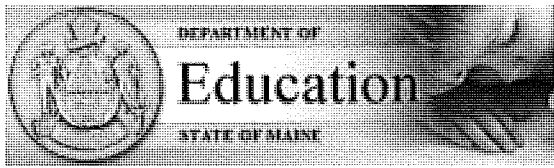


MAINE STATE LEGISLATURE

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Date: December 31, 2007

To: The Joint Standing Committee on Education & Cultural Affairs
The Joint Standing Committee on Health and Human Services

From: PE4ME Planning and Oversight Team

Re: Preliminary Report

We are pleased to provide the attached preliminary report from our work as the planning and oversight team established to respond to RESOLVE, Chapter 102, "To Increase Physical Education for Elementary School Students."

The PE4ME team will meet again in January of 2008 to finalize some details of the report, including the proposed legislation and the detailed implementation plan.

A final report will be submitted to the Committees by January 31, 2008.

In addition to the preliminary report, four appendix items are also attached (on ivory paper). Two are specifically referenced in the report and two others provide additional background and context for the recommendations offered.

We welcome your thoughts and feedback as we prepare the final report. Comments can be directed to Diane Campbell, Maine Governor's Council on Physical Activity, at 622-7566, ext. 230 or dianec@mcd.org.

MAY - 8 2013



PE4ME Planning and Oversight Team

Preliminary Report

*to the Joint Standing Committee on Education and Cultural Affairs
and the Joint Standing Committee on Health and Human Services*

*Responding to RESOLVE, Chapter 102,
To Increase Physical Education for Elementary School Students*

December 31, 2007

OVERVIEW

Why PE?

Physical Education for all K-8 students is an essential element in any comprehensive plan to reduce obesity and chronic disease. Physical Education should be combined with Physical Activity, Nutrition, and Weight-Management programs delivered in school and community settings to children and adults via education and outreach strategies.

There is now indisputable evidence that obesity and overweight are fast overtaking tobacco use as the number one cause of chronic disease and early death in Maine and the nation. The percentage of youth who are obese and overweight has more than tripled since 1980. Overweight adolescents have a 70% chance of becoming overweight adults. Overweight/obesity is a major risk factor for a number of chronic diseases, including cardiovascular disease, Type II diabetes, and several types of cancer. Over \$350 million is spent every year in Maine on medical expenditures attributable to obesity. Lost productivity costs in Maine total another \$2 billion per year. As a result of overweight/obesity, this generation of children may be the first in recent history to not live as long as their parents.

The good news is that overweight/obesity and the chronic diseases they can lead to are almost entirely preventable. With focused and coordinated effort, it will ultimately be possible to reverse this deadly trend. Support for Physical Education in schools is strong and instinctive. In a national survey as reported in "Shape of the Nation", 85% of parents, 81% of teachers, and 92% of teens believe that students in every grade level should receive PE every day. But there is no time to waste in recognizing the crisis and taking aggressive steps to confront it. It will take leadership at every level of government to tackle and win the fight against overweight/obesity. Physical Education for all K-8 students is a vital next step.

PE in Maine Today

Maine Learning Results states: "Students will acquire the knowledge needed to be physically fit and take part in healthful physical activity on a regular basis." Physical education is also a core content area requiring "adequate time" in the school day. But what is "a regular basis"? What is "adequate time"? The reality is, it's different for every school, even though obesity doesn't discriminate and is a growing problem in all Maine schools. This patchwork quilt of physical education offerings is the result of no overarching vision and commitment for all K-8 students to be provided a high quality evidence-based physical education program.

PE4ME Baseline Understandings

1. All PE4ME recommendations represent the 100% consensus agreement of all PE4ME members.

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2. PE4ME recognizes and endorses the national standard that all children and youth participate in at least 60 minutes per day of moderate-to-vigorous physical activity. Support for this standard includes the Centers for Disease Control and Prevention, the Institute of Medicine, the American Academy of Pediatrics, the National Association of State Boards of Education, and two Surgeon General's Reports.
3. PE4ME recognizes and endorses the National Association of Sports & Physical Education (NASPE) definition of Physical Activity (PA) as "bodily movement of any type that may include recreational, fitness, and sport activities such as jumping rope, playing soccer, lifting weights, as well as daily activities such as walking to the store, taking the stairs or raking leaves."
4. PE4ME recognizes and endorses the NASPE definition of a quality school Physical Education (PE) Program as one that "offers the best opportunity to provide physical activity to all children and to teach them the skills and knowledge needed to establish and sustain an active lifestyle... Based on sequence of learning, PE should not be compared to or confused with other PA experiences such as recess, intramurals, or recreational endeavors. (It) provides learning opportunities, appropriate instruction, (and) meaningful and challenging content for all children..."
5. PE4ME believes it is essential that high quality PE programs are always evidence-based in their design.
6. PE4ME believes that, in general, more emphasis must be placed on incorporating PA into the regular school day.
7. PE4ME recognizes the American Heart Association's 2006 Scientific Statement "Promoting Physical Activity in Children and Youth" as the foundation for its recommendations.

RECOMMENDATIONS

Physical Education and Physical Activity Requirements

PE4ME recommends the following Physical Education (PE) and Physical Activity (PA) practices be required for all K-8 students in all Maine schools:

1. At least 30 minutes per day of moderate-to-vigorous PA, which must be structured and can include time spent active in PE classes.
2. At least 150 minutes per week of PE that is evidence-based, health-related, and teaches students the motor and behavioral skills needed to develop an active, physically fit lifestyle.

Teachers and Teacher Training

PE4ME recommends the following regarding teachers and teacher training:

1. All PE classes are to be taught by certified and highly qualified PE teachers.
2. All statewide teacher conferences are to include workshops on physical activity opportunities for all classes, including ways to get students outside all year round. The organizations WinterKids and Maine Association of Health, Physical Education, Recreation, and Dance (MAHPERD) already provide such trainings at no cost and are willing to conduct them regionally.
3. Maine colleges and universities are to provide professional preparation programs that produce teachers who are highly qualified to deliver evidence-based PE and health education programs. Opportunities to cross-train existing teachers of other subjects in PE, including training in evening hours, should also be provided.
4. Statewide assessments (including regional data) are to be conducted in order to accurately calculate the number of PE teachers that will be needed and the number of existing certified PE teachers available to join the workforce. The following current data suggests there is adequate capacity to meet future needs:

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- a. Maine colleges/universities have the capacity to train 155 physical education teachers every year. At this time, approximately 65% of all graduates look for work in Maine.
 - b. There are currently over 500 certified PE teachers in Maine who are not currently practicing as PE teachers.
 - c. Between 290 and 450 new PE teaching positions will be created over a period of six years as a result of implementing the PE4ME recommendations.
5. A system of incentives is to be designed for the purpose of retaining graduates of Maine colleges/universities for employment as PE teachers in Maine schools.
 6. At the local level, PE should be graded and reported like all other subjects.

Maine Learning Results

PE4ME recommendations for PE and PA in schools are in harmony with the Maine Learning Results (MLR). While the Maine Learning Results provides a consistent means to define outcomes, the PE4ME recommendations provide the evidence-based means to achieve the MLR outcomes and maximize success.

Funding

PE4ME recommends the following budget, method of funding, and integration into Maine Essential Programs and Services (EPS):

1. Budget
 - The total new cost to fully implement PE4ME recommendations is approximately \$12.7 to \$19.3 million per year. This cost represents funds needed over and above what is currently being spent from state and local sources on existing PE programs.
 - The new cost to fully implement PE is to be funded through the EPS system within the “Total Adjustments and Miscellaneous Costs” line item. Statutory changes are to be made accordingly.
 - A statewide assessment of all school districts (including regional data) is to be conducted to verify current PE capacities and gaps, including staffing, equipment, and facilities.
 - Total additional PE costs will include teacher salaries, equipment, training and technical assistance, preliminary statewide assessments, baseline fitness assessments, local and statewide program evaluation, and incentives for capacity building and implementation.
2. Funding sources
 - Federal and private funding are not viable options to supplement or supplant state funding. These sources would be neither adequate nor sustainable for this long-term investment.
 - New state revenues are to be raised in order to provide 100% of the total new cost of providing PE for all K-8 students in Maine.
 - A new state fund is to be created that will collect new revenue from sources identified as being related to the causes of obesity and other chronic disease. Examples of possible sources include surcharges on soda, junk food (foods of minimal nutritional value), and non-cigarette tobacco products.
 - Allocations from the new fund will be made for efforts that will reduce obesity and promote physical activity and good nutrition. Funding priority will be given to PE, obesity prevention and control via Maine’s Physical Activity and Nutrition (PAN) program, and expansion of the number of School Health Coordinators (SHC) working to promote healthy school environments for youth.

Evaluation

PE4ME recommends the following regarding evaluation of PE in Maine schools:

1. An efficient and effective common evaluation system will be designed and implemented that maximizes data value for the local level while also feeding data up to the state level for aggregation and consistent reporting:

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2. The evaluation system will measure a quality PE program in terms of:
 - a. **Infrastructure:** What is in place to support PE? (e.g. facilities, equipment, schedules, student/teacher ratio, staff education & development opportunities)
 - b. **Content:** Does the PE class meet or come close to best practice? (e.g. defined curriculum and curriculum elements, active time in class, activities included that support lifelong physical activities)
 - c. **Impact:** What are the individual health effects? (e.g. student-based measures such as cardio-respiratory fitness, strength, flexibility, BMI, reported physical activity levels, knowledge and understanding of key physical activity concepts)
3. Details of the evaluation system include:
 - a. Infrastructure and Content will be evaluated in every school every three years. The evaluation may include elementary and middle school-specific questions to account for the various grades that can be present within a single school.
 - b. Impact will be evaluated through fitness assessments completed by the PE teacher(s) and reported to the state in an interval and manner that will allow the data to be reported by school unit, district, and grade levels statewide.
 - c. Individual fitness data will be reported back to families in an appropriate and sensitive way from the local level. It will be treated with confidentiality consistent with other student data within the school.
4. A statewide assessment is to be conducted that identifies what evaluation tools are currently being used at the local level to evaluate PE student and program success.
5. A baseline fitness assessment of all K-8 students is to be conducted prior to the first full evaluation year.

Small, Rural, and Isolated Schools:

Small, rural, and isolated (SRI) schools are to be held to the same quality PE standards as other schools and given the same time to meet those standards. However, SRI schools are to be offered enhanced support through technical assistance, priority funding for equipment, and priority training and professional development opportunities.

IMPLEMENTATION OVERVIEW

1. PE4ME recommends that all Maine schools implement a high quality evidence-based PE and PA program as outlined above by the 2013/2014 academic year.
2. In recognition of the preference for local leadership, PE4ME recommends that PE implementation be driven from the local-level using the PE4ME recommendations as strict guidelines for implementation.
3. The newly established obesity and chronic disease fund will provide financial resources in the form of grant funds and other incentives for fully implementing evidence-based PE beyond what is currently being offered and funded.
4. In additional recognition of the vital importance of evidence-based PE to the children of Maine and to the state as a whole, the locally driven implementation process is to be monitored closely and assessed annually starting in AY/FY 2009/2010.
5. PE4ME is to become an ongoing oversight committee meeting two to four times per year as needed to assess PE implementation and make recommendations to the Legislature for changes to the implementation process.
6. The following benchmarks are to be established for implementation of a high quality evidence-based PE and PA program as outlined by PE4ME:

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- AY/FY 2009/2010: implementation by 15% of all Maine schools
 - AY/FY 2010/2011: implementation by 40% of all Maine schools
 - AY/FY 2011/2012: implementation by 65% of all Maine schools
 - AY/FY 2012/2013: implementation by 90% of all Maine schools
 - AY/FY 2013/2014: implementation by 100% of all Maine schools
7. The new fund will begin allocating resources for the following items as soon as possible:
 - Implementation assessments
 - New PE costs, including all associated costs as delineated in the “Funding” recommendation
 - Maine’s efforts for obesity prevention and control (approximately \$5 million per year)
 - School Health Coordinators for every school district (approximately \$3 million per year with a three year timeline for full implementation)
 8. To encourage and enforce implementation, financial incentives for early adoption and ongoing improvements are to be built into the funding plan. Enforcement options will include the withholding of funding if the PE program fails to meet established operational criteria.
 9. If interim benchmarks are not met by AY/FY 2010/2011, PE4ME will recommend immediate adjustments to the PE implementation plan in order to meet all further benchmarks. Options for additional legislation will remain open to PE4ME at any time during implementation. A legislative mandate on implementing PE in the timeline provided is the most likely next step in order to protect the health of Maine children and reduce the physical and financial burden that lack of PA and PE bears on all Maine people.

TIMELINE

Implementation steps by academic and fiscal year (AY/FY) are as follows:

AY/FY 2007/2008:

- Pass legislation to implement the recommendations of PE4ME and establish funding source
- Establish criteria for Small, Rural, and Isolated (SRI) schools

AY/FY 2008/2009:

- Allocate revenue to assessments, obesity prevention and control efforts, SHC program, and preliminary costs related to new PE programs
- Conduct statewide assessments regarding teacher capacities, funding needs, evaluation tools, and SRI needs
- Schools with capacity submit proposals for Phase One PE funding and implementation
- Evaluation tools and systems established, including training and technical assistance program
- All Maine schools conduct baseline fitness assessments for all K-8 students

AY/FY 2009/2010:

- Phase One schools funded to implement PE
- Evaluation system pilot tested
- Training and technical assistance initiated, with priority given to SRIs
- Ongoing funding to obesity prevention and control efforts and SHC program

AY/FY 2010/2011:

- Phase Two schools funded to implement PE
- Evaluation of PE Infrastructure, Content, and Impact begins
- Ongoing training and technical assistance provided, with priority given to SRIs

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- Implementation benchmarks evaluated by PE4ME
- Ongoing funding to obesity prevention and control efforts and SHC program

AY/FY 2011/2012:

- New legislation introduced if necessary to mandate PE implementation
- Ongoing evaluation of PE Infrastructure, Content, and Impact
- Ongoing training and technical assistance provided, with priority given to SRIs
- Phase Three schools funded to implement PE
- Ongoing funding to obesity prevention and control efforts and SHC program

AY/FY 2012/2013:

- Ongoing evaluation of PE Infrastructure, Content, and Impact
- Ongoing training and technical assistance provided, with priority given to SRIs
- Phase Four schools funded to implement PE
- Ongoing funding to obesity prevention and control efforts and SHC program

AY/FY 2013/2014:

- Ongoing evaluation of PE Infrastructure, Content, and Impact
- Ongoing training and technical assistance provided, with priority given to SRIs
- Phase Five (final phase) schools funded to implement PE
- Ongoing funding to obesity prevention and control efforts and SHC program

CONCLUSIONS

PE4ME is proposing a clear seven-year roadmap to implementation of a statewide evidence-based physical education program for all K-8 students. The roadmap includes legislation to be submitted immediately for consideration in the Second Regular Session of the 123rd Maine Legislature that supports the recommendations outlined in this report. If the proposed roadmap is adopted, PE4ME will continue to meet and provide oversight for this process.

The benefits of physical education and physical activity go well beyond obesity prevention and control. The value of the physical, mental, and social benefits cannot be understated. Students who get recommended levels of physical activity are more confident, better learners, less likely to get chronic diseases, and more likely to avoid unhealthy behaviors like tobacco and drugs. Physical activity strengthens bones and joints, builds muscle, improves balance, improves blood pressure and cholesterol, can help control diabetes and helps relieve the symptoms of depression and anxiety.

It is important to remember that physical education alone will not solve the obesity problem. As in the fight to reduce tobacco use, it will take a comprehensive approach that includes state policies, school programs, community programs, public education, and strong partnerships with medical providers. But implementing a high-quality evidence-based PE program for every K-8 student in Maine is an essential next step in our efforts to reduce obesity, chronic disease, and the resulting health costs that burden Maine citizens and Maine businesses.



APPENDIX

PE4ME Participants

1. Naomi Anderson Schucker, MaineHealth
2. Susan Berry, Maine Department of Education
3. Stephen A. Butterfield, University of Maine and Governor's Council on Physical Activity
4. Sue Campbell, Maine School Boards Association
5. Diane M. Campbell, Medical Care Development and Governor's Council on Physical Activity
6. David W. Crawford, Maine Center for Disease Control and Prevention, Physical Activity and Nutrition Program
7. Jocelyn Dill, Maine Association of Health Physical Education Recreation and Dance, Retired Physical Education Teacher
8. Rebecca Drewette-Card, Maine Center for Disease Control and Prevention, Maine Physical Activity and Nutrition Program
9. Liz Giles-Brown, Physical Education Teacher
10. Andy Hamblett, Boothbay Region YMCA
11. Robbie Lipsman, Portland United Way "Let's Go" Program
12. Richard Lyons, Maine Superintendent's Association
13. Carla Marcus, WinterKids and Governor's Council on Physical Activity
14. Karen O'Rourke, Maine Center for Public Health
15. Roger Park, Governor's Council on Physical Activity
16. Amy Root, Maine Nutrition Network and Governor's Council on Physical Activity
17. Lee Scott, American Lung Association of Maine and Governor's Council on Physical Activity
18. Becky Smith, Health Policy Partners of Maine
19. Erik Steele, DO, Eastern Maine Health Care Systems and Governor's Council on Physical Activity
20. David Stockford, Maine Department of Education
21. Jeff Sturgis, Maine Principal's Association
22. Kawika Thompson, University of Maine and Governor's Council on Physical Activity
23. Dennise Whitley, American Heart Association New England Affiliate and Governor's Council on Physical Activity
24. Jean Zimmerman, Maine Department of Education

PE4ME Facilitator:

Carol Kelly, Pivot Point Inc.

Attachments:

1. New England Journal of Medicine, "Childhood Obesity – The Shape of Things to Come," by David S. Ludwig, M.D., Ph.D., December 2007
2. National Association for Sport & Physical Education, "Is It Physical Education or Physical Activity," 2006
3. American Heart Association, Scientific Statement: "Promoting Physical Activity in Children and Youth," September 2006
4. National Association for Sport & Physical Education, "Physical Education is Critical to a Complete Education," July 2001

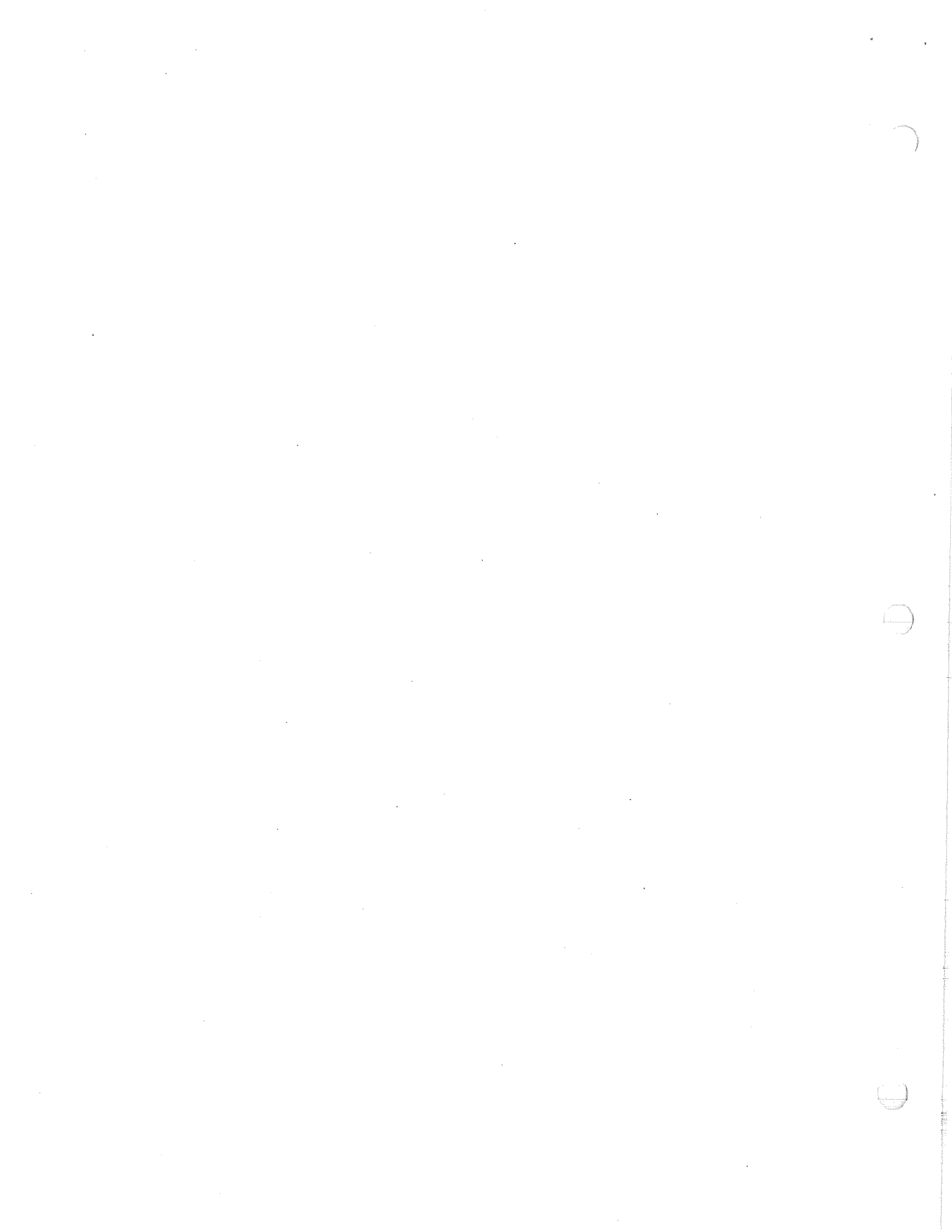
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PE4ME Planning and Oversight Team

Preliminary Report

APPENDICES



Childhood Obesity — The Shape of Things to Come

David S. Ludwig, M.D., Ph.D.

Related articles, pages 2329 and 2371

Last week, I met with the G. family in the Optimal Weight for Life (OWL) clinic at my hospital. One of the parents was overweight, and the other was obese. The five children were more severely obese and had numerous weight-related complications — one had evidence of fatty liver, one had high blood pressure, two had gastroesophageal reflux, two had orthopedic problems, three had marked insulin resistance, four had dyslipidemia, and all had emotional problems related to their weight.

Sadly, this family might be a microcosm of 21st-century America: if we don't take steps to reverse course, the children of each successive generation seem destined to be fatter and sicker than their parents. How will obesity affect the physical and psychological well-being of children in coming decades? What effects will childhood obesity have on life expectancy, the national economy, and our society? To explore these questions, one might view the obesity epidemic as consisting of four overlapping phases.

Phase 1 began in the early 1970s and is ongoing: average weight is progressively increasing among children from all socioeconomic levels, racial and ethnic groups, and regions of the country. Today, about one in three children and adolescents is overweight (with a body-mass index, or BMI, in the 85th to 95th percentile for age and sex) or obese

(BMI above the 95th percentile), and the proportion approaches one in two in certain minority groups.¹ Though it has attracted much attention from the medical profession and the public, childhood obesity during this phase has actually had little effect on public health, because an obese child may remain relatively healthy for years.

Phase 2, which we are now entering, is characterized by the emergence of serious weight-related problems.² The incidence of type 2 diabetes among adolescents, though still not high, has increased by a factor of more than 10 in the past two decades and may now exceed that of type 1 diabetes among black and Hispanic adolescents. Fatty liver associated with excessive weight, unrecognized in the pediatric literature before 1980, today occurs in about one in three obese children. Other obesity-related complications affecting virtually every organ — ranging from crippling orthopedic problems to sleep apnea — are being diagnosed with increasing frequency in children (see table). There is also a heavy psychosocial toll: obese children tend to be socially isolated and have high rates of disordered eating, anxiety, and depression. When they reach adulthood, they are less likely than their thinner counterparts to complete college and are more likely to live in poverty.

It may take many years to reach phase 3 of the epidemic, in

which the medical complications of obesity lead to life-threatening disease. As Baker et al. (pages 2329–2337) and Bibbins-Domingo et al. (pages 2371–2379) report in this issue of the *Journal*, overweight or obesity in childhood or adolescence increases the risk of coronary heart disease (CHD) in adulthood; by 2035, Bibbins-Domingo et al. predict, the prevalence of CHD will have increased by 5 to 16%, with more than 100,000 excess cases attributable to increased obesity among today's adolescents. Preliminary data from Canada suggest that adolescents with type 2 diabetes will be at high risk for limb amputation, kidney failure requiring dialysis, and premature death. In some, fatty liver will progress to hepatitis and cirrhosis, which may remain asymptomatic until irreversible organ damage has occurred. Poverty and social isolation would complicate the timely identification and management of such problems. Shockingly, the risk of dying by middle age is already two to three times as high among obese adolescent girls as it is among those of normal weight, even after other lifestyle factors are taken into account.³ My colleagues and I have predicted that pediatric obesity may shorten life expectancy in the United States by 2 to 5 years by midcentury — an effect equal to that of all cancers combined.⁴

Without effective intervention, phase 4 of the epidemic will entail an acceleration of the obesity

Complications of Childhood Obesity	
Psychosocial	Poor self-esteem Anxiety Depression Eating disorders Social isolation Lower educational attainment
Neurologic	Pseudotumor cerebri
Endocrine	Insulin resistance Type 2 diabetes Precocious puberty Polycystic ovaries (girls) Hypogonadism (boys)
Cardiovascular	Dyslipidemia Hypertension Coagulopathy Chronic inflammation Endothelial dysfunction
Pulmonary	Sleep apnea Asthma Exercise intolerance
Gastrointestinal	Gastroesophageal reflux Steatohepatitis Gallstones Constipation
Renal	Glomerulosclerosis
Musculoskeletal	Slipped capital femoral epiphysis Blount's disease* Forearm fracture Back pain Flat feet

* Blount's disease is a growth disorder of the tibia that causes the lower leg to angle inward (tibia vara).

rate through transgenerational mechanisms. Obese children tend to be heavy in adulthood, in part because obesity-promoting habits persist. In addition, carrying excessive weight early in life may elicit irreversible biologic changes in hormonal pathways, fat cells, and the brain that increase hunger and adversely affect metabolism. Furthermore, adult obesity

and its complications appear to increase the risk of obesity and its complications in offspring through nongenetic influences, a phenomenon termed perinatal programming. For example, a recent study found that maternal hyperglycemia during pregnancy strongly predicted BMI in offspring at 5 to 7 years of age, after adjustment for maternal weight gain and birth weight.⁵

Currently, the economic costs of pediatric obesity in the United States are relatively small — probably several hundred million dollars annually. Without effective intervention, the costs of obesity might well become catastrophic, arising not only from escalating medical expenses but also from diminished worker productivity, caused by physical and psychological disabilities. Future economic losses could mean the difference between solvency and bankruptcy for Medicare, between expanding and shrinking health care coverage, and between investment in and neglect of our social infrastructure, with profound implications for our international competitiveness. The human costs would be incalculable.

Like global warming, the obesity epidemic is a looming crisis that requires action before all the scientific evidence is in. And as with climate change, some have questioned experts' forecasts, doubting the far-reaching impact of obesity, though skepticism is gradually being overcome by accumulating data. Others would defer concerted efforts to address the problem, placing hope in the development of new drugs or surgical procedures that, like some

abundant and nonpolluting energy source, might offer a painless technological fix. Or they argue that the costs of action are too great, not recognizing that our survival depends on solving the problem. But I believe that obesity differs in one important respect from global warming: simple solutions are available, and with a comprehensive national strategy, we may be able to implement them without great sacrifice.

Certainly, we have much to learn about the regulation of body weight. Low-fat diets have yielded disappointing results, and very-low-carbohydrate diets appear to be more effective only in the short term. Novel approaches that focus on the quality rather than the ratio of macronutrients appear promising, and other areas warrant study, including the effects of sleep deprivation, stress, infectious agents, and endocrine-disrupting environmental toxins on weight. Unfortunately, the U.S. government has thus far invested only a fraction of a cent in research for every dollar that obesity costs society. And although broad consensus exists regarding the dietary and lifestyle habits needed to prevent and treat childhood obesity, we lack anything resembling a comprehensive strategy for encouraging children to eat a healthful diet and engage in physical activity. Such a strategy would include legislation that regulates junk-food advertising, provides adequate funding for decent lunches and regular physical activities at school, restructures the farm-subsidies program to favor nutrient-dense rather than

calorie-dense produce, and mandates insurance coverage for preventing and treating pediatric obesity.

Parents must take responsibility for their children's welfare by providing high-quality food, limiting television viewing, and modeling a healthful lifestyle. But why should Mr. and Ms. G.'s efforts to protect their children from life-threatening illness be undermined by massive marketing campaigns from the manufacturers of junk food? Why are their children subjected to the temptation of such food in the school cafeteria and vending machines? Why don't they

have the opportunity to exercise their bodies during the school day? And why must Mr. and Ms. G. fight with their insurance company for reimbursement to cover the costs of their children's care at the OWL clinic? Fortunately, with the exercise of both personal and social responsibility, we have the power to choose the shape of things to come.

An interview with Dr. Ludwig can be heard at www.nejm.org.

Dr. Ludwig is director of the Optimal Weight for Life Program in the Division of Endocrinology, Children's Hospital Boston, and an associate professor of pediatrics at Harvard Medical School — both in Boston.

1. Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. *JAMA* 2006;295:1549-55.

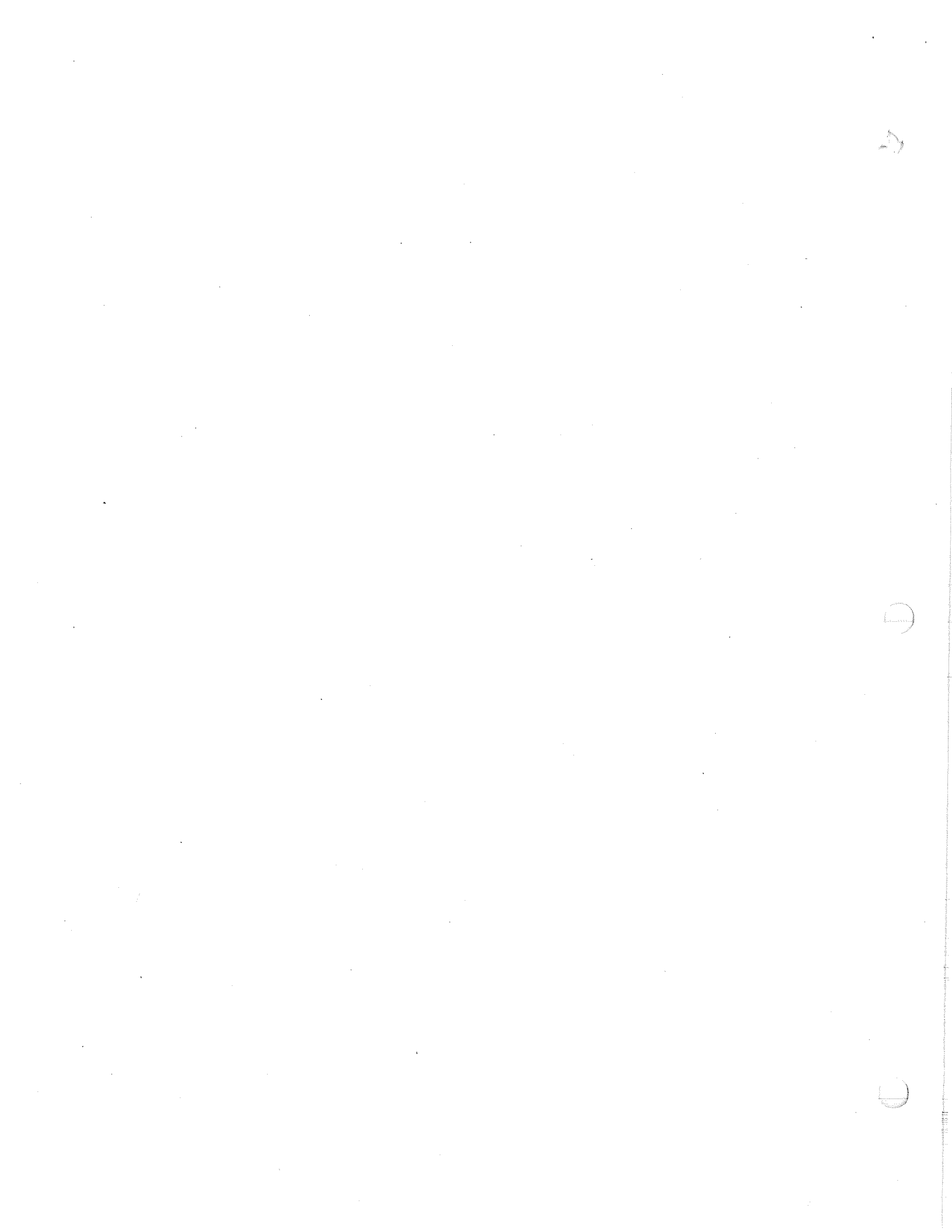
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3. van Dam RM, Willett WC, Manson JE, Hu FB. The relationship between overweight in adolescence and premature death in women. *Ann Intern Med* 2006;145:91-7.

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National Association for Sport & Physical Education

an association of the American Alliance for Health, Physical Education, Recreation and Dance

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Understanding the Difference

IS IT PHYSICAL EDUCATION OR PHYSICAL ACTIVITY?

With heightened attention on childhood obesity prevention efforts, there seems to be some confusion between the terms “physical education” and “physical activity.” Often the words are used interchangeably but they differ in important ways. Understanding the difference between the two is critical to understanding why both contribute to the development of healthy, active children. The National Association for Sport and Physical Education (NASPE) believes every child in the United States deserves both a quality physical education and physical activity program.

School **physical education programs** offer the best opportunity to provide physical activity to all children and to teach them the skills and knowledge needed to establish and sustain an active lifestyle. Physical education teachers assess student knowledge, motor and social skills, and provide instruction in a safe, supportive environment. NASPE recommends that schools provide 150 minutes of instructional physical education for elementary school children, and 225 minutes for middle and high school students per week for the entire school year. Based on sequence of learning, physical education should not be compared to or confused with other physical activity experiences such as recess, intramurals, or recreational endeavors.

A quality physical education program provides learning opportunities, appropriate instruction, meaningful and challenging content for all children, and should include:

Opportunity to Learn:

- Instructional periods totaling 150 minutes per week (elementary) and 225 minutes per week (middle and high school)
- Qualified physical education teachers providing a developmentally appropriate program
- Teacher/student ratio in physical education no greater than 1:25 (elementary) and (1:30 middle/high) for optimal instruction (similar to other classroom settings)
- Adequate equipment and facilities for all students to be active at the same time

Appropriate Instruction:

- Full inclusion of all students
- Maximum participation and ample practice opportunities for class activities
- Well-designed lessons that facilitate student learning
- Out of school assignments that support learning and practice of learned skills
- Appropriate discipline and class management (physical activity should never be used as punishment)
- Use of regular assessment to monitor and reinforce student learning

Meaningful Content:

- Instruction in a variety of motor skills that are designed to enhance the physical, mental, and social/emotional development of every child
- Fitness education and assessment to help children understand, improve and/or maintain their physical well-being
- Development of cognitive concepts about motor skill and fitness
- Opportunities to improve emerging social and cooperative skills through physical activity and gain a multi-cultural perspective
- Promotion of recommended amounts of physical activity now and throughout life

Physical activity is bodily movement of any type and may include recreational, fitness and sport activities such as jumping rope, playing soccer, lifting weights, as well as daily activities such as walking to the store, taking the stairs or raking the leaves. Similar health benefits to those received during a physical education class are possible during physical activity bouts when the participant is active at an intensity that increases heart rate and produces heavier than normal breathing. NASPE recommends school-age children accumulate at least 60 minutes and up to several hours of physical activity per day while avoiding prolonged periods of inactivity.

Opportunities to accumulate physical activity during the school day include time spent in physical education class, classroom-based movement, recess, walking or biking to school, and recreational sport and play that occurs before, during, and after school. Parents and grandparents are urged to get active with their children. The benefits of regular physical activity include:

- Reduces the risk for overweight, diabetes and other chronic diseases
- Assists in improved academic performance
- Helps children feel better about themselves
- Reduces the risk for depression and the effects of stress
- Helps children prepare to be productive, healthy members of society and
- Improves overall quality of life.

NASPE encourages parents and community members to visit the local schools to view daily developmentally appropriate physical education classes and supplementary physical activity opportunities such as recess, physical activity breaks and after school programs.

To learn more about the importance of physical education and physical activity, visit the NASPE website at www.naspeinfo.org.

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Promoting Physical Activity in Children and Youth

A Leadership Role for Schools

A Scientific Statement From the American Heart Association Council on Nutrition, Physical Activity, and Metabolism (Physical Activity Committee) in Collaboration With the Councils on Cardiovascular Disease in the Young and Cardiovascular Nursing

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Schools have played a central role in the provision of physical activity to American children and youth for more than a century. Physical education (PE) has been an institution in American schools since the late 1800s,¹ and school sports have been a growing component of the educational enterprise since the early 1900s. Traditionally, students have engaged in physical activity during recess breaks in the school day and by walking or riding bicycles to and from school. However, as we move into the 21st century, alarming health trends are emerging, suggesting that schools need to renew and expand their role in providing and promoting physical activity for our nation's young people.

Over the past 20 years, obesity rates in US children and youth have skyrocketed. Among children ages 6 to 11, 15.8% are overweight (≥ 95 th percentile body mass index [BMI] for age) and 31.2% are overweight or at risk for overweight (≥ 85 th percentile BMI for age).² Among adolescents ages 12 to 19, 16.1% are overweight (≥ 95 th percentile BMI for age) and 30.9% are overweight or at risk for overweight (≥ 85 th percentile BMI for age).² The rapid increase in the prevalence of obesity in American young people has occurred concurrently with other disquieting trends. Between 1991 and 2003, enrollment of high school students in daily PE classes decreased from 41.6% to 28.4%.³ Physically active transport to and from school has declined from previous generations; only one third of trips to school ≤ 1 mile and $< 3\%$ of trips ≤ 2

miles are made by walking or biking.^{4,5} Even recess has been reduced or eliminated in some elementary schools.^{6,7}

Over the years, many public health, medical, and educational authorities have called on schools to give greater attention to provision of physical activity to students. It has often been recommended that PE programs be expanded, and for several decades professional organizations have indicated that the provision of "quality, daily physical education" should be a standard to which schools aspire.⁸⁻¹¹ Unfortunately, few American schools meet that standard, and little evidence indicates that progress has been made toward attaining that goal.^{3,12}

The recent rapid increase in childhood obesity rates suggests that a reconsideration of the role of the schools in addressing this problem is necessary and appropriate. The American Heart Association recently issued a scientific statement on overweight in children and adolescents that drew attention to the severity of the problem and identified the importance of prevention and treatment.¹³ The Institute of Medicine recently issued a report on prevention of childhood obesity that placed major emphasis on the potential role of schools.¹⁴ Other leading organizations have recommended that schools adopt policies that require daily PE, elementary school recess, and physical activity opportunities before, during, and after school.¹⁵ Over the past decade, several organizations have recommended that children and youth participate in ≥ 60 minutes of physical activity each day.^{16,17}

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Recently, an expert panel conducted a comprehensive review of the literature on physical activity in school-age youth and recommended that children and youth participate in ≥ 60 minutes per day of physical activity that is developmentally appropriate, enjoyable, and involves a variety of activities.¹⁵ The panel's report suggested that the ≥ 60 minutes can be accumulated throughout the day in school, during PE and recess, during intramural sports, and in before-school and after-school programs.¹⁸

It appears that the time has come to consider a markedly expanded role for schools in providing physical activity to our children and youth. Schools could become the central element in a community system that ensures that students participate in enough physical activity to develop healthy lifestyles. Although nutrition also clearly plays an important role in the promotion of health and prevention of obesity,¹³ the present document focuses on physical activity. It describes a renewed and expanded role for schools in the area of physical activity. Furthermore, it addresses the current state of affairs and summarizes the evidence supporting schools' potential for effectively providing and promoting physical activity. In addition, this statement recommends several key changes in school policy and practice.

The Current State of Affairs

The status of physical activity participation by children and youth in the United States and the status of the schools' promotion of physical activity are monitored systematically by the Centers for Disease Control and Prevention. The Youth Risk Behavior Surveillance System (YRBSS) is a survey of high school youth conducted regularly through national, state, and local education and health agencies.¹² The system collects self-reported data related to 6 health-risk behaviors, including physical activity, in nationally representative samples of youth. In addition, the School Health Policies and Programs Study (SHPPS) regularly assesses school health policies and programs at the state, district, school, and classroom levels.¹⁹ It is likely that vigorous physical activity is overreported and moderate physical activity is underreported in the YRBSS data.²⁰ However, the YRBSS data are the only national surveillance data currently available for this population.

Participation in Physical Activity

Children are more active than adults, but their activity levels decline as they move toward adolescence, and significant numbers of young people do not participate in recommended levels of physical activity.²¹ The 2003 YRBSS provides documentation of the inadequate levels of physical activity among high school-age youth. Thirty-seven percent of students did not participate in ≥ 20 minutes of vigorous physical activity on ≥ 3 of the previous 7 days, and black, Hispanic, and female students were less likely than their white male counterparts to participate in vigorous physical activity at recommended levels. More than one third (38.2%) of students spent > 3 hours per day watching television.¹²

Physical Education

PE is a mandated part of the school curricula in most states,^{19,22} and daily PE is recommended by numerous enti-

ties.^{5,21,23} In addition to providing opportunities for physical activity, PE has traditionally pursued objectives that are not necessarily directly related to health outcomes. These include objectives in the cognitive, social, and emotional domains. According to the 2003 YRBS, 55.7% of high school students were enrolled in PE classes, 28.4% attended PE class daily, and 80.3% of those attending PE classes spent ≥ 20 minutes being active during class.¹² Enrollment in PE remained steady from 1991 through 2003; however, the percentage of students participating in daily PE classes decreased significantly from 1991 to 1995 (from 41.6% to 25.4%) and rose only slightly from 1995 to 2003 (from 25.4% to 28.4%).³

The 2000 SHPPS report addressed PE, standards and guidelines, evaluation, elementary school recess, intramurals, and interscholastic sports.¹⁹ At the middle school level, the study found that only 6.4% of middle schools provided daily PE for the entire school year, whereas 15.5% offered daily PE (or its equivalent) for at least half the school year, and 34.4% offered it 3 days per week for at least half of the school year.¹⁹ Only a few studies other than SHPPS have focused on middle school PE. One of those found that PE in middle schools ranged from a low of 54 hours per year (grades 6 to 8, South Carolina) to a high of 156 hours per year (grades 6 to 8, California).²⁴ Direct observations of individuals in PE classes in both elementary^{25,26} and secondary²⁷ schools indicated that students typically engage in moderate-to-vigorous physical activity (3.0 to 5.9 METS) $< 40\%$ of PE class time, far short of the 50% recommended by the *Healthy People 2010* objectives.⁵

Enrollment Requirements

At the state level, 78.4% of states required elementary schools to provide PE, whereas 85.7% required middle schools and 82.4% required high schools to do so.¹⁹ At the school level, a large majority ($> 95\%$) of schools required that PE be offered in the curriculum. Requirements for student participation in PE, however, were lower in the higher grades. Forty percent of elementary schools required students to participate in PE, but only 5.4% of high schools required that seniors enroll.

Time Requirements

Only 8% of elementary schools, 6.4% of middle/junior high schools, and 5.8% of senior high schools provided PE daily or allocated the recommended amount of time per week (150 minutes for elementary schools; 225 minutes for middle/junior and senior high schools).¹⁹ Participation in PE also was reduced by substitutions of other activities for PE and student exemptions. Seventeen percent of elementary schools allowed exemptions from required PE courses because of competency test scores or participation in other school, community sports, or community service activities. At the middle and high school levels, 25.3% and 40%, respectively, allowed students to be exempt from PE for the same reasons, as well as for enrollment in other school courses and participation in school sports and vocational training.¹⁹ Although these substitute activities provide physical activity in some cases, they do not replace the educational aspects of PE that are designed to develop the knowledge, behavioral skills,

and motor skills necessary to develop and maintain a physically active and healthy lifestyle.

Physical Education Content

SHPPS reported that the content of PE included a wide array of activities, but traditional activities predominated. For example, 98.2% of schools taught group or team activities, 97.4% taught individual or partnered activities, 69.3% taught dance activities, and 12.5% taught aquatic activities.¹⁹ Eighty-four percent of elementary schools, 77.4% of middle/junior high schools, and 79.5% of senior high schools reported following state or national standards in the PE curriculum.

Teacher Qualifications and Class Size

A significant percentage of states, districts, and schools have established requirements for teacher qualifications and class size for PE. The majority of schools (80.6%) required newly hired PE teachers to have undergraduate or graduate training in PE or a related field, and 73.2% required new teachers to be state certified, licensed, or endorsed in PE.¹⁹ Funding for staff development in PE was offered in 66% of the states and 80.7% of the districts. In 89.3% of the schools, physical educators had received staff development on at least 1 PE topic in the previous 2 years. However, the survey did not document whether or not teachers used the skills learned in PE staff development in their PE classes. Of the schools with PE requirements, 41.9% had a maximum student-to-teacher ratio. The average maximum ratio was 28:1 for elementary schools, 31:1 for middle/junior high schools, and 33:1 for senior high schools. Large class sizes, common in many PE programs, are associated with reduced levels of student physical activity.¹⁹

Recess, Intramurals, and Other School Programs

SHPPS found that a majority (71.4%) of elementary schools provide regularly scheduled recess for grades K to 5.¹⁹ Few states require that schools provide a recess break, but 46.3% of school districts require schools to do so. Recess periods do not necessarily require or even encourage activity; in fact, some schools cited injuries and supervision issues as reasons for restricting recess and physical activity during recess. Nearly half (49%) of schools offered physical activity clubs or intramurals, and more than half of students participated in at least 1 club or intramural team. Few schools offered transportation home after club or intramural programs, and these activities may be accessible only to students who can resolve transportation needs. The activities offered in intramural programs tend to be traditional sports programs. Although these programs have not been formally studied, physical activity professionals believe that the students who elect to participate tend to be those who are already more active.

School Sports

Data from the 2003 YRBSS survey indicate that 57.6% of students in grades 9 to 12 played on at least 1 sports team during the prior year.¹² The National Federation of High School Activities Associations reports that 53% of all high school students, approximately 7 million students, participate in high school sports teams. Of this number, approximately 4 million are boys and 3 million are girls.

The SHPPS survey found that interscholastic sports teams were available in a majority of middle schools and high schools, but intramural activities or physical activity clubs were offered by only about half (49.0%) of those schools.¹⁹ As a result, nonathletes have fewer school-based opportunities for after-school physical activity than do students who are interested in competitive athletics. The National Middle Schools Association reported that approximately 77% of middle schools offered interscholastic sports programs.

Evidence: Physical Activity During the School Day and Within the School Program

Physical Education

Perhaps because schools have been unable to provide sufficient time and resources for students to meet all the objectives of standard PE, the concept of "health-related PE" has been promoted.^{28,29} A major goal of health-related PE is the development of lifelong physical activity. As such, the priority for PE is seen as providing opportunities for students to engage in enjoyable physical activity, to become physically fit, and to learn generalizable motor and behavioral skills.³⁰

A number of carefully designed studies that incorporated health-related PE concepts and used physical activity in PE classes as the primary outcome have been conducted in the United States.³¹⁻³³ In most of these, PE was one component of a multidisciplinary and multifaceted intervention package. These studies moved beyond the focus on knowledge and attitudes that characterized earlier health behavior change studies and used behavioral models from social psychology as the theoretical underpinning for changing behaviors, including physical activity. Many also focused on a Coordinated School Health Program model, so that multiple environmental components and policies supported a topic addressed in the classroom.^{21,34,35} In addition, the school-based research field advanced to using more robust research designs, selection of more appropriate theoretical models, improved measurement approaches, and more appropriate analysis strategies for the multiple health behaviors and multiple component programs being implemented. Studies that adopted these approaches to promotion of physical activity in schools included the Child and Adolescent Trial for Cardiovascular Health (CATCH),^{37,38} Go for Health,^{27,39} Lifestyle Education for Activity Program (LEAP),^{40,41} Middle School Physical Activity and Nutrition (M-SPAN),^{42,43} Pathways,⁴⁴ Sports, Play, and Active Recreation for Kids (SPARK),^{45,46} and Trial of Activity for Adolescent Girls (TAAG).^{24,47} Several comprehensive reviews summarize many of these studies.^{32,33,48,49}

The majority of physical activity intervention studies have been conducted at the elementary school level and have involved grades 3, 4, 5, and 6 in some combination.^{32,48,49} Most of these studies were designed to intervene on multiple cardiovascular disease behavioral risk factors—primarily physical activity, sedentary behaviors, and dietary behaviors. Most involved changes to PE, the classroom health curriculum, and the food service program and included some family, community, and policy change components. In most, existing school staff were trained to implement the interventions,

AQ: 7

AQ: 8

AQ: 9

AQ: 10

although the Stanford Adolescent Heart Health Program was implemented by project staff from outside the school, and SPARK was implemented by both outside PE specialists and school staff who were trained in the intervention.^{46,50} Some programs increased both the number of minutes and the proportion of lesson time that students were vigorously active in PE classes.^{38,45} For example, without a modification to either the frequency or the duration of lessons, moderate-to-vigorous physical activity during PE increased from 37% to 52% in CATCH intervention schools.³⁸

AQ: 11

Middle school studies include M-SPAN, Planet Health, and the Oslo Youth Study. In the M-SPAN intervention schools, moderate-to-vigorous physical activity in PE classes increased by 18%.⁴² The results of Planet Health showed that the prevalence of obesity was reduced among girls, but not boys, as compared with controls, and that a reduction in TV-watching predicted a change in obesity.^{51,52} The Oslo Youth Study addressed multiple cardiovascular health behaviors and used multiple intervention components in grades 5 and 7, with follow-up in grade 7 and at 12 years after the intervention. Results showed an increase in knowledge and in frequency of vigorous physical activity, which persisted to the 12-year follow-up for boys but not for girls.⁵³ Fitness also was increased for boys in the intervention group. TAAG, a national multisite randomized intervention study, is currently under way at 6 sites across the country. It is testing a school and community multicomponent intervention designed to prevent the decline in physical activity in middle school girls.⁴⁷

Only a few studies have tested programs designed to promote physical activity in high school students. The Stanford Adolescent Heart Health Program was a curriculum-based program designed to improve physical activity, nutrition, smoking, and stress behaviors. Students in the intervention schools reported significant knowledge gains and increases in regular exercise.^{50,54} Positive treatment effects also were observed for BMI, skinfolds, and resting heart rate. LEAP was a comprehensive physical activity intervention designed to change the instructional program and school environment to increase support of physical activity for ninth-grade girls. LEAP focused on 6 components of the Coordinated School Health Program model: PE, health education, school environment, school health services, faculty/staff health promotion, and family/community involvement. After the 1-year intervention, the prevalence of vigorous physical activity was significantly higher in the LEAP intervention schools than in the control schools.⁴⁰ Other high school studies that addressed physical activity through multiple component interventions include the Australia School Project⁵⁵ and Slice of Life.⁵⁶ The Class of 89 Study,⁵⁷ which was part of a larger community study, had multiple intervention components and addressed multiple cardiovascular health behaviors. It involved grades 6 to 12, with follow-up through grade 12. The results showed smaller declines in physical activity for intervention students, with the most significant effect on girls. The study also showed that physical activity tracks during youth (ie, high activity at one age is associated with high activity at an older age).

AQ: 12

Most of the interventions to date have focused on increasing physical activity during the school day. It is possible that students who increase their physical activity levels during the school day may compensate by decreasing out-of-school physical activity. Additional research is needed to clarify the relationship between in-school and out-of-school activity. In addition, it has not yet been demonstrated that school-based interventions can reduce BMI or the prevalence of overweight.

Very few studies have examined the long-term effects of health-related PE interventions, either the maintenance of physical activity in study children or the maintenance of programs within a school.^{58,59} SPARK-trained classroom teachers maintained student activity levels at about 89% of their intervention rates 1.5 years after intervention,⁴⁵ and some effects of the CATCH intervention remained after 5 to 7 years.⁶⁰ In both studies, moderate levels of physical activity were retained in school PE with more success than were vigorous levels, and this reduction in vigorous activity was accompanied by teachers' reducing fitness activities and increasing time for game play. In the CATCH study, <50% of the teachers conducting PE in the schools at follow-up had received CATCH PE training, suggesting that staff development in PE needs to occur regularly. A study of the sustainability of SPARK found that a large majority of schools that received SPARK training continued to implement the program up to 4 years after training.⁶¹ Sustainability of interventions is associated with increased training, support within the school (especially from the principal), and availability of adequate equipment.^{61,62}

The effects of different teacher preparation programs on the abilities of physical educators to develop and implement health-related PE programs also are not known. An evaluation of these programs is in order because PE currently provides students with insufficient amounts of physical activity and adults graduating from schools do not engage in sufficient physical activity. McKenzie and Kahan⁶³ have suggested that colleges' physical education teacher education (PETE) programs, in addition to teaching PE content and pedagogical skills, should expand to prepare future physical educators to develop natural linkages to physical activity and public health. An adoption of a public health approach would require a modification to the current traditional coursework, which emphasizes the biological sciences and school-based training experiences. It would require those who are preparing to become PE teachers to spend time in community-based settings, where they could master behavioral approaches to enhancing youth physical activity, practice communication and collaboration skills, and work with diverse learners.

Recess and Active Transport to School

Although little research specifically documents the impact of recess, common sense suggests that, at the very least, providing a recess period gives an additional opportunity for physical activity. The research has suggested that recess has educational and developmental benefits.^{64,65} Various organizations and experts have called for regular recess periods in elementary schools (eg, the American Association for the Child's Right to Play, the Centers for Disease Control and

Prevention, and the American Academy of Pediatrics). Guidelines for recess include not replacing PE with unstructured recess, scheduling recess periods so that they do not precede or follow PE, encouraging physical activity during recess, and ensuring the availability of safe facilities and equipment.

Little is known about the contribution of active transport to school to overall physical activity. Trips to school by walking and biking have decreased in recent years,⁶⁶ and most studies of walking to school have been based on parent reports.^{67,68} A recent study used direct observation to determine the prevalence of walking and biking to school at 8 urban and suburban schools in 1 city. The vast majority of students rode a school bus or were driven to school; only 5% walked or rode a bike to school.⁶⁹ A small number of interventions have been designed to increase the prevalence of walking to school.⁷⁰

School Sports

Participation in sports has long been assumed to provide health benefits to young athletes. Despite some questions about this assumption,⁷¹⁻⁷³ a number of studies have shown that health benefits accrue to young people who participate in sports. An analysis of the 1997 YRBSS data found that students who reported participating in 1 or more sports teams were more likely to report multiple positive health behaviors and less likely to report negative health behaviors than students who did not participate in sports.⁷⁴ The association was stronger for white students than for black and Hispanic students. Other studies have found increased physical fitness and lower body fat⁷⁵ and lower prevalence of a number of health risk behaviors in students who participate in sports.^{76,77} Some negative health behaviors may be associated with sports participation, and these associations may vary by race, ethnicity, and gender.⁷⁴

School intramural and club programs at middle and high school levels have not been studied extensively. The available programs vary widely in terms of numbers of students served, types of activities offered, and the possible impact on physical activity levels. Issues that must be addressed in planning and implementing physical activity-based programs include transportation, qualified supervision, selection of activities to meet student needs and interests, and access to appropriate facilities, often in competition with interscholastic sport needs. Many programs are highly dependent on teacher interest and availability. Often teachers volunteer to sponsor or supervise student clubs. Although stipends are available for some student activity support, they may not be available for physical activity-based clubs. The additional potential liability of physical activity also may deter schools from sponsoring such activities.

Although interscholastic sports provide more than half of the student population with significant amounts of physical activity, the other half of the students may be very sedentary and represent those who most need greater amounts of physical activity. In fact, in large schools, access to interscholastic sports programs may be limited to a much smaller percentage of the student body. Most athletic teams are of similar size, and although large schools may offer more sports than smaller ones, the total number of students that can be

served does not increase proportionately to enrollment. In addition, highly competitive sports programs may not be reinforcing positive health aspects of sports participation. Teacher certification was once a prerequisite for school coaches, but this credential is now required in many fewer states. Coach qualifications are often focused on win-loss records. When education or training is required, it often focuses on care for and prevention of athletic injuries. However, efforts to promote higher qualifications and education for school coaches have increased recently.

Physical Activity in the Academic Classroom

Recently, several programs have been designed to incorporate physical activity into the academic curriculum and allow students to be physically active during classroom instruction. One example is TAKE 10! Stewart et al⁷⁸ reported the results of a small study that evaluated exercise intensity levels and estimated energy expenditure by first, third, and fifth graders participating in TAKE 10! activities. Positive findings were reported for each age group. Pathways used a similar exercise break box designed to be used by the classroom teacher any time during the day as an in-classroom exercise break.⁷⁹ Process evaluation showed high rates of use by the classroom teachers implementing the activities.

Increased Emphasis on Academic Achievement

With the adoption of the No Child Left Behind Act⁸⁰ and increases in mandated high-stakes testing across the United States, districts are attempting to allocate more time to "core" subjects such as math and reading. As a result, time for students to engage in physical activity during recess and during structured PE is being threatened. This is occurring in an unknown number of schools across the nation, even though studies have shown that no meaningful relationship exists between time allocated for PE and academic achievement.⁸¹ Additionally, some intervention studies have shown that increasing time for structured PE did not reduce students' academic achievement and may have even contributed to it.^{82,83} Van der Mars recently reviewed studies in the area and concluded that, on the basis of the best available knowledge, it appears that (1) increased time in PE does not impede students' classroom academic performance, (2) increased time in PE may contribute slightly to academic performance, and (3) decreased time for PE in favor of academic work does not necessarily result in improved academic performance.⁸⁴

Evidence: Physical Activity Beyond the School Day

Reducing Inactivity

Two randomized controlled trials have shown some promise of classroom-based screen time reduction curricula to prevent inactivity and obesity. Gortmaker and colleagues⁸² examined the effects of the 2-year Planet Health curriculum that focused on decreasing television viewing as well as decreasing high-fat food intake, increasing fruit and vegetable intake, and increasing moderate and vigorous physical activity among students in grades 6 to 8. In a 10-school randomized trial, boys and girls in the intervention schools reported reducing their television viewing more than controls. The

prevalence of obesity (defined by age-specific and sex-specific thresholds using a combination of BMI and triceps skinfold thickness) decreased significantly among intervention girls, but no significant effects on obesity were observed in boys. No significant changes occurred in self-reported physical activity. Although this study did not test the effects of reducing screen viewing behaviors alone, reductions in television viewing were associated with changes in obesity and were found to “mediate” the intervention effect in a regression analysis.⁵²

Robinson⁸⁵ completed a school-based study specifically designed to examine the causal relationship between reducing screen time and body fatness. This randomized controlled trial involved third and fourth graders in 2 sociodemographically and scholastically comparable public elementary schools in San Jose, California. The 18-lesson Stanford Student Media Awareness to Reduce Television (SMART) classroom curriculum aimed to reduce television, videotape, and video game use, without specifically promoting more active behaviors as substitutes, therefore isolating the effects of reduced television viewing behaviors alone, apart from promotion of specific alternatives. Over a 7-month period, the curriculum was successful at significantly decreasing children’s television viewing and video game use, BMI, triceps skinfold thickness, and waist circumference, as compared with controls.⁸⁵ No statistically significant differences in reported levels of moderate and vigorous physical activity or a test of cardiorespiratory fitness were detected among schools.

Despite the lack of clear effects of school-based screen time–reduction curricula on physical activity, some results from other settings suggest that reducing screen time may play a role in promoting physical activity in children. In laboratory studies, for example, Epstein and colleagues have found that obese children increased physical activities when access to sedentary activities (including screen viewing) was limited⁸⁶ or when they were either negatively reinforced for sedentary activities or positively reinforced for limiting them.⁸⁷ Epstein and colleagues also examined the effects of manipulating sedentary behaviors among 13 nonobese 8- to 12-year-olds in their home settings. When time in sedentary behaviors was increased by an average of 50% above baseline, physical activity trended lower. However, when the children reduced their sedentary behavior time by about half, there was no associated change in physical activity.⁸⁸ Some additional evidence comes from a randomized controlled pilot and feasibility trial of counseling to reduce screen time among 28 families with 7- to 12-year-old black children receiving primary care at a low-income, urban community clinic. Ford et al⁸⁹ found that families randomized to receive counseling plus a behavioral intervention, including goal setting and an electronic television time manager, reported significant increases in organized physical activity and a trend toward greater increases in playing outside, as compared with families receiving brief counseling alone.

In sum, despite the demonstrated promise of screen time–reduction curricula to prevent obesity, experimental data do not yet support a direct link between screen time–reduction curricula and increased physical activity. Additional experi-

mental studies, using more sensitive and valid measures of physical activity, are needed to adequately test and better understand the effects, if any, of screen time–reduction curricula on physical activity.

After-School Programs

The after-school time period represents one of the largest blocks of discretionary time in a child’s typical day. As a result, after-school programs are considered to have great potential to provide opportunities for increasing physical activity.¹⁴ After-school programs to promote physical activity include competitive sports teams, clubs, classes or training, recreational and intramural sports, or nonathletic activities that involve physical activities (eg, outdoor education, some community service programs). In recent years, there has been substantial interest in offering additional after-school activities to serve the needs of more students. For example, researchers at Stanford University are testing after-school ethnic and popular dance classes for girls in grades 2 to 5⁹⁰ and an after-school team sports program designed exclusively for overweight children in grades 4 and 5, a population that would not normally participate in sports teams.

Despite the logic of offering more physical activity during after-school hours, data are not yet available to show that more after-school activity programs result in increases in total daily physical activity or associated health benefits. It is unknown whether students compensate for increased after-school physical activity by being less active during the rest of the day or during other days of the week. However, studies of structured vigorous physical training in obese children and adolescents during the after-school hours have demonstrated improvements in some physiological risk factors.^{91,92}

School–Community Linkages

Traditionally, the role of schools in providing and promoting physical activity has been during the school day (eg, PE, recess) and/or on the school campus immediately after school (eg, interscholastic and intramural sports). Although there have been exceptions, school-based programs usually have been sponsored by the schools themselves and supervised by school employees. However, enormous potential appears to exist for schools to expand their role in providing students with additional physical activity by building institutional relationships with community-based providers of physical activity. Such relationships could manifest in several ways. Schools can make their facilities available to community-based organizations during after-school, weekend, and summer periods. Also, schools can collaborate with community organizations in promoting physical activity programs to students and their parents. Because transportation can be a barrier to students’ participation in after-school programs, schools can collaborate with community organizations, including transit authorities, to ensure that students have the opportunity to participate in programs beyond the school day.

Although school–community linked physical activity programs offer much promise, little research has addressed the efficacy of such initiatives for increasing physical activity in children and youth. One notable exception is TAAG, a large-scale randomized trial involving 36 schools at 6 study

sites across the country and sponsored by the National Heart, Lung, and Blood Institute.⁴⁷ This large-scale study is examining the effects of a school–community linked intervention on overall physical activity in middle school girls. Intervention strategies emphasize enriching the after-school physical activity programming environment of middle schools, with particular focus on the needs and interests of girls. Although the results of this study are not yet available, experience gained in TAAG should provide important information on ways in which schools and community agencies can collaborate in meeting the physical activity needs of youth. Various efforts have been made to allow community programs to benefit from the availability of school facilities, but these efforts have not always resulted in positive linkages. There are many opportunities for collaborative programs and for schools to promote physical activity opportunities available in the community. Leveraging the resources of schools and organizations in the community can provide expanded opportunities for improving the health status of children and families.

Policy and Practice Recommendations

Children and youth spend more time in schools than any other setting with the exception of their homes. Accordingly, if young people are going to engage in adequate amounts of physical activity, it is essential that schools systematically and effectively provide and promote participation in physical activity. Most schools already have programs that provide students with some physical activity, but population trends for obesity suggest that American children and youth need more physical activity than their current levels. Although parents, community agencies, and healthcare providers share the responsibility for ensuring that young people are physically active, schools are uniquely positioned to address this critical public health concern. The following recommended school policies and practices, if implemented nationally, would move America's schools into an appropriate position of leadership in providing our nation's children and youth with the physical activity they need for lifelong health.

1. Schools should ensure that all children and youth participate in a minimum of 30 minutes of moderate-to-vigorous physical activity during the school day; this includes time spent being active in PE classes. Additional physical activity should be provided through extracurricular and school-linked community programs.
2. Schools should deliver evidence-based health-related PE programs that meet national standards to students at all school levels. These programs should provide substantial amounts of moderate-to-vigorous physical activity (ie, 50% of class time) and should teach students the motor and behavioral skills needed to engage in lifelong physical activity.
3. States and school districts should ensure that PE is taught by certified and highly qualified PE teachers at all school levels.
4. States should hold schools accountable for delivering PE programs that meet national standards for quality and quantity (ie, 150 minutes per week for grades K to 8 and 225 minutes per week for grades 9 to 12). Specifically, each state should include PE in its core

educational accountability system and should incorporate PE into its system national standards for curriculum and instructional quality.

5. Schools should expand physical activity opportunities by providing clubs, lessons, intramural sports, and interscholastic sports programs that meet the physical activity needs and interests of all students. Coaches and other leaders of such programs should be well qualified and, where appropriate, certified.
6. Schools should promote walking and bicycling to school, and school leaders should work with local governments to ensure that students have safe routes for walking and bicycling to school.
7. Child development centers and elementary schools should provide children with at least 30 minutes of recess during each school day.
8. Schools should provide evidence-based health education programs emphasizing behavioral skills focused on increasing physical activity and decreasing sedentary behaviors.
9. Colleges and universities should provide professional preparation programs that produce teachers who are highly qualified to deliver evidence-based PE and health education programs.

Summary

Schools are potentially attractive settings in which to promote positive health behaviors because students spend large amounts of time in the school environment, elements of the traditional school curriculum relate directly to health, and schools typically provide extracurricular programs that can promote health. Although schools are under increasing pressure to increase student scores on standardized tests, the recent dramatic rise in the prevalence of obesity in children and adolescents in the United States suggests that there is a pressing need for the nation's schools to systematically and effectively promote behaviors that will prevent the development of overweight. Physical activity is a key determinant of weight status. Disquieting trends in other segments of American society, such as increased "screen time" and decreased reliance on physically active transport, indicate that the schools should assume a leadership role in ensuring that young people engage in adequate amounts of physical activity each day. This statement advances policy initiatives that, if fully implemented, would position American schools as societal leaders in addressing an enormous public health challenge.

Appendix

Terms and Definitions

Physical activity—any body movement produced by skeletal muscles that results in energy expenditure.⁹³

Moderate-to-vigorous physical activity—activity that causes some increase in breathing and heart rate, an activity level usually associated (in a healthy person) with brisk walking, dancing, swimming, or cycling on flat terrain. Energy expenditure is usually at the level of ≥ 3 METS (metabolic equivalents), and the activity expends ≥ 3.5 kcal/min.⁹³

Exercise—physical activity that is planned or structured, involving repetitive body movements done to improve or maintain one or more of the components of physical fitness (ie, aerobic fitness,

muscular strength, muscular endurance, flexibility, and/or body composition).⁹³

Physical fitness—a set of physical attributes related to a person's ability to perform activities that require aerobic fitness, endurance, strength, and flexibility. A person's level of physical fitness is determined by a combination of regular physical activity and genetic attributes.⁹³

Overweight—Overweight in children and adolescents is defined as ≥ 95 th percentile BMI-for-age, meaning that 95% of children of the same age and gender have a lower BMI. "At risk of overweight" is defined as ≥ 85 th percentile and < 95 th percentile BMI-for-age.⁹⁴

Physical education—a school-based program that provides students with opportunities to be physically active and to acquire the skills and knowledge needed to establish and sustain an active lifestyle.⁹⁵

Health-related physical education—a type of physical education program that emphasizes in-class participation in moderate-to-vigorous physical activity and mastery of motor and behavioral skills that promote lifelong physical activity.

Prevalence—the percentage of a population that is affected with a particular condition or disease at a given time.⁹⁶

Intervention—a program or set of actions designed to modify a health outcome.

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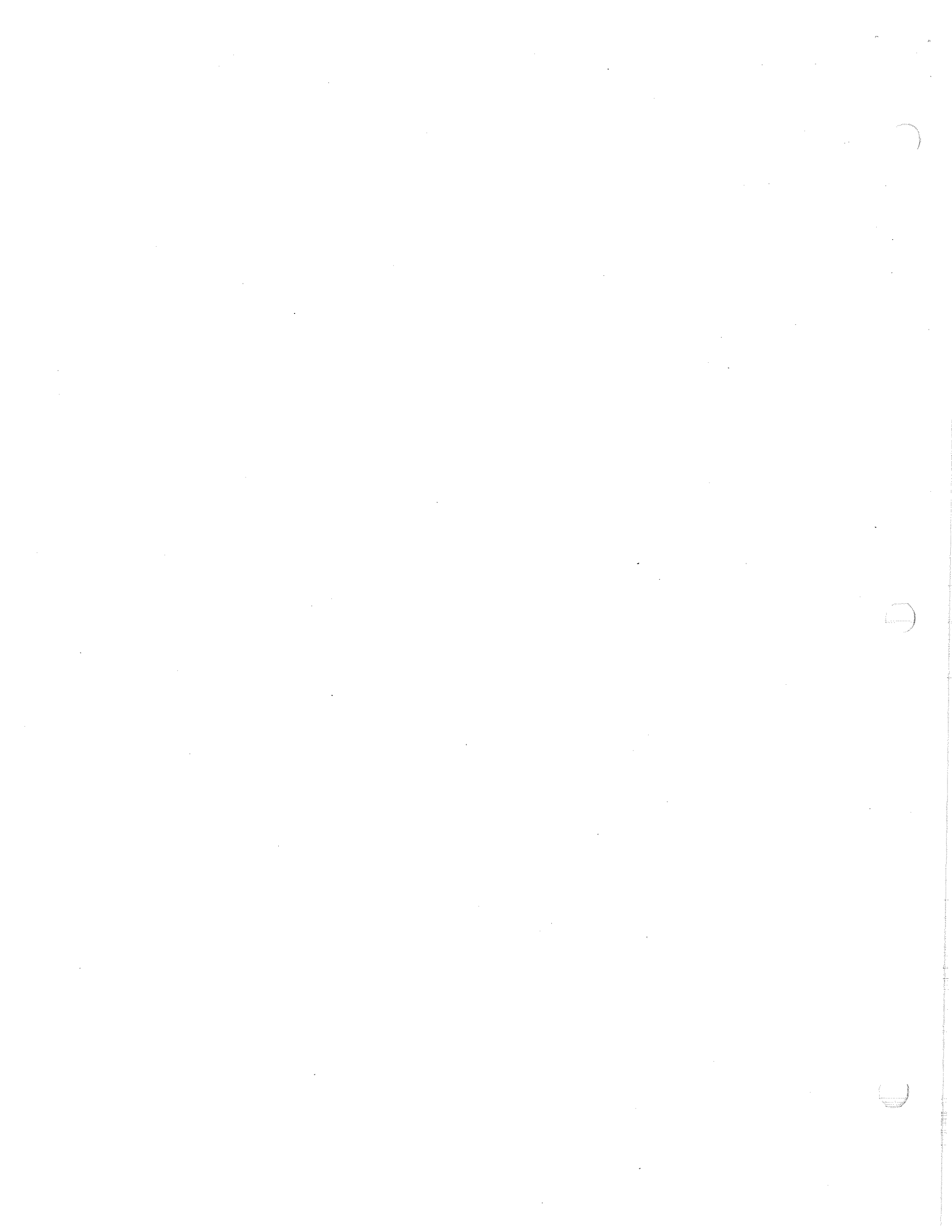
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AQ: 31

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Physical Education is Critical to a Complete Education

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.

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