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School-Based Physical Education Programs and Obesity in the United States: Trends, Rationalizations, and Perspectives of Change

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Current incidence of obesity among children and adolescents in the United States necessitates the development of physical activity based programs. It is postulated that one such arena for these programs is found in properly structured school physical education. Such programs hold the potential to promote active lifestyle that leads to positive health changes among children, youth and future adult populations. Accordingly, the purposes of this paper were to, firstly, identify current rationalizations and tangible research evidence that supports a quest for development of exemplary school-based physical education, secondly,

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describe challenges that school-based physical education currently faces, and thirdly, suggest recommendations for promotion of quality physical education. In our opinion these steps are necessary to guide our efforts for an effective school-based physical education that can help us to manage overweight and obesity problem in children.

Key words: childhood obesity, school physical education, physical activity promotion

Introduction

Obesity among children and adolescents is a national epidemic of particular concern. Ogden and colleagues noted in 2010 that based on the Centers for Disease Control and Prevention (CDC)'s definition of childhood obesity [body mass index (BMI) for age ≥ 97th percentile], in 2007–2008 approximately 15% of children between the ages of 6 and 11 years and 13% of children and adolescents between the ages of 12 and 19 years were considered obese. This trend clearly implies a need for a greater focus on health and wellness in the United States (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010).

Numerous identified health conditions have been linked to childhood obesity. It is the leading cause of pediatric hypertension, type 2 diabetes mellitus, and fatty liver disease and has been linked to asthma, orthopedic complications and increased stress on weight-bearing joints (Shaya, Flores, Gbarayor & Wang, 2008). Various psychosocial issues are also found in obese children with studies showing a relationship between childhood obesity and lowered self-esteem, decreased self-efficacy, discrimination, stigmatization, peer rejection in educational settings and depressive behavior (Schwimmer, Burwinkle, & Varni, 2003). This has additional implication for existing economic structures where healthcare is delivered, especially with the prediction that obese or overweight children and adolescents are expected to maintain their childhood or adolescent physiques as adults (Anderson & Butcher, 2006). Finkelstein and colleagues indicated that approximately

75 billion dollars annually of the healthcare budget in the United States was spent on the treatment of obesity and related diseases, a number projected to increase continuously well into the next century (Finkelstein, Fiebelkorn, & Wang, 2004). The rationale for effective health and physical activity is glaringly evident. Burden imposed by obesity has become a significant concern in the United States, affecting Americans at every impasse (Otto, 2005). Therefore, there is a need to reduce the impact of this problem among children and adolescents using cost effective intervention.

The idea of school-based intervention is not a recent occurrence; there have been rather many examples of it focused on modifying students' diet and increasing physical activity. What remains unclear is the level of sustainability and efficacy of different types of intervention of each these programs for widespread adoption, particularly given that children still continue to display poor health outcomes (Shaya, et al., 2008). Physical education is the key component of school based programs, as they provide a foundation for the promotion of lifelong activity and advocate healthy practices. Thus, a focus on school-based interventions which involve physical education is warranted. Unfortunately, only "a few evidence-based physical education programs exist and little is known about effective approaches for overcoming barriers to their widespread adoption" (McKenzie, Sallis, & Rosengard, 2009, p. 114). Accordingly, the purposes of this study were to; firstly, identify current rationalizations and tangible research evidence on school-based interventions directly related to physical education, and secondly, describe current challenges that school-based physical education faces and thirdly, suggest future recommendations for the promotion of healthy lifestyles among youth and adolescent populations. These steps are necessary to guide our efforts for an effective school-based physical education.

Rationalizations for Promotion of School-Based Physical Education Programs

The dramatic rise in obesity among youth is a symptom of the lack of sufficient participation in physical activity (Fairclough & Stratton, 2005).

There are fewer than 33% of children and adolescent aged 6–17 engaged in 20 minutes of vigorous physical activity on five days per week although published guideline is 60 minutes of daily physical activity (United States Department of Health and Human Services, 2008). What remains unclear is the means by which to best counteract this problem. Done well, school-based physical education programs may hold the answer to this question. School-based physical education serves as the primary vehicle for development of health related physical activities that often garner many benefits (Tappe & Burgeson, 2004). Studies demonstrate significant linkages between school physical education and a wide range of important health benefits (Gray & Oslin, 2003; Kain et al., 2004; McKenzie et al., 2004; Pyle et al., 2006; Tappe & Burgeson, 2004). Numerous professional organizations and public health agencies strongly endorse the importance of school-based physical education as a key to helping reverse the obesity epidemic in children (Centers for Disease Control and Prevention, 2002).

School is a social institution that has a large influence on behavior control in children, and therefore is an ideal setting to encourage daily physical activity participation (Wechsler & Devereaux, 2001). Children spend many hours in school, making physical education in schools an important channel for physical activity promotion among young children, especially when many of the lifestyle and behavior choices associated with obesity develop during school-age years (Edmunds, Waters, & Elliot, 2001). What school physical education does, is that it plays a vital role in efforts to expose students to lifetime activities, teaches students how to integrate exercise into their lives, provides them with the opportunity to meet the needs of individual students at no extra cost, and motivates them to adopt exercise as a lifestyle habit in a manner more likely to transfer into adulthood (Datar & Sturm, 2004; Harrell, Davy, Stewart, & King, 2005). This is critical for those adolescent students who are beginning to establish lifelong physical activity behavior (Rowland, 1999). In this context, physical education has the potential to impact children and adolescents' knowledge in developing attitudes, beliefs, and behaviors that engender positive and meaningful ways of life.

School physical education does more than provide some minutes of moderate to vigorous physical activity. It also helps children to learn fundamental motor skills and develop health related physical fitness such as cardiovascular endurance, muscular strength and endurance, flexibility, and body composition (Allensworth, Lawson, Nicholson, & Wyche, 1997). If children have a strong foundation in fundamental movement skills, they are more likely going to enjoy participation in physical activities and be willing to attempt new skills and activities (Okley, Booth, & Patterson, 2001). These attributes are required for a lifetime of physical activity. Therefore, physical education that is provided at a school serves as an ideal way to encourage activity involvement and to develop fitness among children (Edmunds et al., 2001). Eventually, this can lead to the development for an active lifestyle that could persist into adulthood (Sallis et al., 2001).

Moreover, body of research conducted within the field of physical education over the last decade (McKenzie et al., 2004; Schuldheisz & van der Mars, 2001; Siedentop & Tannehill, 2000) demonstrates the potential role physical educators can play in determining students' achievement orientation and facilitating an increased perception of competence and enjoyment within different activity areas (Treasure & Roberts, 2001). Dale and associates reported this interactive relationship relative to students' conceptual fitness learning and participation in lifetime physical activity (Dale & Corbin, 2000). Schuldheisz and van der Mars (2001) conducted a study to examine the effects of teachers' supervision on student activity levels. They found teachers' active supervision not only help students to engage in the assigned tasks, but also maintain this engagement at an appropriate level of intensity, duration, and quality (Schuldheisz & van der Mars, 2001). It is also recognized that a teacher educator that deals with different types of students at various levels may have differing professional goals (Schuldheisz & van der Mars, 2001). With this perspective in mind, the teacher educator's main concern is to use different teaching strategies when working with different students, which ensures maximal participation, sequential development, and positive influence in the long run. Therefore strengthening school physical education and professional

requirements could serve as a key in initiating a multifaceted solution to the problem of childhood obesity (Martin & Kulinna, 2003).

Evidence-Based Research

Studies demonstrate significant linkages between school physical education program and involvement of health related physical activities (Gray & Oslin, 2003; Kain et al., 2004; McKenzie et al., 2003; McKenzie et al., 2004; Steckler et al., 2003; Pyle et al., 2006; Tappe & Burgeson, 2004). Evidence from the Early Childhood Longitudinal Study showed physical education programs' effect on childhood obesity, especially in young adolescent girls (Datar & Sturm, 2004). Kain and his colleagues (2004) conducted study to determine the impact of school-based physical education on primary school children through changes in adiposity and physical fitness. In their study, trained nutritionist and physical education teacher have been used to implement the nutrition education and physical activity program, to evaluate the process during a six-month intervention, and to conduct physical activity workshops for children. The results showed a robust effect on physical activity involvement in both genders and a significant decrease in adiposity in boys (Kain et al., 2004). In a 2-year school-based physical education study, McKenzie and colleagues (2004) completed a randomized control trails involving 24 middle schools in Southern California, United States. Results of this study indicate that male students in the studied physical education schools, as compared to control group of schools, shown greater increase in physical activity during physical education class and leisure time, and decrease in body mass index (McKenzie et al., 2004). In a physical education focused study, Sallis and colleagues (1997) completed a quasi-experimental design study (n = 955) of three conditions in the process of implementing a health-related physical education program. Three conditions were as follows: physical education specialist taught, trained classroom teacher taught and controlled condition with regularly physical education program. Students from these classes were compared with those in control classes. Results indicate that students in physical education specialist led condition increased physical activity

involvement as expected, but none of those three conditions shown changes in body fat percentage (Sallis et al., 1997). Moreover, there was a large-scale, multi-site, 3-year school-based study designed to lower percent body fat and promote physical activity in American Indian elementary school children (Steckler et al., 2003). The results demonstrated that the school-based interventions succeeded in physical activity behavior changes only (Steckler et al., 2003). Some other studies also document variable levels of success rate in school-based physical education programs, particularly with elementary and middle school children (Caballero et al., 2003; Harrell et al., 2005; Kelder et al., 2003, McKenzie et al., 2003). All of the inquiry-based reviews completely support the view that with carefully designed instructional strategies, the physical education program helps children to be active and to acquire health benefits.

Perspectives on Needed Changes

Given the importance of the school-based physical education for children and adolescent obesity prevention and intervention, ensuring its quality seems to be a logical response to current obesity trend. Unfortunately, physical education in schools is facing many challenges. Student enrollment in physical education has dropped from 41% to 25% (McCracken, 2002), and many schools are cutting back on physical education time and staff support even further (Barney & Deutsch, 2009; Burgeson, Wechsler, Brener, Young, & Spain, 2001), despite the National Association for Sport and Physical Education (NASPE; 2004) recommendation of 150 minutes of physical education per week for elementary school children and 225 minutes per week for middle and high school students. Apparently, there is a need to evaluate current situations of physical education in schools so that the effective strategies can be taken for changes needed.

Physical Education Program

Physical education faces many challenges in the United States. A survey conducted by NASPE and American Heart Association (AHA) (NASPE

& AHA, 2010) found out that the median physical education budget for schools is only $764 per school year. Even though majority of states in the United States require physical education in grades K–12, there are only five of them, Illinois, Iowa, Massachusetts, New Mexico and Vermont, which actually mandate daily physical education for all students from K to 12. More than a half of all states allow students to substitute other activities for physical education credit such as cheerleading (NASPE & AHA, 2010). In general, daily physical education is still an unfulfilled goal at the lower grade level. According to Datar and Sturm (2004), only 16% of kindergartners received daily physical education instruction and 14% received physical education instruction less than once a week or never. This trend in decreasing physical education time continues in higher grade levels. School Health Policies and Programs Study (SHPPS, 2010) indicated that only 3.8% of elementary schools, 7.9% of middle schools, and 2.1% of high schools provided daily physical education or its equivalent (150 minutes per week in elementary schools; 225 minutes per week in middle schools and high schools) for the entire 36 weeks of school year for students in all grades in the school.

The other program problem according to the study conducted by CDC is that only 6.4% of elementary schools, 20.6% of middle schools, and 35.8% of high schools follow national or state physical education standards or guidelines for health (SHPPS, 2010). There are only 19 states in the United States require some form of student assessment in physical education, and there are only 13 states require schools to measure BMI for each student. New Jersey and Pennsylvania are the only two states that require BMI collection from every student in grades 1–12 (NASPE & AHA, 2010).

Teacher-Coach Role Conflict

Because of the dwindling support for physical education in many parts of the United States, physical educators are facing limitations. Some schools require physical education teachers to bear multiple responsibilities — coaching and teaching, while others have heavy teaching loads (Himberg, Hutchinson, & Roussell, 2003). This can limit

the physical education teacher's instruction planning time and influence the quality of the whole physical education program, especially teacher-coach role conflict. According to Himberg et al. (2003), it may cause individual cognitive dissonance and physical tension when attempting to effectively fulfill the stated expectations of both roles. In most cases, the teacher-coach either falls short of these expectations in both roles or devotes time and energy only toward one of them, thereby neglecting the other, and this has serious consequences for the educational attainment of students (Himberg et al., 2003). Also, in some school, the physical education specialist's instructional duties are spread across several schools within the district or even outside of it.

Qualification of Physical Education Teacher

Although well-trained physical educator are important for the quality of physical education, there are 57% of states in the United States allow elementary classroom teachers teach required elementary physical education class (NASPE & AHA, 2010). In some schools, the instruction of physical education is solely the responsibility of the classroom teacher and in others, no physical education instruction is provided at all (Lee, Burgeson, Fulton, & Spain, 2007). Physical education classes conducted by classroom teachers consisted mainly of game play, in which a few children actively participated while the others waited their turn, and it rarely had fitness activities as the major focus (Fishburne, 2005). Usually classroom teachers are not willing to dedicate the necessary time to plan for effective physical education instruction because they believe that physical education is of lesser value to learners compared to other subjects (Fishburne, 2005). Therefore, physical education is frequently excluded from the weekly school schedule (Fishburne, 2005). As a result, students tend not to be interested in taking this class and thus cannot benefit from it, sending the wrong message to the decision makers that physical education is not necessary.

The cutbacks in physical education, coupled with preexisting problems, prevent children from developing active lifestyles (Edmunds et al., 2001), especially for middle school age individuals. Research

studies have shown that the middle school years may be a critical developmental period to deliver intervention strategies because children are at greater risk from overweight and obesity (Baranowski et al., 2000; Eccles et al., 1996). Also, there was considerable evidence that motivational decline occurs across a wide range of behaviors, including physical activity participation during this period (Eccles et al., 1996). Quality of physical education programs apparently is affecting this vulnerable population (Telama, Yang, Laakso, & Viikari, 1997) According to McCracken (2002), "America's sedentary lifestyle is not only a result of the increased use of automobile and labor saving devices, our schools must accept a good portion of the responsibility for childhood inactivity and the obesity crisis" (p. 49). Changes are needed to guarantee weekly physical education, have qualified physical education teachers, and end the teacher-coach conflict. Question remains what to do to change the current situation in order for school-based physical education to complete its mission to promote physical activity involvement among children and adolescents.

Promotion of Quality Physical Education

Considering the current situations of physical education in schools, actions are needed to promote a quality physical education program to confront childhood obesity problems, which could equip children and adolescents with the fitness levels, knowledge, motor skills, and personal/social skills they need to be active now and in the future (NASPE, 2004). The following are things that can have an impact on the success of physical education promotion.

Keep Decision Makers Well-informed

To tailor a quality physical education especially to health promotion, decision makers' support is needed. Physical education in schools cannot function well without guaranteed weekly physical education class time and well trained physical education teachers. Even though research evidences supports the importance of the role that school-based

physical education plays in childhood obesity prevention and intervention (Harrell et al., 2005), multidimensional approach is necessary to convince decision makers to provide support needed to retain, improve and expand physical education programs in schools. Professionals in physical education should continuously disseminate an up to date information and evidence-based knowledge about the importance of physical education, making sure to differentiate between physical education and physical activity, thus letting decision makers know why schools should have qualified and appropriately trained physical education teachers. That is, decision makers need to understand the significance of having physical education in schools, and the positive health and educational outcomes that come from having a quality physical education program (Gabbard, 2001).

Essentially, decision makers need to know that physical education is fundamentally different from the stereotypical "roll out the balls and play." The trained professionals cover instructional components, provide opportunities for adequate skill practice and health-enhancing physical activities, and provide quality physical education programs where children learn to be physically active and are educated on the importance of physical activities in daily life. One, among of many physical education's merits, is that being physically active helps to improve overall physical health and motor skill competence, increase self-esteem, promote interpersonal relationships, and facilitate responsible behavior. This is the reason why it is valuable to have physical education in the schools, particularly during the current obesity crisis. Although each professional in the physical education field might be facing different obstacles, e.g., large class size, low priority relative to other academic subjects, inadequate financial resources, inadequate indoor, outdoor facilities (Barroso, McCullum-Gomez, Hoelscher, Kelder, & Murray, 2005), teacher educators should try to do their best to make a difference in the promotion of physical education and to keep abreast of changing needs of children and adolescents. Research studies are helpful in identifying students' experience of physical education and in providing new knowledge to inform our understanding of exemplary programs.

Physical Educators and Teacher Education

Except the support from decision makers, it seems logical that success of such efforts will depend also on quality of physical education teaching profession (Lee et al., 2007; van der Mars, Vogler, Darst, & Cusimano, 1998). That is, physical educators can help children and adolescents to select appropriate types of physical activity for lifelong participation and could provide them with necessary knowledge and skills, which in turn would influence their beliefs and decisions about physical activity (NASPE, 2004). To be prepared for such an important responsibility, physical education teaching profession should continue updating their knowledge and improving their teaching strategies to promote lifetime physical activity for regular students and active participation of overweight students. Teacher education plays a critical role in that. One way to achieve these goals is to actively support recruitment of stellar students to teaching profession, another is to make every effort to develop exemplary curricula that is dynamic, engaging, and empowering which, in turn, will help produce capable and inspiring teachers who are well prepared to incorporate a diverse set of pedagogical practices designed to improve the delivery of physical education in schools to promote lifetime physical activity (Lee et al., 2007).

As a part of this effort, teacher education programs need to provide pre-service teachers with opportunity to experience new kinds of teaching, e.g., reflection in action, understand the challenges such teaching can pose for teachers, and explore the paths beginning teachers take as they develop their practice. Obese or overweight students face specific challenges in physical education and pre-service teachers need to not only understand these challenges but also possess teaching strategies that foster a positive learning environment. This may result in increased levels of student success and motivation toward physical activity. It is important to inform pre-service teachers of various types of reflective teaching and to reinforce their attempts to reflect on different aspects of teaching and schools (Lee et al., 2007). This will help pre-service teachers to develop a greater awareness of contextual variables and strategies used as lesson evolves (Shulman, 2000).

Curriculum Models Selections

Considering the issue of obesity, curriculum models that include content that reinforces healthy lifestyle should be considered paramount (Allan et al., 2004). Further, the physical education curriculum content should require not only the mastery of certain basic fundamental skills but also provide an opportunity for the students to experience a wide variety of different movement activities (Allan et al., 2004). In addition, physical education curriculum should provide students with many different ways in which human movement can be made personal and meaningful.

There are numerous curriculum models that can be used to address problems of overweight and obesity in physical education (Lambert, 1999), but the most common one is movement skills based curriculum, which are using either health-fitness activities or skill-fitness activities (McKenzie et al., 2009; Sallis et al., 1997). Health-fitness activities emphasize one's heart rate during aerobic activities as a measure of physical activity, and in this curriculum, some of the activities in the traditional physical education curriculum, such as softball, could be exchanged for more vigorous type of activity, e.g., Ultimate Frisbee, stationary bicycling (Driscoll, Stimpson, & Miyazaki, 2007). In this context, it is important to develop a health-related fitness goal and to use technology to track fitness status of the students. Moreover, all components of fitness should be age appropriate and gender sensitive. The second part of movement skill focused curriculum is skill-fitness activities that center on behavioral skill-building based curriculum, which targets the constructs of self-regulation, social situation, strength of self-efficacy, and outcome expectancy value (McKenzie et al., 2009). The curriculum engages students at all levels: strategically and operationally. Although many students might not be able to articulate what they need to know, a prescriptive approach is used for students in this context. It might stem from the lack of awareness of what is available to them or necessary in the long-term context of an active lifestyle.

Another approach that can be used is self-management curriculum, which helps students to learn skills needed for engagement in a regular physical activity and beyond the school grounds (Marcoux et al., 1999).

Programs designed to help students achieve this goal are focused not only on conditioning activities and conceptual knowledge about achieving and maintaining health-related fitness but also on the development of self-regulatory behavioral skills associated with self-evaluation, self-monitoring, and self-motivation (Marcoux et al., 1999). In this approach, the curricular materials are children centered and intend to support their movement development to ensuring that they have a meaningful learning experience.

Teaching Strategy Issues

While curriculum is important, delivering curriculum content is as important as selecting the content itself because the primary concern is on the effect of teaching on learning. In light of current obesity epidemic, a variety of teaching behaviors should focus on promoting students' self-determination in physical activity, which has linkage to adaptive consequences (Reeve, Nix, & Hamm, 2003). Structuring class environment and providing support for student are two avenues for self-determination promotion in physical education (Reeve et al., 2003). More specifically, a well-structured environment promotes student engagement in physical activity. However, it is important to make students well informed about teaching expectations and possible consequence of misbehaviors, and adjust teaching goals based on students' ability (Reeve et al., 2003). Appropriate support for students enhances their intrinsic motivation for physical activity involvement. However, teacher should possess and exhibit competency in content knowledge and teaching skills related to lifetime physical activities (Shulman, 2000), because they should provide students with a rationale for exercise and an individualized feedback for a particular physical activity, helping students to understand the benefits of physical activity (Reeve et al., 2003).

It is crucial to know how teachers' practice has changed in recent years given the curriculum change that has occurred in the United States. This is particularly important when trying to understand how teachers cope with curriculum changes, how they structure their classroom activities, how their practice adapts as their career progresses and what

works (Shulman, 2000). Best practices, results of this approach could be generalized and disseminated through teacher education program to help prepare qualified future physical education teachers. According to the ideas presented, it would be critical to receive feedback from researchers who are working in the area of physical education. Research would inform on how teachers benefit from the dissemination of good practices, and would indicate specific practices that promote physical activity involvement, thus enhancing the health of the children and adolescents (McKenzie et al., 2009).

Assessments

It is nearly impossible to promote quality physical education that specifically targets childhood obesity without proper assessment. Yet, there are only 19 states in the United States that require some form of assessment and only two states, New Jersey and Pennsylvania, require schools to conduct specific BMI assessment for every student in grades 1–12 (NASPE & AHA, 2010). Assessment allows educators and other professionals in the field to not only systematically document any effort in the areas of physical activity promotion and student fitness improvement, but also facilitate parental and administrative support for a school-based physical education (McKenzie et al., 2009). Assessment can help professionals to understand how students learn and this knowledge in turn helps them to set appropriate objectives and to create effective programs for the students (McKenzie et al., 2009). This feedback mechanism provides an effective and summative evaluation of physical education, thus careful monitoring the progress made toward goals in students' physical activity involvement. From this it is clear that assessment in the field of physical education needs to be used widely. In the process of assessment application, physical education profession need to carefully select appropriate form of assessment, one that is in line with the ideas of promoting physical activity and healthy lifestyles in students, so as to keep up with current trends. In order to fulfill this goal, assessment needs to incorporate sections dealing with students' knowledge of physical education content, physical skills, physical development, health, fitness, and cognitive skills and its development

(NASPE & AHA, 2010). Specific objectives that need to be assessed have been identified and detailed criteria have been provided in NASPE's K–12 curriculum standards (NASPE, 2004).

It is clear that how assessment is carried out to evaluate specific teaching objectives will not be an easy task, especially students' subjective responses and feelings can be a challenging category. Teachers have to know their students well enough and be willing to accept individual differences. Observation, analysis and evaluation for specific teaching objectives in an assessment could be achieved through practical and theoretical performance. Different assessments suitable for physical education programs in terms of promoting lifetime physical activity participation have been extensively discussed in other publications (e.g., Jonides, Buschbacher, & Barlow, 2002; Sirard & Pate, 2001; Vincent & Pangrazi, 2003; Welk, 2008; Welk & Wood, 2000).

Conclusion

School-based physical education programs have the potential to play an important role in promotion of healthy lifestyles among the youth. However, physical education in school faces many challenges, e.g., budget limitation, program cutbacks, lack of qualified teachers, teaching-coaching role conflict. Changes are needed to ensure quality of physical education program through decision-making, future teacher preparation program, curricula model selection, physical education assessment. For physical activity promotion to be truly effective, i.e., leading to sustainable knowledge and behavior change, it requires the cooperation of professionals from various health and wellness fields along with researchers and decision makers who are committed to making changes. Involvement of policy-makers, teachers and researchers ensures development of exemplary physical education programs focused on reducing obesity among children and adolescents.

Future Research Directions

School-based physical education to promote healthy lifestyle must be of utter consideration as it reaches nearly all youths, can take an advantage of trained teachers who have the potential to encourage students in a way not available elsewhere, can use established teacher-student communication mechanisms, and utilize existing infrastructure. However, the "best practices" of school-based physical education has yet to be identified and physical education is still facing many challenges. Research areas of an immediate concern are related to seeking evidence about the influence of school policy changes on physical education programs and developing evidence-based strategies for adoption of physical education programs. A research area that is definitely affected by changes in school policy is a course content delivery. Obtained evidence could be used for development of delivery of school-based program in conjunction with school-based health instruction or development of Internet-based information delivery strategy and study of its effect on health and physical activity in schools. The effect of staff development and increases of weekly physical education instruction time also falls into this research category. All in all, with collective, continuous efforts, children and adolescents can eventually benefit from school-based physical activity promotion, which in the long term will help them to shape up and maintain a healthy lifestyle.

References

Allan, J., Barwick, T. A., Cashman, S., Cawley, J. F., Day, C., Douglass, C. W., … Wood, D. (2004). Clinical prevention and population health: Curriculum framework for health professions. *American Journal Preventive Medicine*, *27*, 471–476.

Allensworth, D., Lawson, E., Nicholson, L., & Wyche, J. (Eds.). (1997). *Schools and health: Our nation's investment.* Washington, DC: National Academy Press.

Anderson, P. M., & Butcher, K. F. (2006). Childhood obesity: Trends and potential factors. *The Future of Children*, *16*(10), 19–45.

Baranowski, T., Mendlein, J., Resnicow, K., Frank, E., Cullen, K. W., & Baranowski, J. (2000). Physical activity and nutrition in children and youth: An overview of obesity prevention. *Preventive Medicine*, *31*, S1–S10.

Barney, D., & Deutsch, J. (2009). Elementary classroom teachers' attitudes and perspectives of elementary physical education. *Physical Educator*, *66*(3), 114–123.

Barroso, C., McCullum-Gomez, C., Hoelscher, D., Kelder, S., & Murray, N. (2005). Self-reported barriers to quality physical education by physical education specialists in Texas. *Journal of School Health*, *75*(8), 313–319.

Burgeson, C. R., Wechsler, H., Brener, N. D., Young, J. C., & Spain, C. G. (2001). Physical education and activity: Results from the School Health Policies and Programs Study 2000. *Journal of School Health*, *71*, 279–293.

Caballero, B., Clay, T., Davis, S. M., Ethelbah, B., Rock, B. H., Lohman, T., … Stevens, J. (2003). Pathways: A school-based, randomized controlled trial for the prevention of obesity in American Indian school children. *The American Journal of Clinical Nutrition*, *78*, 1030–1038.

Centers for Disease Control and Prevention. (2010). Prevalence of obesity among children and adolescents: United States, trends 1963–1965 through 2007–2008. Retrieved from http://www.cdc.gov/nchs/data/hestat/obesity_child_07_08/obesity_child_07_08.htm

Dale, D., & Corbin, C. (2000). Physical activity participation of high school graduates following exposure to conceptual or traditional physical education. *Research Quarterly for Exercise and Sport*, *77*, 61–68.

Datar, A., & Sturm, R. (2004). Physical education in elementary school and body mass index: Evidence from the early childhood longitudinal study. *American Journal of Public Health*, *94*, 1501–1506.

Driscoll, G. L., Stimpson, T. M., & Miyazaki, Y. (2007). Preventing obesity and increasing aerobic fitness with heart rate monitors in PE class: Initial findings. *VAHPERD Journal*, *9*(3), 1–4.

Eccles, J. S., Flanagan, C., Lord, S., Midgley, C., Roeser, R., & Yee, D. (1996). Schools, families, and early adolescents: What are we doing wrong and what can we do instead? *Journal of Developmental and Behavioral Pediatrics*, *17*, 267–276.

Edmunds, L., Waters, E., & Elliott, E. J. (2001). Evidence based management of childhood obesity. *British Medical Journal*, *323*, 916–919.

Fairclough, S., & Stratton, G. (2005). Physical activity levels in middle and high school physical education: A review. *Pediatric Exercise Science*, *17*, 217–236.

Finkelstein, E. A., Fiebelkorn, I. C., & Wang, G. (2004). State-level estimates of annual medical expenditures attributable to obesity. *Obesity Research*, *12*(1), 18–24.

Fishburne, G. J. (2005). *Developmentally appropriate physical education for children and youth*. Edmonton, Canada: Ripon Publishing.

Gabbard, C. (2001). The need for quality physical education. *The Journal of School Nursing*, *17*(2), 73–75.

Gray, T., & Oslin, J. (2003). Primary school students' choices for a healthy active lifestyle. *Journal of Physical Education, Recreation and Dance*, *74*, 52–57.

Harrell, T. K., Davy, B. M., Stewart, J. L., & King, D. S. (2005). Effectiveness of a school-based intervention to increase health knowledge of cardiovascular disease risk factors among rural Mississippi middle school children. *The Southern Medical Journal*, *98*, 1161–1162.

Himberg, C., Hutchinson, G. E., & Roussell, J. M. (2003). *Teaching secondary physical education: Preparing adolescents to be active for life*. Champaign, IL: Human Kinetics.

Jonides, L., Buschbacher, V., & Barlow, S. E. (2002). Management of child and adolescent obesity: Psychological, emotional, and behavioral assessment. *Pediatrics*, *110*, 215–221.

Kain, J., Uauy, R., Albala, V. F., Cerda, R., & Leyton, B. (2004). School-based obesity prevention in Chilean primary school children: Methodology and evaluation of a controlled study. *International Journal of Obesity and Related Metabolic Disorders*, *28*, 483–493.

Kelder, S. H., Mitchell, P. D., McKenzie, T. L., Derby, C., Strikmiller, P. K., Luepker, R. V., & Stone, E. J. (2003). Long-term implementation of the CATCH physical education program. *Health Education & Behavior*, *30*(4), 463–475.

Lambert, L. T. (1999). A differentiated goal structure framework for high school physical education. *Journal of Physical Education, Recreation and Dance*, *70*(2), 20–24.

Lee, S. M., Burgeson, C. R., Fulton, J. E., & Spain, C. G. (2007). Physical education and physical activity: Results from the School Health Policies and Programs Study 2006. *Journal of School Health*, *77*, 435–463.

Marcoux, M. F., Sallis, J. F., McKenzie, T. L., Marshall, S., Armstrong, C. A., & Goggin, K. (1999). Process evaluation of a physical activity self-management program for children: SPARK. *Psychology and Health*, *14*, 659–677.

Martin, J. J., & Kulinna, P. H. (2003). The development of a physical education teachers' self-efficacy instrument. *Journal of Teaching in Physical Education*, *22*, 219–232.

McCracken, B. (2002). Creating an environment for learning. *The State Education Standard*, *3*, 46–51.

McKenzie, T. L., Li, D., Derby, C., Webber, L., Luepker, R. V., & Cribb, P. (2003). Maintenance of effects of the CATCH physical education program: Results from the CATCH-ON study. *Health Education & Behavior*, *30*(4), 447–462.

McKenzie, T. L., Sallis, J. F., Prochaska, J. J., Conway, T. L., Marshall, S. J., & Rosengard, P. (2004). Evaluation of a two-year middle-school physical education intervention: M-SPAN. *Medicine and Science in Sports and Exercise*, *36*(8), 1382–1388.

McKenzie, T. L., Sallis, J. F., & Rosengard, P. (2009). Beyond the stucco tower: Design, development, and dissemination of the SPARK physical education programs. *Quest*, *61*, 114–127.

McKenzie, T. L., Stone, E. J., Feldman, H. A., Epping, J. N., Yang, M., Strikmiller, P. K., … Parcel, G. S. (2001). Effects of the CATCH physical education intervention: Teacher type and lesson location. *American Journal of Preventive Medicine*, *21*, 101–109.

National Association for Sport and Physical Education. (2004). *Moving into the future: National standards for physical education, a guide to content and assessment* (2nd ed.). Reston, VA: Author.

National Association for Sport and Physical Education & American Heart Association. (2010). *The 2010 shape of the nation report: Status of physical education in the USA*. Reston, VA: National Association for Sport and Physical Education.

Ogden, C. L., Carroll, M. D., Curtin, L. R., Lamb, M. M., & Flegal, K. M. (2010). Prevalence of high body mass index in US children and adolescents, 2007–2008. *The Journal of American Medical Association*, *303*(3), 242–249.

Okley, A. D., Booth, M. L., & Patterson, J. W. (2001). Relationship of physical activity to fundamental movement skills among adolescents. *Medicine and Science in Sports and Exercise*, *33*, 1899–1904.

Otto, C. N. (2005). Understanding the obesity epidemic: What does the lab need to know? *Medical Laboratory Observer*, *37*, 12–19.

Pyle, S. A., Sharkey, J., Yetter, G., Felix, E., Furlong, M. J., & Poston, C. W. S. (2006). Fighting an epidemic: The role of schools in reducing childhood obesity. *Psychology in the Schools*, *43*, 361–376.

Reeve, J., Nix, G., & Hamm, D. (2003). Testing models of the experience of self-determination in intrinsic motivation and the conundrum of choice. *Journal of Educational Psychology*, *95*, 375–392.

Rowland, T. W. (1999). Adolescence: A "risk factor" for physical inactivity. *President's Council on Physical Fitness and Sports*, *3*, 1–8.

Sallis, J. F., Conway, T. L., Prochaska, J. J., McKenzie, T. L., Marshall, S., & Brown, M. (2001). The association of school environments with youth physical activity. *American Journal of Public Health*, *91*(4), 618–620.

Sallis, J. F., McKenzie, T. L., Alcaraz, J. E., Kolody, B., Faucette, N., & Hovell, M. F. (1997). The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. *American Journal of Public Health*, *87*, 1328–1334.

School Health Policies and Programs Study. (2010). *Healthy youth! SHPPS: School health policies and programs study.* Retrieved from www.cdc.gov/HealthyYouth/

Schuldheisz, J. M., & van der Mars, H. (2001). Active supervision and students' physical activity in middle school physical education. *Journal of Teaching in Physical Education*, *21*, 75–90.

Schwimmer, J. B., Burwinkle, T. M., & Varni, J. W. (2003). Health-related quality of life of severely obese children and adolescents. *The Journal of the American Medical Association*, *289*(14), 1813–1819.

Shaya, F. T., Flores, D., Gbarayor, C. M., & Wang, J. (2008). School-based obesity interventions: A literature review. *Journal of School Health*, *78*(4), 189–196.

Shulman, L. S. (2000). Teacher development: Role of domain expertise and pedagogical knowledge. *Journal of Applied Developmental Psychology*, *21*(1), 129–135.

Siedentop, D., & Tannehill, D. (2000). *Developing teaching skills in physical education* (4th ed.). Mountain View, CA: Mayfield.

Sirard, J. R., & Pate, R. R. (2001). Physical activity assessment in children and adolescents. *Sports Medicine*, *31*, 439–454.

Steckler, A., Ethelbah, B., Martin, C. J., Stewart, D., Pardilla, M., Gittelsohn, J., … Vu, M. (2003). Pathways process evaluation results: A school-based prevention trial to promote healthful diet and physical activity in American Indian third, fourth, and fifth grade students. *Preventive Medicine*, *37*, S80–S90.

Tappe, M. K., & Burgeson, C. R. (2004). Physical education: A cornerstone for physically active lifestyles. *Journal of Teaching in Physical Education*, *23*, 281–299.

Telama, R., Yang, X., Laakso, L., & Viikari, J. (1997). Physical activity in childhood and adolescence as predictor of physical activity in young adulthood. *American Journal of Preventive Medicine*, *13*, 317–322.

Treasure, D. C., & Roberts, G. C. (2001). Students' perceptions of the motivational climate, achievement beliefs, and satisfaction in physical education. *Research Quarterly for Exercise and Sport*, *72*, 165–175.

United States Department of Health and Human Services. (2008). *2008 Physical Activity guidelines for Americans*. Retrieved from http://www.health.gov/paguidelines

Van der Mars, H., Vogler, B., Darst, P., & Cusimano, B. (1998). Students' physical activity levels and teachers' active supervision during fitness instruction. *Journal of Teaching in Physical Education*, *18*, 57–75.

Vincent, S. D., & Pangrazi, R. P. (2003). An examination of the activity patterns of elementary school children. *Pediatric Exercise Science*, *14*, 432–441.

Wechsler, H., & Devereaux, R. (2001). Using the school environment to promote healthy eating and physical activity. *Preventive Medicine*, *31*(Suppl.), S121–S137.

Welk, G. (2008). The role of physical activity assessments for school-based physical activity promotion. *Measurement in Physical Education and Exercise Science*, *12*(3), 184–206.

Welk, G., & Wood, K. (2000). Physical activity assessments in physical education: A practical review of instruments and their use in the curriculum. *Journal of Physical Education, Recreation and Dance*, *71*(1), 30–40.