regulate their attention and as a result may require lesson adaptations and accommodations. Certain types of interventions have proven successful in working with students with ADHD, such as environmental supports, academic interventions, behavioral interventions, parent education, and medical interventions (Friend & Bursuck, 2006). When implementing movement activities during transitions and lessons utilizing energizers, teachers also may need to provide environmental, academic and/or behavioral accommodations for students with ADHD (see Table 3).

Table 1. Sample Daily Energizers (Grade 2)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Classroom Energizer</th>
<th>Lesson Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>&quot;Inches, Feet and Yards, Oh My!&quot; <a href="http://ncpe4me.com/pdf_files/energizers_K-2.pdf">http://ncpe4me.com/pdf_files/energizers_K-2.pdf</a></td>
<td>Learning measurement systems; students take small, medium, and large steps to indicate distance in inches, feet, and yards.</td>
</tr>
<tr>
<td>Science</td>
<td>&quot;Heart Smart&quot; <a href="http://ncpe4me.com/pdf_files/energizers_K-2.pdf">http://ncpe4me.com/pdf_files/energizers_K-2.pdf</a> (page 18)</td>
<td>Understanding the human heart and learning about activities that strengthen or weaken it; students either jump (for strengthen) or squat (for weaken).</td>
</tr>
<tr>
<td>Language Arts</td>
<td>&quot;As If&quot; <a href="http://ncpe4me.com/pdf_files/energizers_K-2.pdf">http://ncpe4me.com/pdf_files/energizers_K-2.pdf</a> (page 12)</td>
<td>Learning &quot;action&quot; words; students move (walk, jump) &quot;as if&quot; they were another animal or object, students act out and then create the sentences, create a tree map of other action words</td>
</tr>
<tr>
<td>Physical Education</td>
<td>&quot;Frogs in the Pond&quot; <a href="http://ncpe4me.com/pdf_files/energizers_K-2.pdf">http://ncpe4me.com/pdf_files/energizers_K-2.pdf</a> (page 29)</td>
<td>Developing gross motor skills; similar to game of &quot;tag&quot;</td>
</tr>
<tr>
<td>Language Arts</td>
<td>&quot;Jump to Spell&quot; <a href="http://www.eduref.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Physical_Education/Skill_Related/SRF0003.html">http://www.eduref.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Physical_Education/Skill_Related/SRF0003.html</a></td>
<td>Spelling and learning the keyboard; students spell words by jumping on a floor-size computer keyboard</td>
</tr>
</tbody>
</table>

Table 2. "California Dreamin'" Classroom Energizer (Grades 3-5)

<table>
<thead>
<tr>
<th>Student formation</th>
<th>Standing at desks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment required</td>
<td>None</td>
</tr>
<tr>
<td>Rules/directions</td>
<td>Teacher leads the class on a &quot;tour&quot; of California (can use a wall map to point out specific landmarks or areas): &quot;March across the Golden Gate Bridge.&quot; &quot;Surf the waves in the Pacific Ocean.&quot; &quot;Climb a redwood tree.&quot; &quot;Pretend you are an actor and wave to all your fans.&quot; &quot;Flex your muscles like Governor Arnold Schwarzenegger.&quot; &quot;Stomp grapes.&quot; &quot;Pick oranges.&quot; &quot;Rollerblade on the boardwalk.&quot; &quot;Ski the Sierra Nevada Mountains.&quot; &quot;Climb Mount Whitney, the highest peak in the continental United States.&quot; &quot;Crawl through the sand in Death Valley.&quot; &quot;Hit a homerun in Pac-Bell Park.&quot; &quot;Shoot a foul shot at the Staples Center.&quot;</td>
</tr>
</tbody>
</table>

Table 3. Movement Lessons/Activities Accommodations for Students With ADHD

<table>
<thead>
<tr>
<th>Environmental Supports</th>
<th>Academic Interventions</th>
<th>Behavioral Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep student’s desk/area free from clutter and in an uncluttered area of the room.</td>
<td>Break activities into smaller parts and assign individually; give extended time, if needed.</td>
<td>Give frequent specific verbal praise and reinforcement for desired behavior.</td>
</tr>
<tr>
<td>Provide clear classroom rules and routines; alert student when change in routine is going to occur.</td>
<td>Keep directions brief, don’t give too many directions at once, and don’t rely only on oral directions.</td>
<td>Look for signs of stress, fatigue, and frustration, and intervene before behavior problems occur.</td>
</tr>
<tr>
<td>Seat student near well-behaved, attentive peers, and near front of room or teacher.</td>
<td>Provide visual supports such as handouts, outlines, and graphic organizers.</td>
<td>Provide visual reminders of expected behaviors (picture cue card, point chart, timer).</td>
</tr>
<tr>
<td>Allow student to disengage from activity or to move to a “free” desk/space if feeling overwhelmed.</td>
<td>Directly model the activity and specify parameters for movement, volume, contact with others, etc.</td>
<td>Repeat and model rules and expectations for behavior often; remind students in a calm, nonthreatening manner.</td>
</tr>
<tr>
<td>Designate the student’s space; mark off with tape or carpet square.</td>
<td>Provide a peer partner to assist with activities.</td>
<td>Engage the student in monitoring his or her own behavior (giving self points when on task).</td>
</tr>
</tbody>
</table>

Additional Resources

Energizers
East Carolina University’s “Be Active” Program
For teachers: http://www.ncpe4me.com/energizers.html
For parents: “Be Active Kids”
http://www.beactivekids.org/parents.html#move

Recess Activities
Games Kids Play
http://www.gameskidsplay.net
Basic instructions for traditional children’s games and directions for additional classroom ball games, rhymes used for jump-roping, and strength games

Education World
http://www.education-world.com/a_special/physical_fitness.shtml
Physical education stories, lessons, resources, and other activities that can be modified for the classroom

Educator’s Reference Desk
http://www.eduref.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Physical_Education/Games/GAM0202.html
Instructions for chasring, tagging, and ball games (e.g., “Sharks and Barracudas,” “Thunderball”) Physical Education Lesson Plan Page
http://members.tripod.com/~pazz/lesson.html
Exercise games (e.g., “Sponge Bob, Gary, & Patrick,” “Shark Island,” “Hamburger Relay,” “Make Books Come Alive”) A to Z Teacher Stuff
http://www.atozteachersstuff.com/Lesson_Plans/Physical_Education/index.shtml
Lesson plans for structured physical activity games and exercises

PE Central
http://www.pecentral.org/adapted/adaptedactivities.html
Adaptations for physical activities to use for students with disabilities

Incorporating Exercise Activities During Recess

Even when engaged in frequent movement activities in the daily classroom routine, recess is the time when students have the most opportunity to participate in physical exercise. Recess may be even more important for students with ADHD; the benefits of activity may go beyond reducing the “fidget factor” (Silver, 2005). Tomporowski and Ellis (1986) suggested that vigorous playground behavior is related to attention to seat work after recess, and that exercise increases attention to various cognitive tasks and can help boost academic performance. Children with ADHD, however, often experience difficulties during recess because they often lack the social skills needed to get along with their peers. They may have difficulty with peer relationships as a result of (a) inability to pick up on social cues, (b) acting impulsively, (c) having limited self-awareness of their effect on others, (d) overpersonalizing another’s actions.
as being criticism, and (e) not recognizing positive feedback (Cowan, 2004).

Using structured games during recess (see box, "Additional Resources") is a way to teach socially appropriate values and behaviors, including sharing, fairness, and respect. Games also teach listening and responding skills and how to respect personal space, read social signals, cope with teasing, and manage anger. It is important to maximize the involvement of all the students. For example, with tag games, teachers can design strategies for children to reenter the game quickly to ensure continuous activity among all students. Examples of appropriate accommodations for students with ADHD for activities during recess include (a) assigning a peer partner, (b) giving simple, clear directions, (c) providing frequent monitoring and reinforcement of desired behavior, (d) modeling rules and expectations for behavior, and (e) reminding students of expectations in a calm nonthreatening manner.

**Final Thoughts**

Exercise activities incorporated throughout the day's schedule are important for all students, especially those diagnosed with ADHD; research provides evidence that movement activities throughout the day can help all students with their concentration and attention. The literature from physical education, special education, and neuroscience on the effects of exercise and learning suggests that physical activity is a viable teaching strategy worth implementing. Integrating the general strategy of active response into the curriculum and using varied and interesting movement tasks during classroom transitions, lessons, recess, and gym might have a positive effect on a child's well-being and learning. Engaging students with ADHD in planned frequent movement activities (while providing appropriate accommodations) increases the likelihood that students will experience success. Given the sedentary lifestyles of our youth and the learning problems associated with students with ADHD, these suggestions to get students more active surely will not hurt, and chances are they just might help—so get moving!

**References**


Carbone, E. (2001). Arranging the classroom with and eye (and ear) to students with ADHD. *TEACHING Exceptional Children, 34*(2), 72-81.


Christopher F. Mulrine (CEC NJ Federation), Associate Professor, Special Education and Counseling, William Paterson University, Wayne, New Jersey. *Mary Anne Prater* (CEC UT Federation), Professor, Counseling Psychology and Special Education Brigham Young University, Provo, Utah. *Amelia Jenkins* (CEC HI Federation), Associate Professor and Chair, Special Education and Counseling, University of Hawaii, Honolulu.

Address correspondence to Christopher Mulrine, Department of Special Education and Counseling, William Paterson University, 300 Pompton Road, Wayne, NJ 07470 (e-mail: mulrinec@wpunj.edu).
