Does Physical Activity Influence Academic Performance?

By

Leslee J. Scheuer, Graduate Student
and Dr. Debby Mitchell, Ed.D.
Associate Professor
Physical Education / Sports & Fitness
University of Central Florida- Orlando, FL USA

Relationship of Physical Activity and Academic Performance

A positive relationship of physical activity and academic performance has been explored through several studies conducted in the USA by the California Department of Education; Dwyer, Sallis, Blizzard, Lazarus, & Dean (2001); Dwyer et al. (1983); Linder (1999); Linder (2002); Shephard (1997); Tremblay et al. (2000); and others. These studies support one another in suggesting that when a substantial amount of school time is dedicated to physical activity, academic performance meets and may even exceed that of students not receiving additional physical activity (Shephard, 1997).

Co-author, Debby Mitchell became interested in the link between physical activity and cognitive ability after attending two summer workshops with Phyllis Weikart, Professor Emeritus at the University of Michigan. Weikart's concern was that children are having less opportunities to be physically active and develop basic motor skills that will enhance children acadmically.

Due to Weikart's influence, Mitchell performed a research study, "The relationship between rhythmic competency and academic performance in first grade children" (1994). The findings supported a link between academic achievement and the motor skills of maintaining a steady beat. Also motivated by Phyllis Weikart are Kuhlman & Schweinhart, who report in their discussions that children's timing has been found to be positively related to children's overall school achievement, as well as mathematics and reading achievement (1999).

Physical Activity Benefits

Youth receiving additional physical activity tend to show improved attributes such as increased brain function and nourishment, higher energy/concentration levels, changes in body build affecting self esteem, increased self-esteem and better behavior which may all support cognitive learning (Cocke, 2002) (Tremblay, Inman, & Willms, 2000) (Dwyer, Coonan, Leitch, Hetzel, & Baghurst, 1983) (Shephard, 1997).

Improved brain attributes associated with regular physical activity consist of increased cerebral blood flow, changes in hormone levels, enhanced nutrient intake, and greater arousal

(Shephard, 1997). Cocke (2002) states "a trio of studies presented at the 2001 Society for Neuroscience Conference suggest that regular exercise can improve cognitive function and increase levels of substances in the brain responsible for maintaining the health of neurons." Brain function may also indirectly benefit from physical activity due to increased energy generation as well as from time outside of the classroom/away from studying; The increased energy levels and time outside of the classroom may give relief from boredom resulting in higher attention levels during classroom instruction (Linder 1999).

California Statewide Study of Physically Fit Kids

A cross-sectional study completed by the California Department of Education (CDE) (2002), included a sample of 954,000 students who were in grades five (353,000), seven (322,000), and nine (279,000). The study individually matched Stanford Achievement Test Ninth Edition (SAT-9) standardized test scores with results of the state-mandated, teacher administered, physical fitness test, known as the Fitnessgram. The six fitness standards included in the Fitnessgram are cardiovascular endurance, body composition, abdominal strength and endurance, trunk strength and flexibility, upper body strength and endurance, and overall flexibility.

Results of the CDE (2002) study included a "statistical analysis indicating a distinct and linear correlation between students' academic achievement and fitness scores" in all three grades; higher academic performance was positively related to higher levels of fitness with the greatest academic gains in students who met three or more physical fitness standards.

This association was greater in mathematics than in reading. Additionally, females demonstrated higher academic achievement at higher fitness levels than the males. In looking at this information, it should be noted that this study is still in the process of working with academicians to reach a published state in a peer-reviewed professional journal.

Australia -Academic Performance, Physical Activity and Fitness in Children

Dwyer et al. (2001) completed a study on 7,961 Australian schoolchildren (7-15 year olds) using a questionnaire/fitness test for measurement of physical activity/physical fitness and a 5-point scale to depict academic performance. The questionnaire was administered by trained data collectors to four students at a time to ensure the questions were understood and the obtained responses were as accurate as possible. Questions requested information on the students' involvement in sport including frequency, time, and intensity in the past week. Additionally, information in reference to the subjects' mode of transportation to and from school as well as activities during morning recess and lunch breaks was sought.

The fitness test was administered by a trained testing team and consisted of indoor and

outdoor tests. Each student's academic performance was measured via 5-point scale (which indicated excellent, above average, average, below average, or poor ratings) administered by a school representative, most often the principal. Additionally, information regarding school size and physical activity programs were also noted on a school questionnaire (Dwyer, et al. 2001).

After analysis of the results, Dwyer concluded that "consistently across age and sex groups, the [academic] ratings were significantly correlated with questionnaire measures of physical activity and with performance on the 1.6 kilometer run, sit-ups, and push-ups challenges, 50-meter sprint, and standing long jump. "

Hong Kong - Sport Participation and Perceived Academic Peformance of School Children and Youth

Different from the above studies' tests of measurements, Linder (1999) used a questionnaire to gather data on both physical activity and academic performance of 4,690 9-18year old students in Hong Kong. Both tests were administered by trained data collectors to classrooms of students. Each student personally completed his/her questionnaires by rating their own physical activity and academic performance. After data analysis through the Statview computer program, results showed a significant but low correlation (more for the girls than for the boys) indicating that students who perceive themselves to have high academic performance generally participate in more physical activity (Linder, 1999). It is obvious that no direct correlations or causations can be assumed from this study, however a positive relationship between physical activity and perceived academic performance was found.

Conclusion

Enhanced brain function, energy levels, body builds/perceptions, self-esteem, and behavior have been attributed to physical activity and to improved academic performance. One cannot make direct correlations from the information offered. However it is obvious that many positive relationships have been suggested. Perhaps instead of decreasing physical activity, school officials should consider developing enhanced physical activity programs.

References

Cocke, A. (2002). Brain May Also Pump up from Workout. Retrieved April 11, 03, from Society for Neuroscience Annual Meeting Web Site: http://www.neurosurgery.medsch.ucla.edu/whastnew/societyforneuroscience.htm

Dwyer, T., Coonan, W., Leitch, D., Hetzel, B., & Baghurst, R. (1983). An investigation of the

effects of daily physical activity on the health of primary school students in South Australia. International Journal of Epidemiologists, 12(3), 308-313.

Dwyer, T., Sallis, J. F., Blizzard, L., Lazarus, R., & Dean, K. (2001). Relation of Academic Performance to Physical Activity and Fitness in Children. Pediatric Exercise Science, 13, 225-238.

Geron, E. (1996). Intelligence of Child and Adolescent Participants in Sports. In The Child and Adolescent Athlete (Vol. 6). Oxford, England: Blackwell Science Ltd.

Kuhlman, K & Lawrence J. Schweinhart, L.J. (1999). Timing in Child Development. High/Scope Educational Research Foundation.
http://www.highscope.org/Research/TimingPaper/timingstudy.htm

Linder, K. J. (1999). Sport Participation and Perceived Academic Performance of School Children and Youth. Pediatric Exercise Science, 11, 129-144.

Linder, K. J. (2002). The Physical Activity Participation--Academic Performance Relationship Revisited: Perceived and Actual Performance and the Effect of Banding (Academic Tracking). Pediatric Exercise Science, 14, 155-170.

Mitchell, D. L. (1994, May). The relationship between rhythmic competency and academic performance in first grade children. Doctoral Dissertation. Orlando, FL: University of Central Florida Department of Exceptional and Physical Education.

Shephard, R. J. (1997). Relation of Academic Performance to Physical Activity and Fitness in Children. Pediatric Exercise Science, 13, 225-238.

Tremblay, M. S., Inman, J. W., & Willms, J. D. (2000). The Relationship Between Physical Activity, Self-Esteem, and Academic Achievement in 12-Year-Old Children. Pediatric Exercise Science, 12, 312-324.

CALIFORNIA DEPARTMENT OF EDUCATION

NEWS RELEASE

CONTACT: Nicole Winger, Mary Lou Thomas — communications@cde.ca.gov — (916) 319-0818

REL #02-37 — **December 10, 2002**

STATE STUDY PROVES PHYSICALLY FIT KIDS PERFORM BETTER ACADEMICALLY

SACRAMENTO – State Superintendent of Public Instruction Delaine Eastin today announced that the results of a recent stu conducted by the California Department of Education (CDE) show a distinct relationship between academic achievement anc physical fitness of California's public school students.

"This statewide study provides compelling evidence that the physical well-being of students has a direct impact on their abilit academically," said Eastin. "We now have the proof we've been looking for: students achieve best when they are physically f Thousands of years ago, the Greeks understood the importance of improving spirit, mind, and body. The research presented validates their philosophic approach with scientific validation."

The newly completed research study individually matched scores from the spring 2001 administration of the Stanford Achiev Ninth Edition (SAT-9), given as part of California's Standardized Testing and Reporting Program, with results of the state-ma physical fitness test, known as the Fitnessgram, given in 2001 to students in grades five, seven, and nine.

In the study, reading and mathematics scores were matched with fitness scores of 353,000 fifth graders, 322,000 seventh gr 279,000 ninth graders. The attached bar graphs for each grade level show a significant relationship between the two types o that were matched.

Key findings of the study are:

- Higher achievement was associated with higher levels of fitness at each of the three grade levels measured.
- The relationship between academic achievement and fitness was greater in mathematics than in reading, particular fitness levels.
- Students who met minimum fitness levels in three or more physical fitness areas showed the greatest gains in acad achievement at all three grade levels.
- Females demonstrated higher achievement than males, particularly at higher fitness levels.

Eastin pointed to physical education as a primary source for promoting physical fitness. "Every student in California should h physical education experiences from kindergarten through high school," Eastin said. "The goal of these programs should be students with the knowledge, skills, and confidence to participate in health enhancing physical activity throughout their lives."

The California Education Code mandates physical education for all students in grades one through nine, plus one additional school. Students in grades one through six are required to have 200 minutes of physical education every 10 school days, an in grades seven through twelve are required to have 400 minutes every 10 school days.

Families are encouraged to plan activities that include opportunities for all family members to be physically active together. H related fitness assessment results can be used as a tool to help students understand, enjoy, improve, and maintain their phy and well-being.

In 2001, more than one million students participated in statewide physical performance testing mandated by Assembly Bill 2 The law requires that school districts annually administer a physical fitness test designated by the State Board of Education t seventh, and ninth graders.

The Fitnessgram, developed by the Cooper Institute for Aerobics Research, assesses six major health-related areas of physi including aerobic capacity (cardiovascular endurance), body composition (percentage of body fat), abdominal strength and e trunk strength and flexibility, upper body strength and endurance, and overall flexibility. A score of 6 indicates that a student i healthy fitness zone in all six performance areas, and meets standards to be considered physically fit.

Fitnessgram results from the 2001 administration indicated that 23 percent of California's fifth, seventh, and ninth graders tes be considered physically fit. Detailed 2001 physical fitness results for schools, districts, countries, and the state are available CDE Web site: Physical Fitness Testing (PFT) - Testing (CA Dept of Education).

For more information, please contact Debbie Vigil at 916/319-0341 or dvigil@cde.ca.gov, or Dianne Wilson-Graham at 916/3 dwilsong@cde.ca.gov.

####

Attachment: SAT 9 and Physical Fitness (3 Tables) (PDF; 92KB; 3pp.)

####

DELAINE EASTIN - STATE SUPERINTENDENT OF PUBLIC INSTRUCTION
COMMUNICATIONS OFFICE - ROOM 5206 - 916/319-0818 - (FAX) 916/319-0111

Downlo

Medical News Categories

Ads by Google
- Physical Fitness
- Health Fitness
- Fitness for Kids
- Children Obesity

Home Page
Medical News Letter
Institutions A to Z
Medical A to Z
- Child Health News
- Disease/Infection News
- Devices/Technology
- Healthcare News
- Medical Condition News
- Medical Procedure News
- Medical Patent News
- Medical Research News
- Medical Study News
- Men's Health News
- Medical Science News
- Miscellaneous News
- Pharmaceutical News
- Women's Health News

Archived Stories
Info
Legals

Medical Books

Medical Conferences

Featured Publications
- Child Health
- Epidemiology
- Food and Nutrition
- Gender and Health
- Health Promotion

Strong relationship between kids academic achievement and fitness

Child Health News
Published: Tuesday, 19-Oct-2004

Printer Friendly Email to a Friend

The health benefits of exercise - across the lifespan - have been well documented. More recently, scientists have begun to demonstrate that exercise also may improve cognitive functioning in older adults.

But what about children? Are physically fit kids better suited to compete not only on the ball field, but in the classroom as well?

University of Illinois researchers have been exploring these and other related questions in a series of studies during the past two years, and preliminary results indicate a correlation.

"We have found a strong relationship between academic

Injuries and Violence
- Lifestyles
- Maternal Health
- Non-communicable Diseases
- Research and Scientific Writing

achievement and fitness scores," said Darla Castelli, a professor of kinesiology whose area of expertise is effective physical education practices. "Those who scored well in academics also did well in physical fitness.

"We're not suggesting that if we run more laps it will make us smarter," she said, "but there does appear to be a correlation."

Castelli noted that teachers who work closely with young and preadolescent children have long suspected a link between physical fitness and cognitive function. Anecdotal evidence is plentiful, she said, but empirical data to back up those assumptions have been harder to come by.

That's why Castelli jumped at the chance to team with colleague Charles Hillman, also a kinesiology professor at Illinois, to examine possible connections more thoroughly. Hillman's primary research focus is on executive control and cognitive function in elderly adults, which involves studying the effects of exercise on older individuals' abilities to process complex mental tasks.

Together, with assistance from graduate student Sarah Buck, Castelli and Hillman conducted a series of studies with school-aged children and control groups of adults. Data were gathered on subjects' physical attributes (height, weight, body mass), fitness levels and cognitive abilities.

Much of the data was collected first-hand by going into local schools. Working with the cooperation of physical education teachers in Champaign's Unit 4 school district, the researchers measured the physical fitness

of some 500 third-, fourth- and fifth-graders. Using the "Fitnessgram," which Castelli said is widely regarded by physical education researchers as a reliable field assessment tool, they measured subjects' aerobic capacity, flexibility and muscle fitness. Cognitive function was determined by analyzing scores on standardized academic performance tests (the Illinois Standard Achievement Test) and by observing and measuring neuroelectric and behavioral responses to stimulus discrimination tasks.

Hillman and Buck will present results from one of the research group's studies ("Physical Fitness and Cognitive Function in Healthy Preadolescent Children") at the annual meeting of the Society for Psychophysiological Research in Santa Fe, N.M., Oct. 20-24. In that study, the U. of I. researchers examined the relationship between age and physical fitness on attention and working memory among groups of fit and sedentary children, and fit and sedentary adults.

"We looked at the relationship between age and fitness from both a neuroelectric and behavioral perspective," Hillman said.

The researchers observed and recorded the subjects' ability to recognize, respond to, and discriminate between different visual stimuli using a "visual oddball" task. In that task, researchers present subjects with two stimuli; in this case, one was a cartoon drawing of a dog; the other, a cat. Both appeared with different probabilities - one was presented more frequently than the other.

When the researchers

measured brain activation, "we found that fit children allocated more resources towards identifying stimuli, and also processed stimuli faster," Hillman said.

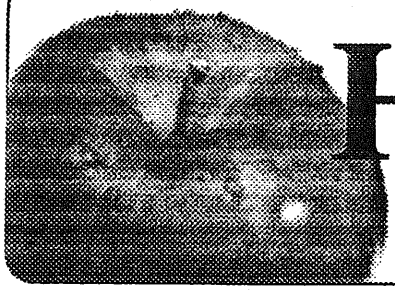
"Behaviorally, these effects showed up in that these fit children made fewer errors than sedentary ones," Hillman said. In terms of response speed, the fit children were still slower than fit and sedentary adults, but were faster than sedentary children, he said.

Hillman - who stressed the preliminary nature of their findings - said the research team is analyzing data for three related studies and plans to present a symposium on their findings next spring in Chicago during the national convention of The American Alliance of Health, Physical Education, Recreation and Dance.

"There's a lot of basic research that needs to go on before we can determine what underlies achievement," Hillman said.

Nonetheless, if scientists can demonstrate that increased levels of physical activity and exercise can have a positive effect on children's physical health and their ability to succeed academically, Castelli is hopeful that educators, school administrators, legislators and other policymakers will take note.

"Despite increased incidence of childhood obesity and type II diabetes mellitus, physical education time is being reduced to address academic issues related to federal 'No Child Left Behind' legislation," Castelli said. "If evidence existed that physical education contributed to intellectual development, it may gain credibility and instructional time."



HealthWise

A Bulletin for School and Community Health

Volume XVIII, Number II | Since 1978 | Fall 2004

Physical Activity for Health and Success in School

Nancy Hood, M.P.H., Rachel Mittleman, M.Ed.

Guest Editors

Schools are entrusted with the academic achievement of their students. School officials and educators recognize how strongly students' health is connected with their ability and willingness to learn. Schools, as microcosms of the larger society, face most child health-related issues on a daily basis. One such concern is the rising rate of childhood overweight and obesity, both of which are associated with type 2 diabetes—increasing among children—future heart disease, cancer and other health problems. Overweight children are subject to depression, teasing and social discrimination, all of which can affect student academic performance. At the same time, schools are sites for developing and encouraging lifelong, positive health behaviors like daily physical activity and good nutrition. Increasing student physical activity is a highly recommended approach to improving their long-term health, well-being and academic success.

Barriers exist, however. How often have school staff heard, "We don't have TIME for physical education classes because we have to get our test scores up?" Even if this is not actually said out loud, it is implied if and when PE classes are cut and that time is applied to other academic subjects like reading and mathematics. As students age, even fewer hours of PE are available to them at school. New Mexico reflects this trend; only 23% of our high school students participated in moderate physical activity on most days of the week in 2001 (see graph, page 5). The fact is we may be thwarting our intent to improve academic achievement by cutting back on physical education. Research shows that physical activity can positively affect student performance and elevate test scores. This edition of *HealthWise: A Bulletin for School and Community Health* focuses on the benefits of physical activity for young people and explains how to implement policies or strategies to increase physical activity in schools and communities in enjoyable ways.

One article outlines the evidence demonstrating the relationship between physical activity and academic achievement. School officials and parents can use the information presented here, as well as in the New Mexico Prevention Research Center "Facts About" Series (see page 10), to advocate for and create school policies to keep physical education in the curriculum as a necessary component of efforts to raise test scores.

In response to the question, "how do we fit everything that's needed into the school day?" we suggest approaches to help schools support and encourage physical activity that do not necessarily depend on having physical education classes. For example, one easy-to-implement school policy is to prohibit the use of physical activity as punishment. Environmental changes that promote physical activity include mapping and measuring a walking path around school grounds for students and staff to use during free time or recess, and involving parents in walking their children safely to school. We present several other tips and resources in this *HealthWise* edition to help teachers, school health professionals, staff and parents incorporate easy, time-efficient ways to increase physical activity in their schools and classrooms.

Inside HealthWise

All Work and No Play Does Affect Jack's Grades

Nancy Hood, M.P.H., Christine Hollis, M.P.H., M.P.S.

The idea that physical activity contributes to children's health and well-being is not new. One New Mexico teacher, speaking in a 2002 University of New Mexico focus group on school health, reflected this when she said, "We definitely need more physical education time, because I don't think the students are getting the exercise they need....If I take the kids outside every morning just for a brisk little ten minute walk, they do so much better in the classroom and especially before tests." Despite this, fewer than 10% of all U.S. schools provide daily physical education or its equivalent; in New Mexico, fewer than half of middle school students take physical education classes for just three days per week.[1] One reason schools may not provide enough physical activity is the intense pressure they face to improve students' standardized test scores. Many cut physical education classes to give students more time to study core academics. Faced with the reality of standardized tests and possible school probation, one message may sway administrators to maintain physical education programs: research shows that physical activity supports academic achievement.

Several school-based studies have shown evidence that giving students additional moderate and vigorous physical activity in school is associated with improved academic achievement and cognition.[2] Findings also indicate that if students spend more time in physical education, this does no harm to their academic performance.[3] In a recent example, New Hampshire announced that a cross sectional study of state elementary schools showed those schools with the highest rates of overweight children had the lowest scores on English and math proficiencies.[4] A more direct relationship between physical activity and academics was demonstrated in California, where a longitudinal study matched reading and mathematics scores from the state standardized achievement test with those from the state-mandated physical fitness test.[5] Findings indicated that both high- and low-performing schools with high percentages of students participating in physical activity had larger gains in test scores than other schools.

Physical activity may also affect academic achievement indirectly. For example, overweight children, especially girls, seem to be more susceptible to depression, more likely to be socially isolated by their peers, have lower levels of self-esteem and higher rates of loneliness and sadness.[6] Teasing children about body weight may lead to emotional problems, among them serious depression, even thoughts of suicide. Research indicates that overweight children with lower levels of self-esteem are more likely to smoke and/or drink alcohol than children with higher self-esteem. Students with risk factors like smoking, drug and alcohol use are more likely to drop out of school and have lower academic achievement.[7]

More than nine out of 10 parents (95%) think that regular, daily physical activity helps their children do better academically.[8] Given that parents recognize the positive effects of physical activity, school boards and principals, supported by their communities, need the most up-to-date information showing that physical activity not only does not hurt, but it may well improve academic achievement. Armed with this important information, schools can begin reversing the trend of taking physical activity out of the school day.

Research shows that physical activity supports academic achievement.

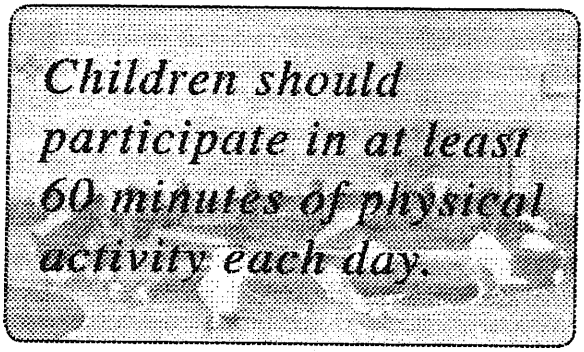
1. NM 2000 *Middle School Youth Risk Behavior Survey: Report of State Results.*
2. Sibley et al. (2003). *Pediatric Exercise Science, 15,* 243-256.
3. Sallis et al. (1999). *Research Quarterly for Exercise & Sport, 70* (2), 127-135.
4. NH Health Assessment Project, www.ed.state.nh.us/FoodandNutrition/HAP_Executive_Summary.pdf.
5. Hanson et al. (2003). *Student Health Risks, Resilience, and Academic Performance: Year 1 Report.*
6. Strauss et al. (2003). *Arch Pediatr Adolesc Med, 157,* 746-752.
7. Symons et al. (1997). *J School Health, 67* (6), 220-227.
8. NASPE. (2000). Survey conducted by Opinion Research Corp. International, NJ.

To get a fact sheet (see page 10) about the relationship between physical activity and academics, email requests to PRCPublications@salud.unm.edu.

Helping Students Increase Physical Activity

Nancy Hood, M.P.H., Christine Hollis, M.P.H., M.P.S.

About 13% to 20% of American children (ages 6-17) are overweight, largely because more than half (60%) of them do not participate in organized physical activity out of school hours.[1] In New Mexico, by the time children become high school students, only 23% of them participate in moderate physical activity on five or more days of the week (see graph on page 5).[2] Because of these and other statistics, the U.S. Surgeon General identified schools as key sites to promote health and decrease obesity and overweight in children.[3] School policies can ensure that students are provided with quality daily physical education, recess, unstructured play periods, and/or extracurricular physical activity programs. These programs can help children meet the National Association for Sport and Physical Education (NASPE) recommendations of at least 60 minutes of physical activity each day.[4]



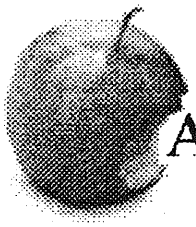
Children ages 5-12 have developmental characteristics that make them different from adults. This means they require different approaches to their physical activity. Much of their moderate to vigorous activity should be in intermittent, short bursts (10-15 minutes) and accumulated throughout the day, an approach that is developmentally-appropriate and consistent with children's shorter attention span. NASPE guidelines for children discourage extended periods of inactivity like sitting all day in classrooms or watching TV, or long periods (more than several minutes in length) of continuous vigorous activity, like jogging.[4] It is also important to remember that youth participate in physical activities because the activities are fun and rewarding, not because they know they're doing something good for their future health.

So, how can school staff help children be more active during the school day? There are quite a few options. For one, school staff should be aware that students often do not effectively use activity areas in the schools to be physically active during their leisure or "open" time—a missed opportunity for increasing their activity levels. Teacher or staff supervision also tends to stimulate more physical activity among students.[5] For these reasons, newer school-based physical activity promotion programs address environmental factors, including teacher support and technical assistance, school-wide policies promoting physical activity, appropriate physical activity curricula, and policies that make activity areas more accessible to students.

One school intervention, *Sports, Play, and Active Recreation for Kids* (SPARK), increases active time during elementary school physical education classes, teaches movement skills, and is implemented 30 minutes three times a week in an enjoyable way. SPARK (www.sparkpe.org/index.jsp) has increased physical activity in schools.[6] Another program, the *Child and Adolescent Trial for Cardiovascular Health* (CATCH), has increased the percent of time students spend in moderate-to-vigorous activity during physical education classes.[7] School staff enjoy the CATCH activity boxes that contain flexible, easy-to-use activities for use in their classrooms (www.sph.uth.tmc.edu/chppr/catch/). In a similar vein, the *Pathways* program (http://hsc.unm.edu/pathways), designed for third, fourth and fifth grade American Indian students, improved activity levels by implementing SPARK in combination with *Pathways* American Indian games and using short, popular exercise breaks implemented by teachers and others in class.[8] (See sample activities under Physical Activity at http://hsc.unm.edu/pathways/Downloads/dwnloads.htm)

School staff can use other creative strategies to add physical activity to the school day. *Utah's Gold Medal School Initiative* (http://www.hearthighway.org/school_information/gold_medal_school_initiative/gmsi_initiative_description.htm) motivates schools to implement school-based policy and environmental changes, such as designing a Gold Medal Mile Walking Program around the school to encourage students and staff to walk that distance each day (with no extra work for teachers). The *Take 10!® Elementary School* physical activity program provides user-friendly activity lesson plans to help teachers lead at least 10 minutes of moderate-to-vigorous

(continued on page 7)



An Apple a Day: Info Bites

- 95% of parents in the U.S. think physical education should be part of a school curriculum for all students, grades K-12.

  ☐ True
  ☐ False

Answer: True. From the National Association for Sport & Physical Education "Parents Believe Physical Activity Key to Preventing Childhood Obesity Report," 2003, at: www.aahperd.org/naspe/template.cfm?template=pr_042903.html.

- An example of appropriate continuous physical activity for children ages 6-12 is bike riding

  ☐ True
  ☐ False

Answer: True. Continuous physical activity is movement that lasts several minutes without a rest period. Long periods of continuous physical activity are not considered age- or developmentally-appropriate for children unless a child self-selects that activity. (NASPE. (2004). Physical Activity for Children: A Statement of Guidelines for Children Ages 5-12.)

Physical activity: bodily movement produced by the contraction of skeletal muscle which substantially increases energy expenditure. It includes exercise, sport, dance and other movement forms. (NASPE. (2004). *Physical Activity for Children: A Statement of Guidelines for Children Ages 5-12.*)

Physical education: planned, sequential instruction that promotes lifelong physical activity. It helps develop basic movement and sports skills, and physical fitness, and enhances intellectual, social and emotional abilities. (Marx & Wooley. (1998). *Health Is Academic,* p. 4.)

If you are planning and/or providing physical activity and intramural programs for children in grades K-12, you can find guidelines for quality physical education and activity, after-school physical activity, and intramural sport programs at the National Association for Sport & Physical Education website, at: www.aahperd.org/naspe.

This Issue's Authors

Nancy Hood, M.P.H., (guest editor) is an Associate Scientist at the UNM Center for Health Promotion and Disease Prevention. She has conducted evaluation activities for local and federal agencies and non-profit organizations including the American Cancer Society, CDC (Physical Activity and Health Branch), and Emory University. Much of her work involves school-based programs to promote physical activity.

Rachel Mittleman, M.Ed., (guest editor) a Health Educator at the UNM Center for Health Promotion and Disease Prevention, has an MS in Community Education. She has ten years experience implementing obesity prevention, diabetes prevention, HIV prevention and health education curricula, training community-based groups, providing technical assistance to and developing evaluation tools in community and clinical settings. Ms. Mittleman also participates in state committees/coalitions that contribute to the development of health promotion policies and program initiatives.

Christine Hollis, M.P.H., M.P.S., C.H.E.S., is Health Promotion Manager for the Center and has 20 years experience in health communications. Her background in school health includes coordinating a CDC-funded project promoting coordinated school health, evaluating a media literacy and health curriculum project, and developing health and literacy materials.

Jane Moorman, B.S., is a National Program for Playground Safety Advisory Board Member and has been a playground safety advocate since 1996. A former risk consultant with the New Mexico Public School Insurance Authority, she has also done risk management for Los Lunas School District. Ms. Moorman has a B.S. in Education, with a focus in physical and health education, and journalism and provides playground supervision training in the state.

Brain Gym

Academic Publications

Group I
True Experimental Research Designs

The effect of Educational Kinesiology upon simple response times and choice response times

Josie M. Sifft, Ph.D., and G.C.K. Khalsa ©1991
Published in Perceptual and Motor Skills, *73, 1011-1015, 1991, as "The effect of Educational Kinesiology upon simple response times and choice response times." Previously presented at the American Alliance for Health, Physical Education, Recreation and Dance Southwest District Convention, March, 1989, Salt Lake City, Utah. Reported on in the* Brain Gym® Magazine, *Volume II, No. 3, 1988*

This publication is the short research journal report of the second experimental study conducted using Educational Kinesiology techniques. The study was done with university students to see whether Brain Gym activities and Dennison Laterality Repatterning would influence the response times to a visual stimulus. The results indicated that both Edu-K groups were superior to the control group and that the repatterned group improved twice as much as the Brain Gym-only group.

Group II
Quasi-Experimental Research Designs

Brain exercise improves reading and memory

Jochen Donczik, Ph.D. ©1994.
The following summary is from an edited English-language translation by Christine M. Grimm and Sigrid Wong, republished in the Brain Gym® Journal, *Volume XV, Nos. 1 and 2, 2001, from "Können edukinestetische Übungen (Brain-Gym®) Legasthenikern helfen?" in Die Sprach-heilarbeit 39 (1994), S. 297-305, a German publication.*

In a previous work on reading and language development (1994), the author presented his findings on how Dennison Laterality Repatterning (DLR) helped to lessen errors in the reading, memory, and comprehension of those considered to have language disabilities. The purpose of the DLR movement process, originated by Paul E. Dennison, Ph.D., is to help the learner discover how to cross the visual/auditory/kinesthetic midline of the body for improved bilateral processing.

Between 1995 and 1996, based on that 1994 study, the researcher added additional controls to show how DLR influences rate of reading, as well as learning and memory processes. In this control study, the reading scores of those with language disabilities who did not have the benefit of DLR grew consistently lower with each trial, while those who experienced DLR in the 1994 pilot study improved from trial to trial. With the number-sequencing test, it was seen that reading rate increased after DLR while it stayed the same for those without DLR. Finally, it was also found that long-term memory retention improved after DLR, while no such improvement was evident without DLR.

The effects of Educational Kinesiology on the static balance of learning-disabled students

G.C.K. Khalsa, Don Morris, and Josie M. Sifft, Ph.D.
Published in Perceptual and Motor Skills, *67, 51-54, 1988*

This study was completed with 60 elementary students who were classified as learning-disabled. An equal number of boys and girls were divided into three groups: Dennison Laterality Repatterning, Edu-K movement, and a control. The results indicated that the repatterned Edu-K group showed a greater improvement in static balance than did the Edu-K movement group, who in turn performed better than the control group. The findings also suggest that Edu-K can be used effectively in a coeducational setting.

The effects of Educational Kinesiology upon the static balance of learning-disabled boys and girls

G.C.K. Khalsa and Josie M. Sifft, Ph.D. ©1988

This publication is a hard copy of a presentation made to the American Alliance for Health, Physical Education, Recreation and Dance National Convention in Las Vegas, Nevada, in April of 1987. Based on the above-named research project.

♦ Available from Educational Resources Information Center, or on microfiche (ERIC Document Reproduction Series No. ED 289835).

PTOtodayLogo

Combating Childhood Obesity with Physical Play Opportunities

Ed Note: Content provided by IPEMA -- the International Play Equipment Manufacturing Association.

By Pei-San Brown, John Sutterby, and Candra Thornton

The greatest health risk facing children today is not a terrible disease such as Leukemia or unthinkable trauma such as abuse. It is obesity. Recent statistics show that the number of obese and overweight children is increasing. The National Center for Health Statistics reports that the percentage of elementary-age children who are considered obese has doubled since 1980, from 7% to 14%. Generally, children who are between 10 and 20% over the appropriate weight for their height and age would be classified as overweight. Children who are 20% or more over the ideal weight are classified as obese. About 85% of obese children continue to be classified as obese for the rest of their lives. These health risks are frequently found in higher concentrations among populations of minority and low-income children. The impact of obesity on these children may be exacerbated because they are less likely to have access to community recreation centers and are more likely to live in high crime areas.

Obesity is more than just a cosmetic concern. Short- and long-term physical and psychological concerns can result from childhood obesity. It has been linked to shorter life spans and a number of health factors that can affect children including Type II diabetes, cardiovascular disease, high blood pressure, stress on bones and lungs, high cholesterol, joint disease, irregular menstrual cycles, stroke, gall stones, gout, sleep apnea, and possibly cancer. Furthermore, obese children are often teased and discriminated against, and psychological effects of can include feelings of inadequacy, low self-esteem, and embarrassment. People who remain obese as adults are often discriminated against with regards to jobs and relationships.

Children who are obese are more likely to become adults who are obese. As children get older, this possibility increases. By the time obese children reach the age of 6 years, their probability of becoming obese adults is more than 50%. Obese adolescents have a 70-80% chance of remaining obese when they become adults. Having one obese parent also increases the possibility that obese children will become obese adults.

Obesity is the end result of an inversely proportional relationship between activity level and caloric intake. Children who take in more calories than they burn become obese and less physically active. These children experience physical activities differently from non-obese children. Rigorous physical play is difficult and they are often physically inept. In a recent study investigating the developmental progression of young children's overhead ladder usage, approximately 120 children ages 3 to 10 were observed traversing the apparatus. Although obesity was not an objective of the study, it was noted that the only children who were unable to successfully navigate the equipment were obese. Another study reveals that obesity also is an influence on children's walking patterns. Obese children generally walk slower, are flat footed, walk with turned out toes, and walk asymmetrically. These poor walking habits have the potential to impose cumulative consequences such as body tissue damage and structural deformities.

When considering "solutions" for the childhood obesity problem, the basic factors involved in obesity must be considered. These include genetics, emotional stability, hormone levels, and intake-activity relationships. For the majority of people involved with children, the intake-activity relationship is the only factor with which it is possible to engage. And of that factor, only the "activity" aspect is within reach. But increasing the physical activity level among children is complicated. Schools, under pressure to increase test scores, are decreasing children's opportunities to participate in recess and physical education (PE). In fact, the Center for Disease Control (CDC) reports that PE classes are disappearing from schools in the United States, as evidenced by the drop in percentage of schools that have PE programs. In the 1990's alone, the percentage of schools that offer PE classes dropped from over 40% to around 25%, and that number is still on the decline. As a result, schools are increasing the amount of time children's bodies remain relatively stationary. Reductions in the amount of physical activity in schools may be leading to serious consequences. Researchers have found that children who were not engaged in a PE program at school gained 1 inch more around the waist and 2 pounds more overall than those who were involved in a PE curriculum.

Children are not compensating for this lost physical activity time by increasing their physical activity level after school. In fact, they may also engage in sedentary activities after school. More and more, children's free time is consumed with

sedentary activities like watching television and playing computer games. Researchers have reported direct correlations between the amount of television watching and obesity. The sedentary habits found in our schools and homes may be compounding the growing number of obese bodies.

A promising area for increasing physical activity is through improving children's access to areas where they can have high rates of challenging physical activity. A recent study published in Pediatrics suggests a direct link between physical activity and the environment to which children are exposed. The CDC in 1998 sent out a call for an increase in environments that encourage physical activity. Furthermore, the American Heart Association (AHA) recommends that children get 30 minutes of vigorous cardiorespiratory exercise at least 3 times a week.

Studies also show that physical stature largely dictates in which activities children can participate and what areas of play environments are accessible. Thus, it becomes a responsibility of playground designers to provide challenging activities for obese children who are not as physically adept as their non-obese peers; as a result, they will have opportunities to be physically active during play times. Responsibility also lies with parents to advocate for instilling sufficient recess and physical education times during the course of the school day. Furthermore, children who participate in physical education programs and/or have access to community recreation areas are more likely to be physically active. Increasing opportunities for challenging active play, physical education, and recess, as well as the development of community recreation centers in low-income areas, may have an important impact on the greatest health risk facing our children today. The AHA recommends requiring PE classes for K-12 students, encouraging extra-curricular activities that promote and increase physical activity, and promoting active lifestyles in schools and colleges.

References

Active youth: Ideas for implementing CDC physical activity promotion guidelines (1998). Champaign, IL: Human Kinetics.

Barbour, A. (1999). The impact of playground design on the play behaviors of children with differing levels of physical competence. Early Childhood Research Quarterly, 14 (1), 75-98.

Bowser, B. A. (2001). Obese children. PBS Online News Hour (May 1, 2001). http://www.pbs.org/newshour/bb/health/jan-june01/obesekids_05-01.html.

Dale, D., Corbin, C., & Dale, K. (2000). Restricting opportunities to be active during school time: Do children compensate be increasing physical activity levels after school. Research Quarterly for Exercise and Sport, 71 (3), 240-248.

Epstein, B. A. (2001). Obese children, a "growing" problem. The Doctor's Office: http://www.allkids.org/Epstein/Articles/Obese_Children.html.

Epstein, L., Paluch, R., Kalakanis, L., Goldfield, G., Cerny, F., & Roemmich, J. (2001). How much activity do youth get? A quantitative review of heart-measured activity. Pediatrics, 108 (3). Online at www.pediatrics.org/cgi/content/full/108/3/e44.

Frost, J., Brown, P., Thornton, C., Sutterby, J., & Therrell, J. (2001). The developmental benefits and use patterns of overhead equipment on playgrounds. Unpublished study commissioned by GameTime, a PlayCore, Inc., Company. Fort Payne, Alabama, U.S.A.

Gabbard, C. (2000). Physical education: Should it be in the core curriculum. Principal, 79 (3), 29-31.

Gordan, Larsen, P., McMurray, R., & Popkin, B. (2000). Determinants of adolescent physical activity and inactivity patterns. Pediatrics, 105 (6). Online at www.pediatrics.org/cgi/content/full/105/6/e83.

Hills, A. (1994). Locomotor characteristics of obese children. In A. Hills & M. Wahlqvist (Eds.), Exercise and obesity, pp. 141-150. London: Smith-Gordon, Nishimura.

Horvat, M. & Franklin, C. (2000). The effects of the environment on physical activity patterns of children with mental retardation. Research Quarterly for Exercise and Sport, 72 (2), 189-195.

Moran, R. (1999). Evaluation and treatment of childhood obesity. American Family Physician (February 15, 1999). http:/www.aafp.org/afp/990215ap/861.html.

Pangrazi, R. & Dauer, V. (1992). Dynamic physical education for elementary school children (10th edition). New York: Macmillan Publishing Company.

Sallis, J., McKenzie, T., Kolody, B., Lewis, M., Marshall, S., & Rosengard, P. (1999). Effects of health-related physical education on academic achievement: Project spark. Research Quarterly for Exercise and Sport, 70 (2), 127-134.

Click here to return to http://www.ptotoday.com/play4.html

Physical Education is Critical to a Complete Education

Council of Physical Education for Children

A Position Paper from the National Association for Sport and Physical Education

Overview

Physical education plays a critical role in educating the *whole* student. Research supports the importance of movement in educating both mind and body. Physical education contributes directly to development of physical competence and fitness. It also helps students to make informed choices and understand the value of leading a physically active lifestyle. The benefits of physical education can affect both academic learning and physical activity patterns of students. The healthy, physically active student is more likely to be academically motivated, alert, and successful. In the preschool and primary years, active play may be positively related to motor abilities and cognitive development. As children grow older and enter adolescence, physical activity may enhance the development of a positive self-concept as well as the ability to pursue intellectual, social and emotional challenges. Throughout the school years, quality physical education can promote social, cooperative and problem solving competencies. Quality physical education programs in our nation's schools are essential in developing motor skills, physical fitness and understanding of concepts that foster lifelong healthy lifestyles.

Physical Benefits

Physical education is unique to the school curriculum as the only program that provides students with opportunities to learn motor skills, develop fitness and gain understanding about physical activity. Physical benefits gained from physical activity include: disease prevention, safety and injury avoidance, decreased morbidity and premature mortality, and increased mental health. The physical education program is the place where students learn about all of the benefits gained from being physically active as well as the skills and knowledge to incorporate safe, satisfying physical activity into their lives.

Elementary

In the elementary grades, the physical education program emphasizes the development of fundamental locomotor, non-locomotor, and manipulative skills through the main content areas of educational games, dance, and gymnastics. The movement framework, (i.e., body, space, effort, and relationship) is also a part of the core content and is the basis for developing, expanding, and refining children's range of motor skills and awareness. Quality instruction by physical education professionals is critical if children are to develop fundamental motor patterns (e.g. jump, throw, skip, hop, catch, and kick). The motor skill foundations established during the elementary grades may enhance children's social, cognitive and physical development and increase the likelihood of continued interest and participation in physical activity. Fitness at elementary grades is supported by a rich experience in many basic movement forms.

Middle School

The middle school student is ready to experience a wide variety of applications of fundamental movements, including traditional sports, adventure activities (e.g., rock climbing, ropes, kayak, skiing), and lifetime or leisure-oriented activities (e.g., roller-blading, biking, dance). It is during this period when students are capable of refining, combining and applying a variety of sport-related and lifetime skills. Students may explore after-school opportunities for specialized or/and competitive physical activity programs.

Rapid growth during the pre-adolescent years may affect students' interests, choices, and activity patterns. Therefore physical education programs offer a variety of activities to meet and expand student interests. Fitness development becomes more systematic. Students develop specific fitness components, set goals and assess personal fitness levels.

High School

High school students become increasingly more independent as their daily lives become more complex and diversified. High school students begin to make decisions and choices in taking increased responsibility for themselves. Quality high school physical education programs provide students conceptual and practical understanding of: 1) health-related physical fitness, and 2) how to maintain a health-related level of physical fitness. Physical education plays a vital part in helping high school students maintain and refine the skills and knowledge needed to select physical activities to use throughout their lives.

Cognitive Benefits

Children learn through a variety of modalities (e.g., visual, auditory, tactile, physical). Teaching academic concepts through the physical modality may nurture children's kinesthetic intelligence.

Academic constructs have greater meaning for children when they are taught across the three realms of learning, including the cognitive, affective and psychomotor domains. Greater depth and relevance can be achieved when the subject matter constructs are related to each domain of learning. Research has demonstrated that children engaged in daily physical education show superior motor fitness, academic performance, and attitude towards school versus their counterparts who did not participate in daily physical education. Physical education learning experiences also offer a unique opportunity for problem solving, self-expression, socialization, and conflict resolution.

Elementary

Research suggests that young children learn through active engagement with the "stuff" of their world. Children in elementary school acquire knowledge through physical exploration of their environment. Physical education may provide children with learning experiences essential to the formation of mental schemes (i.e., mental patterns or systems that describe the ways people think about the world; building blocks of thinking). Children form more effective schemes by

physically interacting with their environment. Quality physical education programs facilitate exploration of movement in various contexts that enhance acquisition of knowledge.

Middle School

Middle school students are intensely curious, prefer active to passive learning, and definitely favor interaction with peers during learning activities. The early adolescent exhibits a strong willingness to learn things they consider useful. They enjoy using skills to solve real life problems. Quality physical education programs provide a medium through which middle school students can refine and expand upon their physical repertoire of skills. It has been shown that students miss fewer days of school because of illness and exhibit greater academic achievement because of the physical vitality gained in physical education.

High School

During the high school years students should be given more in-depth learning opportunities so they can understand the mechanical, physiological and social-psychological aspects of physical activity. High school students' growing ability to compare and contrast, analyze, and synthesize information enables them to apply movement principles in new and meaningful ways. Students can more fully understand the role of physical activity in preventive health and analyze the pros and cons of various types of physical activity in lifelong health.

Affective Benefits

Physical competence builds self-esteem. Quality physical education programs enhance the development of both competence and confidence in performing motor skills. Attitudes, habits, and perceptions are critical prerequisites for persistent participation in physical activity. Appropriate levels of health-related fitness enhance feelings of well being and efficacy.

Elementary

Quality physical education programs can contribute to the development of self-esteem among children. Children who are more active may have greater social success and positive relations with peers. Children need many opportunities to experience personal feelings of success and achievement in physical activity settings. Explorations of various movement capabilities contribute to feelings of joy and accomplishment.

Middle School

Quality middle school physical education programs provide students unique opportunities for demonstrating leadership, socialization, and goal setting skills. Involvement in physical activity has shown a consistent relationship with mood, self-esteem, and other indices of psychological well-being in early adolescence. Student preferences become more specialized at this age and the preference influences students' motivation to continue in physical activities. A youngster's

feelings of perceived competence also affects future participation and self-esteem. Despite the physiological changes that occur at this age, students are generally willing to work cooperatively toward common goals because the desire for peer group acceptance is strong. Risk taking is attractive and students accept the challenge of setting and achieving personal goals. Physical education programs have a unique opportunity to provide learning experiences that enhance middle school students' self-esteem.

High School

During this phase of development, students begin to select activities based more on personal interests. Other factors affecting students' choices of physical activity may be their level of health-related physical fitness, body type, geographical location, and socio-economic group or circle of peers. Physical education programs must continue to enhance students' fitness development and offer an array of activities from which students can select.

Attitudes, habits, and perceptions are critical prerequisites for persistent participation in physical activities. To help students achieve self-realization through physical activity, the physical education program can guide student choices and help them become self-directed in the selection of activities that are satisfying. The importance of commitment and dedication in achieving success may be emphasized in physical education. Physical activity habits and preferences are not static, but are continually in a state of flux throughout one's lifetime. High school is a time when students can establish habits and attitudes about the role physical activity will play in their lifetime. This is the time for students to explore their preferences related to physical activity and perhaps specialize based on abilities and interests.

Physical Activity Improves the Quality of Life

Regular physical activity improves functional status and limits disability during the middle and later adult years. Physical activity contributes to quality of life, psychological health, and the ability to meet physical work demands. Physical education can serve as a vehicle for helping students to develop the knowledge, attitudes, motor skills, behavioral skills, and confidence needed to adopt and maintain physically active lifestyles. The outcomes of a quality physical education program include the development of students' physical competence, health-related fitness, self-esteem, and overall enjoyment of physical activity. These outcomes enable students to make informed decisions and choices about leading a physically active lifestyle.

In early years children derive pleasure from movement sensations and experience challenge and joy as they sense a growing competence in their movement ability. Evidence suggests that the level of participation, the degree of skill, and the number of activities mastered as a child directly influences the extent to which children will continue to participate in physical activity as an adult.

In early adolescence participation in physical activity provides important opportunities for challenge, social interaction, group membership, as well as opportunities for continued personal growth in physical skill.

Participation for high school students continues to provide enjoyment and challenge as young people express preferences for activities that meet their specific interests. A comprehensive, well-implemented physical education program is an essential component to the total education of students. Physical education prepares students to maintain healthy, active lifestyles and engage in enjoyable, meaningful leisure-time pursuits.

References

Barton, G.V., Fordyce, K., & Kirby, K. (1999). The importance of the development of motor skills to children. *Teaching Elementary Physical Education, 10*(4), 9-11.

Calfas, K. & Taylor, W. (1994). The effects of physical activity on psychological variables in adolescents. *Pediatric Exercise Science, 6*, 302-314.

California Department of Education. (1987). ***Caught in the middle: Educational reform for young adolescents in California public schools.***

Edith Cowan University (1991, August). *Youth Studies, 10*(3), 1-8.

Eggen, P. & Kauchak, D. (1999). *Educational psychology: A window on classrooms* (4th ed.). Upper Saddle River, NJ: Prentice-Hall, Inc.

Evans, J. & Roberts, G. (1987). Physical competence and the development of children's peer relationships. *Quest, 39*, 23-25.

Gruber, J.J. (1985). Physical activity and self-esteem development in children: A meta-analysis. *The Academy Papers, 19*, 30-48.

Hannaford, C. (1995). *Smart Moves.* Arlington, VA. Great Ocean.

Keays, J. & Allison, R. (1995). The effects of regular moderate to vigorous physical activity on student outcomes: A review. *Canadian Journal of Public Health, 86*, 62-66.

Mohnsen, B.S. (1997). *Teaching middle school physical education: A blueprint for developing an exemplary program.* Champaign, IL: Human Kinetics.

Pate, R.R., Trost, S.G., Dowda, M. Ott, A.E., Ward, D.S., Saunders, R., & Felton, G. (1999). Tracking of physical activity, physical inactivity, and health related physical fitness in rural youth. *Pediatric Exercise Science, 11*, 364-376.

Rink, J. E. (1998). *Teaching physical education for learning* (3rd ed.). New York: McGraw-Hill.

The National Center for Chronic disease Prevention and Health Promotion, Centers for Disease Control and Prevention . (1997). Guidelines for school and community programs to promote lifelong physical activity among young people. *Journal of School Health, 76*(6), 202-219.

The National Association for Sport and Physical Education (NASPE, 1995). *Moving into the future. National standards for physical education: A guide to content and assessment.* St. Louis: Mosby.

The National Association for Sport and Physical Education (NASPE, 1999). *Sport and physical education advocacy kit II (Speak II).*

The U.S. Department of Health and Human Services (USDHHS). (1996). *Physical activity and health: A report of the Surgeon General.* Atlanta, GA: USDHHS, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.

California EDUCATOR

Volume 7, Issue 3
November 2002

DOWNLOAD AS PDF

Fitness boosts brainpower

Research shows that physical education actually enhances academic learning. The irony is not lost on educators whose administrators justify cutting PE to improve test scores.

Stories by Sherry Posnick-Goodwin, Photos by Scott Buschman

"I want to see bodies flying through the air," calls out physical education specialist Pat Vickroy, as fifth-graders in groups of three take turns leapfrogging each other and rolling out of the way on mats scattered throughout the courtyard. Their laughter and whoops nearly drown out the music on the boom box at Eliot Elementary School in Gilroy.

Next, students construct human pyramids. Some strike artistic poses while others collapse into a pile of giggles. The goal is to improve balance, flexibility, muscular strength and endurance while building trust and encouraging teamwork.

Lisa Grisham, Alana Osaki, Juliana Wallace and Alissa Castro execute human pyramids in Pat Vickroy's fifth grade PE class.

After 30 minutes, the class ends abruptly. That's all Gilroy allocates per week for elementary physical education with a PE specialist. "Since they cut our program in half five years ago, I only see students for 30 minutes one day a week," says Vickroy, who covers four of the eight elementary schools in the district. "We used to have a quality program."

Regular classroom teachers in Gilroy are supposed to take up the slack in meeting the state's PE requirement, but it isn't necessarily happening.

"At some schools, teachers are being discouraged from taking students out at all," says Vickroy, a member of the Gilroy Teachers Association. "I've had teachers tell

me that if they take students out for PE, they get written up or get into trouble. Recently, at one school (not Eliot), the principal wanted to take recess away from the kindergarten class. When the teacher asked about fitting PE in, the principal said, 'I don't care about physical education. I care about meeting state standards.'"

Thomas Comaggia, Edward Malick and Andrew Gomez

If Vickroy's fifth-grade class is any indication, students in Gilroy could use more activity. Several of the 28 students could be described as overweight.

Following PE, students line up for a school lunch that offers french toast with butter and syrup; pizza; burgers; burritos; peanut butter and jelly sandwiches; chocolate milk; and healthy food, like apples, small salads, and packages of celery and carrot sticks. Some students drink sodas and eat chips brought from home.

"I've seen an incredible increase in student obesity over the last 10 years," observes Vickroy. "It crosses all ethnic backgrounds. Some students are severely overweight. They are limited in their ability to move."

"Physical inactivity," he cautions, "is the second leading cause of preventable death in America, and it's fast becoming No. 1."

Three years ago, Vickroy was so angry about his district's dismissive attitude toward physical education that he refused to administer the state-mandated physical fitness test to students. "There was no point, since students had no quality program to prepare them for the tests," he says.

He was written up for insubordination and his job was threatened. When he filed a grievance, the district hired a substitute to administer the test. For the past two years, he has administered the test under protest.

"It's hard for me to understand the administrative mindset that ignores the benefits of physical education," says

Vickroy. "Research shows that physical activity increases academic performance and reduces the health risk to our nation. But rather than doing more, we're doing less."

What's happening in Gilroy is not uncommon. Increasing numbers of educators and health care providers are sounding the alarm about the ramifications of reduced time spent in physical education classes combined with an increasingly sedentary lifestyle and poor nutrition.

Ashley Velasco, Kellie Kleinke and Jessica Estrada Gomez

Seventy-seven percent of California students tested in 2001 flunked the state's physical fitness test. The Fitnessgram is administered to students in grades 5, 7 and 9 and includes three components - aerobic capacity; muscular strength, endurance and flexibility; and body composition.

More than half of the state's ninth-graders ran the mile so slowly they failed the aerobic portion of the test. The test showed that more than a quarter of the state's students are overweight - some only slightly, some by more than 100 pounds.

Another study from the University of California shows that a third of California's African American and Latino children are overweight. Among white students, those who are overweight are more likely to be economically disadvantaged.

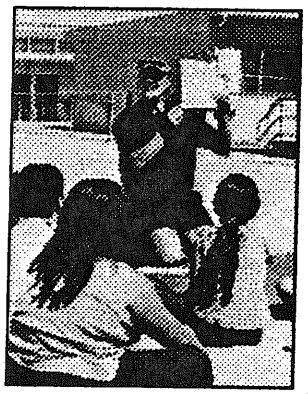
Pediatricians throughout the state are reporting a startling increase in Type II diabetes, which was almost unheard of in children a decade ago. The Oakland Unified School District recently hired a nurse educator to train teachers to recognize symptoms and handle diabetic emergencies.

In February, Oakland became the first district in the state to banish soda and candy sales in its schools in an effort to do something about the problem, a move that was followed by Los Angeles in August.

The U.S. Surgeon General has declared childhood obesity a national epidemic. The

childhood obesity a national epidemic. The Centers for Disease Control and Prevention have reported that hospital costs related to childhood obesity have more than tripled in the past two decades - to nearly $130 million.

More than 30 national organizations recently joined former U.S. Surgeon General Dr. David Satcher at the first Healthy Schools Summit: Taking Action for Children's Nutrition and Fitness, held in Washington, D.C. First Lady Laura Bush served as honorary chair of the summit, which hosted prominent speakers discussing the long-term implications of poor nutrition and physical inactivity.



Gilroy PE Specialist Pat Vickroy explains human pyramids to Eliot Elementary fifth graders.

"Society is being penny-wise and poundfoolish when schools have to drastically reduce physical education programs and struggle to provide an environment that supports nutritious eating due to budget constraints," said Satcher. "We need to reverse the trends that are leading to increases in preventable conditions, such as diabetes, cancer, cardiovascular disease and osteoporosis."

By not paying attention to the physical needs of students, "we're shortchanging ourselves for the future," says Terry Shoup, an elementary school PE specialist in San Bernardino. "We'll pay for this down the line with unhealthy adults and high medical and insurance costs. Believe me, it's going to be very expensive."

There are other ramifications for students and society. For example, obesity can cause excess estrogen production in girls, resulting in early puberty.

When puberty comes earlier, so does sexual awareness, says Aleta Oryall, a sixth-grade language arts teacher at Aptos Middle School in San Francisco. "Girls can become sexually active at an earlier age, which can lead to trouble."

Oryall, a member of United Educators San

Francisco, is especially concerned about immigrant girls, who may not have been taught about saying no to sex - or using birth control - at such a young age.

Lack of exercise and unhealthy eating habits can also affect behavior, making students "squirrelly" in class - or lethargic.

Brisa Patton and Justin Wildes at Meridian Elementary in El Cajon attempt pull-ups while David Parker waits his turn.

"When I take my students on a walking field trip to San Francisco State University, many of the kids are complaining by the time they've walked a quarter mile. Students don't see walking as good for its own sake."

Shoup in San Bernardino has noticed that students are unhealthier than ever before in his 36 years of teaching. "You ask them to jog a couple hundred yards and it's like you asked them to run across the country. Today's kids lack endurance. They also lack body flexibility. I'm almost 60 years old and they are not as flexible as I am."

It's no longer the norm for students to walk or ride their bikes to school, or play outside after school, notes Shoup. Instead, they are inside watching television or playing video games.

"I had one mother tell me her son was really into sports. She said he couldn't wait to get home and turn on the ballgame.

"I said, 'He's not into sports; he's into television.'"

"Kids are out of shape and overweight," says Dawn James, whose dance classes at Skyline High School in Oakland can be taken to meet a PE requirement. "When I inherited this dance program, I found some really old dance clothes from years ago. I literally had to throw out everything because nothing fit. Kids today are definitely bigger, that's for sure."

Some schools meet or exceed PE requirements; others find ways to get

around them. High schools once required students to take four years of PE, but that has been cut in half, with many students opting out through waivers, say teachers. Middle school students are required to have 400 minutes every 10 days. Students in grades 1-6 are required to have a minimum of 200 minutes every 10 days, or 20 minutes a day, but seldom get even that. The *San Francisco Chronicle* estimates that most elementary students in the state get about 15 minutes of organized exercise a week.

Meanwhile, in September, the Institute of Medicine recommended that people who want to stay healthy exercise at least an hour a day - double the previous workout recommendation.

"In some districts, they are doing a good job of meeting physical education requirements; in others, they are not," says Dianne Wilson-Graham, a physical education consultant for the state Department of Education. "There is so much pressure in other areas, such as reading, language arts and mathematics, we are seeing substitutions made in place of physical education."

Some teachers, who do not want to be quoted, say their administrators consider recess and lunch time to count toward meeting the PE requirement. One principal has told teachers that passing periods between classes are to be considered PE.

Elementary schools throughout the state have cut programs with PE specialists in order to save money. Many regular classroom teachers say they lack the expertise to teach physical education, especially when it comes to conveying knowledge of physiology, the body's mechanics, and promoting fitness. The average credentialed teacher has taken only one class on the subject.

Many classroom teachers say it's a moot point - there just isn't enough time to teach PE.

"The focus is on those test scores - everything else be damned," says Shoup, a member of

A student eats a so-called nutritious lunch at Skyline in Oakland.

Shoup, a member of the San Bernardino Teachers Association. "It's really a shame. Many schools aren't meeting the physical education requirement. Others are technically meeting the requirement. But whether the requirement is adequate is another issue."

Some PE enthusiasts have gone so far as to recommend that PE be included in the state's Academic Performance Index (API). SB 1597 by Sen. Betty Karnette (D-Long Beach), which would have legislated such a move, was shot down in the Senate Education Committee last spring.

Another way school districts are cutting down on physical education is by cramming large numbers of students into classes.

In one of her classes, James in Oakland says half of her 51 students are asked to "hold up the wall" and stand to one side, allowing the other half enough room to dance. "The room cannot safely hold that many students. In this room, I should have 32 students, max."

Even in the wealthy district of Danville, overcrowding is a problem, says Rick Steen, a teacher at San Ramon Valley High School.

"Last year's freshman PE classes opened up with 54 and 55 in each," says Steen, a member of the San Ramon Valley Educators Association. Even though the numbers have since been reduced to 47 and 52, "these are huge classes. It impacts our ability to be creative. Expectations are not as great. Instead of having one person in rotation for something, you might have three. It shortchanges the kids."

Kids are being shortchanged at a time when research shows that PE actually enhances academic learning. The irony is not lost on educators whose administrators justify cutting PE to improve academic achievement.

"Studies have shown that when students are physically active, it sets the stage for learning," says Suzanne Mullins, a PE teacher at Hillsdale Middle School in El Cahon. "I find it very ironic that they are cutting PE classes and recess to make way for academics when the two go hand in hand."

Exercise trains the brain to respond to challenges quickly, improves academic performance and diminishes violent impulses, according to researchers.

"It is helpful to think of the brain as a muscle," says Dr. John J. Ratey, a clinical associate professor of psychiatry at Harvard Medical School. "One of the best ways to maximize the brain is through exercise and movement."

Physical activity also relieves symptoms of depression and anxiety.

At left, dance teacher Dawn James sets a dizzying pace for students at Skyline High School in Oakland.

Mullins, who serves as president of the Cajon Valley Education Association, considers herself lucky that her administration supports physical education.

"But it seems like every couple of years, the trend is to say, 'Let's have PE just three days a week and add a reading class.' Then I go to the principal armed with research that proves reading scores are likely to go up more if kids are active."

Dawn James, a member of the Oakland Education Association, finds it frustrating that PE is usually the first thing to go when there are cuts. "It's not valued. They are continually cutting programs and lowering requirements."

But the benefits of PE make it worth fighting for, she says.

Athletics in general and dance in particular can provide lessons in socialization. "Students learn how to work cooperatively, which is a skill they will need forever. They learn to be respectful. They learn tolerance and acceptance," says James.

"When kids are moving, working hard and learning to be part of a team, they seem to be more motivated in other areas of their life.

"As cliché as it sounds, success breeds success."

▲ Return to Top

News | Inside CTA | Membership | Member Benefits | Politics and Legislation | California Educator | Family Involvement | Higher Education | Student CTA | Who We Are | Contact CTA | Site Map

Behavioral Consultants, P.C.
13230 Tesson Ferry Rd.
St. Louis, MO 63128

The Reciprocal Influence of Self-Esteem and Exercise

by Monica A. Frank and Susan Gustafson

Low self-esteem has been implicated in most psychological dysfunction; however, low self-esteem is not necessarily the root cause of this dysfunction. It is believed (Aro, 1994) that individuals with high self-esteem who may be predisposed to psychological disorders are better equipped to cope with those disorders, and thus, reduce the negative consequences that may result. Therefore, if self-esteem can be enhanced, the psychological consequences of disorders can be reduced. This process can be illustrated by describing a similar process that occurs with physical illness such as diabetes. The individual may be genetically predisposed to developing the illness, but if they engage in the proper healthy care-taking activities, they may prevent the development of the illness or, at least, reduce its consequences (Amir et. al., 1990). The enhancement of self-esteem and self-efficacy can be an important contributing factor to both the prevention of psychological and physical illness and the maintenance of health.

Exercise is in the position of being able to contribute to the prevention of illness or the reduction of its effects through the process of improving self-esteem. Reviews of the literature (Gauvin & Spence, 1996) illustrate clearly that exercise contributes to improvements in self-esteem.

The purpose of this paper is to review two lines of research showing the relation of exercise to self-esteem. First, numerous correlational studies (Fontane, 1996) show that individuals with high self-esteem are more likely to engage in exercise regularly. Second, a substantial number of experimental studies show that the implementation of a consistent, long-term exercise program has the effect of increasing self-esteem (Fox, 2000). The articles we reviewed for this paper show this pattern in both adults and children.

The focus of this paper is on the construct of self-esteem, the process of evaluating the self negatively or positively, rather than on the construct of self-concept, the descriptive judgment of the self, as most of the research articles are poor at making the distinction between these two constructs. Studies examining self-efficacy, which is the level and strength of an individual's belief that he or she can successfully perform a given activity, have also been examined given the similarity of this construct to self-esteem. In addition, most measures used examine the evaluation of the self-concept, considered self-esteem, rather than a description of self because the researchers' are interested in improving psychological health, not merely describing it. However, as Sonstroem and Morgan (1989) indicate, an understanding of the underlying structure of the self-concept can contribute to the process of mediating change in self-esteem.

Sonstroem and Morgan (1989) use a model for the structure of self-esteem with is hierarchical in nature and progresses from an individual's perception or evaluation of his/her behavior in specific situations through successive

categorizations to the end result of general self-concept. They propose a model for self-esteem and exercise which involves the individual's self-perceptions progressing from the specific to the general. Specific self-perceptions begin with self-efficacy beliefs regarding the individual's sense of competence with a particular physical activity. Intermediate self-perceptions involve physical competence which is the individual's sense of overall fitness and physical acceptance which is the degree of satisfaction with the body. These more specific self-perceptions are then integrated into the global perception of the self. According to Sonstroem and Morgan (1989), the more specific self-perceptions are more amenable to change than the general self-perceptions.

S elf-Esteem's Impact on Exercise Behavior

Generally, the correlational research examining self-esteem (and other similar constructs) has shown a relation between self-esteem and the probability of engaging in exercise and maintaining an exercise program. The presence of high self-esteem or self-efficacy beliefs has been demonstrated to be factors in determining whether an individual will elect to participate in an exercise program. The research as reviewed by Gauvin & Spence (1996) indicates that exercise adherers report higher levels of efficacy beliefs about their ability to adhere to exercise as well as for their physical proficiency in exercise activities. In contrast, research with adolescents with low self-esteem shows tendencies to under-eating and over-eating with less likelihood of physical activity (Mueller et. al., 1995). With respect to adults, studies utilizing the Physical Self-Perception Profile (PSPP) successfully demonstrated that positive physical self-worth showed a relationship between global self-esteem and the sub-domain levels of sport confidence, physical conditioning, attractive body image, and strength. Further, it predicted exercisers from non-exercisers as well as degree of exercise involvement for both males and females (McAuley et. al., 1997). A study of Chinese students showed that higher body esteem in males tended to be associated with increased exercise, whereas overall Chinese students tended to have lower self-esteem and engage in less exercise than their American counterparts (Davis & Katzman, 1998). Finally, the correlational studies show that there appears to be a lack of a relation between exercise and self-esteem for individuals who do not view exercise as essential (McAuley et. al., 1997). Also, not all research demonstrated a correlational effect between exercise and self-esteem; for instance, Aine and Lester (1995) found no effect on a self-report questionnaire examining regular exercise and amount of exercise in students.

Self-efficacy research with older adults tends to support the theory that individuals with high self-efficacy beliefs are more likely to engage in exercise. In addition, high self-efficacy predicts the likelihood of maintaining an exercise program (Fontane, 1996). For instance, Grembowski et. al. (1993) found that older individuals with high self-efficacy are fairly consistent in positive outcome expectations across different specific health-related behaviors such as exercise, diet, and smoking, and therefore, more likely to follow through on achieving the expected outcome.

Just as the cognitive processes of children have been categorized by age, the development of self-esteem also seems to be age-dependent and is impacted over time by social interaction and personal experiences. Self-esteem impacts specific factors such as physical self-efficacy, self-confidence, anxiety, and perceived control in both male and female athletes of all ages and across different sports. An individual's participation in sports tends to be related to these factors (Boyd & Hrycaiko, 1997).

Exercise Behavior's Impact on Self-Esteem

The research has shown that when adults, adolescents, and children undertake an exercise program self-esteem is enhanced in the process. This paper examines a number of articles examining the different age populations and the influence of exercise on self-esteem.

As research had not previously demonstrated the relation of an environmental influence such as physical activity and its effect on the development of self-esteem in children, Boyd and Hrycaiko (1997) examined this relation more directly. This study of pre-adolescent and adolescent females revealed that the pre-adolescent low self-esteem and low physical self-concept groups derived the greatest benefit from the physical activity intervention. The purpose of the study was to examine the effects of a physical activity intervention package which involved a six-week structured exercise program on the self-esteem of pre-adolescent and adolescent females. They hypothesized that a physical activity intervention would positively affect physical self-concepts and global self-esteem of low-esteem early and pre-adolescent subjects. Upon examination of the intervention package of self-esteem, ranked on the basis of total self-concept, the impact was significant only for the physical appearance of self-concept for the pre-adolescent girls. With respect to the pre-adolescents, partial support for the hypothesis was made since this group experienced significant changes in global self-esteem. However, the results for the early and middle adolescents did not support the hypothesis, as these groups did not have significant changes in self-esteem. Therefore, the hypothesis that a physical activity intervention would have a positive effect on physical self-

concepts was only partially supported. Support for the third hypothesis that the greatest effect would be with the early adolescents followed by the pre-adolescents came from the data showing that the pre-adolescents garnered the most benefit from the intervention package, the early adolescents showed somewhat mixed results, while no significant results were seen with the middle adolescents. It was concluded that the impact on the two adolescent age groups was limited because their levels of self-esteem were high from the start and the physical activity program wasn't challenging enough to the adolescent group to produce significant change.

In a study comparing pregnant adolescents engaged in a six-week course of aerobic exercise with a control group of pregnant adolescents not engaged in exercise, conducted by Koniak-Griffin (1994) at UCLA it was demonstrated that an aerobic exercise program reduced depressive symptoms as well as improved feelings of self-concept. Interpretation of the data from this research coincides with the generally accepted theories of this field. First, the author concluded that the improved mental status could be the increased plasma levels of endorphins. Second, the increased feelings of self-efficacy could be the result of participation in the program. Third, the participant's needs were met simply by being involved in a group activity that provided new opportunities, social contact, and group acceptance. Lastly, the exercise provided a diversion and allowed participants to forget about their problems. In general, the results of this study concur with previous research as to the positive effects of aerobic exercise on mental health, but individual with higher self-esteem do not exhibit significant changes.

Research on adults has revealed consistent results similar to the research with adolescents. Two of the reviewed studies are specific to women; however, another study which included middle-aged men and women showed similar results. A study examining acute mood response in women at two separate time periods, conducted by Pronk et.al. (1995) at Texas A & M, revealed that maximal exercise shows acute increases in fatigue and self-esteem and decreased tension and vigor.

A study of the effects of an eight-week walking program on self-esteem in women conducted by Palmer (1995) at Northeast Louisiana University concurs with the previously stated research. This study also showed improvement in self-esteem following the implementation of a fitness program. They hypothesized that walking will improve scores on depression, self-esteem, and physical fitness. Results of the data showed that, not only did the walking group have an increase in self-esteem, but that the non-walking group had a significant decrease in self-esteem. However, interpretation of the results are similar to that of the pregnant adolescents in that the changes in self-esteem could have been due to other factors such as acquiring a new skill, engaging in social interaction, the influence of the researchers, or having accomplished a difficult task. Additionally, significant improvements in self-esteem are more pronounced when individuals initially have very low self-esteem. These participants described themselves as "fitness rejects" which could also explain their more notable improved feelings of self-efficacy. Another important point is the finding that physiological improvement is not necessary for psychological improvement. The women in this program did not know their improved fitness levels before the post psychological measures were taken, indicating that the self-esteem changes were not related to the physical improvements. However, both physical and psychological benefits from the walking program were demonstrated.

A study by McAuley et. al. (1997) at University of Illinois of exercise and self-esteem in middle-aged adults participating in a twenty week structured exercise program demonstrated support for the theoretical relationships among the components of self-esteem. The purpose of this study was to determine the relation between general self-concept and the specific subareas of self-concept, specifically how the changes in efficacy and aerobic capacity as well as engaging in an exercise program impacted self-worth. This research tested the extent to which self-esteem changed over time with exercise participation and within the hierarchical structure of self-esteem as postulated by Sonstroem and Morgan (1989). The results demonstrated that improved levels of physical self-efficacy and fitness were more directly related to physical self-esteem than perceptions occurring in the subareas. The authors conclude that the findings are consistent with the Sonstroem and Morgan model indicating that self-efficacy predicts physical competence which then impacts self-esteem.

Conclusion

Individuals high in self-efficacy, the belief that they can be successful at an activity, and in self-esteem, a perception of positive self-regard, are more likely to engage and adhere to an exercise program (Fontane, 1996; Gauvin & Spence, 1996; McAuley, et.al., 1997). This is consistent with Sonstroem and Morgan's (1989) model of self-esteem enhancement through exercise. The individuals who have belief in specific competencies are more likely to engage in exercise and then experience success which increases their likelihood of continuing exercise. In addition, exercise is likely to increase self-esteem. These findings are fairly consistent across different age ranges and length of exercise programs as well as intensity of exercise (Boyd and Hrycaiko, 1997; Koniak-Griffin, 1994; McAuley et. al., 1997; Palmer, 1995; Pronk et.al., 1995)

The relation of the correlational studies indicating that high self-esteem individuals are more likely to participate in

exercise and the experimental studies showing improved self-esteem from exercise implementation can be understood through Bandura's (1977) concept of reciprocal determinsim. This theory indicates that behavior, personality, and environment interact together to determine personality and behavior. Thus, the personality trait of positive self-regard leads to the adaptation of exercise behavior. Engaging in the behavior of exercise, in turn, leads to greater positive self-regard; thus, they impact on one another is a reciprocal fashion. Although the articles we reviewed didn't examine the nature of environment in this equation, it can be postulated that increased self-esteem and exercise behavior can also impact environmental conditions. For instance, exercise may bring the individual in contact with others who are more interested in fitness which may encourage the continuation of these behaviors. In fact, several articles (Koniak-Griffin, 1994; Palmer, 1995) speculated in their conclusions that the social contact may be a mechanism of change for self-esteem.

It does seem that the research has difficulty demonstrating that the improvements in self-esteem are directly related to engaging in physical activity versus engaging in any positive goal-oriented activity. The studies did not directly compare exercise to other goal-oriented behavior. Also, third variables such as social influence may be involved in the outcome of the research. Another problem in the research is the use of average or high self-esteem research participants; few studies have used clinical populations (Paluska & Schwenk, 2000). Findings may have been clearer if clinical populations who are particularly low in self-esteem such as depressed individuals had been used. However, it is significant that in some studies when higher self-esteem populations were used that self-esteem was still shown to be enhanced which strengthens the conclusion that self-esteem is improved through exercise.

It seems that the research on self-esteem points to a complex problem involving enhancing self-esteem. That is, individuals who are higher in self-esteem may be more likely to engage in exercise behavior. The experimental studies conducted are artificial environmental conditions given they don't address an individual independently and voluntarily engaging in exercise. It would be interesting to see how this factor would impact the self-esteem. Also, a major problem is how to induce individuals low in self-esteem to voluntarily engage in exercise.

Overall, the connection between self-esteem and exercise has been fairly established although, as identified above, there are specific issues that need to be more clearly defined and more rigorous experimental research conducted.

References

Aine, D. & Lester, D. (1995). Exercise, depression, and self-esteem. Perceptual and Motor Skills, 81, 890.

Amir, S., Rabin, C., & Galatzer, A. (1990). Cognitive and behavioral determinants of compliance in diabetics. Health & Social Work, 15, 144-151.

Aro, H. (1994). Risk and protective factors in depression: a developmental perspective. Acta Pyschiatrica Scandanavica, 89, 59-64.

Bandura, A. (1977). Social Learning Theory. Englewood Cliffs, NJ: Prentice-Hall.

Boyd, K.R. & Hrycaiko, D.W. (1997). The effect of a physical activity intervention package on the self-esteem of pre-adolescent and adolescent females. Adolescence, 32, 693-707.

Davis, C. & Katzman, M.A. (1998). Chinese men and women in the United States and Hong Kong: body and self-esteem ratings as a prelude to dieting and exercise. International Journal of Eating Disorders, 23, 99-102.

Fontane, P.E. (1996). Exercise, fitness, and feeling well. American Behavioral Scientist, 39, 288-305.

Fox, K.R. (2000). Self-esteem, self-perceptions and exercise. International Journal of Sport Psychology, 31, 228-240.

Gauvin, L. & Spence, J.C. (1996). Physical activity and psychological well-being: knowledge base, current issues, and caveats. Nutrition Reviews, 54, 53-63.

Koniak-Griffin, D. (1994). Aerobic exercise, psychological well-being, and physical discomforts during adolescent pregnancy. Research in Nursing and Health, 17, 253-263.

Leith, L.M. (1994). Foundations of Exercise and Mental Health. West Virginia: Fitness Information Technology, Inc.

McAuley, E., Mihalko, S.L., & Bane, S.M. (1997). Exercise and self-esteem in middle-aged adults: multidimensional relationships and physical fitness and self-efficacy influences. Journal of Behavioral Medicine, 20, 67-83.

Mueller, C., Field, T., Yando, R., Harding, J., Gonzalez, K.P., Lasko, D., & Bendell, D. (1995). Under-eating and over-eating concerns among adolescents. Journal of Child Psychology and Psychiatry, 36, 1019-1025.

Palmer, L.K. (1995). Effects of a walking program on attributional style, depression, and self-esteem in women. Perceptual and Motor Skills, 81, 891-898.

Paluska, S.A. & Schwenk, T.L. (2000). Physical activity and mental health. Sports Medicine, 29, 167-180.

Pronk, N.P., Crouse, S.F., & Rohack, J.J. (1995). Maximal exercise and acute mood response in women. Physiology and Behavior, 57, 1-4.

Sonstroem, R.J. & Morgan, W.P. (1989). Exercise and self-esteem: rationale and model. Medicine and Science in Sports and Exercise, 21, 329-336.

See also: Making Mistakes to Enhance Self-Esteem and Improve Performance

Monica A. Frank, Ph.D.
Clinical Psychologist

Behavioral Consultants, P.C.
13230 Tesson Ferry Rd.
St. Louis, MO 63128
(314) 843-0080
fax (314) 843-5655
monica@behavioralconsultants.com

Susan Gustafson is a personal trainer in the St. Louis, Missouri area. She can be reached at the following:

LifeLong Fitness, LLC
Susan Gustafson
Director of Health & Fitness
Suite 14
Clayton, MO 63105
(314) 863-6263