Leisure Time Physical Activity

Structured physical education (PE) programs account for an extremely small portion of an individual's daily activity and time. School PE programs, teach knowledge and skills for performance, fitness, and health, yet continue to fall short of providing adequate amounts of exercise and physical activity for children and youth. In recent decades, school PE programs have been diminished as a part of the overall curriculum in many elementary and secondary programs. A crisis of focus, intent, and lack of accountability in the organization of school PE programs has contributed to challenges that children and youth worldwide face. The opportunities outside of the school setting may, in fact, provide substantially greater prospects of promoting physical activity in support of children's health and well-being.

A review of the activities among children and youth aged 6 to 12 are revealing in terms of time use and focus. Hofferth's (2009) study regarding changes in American children’s time use from 1997 to 2003 demonstrated that the greatest percentage of time use for boys and girls can be thought of as discretionary or free time. Among boys and girls aged 6 to 8, 41% of their activities can be defined as discretionary or free time, compared with 38% dedicated to attending school or doing homework. For boys and girls aged 9 to 12, 42% of their activities can be defined as discretionary or free time, compared with 38% of their activities dedicated to attending school or doing homework. Clearly, children’s free or discretionary time provides a tremendous opportunity to enhance their health and well-being.

Leisure is a multidimensional construct yielding many definitions and interpretations. The most straightforward definition of leisure is free or discretionary time. In other words, leisure is the time separate from a person’s existence (work) or subsistence (maintaining bodily needs). Although leisure has been defined in a number of ways, including as a state of mind, as an activity, or even in a holistic fashion, it occurs when a person feels free from constraints and is motivated by internal forces (Edginton, DeGraaf, Dieser, & Edginton, 2006, p. 8). Today, leisure is sought after and valued throughout the world. Often, when individuals are asked whether they would like to work more hours and harder, and hence gain additional financial rewards, or have more leisure time, the latter is always preferred.

Leisure can occur within structured or unstructured environments. A person can learn from leisure in a formal or informal fashion. The concept of leisure is often related to freedom—the freedom for individuals to be what they desire and the freedom from constraints that prevent individuals from seeking satisfying ends. Leisure often involves individuals seeking happiness and joyful living. There may be certain spontaneity to the leisure experience wherein the leader of an activity seeks to create a structure without robbing individuals of their perceived freedom.

In a classic article published in Public Health Reports titled “Physical Activity, Exercise, and Physical Fitness: Definitions and Distinctions for Health-Related Research,” Caspersen, Powell, and Christenson (1985) noted that "...physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditures" (p. 126). Physical activity can be distinguished from exercise in that the latter is "planned, structured, repetitive and purposive in the sense that improvement or maintenance of one or more components of physical fitness is an objective" (p. 128).

The concept of leisure time physical activity (LTPA) has recently appeared in the literature. The article “Leisure Time Physical Activity and Health Related Quality of Life,” appearing in Preventive Medicine, effectively linked the relationship among leisure, physical activity, and health (Vuillemin et al., 2005). Furthermore, the topic was explored in the paper “Leisure, Physical Activity and Community Healthy Living,” which appeared in the International Leisure Review (Chin, Edginton, Fleming, Flack, & Ruan, 2013). This article discussed the rise of obesity and
overweight worldwide and the benefits that people can gain from physical activity during leisure. As Chin et al. pointed out, “...work patterns, increased screen time and the stresses caused by living in a society punctuated by rapid, random and discontinuous change all require lifestyle adjustments” (p. 2). The direct benefits of LTPA include the prevention of cardiovascular disease and osteoporosis, as well as enjoying a more vigorous and healthful way of living.

The blending and promotion of physical activity in leisure environments may hold great promise of enriching the lives of individuals. For most children and youth, leisure time provides an excellent venue for physical activities ranging from informal play to more complex and highly organized sports and athletic events. For adults, most, if not all, physical activity will occur during their leisure time. With proper educational and mentoring programs, children and youth can carry into their adulthood the values and benefits gained from participating in LTPA.

Christopher R. Edginton, Ph.D.
Ming-kai Chin, MBA, Ph.D.

References


The Challenge of the 2014 World Cup in Brazil

The upcoming 2014 World Football Cup has been presented by the Brazilian government as a world of business opportunities. It would stimulate the service sector, particularly tourism and its subsidiaries. Enormous investments would better the country's urban infrastructure, such as transportation, mobility what is the difference between these?, and even sanitary and sewer installations. The construction industry would boom with the building of new stadiums, therefore affecting urban renovation. The economy as a whole would profit, reaffirming Brazil as a new powerful economic actor on the world stage. All of this would, of course, mean a better quality of life for the Brazilian people who would appreciate, love, and bless it.

The Brazilian government and the mighty Fédération Internationale de Football Association (FIFA) were apparently so involved in their own deals that they did not even notice how profound the disagreement and the dissatisfaction of the Brazilian people were with the realization of what has been perceived as a luxurious and elitist event in a country that lives a situation of social chaos. In this way, the situation could not end in good terms and did not. At the beginning of the Confederations Cup, an event that precedes the World Cup by 1 year, Brazilians went to the streets and promoted massive demonstrations, an upheaval compared to a revolution that surprised the Brazilians themselves and the world.

The demonstrations against the realization of the World Cup in Brazil were in the media and on the Internet even before the decision to bring the Cup to Brazil was announced. The most influential sports media and the most respected sports specialists openly and steadily criticized the venue on the basis of an excessive expenditure that in their perception would not advance sports or society as a whole in Brazil. The last Olympic Games heated the discussions on how all other Brazilian sports were mistreated. Athletes that went to London to represent the country using their own funds, sometimes having to ask for the public's help; the bad conditions for training and poor or no facilities offered to these marginal sports and to these marginal Brazilians; the unjustified use of taxpayer's money to construct big stadiums in places where they most likely will not be useful after the Cup; and on the other side, the shocking contrasting reality of the health care, educational, safety, and other public services apparently drove Brazilians to say, "Enough is enough."

The experience has been lived before. For the 2000 Pan American Games in Rio de Janeiro, an Olympic stadium was built from scratch and is already closed because of construction problems. An Olympic village, also built for those games, is now abandoned and useless. Above all, the experience of the Pan American Games in Rio was tainted with the suspicion, never dissolved, of blatant corruption, as usual in big operations such as these in Brazil.

The recent demonstrations took millions of people to the Brazilian streets and were not focused only on the World Cup. They targeted the continued disparity between the haves and have nots; the unequal treatment of services provided to the elite and to the common citizen; the privileges given to politicians versus the tax and bureaucratic burdens bestowed on the civil society; and above all, the country's poor social conditions, conditions that today are equally bad for the poor and the middle class and, in some cases, for all.

As per the World Cup, it has been said that it will be the most expensive ever. It will cost around $30 billion, compared to half of this amount spent in the last Cup in South Africa, which is considered unacceptable by the Brazilians, whose public schools have children in run-down classrooms, sometimes with no running water, no educational materials, and no lunch, and sometimes have to group pupils of all levels together because of the lack of teachers.
Public health conditions are not any better. The image of extremely sick people suffering, waiting for hours in crowded emergency rooms of ill-equipped hospitals, is usual. The idea of a progressive and efficient national health system, materialized in the 1988 Constitution by force of a Brazilian sanitary movement, has been boycotted by all governments thereon, including the current one. With an excellent opportunity to put into practice a universal and equitable health system, the government chose the old inefficient model that continues to contribute to the deterioration of the people's health.

By the same token, violence escalates to unbearable levels, and the people in big cities, and now also in small cities, feel like prisoners, with no security system, afraid to go in the streets, afraid for their children and for themselves. The power of organized crime rises before the absence of the state and the total unpreparedness of its police force. Human rights are scorned in the overcrowded Brazilian prisons, youth reformatories, and children's shelters. In this field, a most controversial issue has been the appointment of a known homophobic and suspect of corruption as head of the Congress Human Rights Commission.

Football has traditionally been a popular sport in Brazil. Maracanã, the biggest world stadium built for the 1950 World Cup, was public and accessible to all. A family could go together, eat snacks, and have a great time at low cost. For the 2014 World Cup, FIFA had the last word on how Maracanã must look. The stadium has no place for the poor anymore, and it has been privatized. For a family of three to go together and have snacks means—underestimating—a minimum of USD$300 in a country where the minimum salary is about this same amount. And these prices are for the local games, not the international ones. So long to the poor, not only to the World Cup, but also to watching football, the best cultural expression in Brazilian traditions.

For the new Maracanã, destroying various sports facilities located around the old stadium, including swimming pools and athletic training fields that were also available to social programs, was necessary. So long to them, too. The government and FIFA are apparently not worried about these issues but about the good business that they are about to make. No wonder the Brazilians do not agree.

Most of all, the big crisis in Brazil seems to be a profound distrust in their government and in the politicians and business people that run the country. It is a deep ethical problem and the government, as well as FIFA, do not seem to understand it. Brazilians do not seem to accept that they should have a World Cup and give their blessings to a lie that tries to convince the world that everything is going well in Brazil. At this point, they placed this question before all, do we need, do we want, is it necessary, is it ethical, is it for the good of the people to have a World Cup in Brazil? Their answer was well expressed in the demonstrations.

Walter Ferreira de Oliveira, Ph.D.
Professor
Federal University of Santa Catarina
Florianópolis, SC
Brazil
walteroliveira.ufsc@gmail.com
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Childhood Obesity in South Africa: Are We Sitting on a Time Bomb?

J. Hans de Ridder
Dané Coetzee
North-West University, Republic of South Africa

Abstract

South Africa has not escaped the worldwide increase in childhood obesity, and current statistics in this regard do not create a positive picture for the youth of this African country. The lack of presentation of physical education in South African schools and the current unacceptable state of affairs complicate the situation further, and the two physical education models used to date in South African schools, pre- and postapartheid, were not successful. If research statistics and also the current state of physical education in the schools are considered, the answer to the question, are we sitting on a time bomb in South Africa with regard to obesity in our youth, is a definite yes! Despite the challenges, however, it is possible to overcome childhood obesity in South Africa. Success stories from all over the world teach valuable lessons and can be used as motivation. It is extremely important that quality physical education be implemented in all South African schools and be offered by well-trained teachers as soon as possible. The engagement of the community and the parents is also of cardinal importance because without the help and support of parents and the community, it is almost impossible to install healthy dietary habits and regular participation in daily physical activity in children. Also important is the use of evidence-based physical activity intervention to combat childhood obesity, especially in a country with extreme diversity such as South Africa, and last but not the least, physical activity intervention should start at a young age to establish a culture of a lifelong healthy lifestyle among the children of South Africa.

Keywords: Obesity, children, youth, physical education, South Africa
Current statistics on the increasing prevalence of childhood obesity worldwide read like a
horror story and are of great concern because obese children are at higher risk of experiencing a
range of health-related illnesses than the rest of the pediatric population. Obesity is currently the
world’s most dominant metabolic disease, and with regard to obesity in children, it is important
to understand that it is a complex and difficult issue and that environmental factors such as diet,
physical inactivity, and metabolic status contribute to obesity and, in turn, influence genetic
traits (Weinsier, Hunter, Heini, Goran, & Sell, 1998). Childhood obesity also gives rise to a
complex interplay between comorbidities, detrimental psychosocial aspects, and a reduction
in life expectancy and is linked with both economic and societal burdens (Adamo et al., 2011).
The increasing prevalence of childhood obesity and the corresponding reduction in physical
activity in youth have also led to a heightened interest in strategies designed to prevent and
manage the condition (Elliott, Copperman, & Jacobsen, 2004). Unfortunately, South Africa has
not escaped this worldwide increase in childhood obesity and current statistics in this regard do
not create a positive picture for the youth of this African country.

As a developing country, South Africa is currently undergoing an epidemiological transition,
and this process is associated with a variety of health risks in the youth of the country (Cameron,
2005; Goedecke, Courtney, Jennings, & Lambert, 2006). According to the South African Health
Review (1997), approximately half of the population currently resides in urban areas, which
has significantly reduced their level of physical activity, and this is cause for concern because
research evidence clearly has shown a favorable relationship exists between physical inactivity
and a host of factors affecting children’s physical health, including cardiovascular disease,
diabetes, blood pressure, bone health, and obesity. Olshansky et al. (2005) is of the opinion
that because of increased incidence of obesity, current generations in the United States and the
United Kingdom can expect a shorter life span than previous generations and furthermore have
suggested that the youth of today may, on average, live less healthy and possibly even shorter
lives than their parents.

First, this article will answer the question, is South Africa currently sitting on a ticking time
bomb with regard to childhood obesity? Second, it will address the whole issue on how to solve
the problem if it exists and what measures can be put in place to combat childhood obesity in
South Africa.

**Historical Overview of Physical Education in South Africa**

It is important to start this article with a historical overview of physical education (PE)
in South African schools, as it plays a crucial role in the current state of affairs with regard
to physical inactivity in South African children. In a number of countries, evidence clearly
shows that physical activity among youth has declined in recent decades, and the corresponding
increase in obesity prevalence may be the direct result of this decline (Luepker, 1999). The
cost of declining levels of physical activity for the burden of disease is widely recognized,
particularly the price children pay for society’s chronic diseases of lifestyle. According to Chin,
Edginton, and Tang (2012), several factors have contributed to the reduction in physical activity
in youth, including the elimination of PE programs in the schools, among others. Therefore,
giving a historical overview of PE in South African schools to provide a better understanding
of this African country with its unique character and challenges is important. If we can better
understand a country and its history, then we will also be able to offer better solutions to the
problems and challenges.
PE in South Africa has a long history and, according to Van der Merwe (1999), was offered from the early 1800s in South African schools. In the early days, serious effort was made to offer the subject; however, this was limited to the white schools as a result of apartheid legislation in those years. The late 1930s were considered the formative years of PE in South Africa with a strong European influence on the model used to offer the subject in schools. Unfortunately, this model failed because the apartheid legislation only focused on a small minority and the largest section of the population received little or no attention with regard to facilities, equipment, and well-trained teachers to offer PE. In 1994, the political landscape changed dramatically after the first democratic elections in South Africa, and shortly after the African National Congress government came into power, the new South African school law was implemented in 1996 (Department of Education, 2000). With the new system, PE as an individual subject disappeared from the syllabus and became part of one of the five focuses of the learning area life orientation (Department of Education, 2002). This model has been applied in South African schools since 2005 and from 2008 became a compulsory subject in all grades in South African schools. Since 2008, PE has been one of the five focus areas of life orientation, a compulsory subject at school for all grades in South African Schools (Department of Education, 2008; Van der Merwe, 2011). Although PE is not a separate subject and only one part of the subject life orientation, the subject is well structured with good outcomes and assessment criteria (Van der Merwe, 2011). PE has a 2 hour per week time slot and is formally assessed and examined as part of the subject life orientation. Currently, the PE assessment contributes to 25% of the life orientation mark, with a further distribution in PE of 15 marks out of 25 for participation and 10 out of 25 for performance (Department of Education, 2008).

Therefore, PE holds a high status in South Africa as an outcome of the compulsory school subject life orientation in all grades and for all children and young people in South African schools, but this change also resulted in a unique set of problems and challenges, and PE in South African Schools currently faces similar problems and challenges to those experienced on the international front. Aspects such as poor status or esteem, poor and/or no equipment, apparatus, and facilities, as well as poorly trained, and in many cases untrained, teachers to teach a subject such as PE, are only a few that can be mentioned (Van der Merwe, 2011; Van Deventer, 2004).

Currently, PE receives great support from international organizations, such as the United Nations (UN), United Nations Educational, Scientific, and Cultural Organization (UNESCO, The Charter for Physical Education and Sport of 1978), and the World Health Organization (WHO). Furthermore, the Berlin Agenda and Plan of Action was drawn up during the world conference on PE in Berlin in 1999, which emphatically states that every child and young person throughout the world has the basic right to be able to play and participate in physical activities (International Council of Sport Science and Physical Education [ICSSPE], 1999). In 2005, the previous South African minister of basic education declared that sport is for everybody, including children with learning disabilities and girls. Furthermore, she declared that PE and sports can help combat obesity and that the National Department of Education is responsible for ensuring sufficient facilities, equipment, and well-trained teachers for the implementation of school sports and PE (Pandor, 2005). This declaration keeps with the Berlin Call for Action (ICSSPE, 1999) and is strongly supported by the Durban Declaration of Intent on Physical Education, Sport Science, and Recreation, which was issued in August 2010 after the SASReCon conference in Durban, South Africa.
Regardless of the aforementioned, the presentation of PE in South African schools is lacking and, as previously mentioned, is currently in an unacceptable state of affairs. Many years will pass before all the challenges have been met and overcome and the deficit has been erased for the complete presentation of PE in South African schools. Factors such as a lack of funds and human and physical resources will for many years offer the greatest challenges, and in conjunction with the shrinking budget and the current crisis in which our country’s basic education finds itself, these factors will further complicate the matter. The South African government needs to realize that the quality of PE can positively contribute to the health, as well as the social and economic environment, of the country and its people. Specifically in the field of health, PE is an important investment, and in the long-term, the implementation of PE can strongly influence the lives of children in this country.

In summary, during apartheid, the PE curriculum in South Africa was perpetuated by race, class, gender, and ethnicity. Even since 1994 in the postapartheid South Africa, the opportunities for children to engage in physical activity at school have dwindled due to increased pressures to increase student achievement. Therefore, the two models used to date in South African schools, pre- and postapartheid, were not successful, and it is important that a model is applied in South African schools that is successful and that addresses the needs of our current generation of children and adolescents in South Africa. Children and youth spend a great deal of their time within the school setting, and therefore, schools play a key role in shaping healthy behaviors including greater physical activity and improved dietary habits (Chin et al., 2012).

Current State of Obesity and Inactivity in South African Youth

Over the past century, much of the nutrition research with regard to children and youth in developing or third world countries focused on poverty and malnutrition, but currently growing evidence shows a major shift in research toward childhood overweight and obesity (Jacobs & de Ridder, 2012; Wang, Monteiro, & Popkin, 2002). According to Chin et al. (2012), today’s children and youth represent the largest cohort group in the history of humankind with 2.2 billion children and 1.5 billion youth worldwide. Of this number, 1.9 billion children and 1.3 billion youth reside in developing countries (United Nations Children’s Fund, 2005; World Bank, 2007). Therefore, urgent attention must be given to the prevalence of obesity in children, not only in first world countries, but also in developing or third world countries of which South Africa is one.

The Youth Risk Behavior Survey conducted in 2002 in South Africa found that over 17% of South African adolescents were overweight and 4.2% were obese (Reddy et al., 2003). In a study by Steyn, Labadarios, Mauder, Nel, and Lombard (2005), the statistics indicated that 17.1% of South African children aged 1 to 9 living in urban areas were overweight or obese. Armstrong, Lambert, Sharwood, and Lambert (2006) indicated a prevalence of 14% and 17.9% of overweight and 3.2% and 4.9% with regard to obesity among 6- and 13-year-old boys and girls. Kemp, Pienaar, and Schutte (2011) further indicated a prevalence of 7.8% overweight and 3.8% obesity among Grade 1 learners in the North West province of South Africa. In a study by Jacobs and De Ridder (2012) on 11- to 13-year-old black children living in rural areas in the North West Province of South Africa, 5% of the boys were overweight and 4% were obese. With regard to the girls, 10% were classified as overweight and 10% as obese. According to Westwood (2012), lack of physical activity has a strong correlation with obesity in black South African girls.
It must also be kept in mind that the prevalence and aetiology of childhood obesity may vary according to lifestyle and socioeconomic status. Most of the reports with regard to childhood obesity are conducted from studies in urban areas, and South African children in rural areas have different lifestyles in terms of the availability of televisions and computers (Stroebel, De Ridder, & Wilders, 2007). Therefore, the research on the South African youth reported differences between urban and rural communities, as well as ethnic and gender differences.

In 2007, the Healthy Active Kids – South Africa (2007) research indicated that only 45% of youth in South Africa participated in sufficient vigorous physical activity and 40% participated in no or little vigorous physical activity. Kahn (2011) supports the above, and he reported that only 42% of the youth in his study participated in sufficient vigorous physical activity. In smaller towns and rural settings, these figures are even worse, with 64% of girls and 45% of boys reporting little or no moderate physical activity (Healthy Active Kids – South Africa, 2007). Health professionals are concerned that this hypokinetic trend is associated with a sedentary culture, as 25% of adolescents reported little or no interest in leisure-time activities (De Ridder, Strydom, & Greeff, 2012; Healthy Active Kids – South Africa, 2007).

A study by Reddy et al. (2003) in South Africa reported that only 54.3% of adolescents had PE on their timetables and only 52.8% participated in vigorous physical activity at school because many schools in rural areas do not have playgrounds for the children to play on. Rajput and Van Deventer (2010) indicated that only 33% of the total time allocated in the learning area life orientation for Grades 4 to 6 is used for physical development and movement. This trend is shocking because PE is supposed to provide the opportunity for all children to be physically active.

If the aforementioned research statistics and the current state of PE in the South African schools are considered, the answer to the question, are we sitting on a time bomb in South Africa with regard to obesity in our youth, is a definite a yes! Therefore, the matter is no doubt serious, and the question is now, is it possible to fight back and how can we fight back against this noncommunicable disease that currently is a serious threat to South Africa’s youth and that is responsible for a major part of the health care budget of the country?

Is It Possible to Fight Back?

This is not an easy question to answer because childhood obesity is a complex clinical condition with no simple solutions and answers. What is important to remember when implementing intervention programs in the fight against childhood obesity is that each country has its own unique set of circumstances that needs to be considered. Therefore, a country such as South Africa cannot simply directly implement intervention programs that are used in other countries. Aspects such as urbanization, ethnic and gender differences, lifestyle and socioeconomic status, and so forth need to be considered at the development and implementation stages of the intervention programs to combat obesity. Appropriate eating and exercise behaviors should also be integral to any management strategy of childhood obesity. According to Jacobs and de Ridder (2012), the environment in which children grow up has drastically changed worldwide during the last decade as reflected in their unhealthy dietary habits and sedentary behaviors. South Africa is currently undergoing a process of epidemiological transition that is associated with a variety of health and other consequences (Goedecke et al., 2006).

If all the above-mentioned are considered, several challenges will need to be faced to combat childhood obesity in South Africa. However, despite all of these challenges, fighting back is possible! However, this will not be an easy task and will require perseverance and well-
planned strategies that are specifically designed for South Africa to prevent and manage the condition. Success stories all over the world (Chin et al., 2012) provide valuable lessons and can be used to motivate those engaged in this difficult task. It is not necessary for us in South Africa to reinvent the wheel. Although South Africa has its own unique set of circumstances that needs to be considered, we can still use success stories from different countries worldwide to fight childhood obesity in South Africa.

How Can We Fight Back?

Research agrees that genetic predisposition, physical inactivity, poor dietary choices, and an obesogenic environment may all play important roles with regard to obesity; however, the increasing prevalence of obesity over the past 30 years suggests that environmental and lifestyle factors, rather than genetic predisposition, must be responsible for this rapid increase in overweight and obesity (Kesanieme et al., 2001; Mota, 2005). In the fight against childhood obesity and to apply successful intervention programs, it is important to focus on environmental and lifestyle factors that will have the largest impact on intervention programs and where health care professionals can intervene. In this section, brief attention will be given to three of these environmental and lifestyle factors, which in the opinion of the authors, can have a large and positive impact on childhood obesity in South Africa.

Effective physical education in South African schools. The two models for PE used to date in South African schools, pre- and postapartheid, were not successful, and it is important that a model is applied in South African schools that is successful and that addresses the needs of our current generation of children and adolescents in South Africa. Serious challenges currently face the presentation of PE in South African schools. As previously mentioned, the lack of facilities and apparatus plays a huge role, but the greatest problem is the lack of trained teachers to offer the subject, in conjunction with the lack of trained subject advisors to offer the necessary support (Van der Merwe, 2011). According to Rossouw (2004), a further problem is the insufficient safety measures currently in place in PE classes, as a result of the ignorance on the part of the teachers, which could lead to injuries resulting in legal steps being taken and civil suits being filed. Therefore, the aforementioned challenges result in PE being poorly presented in South African schools or even many schools not offering it at all. Another factor that also plays a negative role is that in the pre-1994 apartheid era, PE was only offered in certain privileged schools, and the presentation of this subject in previously disadvantaged schools was grossly neglected (Van der Merwe, 1999).

A unique model that is currently being used in some primary schools is to use trained kinderkinetic specialists. Kinderkinetics is a profession that aims to promote and optimize the neuromotor development of young children, through scientifically based physical activity. Kinderkineticists promote functional growth and development, focus on certain movement activities to promote and facilitate sports-specific activities, and implement appropriate rehabilitation for children with growth and/or developmental disabilities and specific motor deficiencies. Aspects such as obesity and the development of a healthy and balanced lifestyle in children are addressed by kinderkineticists with programs that are offered in groups. The advantages of this program are that it is highly specialized and successful and that highly trained individuals are used (Pienaar & Strydom, 2012). The disadvantages of this model are that it can be expensive and currently is only advantageous to a small group of children. It is imperative that every child in South African schools has the right to participate in physical activity. Therefore, dispelling the controversies that shroud PE to date is important so that its deliverance in South African schools is focused and has direction (Rajput & Van Deventer, 2010).
It is well known that PE and sports are not new to Africa; however, the Western model is new (Amusa & Toriola, 2010). The practice of PE and sports in Africa is deeply rooted in the cultural fabric of its diverse ethnic communities, and in most African countries and communities, physical culture forms an integral part of traditional activities associated with hunting, pastoral way of life, food gathering, intertribal conflicts, survival, and maintenance of good health (Amusa & Toriola, 2010). These are depicted in numerous indigenous games, dances, initiation rites, and rituals. According to Amusa and Toriola (2010), in their article on the development of PE and sports in Africa from the precolonial to colonial and postcolonial eras, the historical past clearly shows that to date hardly any activity is uniquely African in PE and sports as presently practiced. The models being used to practice PE in Africa are mostly Western models that were “imported” with the hope that they would serve Africa’s needs. According to Amusa and Toriola, this is quite worrisome considering the diverse and rich cultures, traditions, sports, and games with which the African continent is blessed. Therefore, countries in Africa need to use their own unique African models to lecture PE in schools—models that are more relevant to the indigenous African populations than the current models being used and which are sustainable—models that are developed in Africa by Africans and for the benefit of our African children. In light of the worldwide problem of overweight and obesity in children, implementing quality PE in all South African schools and offering it through well-trained teachers is more important than ever. If this does not happen, South Africa will reap the bitter fruits of its labor in the future.

**Involvement of parents and the community.** If we are to win the war against childhood obesity, the active involvement of both the parents and the community is important. It is almost impossible for children who are overweight or obese to try and beat this noncontagious disease on their own. The role of the parents is extremely important, and by establishing healthy behavior in children at an early age, parents may circumvent long-term issues that may emerge in adulthood related to obesity and overweight (Wang et al., 2008, 2002? add new ref?). According to Chin et al. (2012), intervention strategies must focus on both healthy nutrition and dietary habits, as well as the importance of daily physical activity. Without the help and support of parents, installing healthy dietary habits and participation in daily physical activity in children is nearly impossible. A large part of the motivation, as well as the support, comes from the parents, and children will only learn the aforementioned good lifestyle habits if they have the support of their parents. Parents can contribute in many ways; for example, they can become involved as members of health-related committees and serve as representatives on the school's medical and health teams overseeing student health services, religious education, the health curriculum, school ethos, interpersonal relationships, and so forth (Chin et al., 2012).

Community involvement in their children’s health is also important. The majority of children in South Africa live in environments that are not conducive to their health and well-being, and therefore, reaching these children who are in many areas considered at risk and in need of developmental help is a challenge (Pienaar & Strydom, 2012). It can even be said that if a community is not involved in its youth’s physical activity programs, it is doomed to failure. The community's assistance in keeping our children fit and healthy is important. In addition, community involvement should not be limited to the financial aspects, but the community should become involved on several levels of the well-being of children. Commitment from the government to make communities safer, to construct sidewalks for walking and bicycle lanes, to help with the development of sports grounds and play areas, and so forth is also important because a community cannot perform all these tasks on their own. They need governmental support in this regard.
The important role of evidence-based physical activity intervention. Children who are active in adolescence are more likely to become physically active adults, and therefore, the promotion of physical activity as a normal part of life through schools and in society is important (Westwood, 2012). The benefits of physical activity and exercise for children and youth have been well documented and parallel to those reported for adults. An increase in physical activity plays an important role, both in primary and secondary intervention, in combating the obesity epidemic among children, and the real challenge is to provide evidence-based physical activity intervention to children during early childhood (ages 3 to 12; Pienaar & Strydom, 2012). Physical activity should be an integral part of normal growth and development for all youth, and according to Pienaar and Strydom (2012), for the very young child, physical activity intervention should be age and developmentally appropriate. Therefore, the professional who administers the intervention during this stage should be thoroughly trained in childhood development and pediatric exercise science.

In South Africa, the profession of kinderkinetics, as referred to earlier in this article, has done excellent work with regard to applied research on the growth, motor development, and physical activity of children, and interventions to improve shortcomings that are identified have already been extensively researched within the field of pediatric exercise science. In this regard, research on obesity among children of different age groups and from different perspectives for a better understanding of the problem have been published (Pienaar & Strydom, 2012). An important aspect is that the research went beyond research and was used as evidence to plan a research project in which an obesity intervention program was developed and assessed. A program based on the principles of physical activity participation, behavior modification, and dietary guidelines was compiled and the outcomes were evaluated (Pienaar & Strydom, 2012). The protocol of this research project is currently successfully implemented as an obese intervention program and is used by kinderkineticists countrywide. Specific adjustments with regard to age appropriateness of the level, selection, and inclusion of motor activities and the intensity level of physical activities have been made to the program (Pienaar & Strydom, 2012). According to Pienaar and Strydom (2012), the treatment program can also be used effectively for inactive children by only modifying the intensity of the program, as it incorporates the necessary fitness components such as strength and strength endurance, cardiovascular endurance, flexibility, and development of basic motor skills needed for sports participation. One challenge of this program is to bring this service to the deep rural and remote areas of South Africa; this asks for innovative thinking in South Africa, an extremely diverse country not only in population and ethnic groupings but also with regard to socioeconomic status (Pienaar & Strydom, 2012).

Conclusion

Chronic diseases that are associated with obesity are now rising in developing or third world countries at a faster rate than that experienced by developed or first world countries (Raymond, Leeder, & Greenberg, 2006). Research clearly has shown that great concern exists regarding the increasing epidemic of obesity and physical inactivity among youth and that efforts to remedy this situation should be enhanced. Therefore, the time for talking is long gone, and in South Africa, as in many other countries in the world, now is the time for serious action. The fight against childhood obesity in a third world country such as South Africa has many challenges, especially the health care system, which is challenged with numerous complexities
and financial constraints. According to Pienaar and Strydom (2012), the first step in childhood obesity treatment will have to be national initiatives acknowledging the severity of the problem, policy support, and community engagement on the level of implementation. Quality PE must be implemented in all South African schools and offered by well-trained teachers because almost all children can be reached through the school curriculum. This will require that PE programs in South Africa, as well as PE teacher preparation programs, be rethought and reformed. According to Chin et al. (2012), PE and health programs worldwide are, without question, in need of transformation. In South Africa, PE curricula will need to harness the technical and scientific principles within a context of political, aesthetic, and ethnic realities that focuses on the needs, culture, traditions, and practices of only one group irrespective of race, class, gender, and ethnicity. The use of evidence-based physical activity intervention to combat childhood obesity is also important, especially in a country such as South Africa, which is extremely diverse not only in population and ethnic groupings but also with regard to socioeconomic status. Physical activity intervention at a young age is important and establishes a culture of a healthy lifestyle among children. Therefore, intervention of childhood obesity (prevention and treatment) calls for comprehensive and innovative strategies (Pienaar & Strydom, 2012), and in South Africa, this is an exciting challenge for the future that, in the end, will greatly benefit this exciting African country and its rainbow nation.

References


Relationships Among Self-Determined Motivation, Achievement Outcomes, and Related Social and Individual Factors in Middle School Physical Education

Tao Zhang
University of North Texas, USA

Melinda A. Solmon
Louisiana State University, USA

Ping Xiang
Texas A&M University, USA

Xiangli Gu
University of North Texas, USA

Qi Chen
University of North Texas, USA

Abstract

Guided by the self-determination theory (SDT) and the hierarchical model of intrinsic and extrinsic motivation (HMIEM), this study attempted to test a structural model of hypothesized relationships among perceived need support from physical education teachers, psychological need satisfaction, self-determined motivation, perceived success, and future expectancies for enjoyment in middle school physical education. The participants were 282 students enrolled in a suburban public school in the southeastern United States. They responded to a previously validated multisection inventory assessing their perceived need support, need satisfaction, self-determined motivation, perceived success, and future expectancies for enjoyment in physical education. Correlation analyses revealed a pattern of significant relationships among the variables. The model provided a good fit to the data according to suggested criteria (RMSEA = .055, CFI = .997, SRMR = .013). The results highlighted the important influence of high levels of self-determined motivation, need satisfaction, and a need-supportive environment on students’ perceived success and future expectancies for enjoyment. This study replicates previous research evidence and supports the use of SDT and the HMIEM to investigate students’ achievement outcomes in school physical education.

Keywords: Social environment, need satisfaction, achievement motivation, youth

Tao Zhang is an assistant professor, Department of Kinesiology, Health Promotion, and Recreation, University of North Texas, USA. Melinda A. Solmon is a professor, School of Kinesiology, Louisiana State University, USA. Ping Xiang is a professor, Department of Health and Kinesiology, Texas A&M University, USA. Xiangli Gu is a lecturer, Department of Kinesiology, Health Promotion, and Recreation, University of North Texas, USA. Qi Chen is an assistant professor, Department of Educational Psychology, University of North Texas, USA. Please send author correspondence to Tao.Zhang@unt.edu.
Introduction

School-based physical education (PE) programs should play an important role in public health (Centers for Disease Control and Prevention, 2010; U.S. Department of Health and Human Services, 2008, 2010). Although the health benefits of regular physical activity in PE for school students are well documented, most school-aged students are not as active as they should be (U.S. Department of Health and Human Services, 2010). Physical inactivity has become a public health concern and has received much attention in recent years. School-based PE programs can serve as an important avenue to foster school-aged students’ motivation to adopt physically active lifestyles that can ultimately lead to habits of lifelong physical activity (Gu, Solmon, & Zhang, 2012; McKenzie, 2001; Wallhead & Buckworth, 2004; Zhang, Solmon, Kosma, Carson, & Gu, 2011). Therefore, understanding the motivational processes associated with positive outcomes based on a sound theoretical framework is an important line of inquiry. Such efforts may help us to create motivationally supportive environments that foster motivation for students to be physically active both during and outside of their PE classes (Cox, Smith, & Williams, 2008; Standage, Gillison, Ntoumanis, & Treasure, 2012). Thus, the purpose of this study was to replicate previous research (e.g., Zhang et al., 2011) in an attempt to provide further empirical support for the use of the self-determination theory and hierarchical model of intrinsic and extrinsic motivation in understanding middle school students’ motivation in PE.

Self-Determination Theory

The self-determination theory (SDT) is a general theory of motivation that assumes individuals are innately oriented toward psychological health and well-being (Deci & Ryan, 1985; Ryan & Deci, 2007). According to this theory (Deci & Ryan, 1985; Ryan & Deci, 2000, 2007), self-determination continuum, from higher to lower self-determination, includes intrinsic motivation, extrinsic motivation, and amotivation, with intrinsic motivation representing the most desirable and enduring motivation. Intrinsic motivation refers to doing an activity for the pleasure it provides or for its own sake. When individuals are intrinsically motivated, they choose to engage in an activity for its own sake rather than an external reason (Ferrer-Caja & Weiss, 2000; Ryan & Deci, 2007; Zhang et al., 2011).

In contrast, extrinsic motivation refers to activities that are carried out as a means to an end that is valued and not for the sake of the activity itself (Deci & Ryan, 1985; Ryan & Deci, 2000). Extrinsic motivation is apparent when individuals perform an activity because they value its associated outcomes, such as public praise, more than the activity itself. Extrinsic motivation includes four levels of regulation: external regulation (behaviors controlled by contingencies external to the individual such as rewards or constraints), introjected regulation (behaviors that individuals perform to achieve social recognition or avoid feelings of guilt), identified regulation (behaviors that are highly valued and can help individuals reach valued personal goals), and integrated regulation (engaging in an activity out of choice).

Besides intrinsic motivation and extrinsic motivation, Deci and Ryan (1985, 2000) asserted that individuals can also be amotivated toward an activity. Amotivation refers to behavior that is neither intrinsically nor extrinsically motivated (Deci & Ryan, 2000). Amotivation occurs when individuals experience a lack of contingency between their behavior and outcomes and represents a complete absence of self-determination and volition with respect to the targeted behavior. This is evident when individuals do not value an activity at all or when they experience feelings of incompetence and uncontrollability. According to previous findings, unfortunately,
many students lack the motivation to participate in some PE activities (Ntoumanis, 2001, 2005; Shen, Wingert, Li, Sun, & Rukavina, 2010). These students cannot see why they should have PE and feel they waste their time in PE.

Furthermore, SDT proposes that satisfaction of the basic psychological needs for autonomy, competence, and relatedness facilitates self-determined motivation (i.e., intrinsic motivation, external motivation, and amotivation) and is central to achievement outcomes, including cognitive, affective, and behavioral indicators such as perceived success, future expectancies for enjoyment, concentration, and persistence/effort (Deci & Ryan, 2000). These three psychological needs for autonomy, competence, and relatedness have been combined into a composite variable labeled psychological need satisfaction in the research literature (Deci, Ryan, & Williams, 1996; Ryan & Deci, 2007; Zhang et al., 2011). Specifically, the need for autonomy is satisfied if individuals feel self-determined in their actions rather than controlled or obliged to act. The need for competence is satisfied through the pursuit of autonomously motivated behaviors that lead to perceptions of success and control of outcomes. The need for relatedness reflects innate desires to be supported by others and be supportive of others when engaging in behaviors (Deci & Ryan, 2000; Ryan & Deci, 2007; Zhang et al., 2011).

Based on SDT, fulfilling or satisfying these basic psychological needs for autonomy, competence, and relatedness is the mechanism through which individuals move toward more self-determined motivation and should promote an individual’s autonomous self-regulation of behaviors and enjoyment of activities (Deci & Ryan, 2000; Deci et al., 1996; Ryan & Deci, 2007; Zhang et al., 2011). For instance, students are more likely to be intrinsically motivated to do physical activity simply for the enjoyment they derive from it, when they can freely choose to pursue the activity (autonomy), when they master the activity (competence), and when they feel supported by important others such as a parent, a teacher, or classmates (relatedness). Previous research has indicated that these basic psychological needs for autonomy, competence, and relatedness are related to the PE setting. Students would like a choice of activities, strive to feel efficacious in these activities, and seek to be accepted by their peers and teachers in school PE (Standage, Duda, & Ntoumanis, 2005; Standage et al., 2012; Zhang et al., 2011).

Applied to the PE setting, SDT predicts that satisfaction of the basic psychological needs for autonomy, competence, and relatedness will lead a student to freely engage in physical activities over a long period of time when these feelings are experienced (Standage et al., 2012). Given the importance of basic psychological needs for autonomy, competence, and relatedness for students’ motivation in PE, knowing how to facilitate psychological need satisfaction in PE is an important objective of research when researchers or practitioners wish to motivate students to be physically active in PE for a long time (Standage et al., 2005; Zhang et al., 2011).

**Hierarchical Model of Intrinsic and Extrinsic Motivation**

In line with SDT, Vallerand (2000) proposed the hierarchical model of intrinsic and extrinsic motivation (HMIEM). Based on the HMIEM, motivation is viewed as a function of social and individual factors that can influence cognitive, affective, and behavioral outcomes. One of the key hypotheses of the HMIEM is framed in terms of social factors that affect psychological need satisfaction and, in turn, different types of motivation and achievement outcomes (Vallerand, 2000; Vallerand & Losier, 1999). This can be expressed through a chain of processes as follows: social factors → psychological need satisfaction → self-determined motivation → achievement outcomes (Ntoumanis, 2001; Vallerand, 2000; Zhang et al., 2011).
Based on previous research evidence, social environmental factors, such as PE teachers’ supports, can play an important role in promoting students’ motivation if they satisfy psychological need satisfaction (Zhang, Solmon, & Gu, 2012). Social support from PE teachers that support the psychological need satisfaction should promote an individual’s autonomous self-regulation of behaviors and physical activity behaviors (Ryan & Deci, 2000; Zhang et al., 2011). Finally, different types of motivation may influence important cognitive, affective, and behavioral outcomes in PE.

The HMIEM provides a powerful theoretical framework for organizing and understanding the mechanisms underlying intrinsic and extrinsic motivational processes (Vallerand, 2000; Zhang et al., 2011). To date, the HMIEM has been widely used to investigate how social factors affect individuals’ motivation and their achievement outcomes in sports and physical activity settings (Edmunds, Ntoumanis, & Duda, 2006; Gagne’, Ryan, & Bargmann, 2003; Vallerand, Fortier, & Guay, 1997; Wilson & Rodgers, 2004; Zhang et al., 2011). For instance, Zhang et al. (2011) examined a model of hypothesized relationships among PE teachers’ support, psychological need satisfaction, intrinsic motivation, and physical activity. They found need satisfaction and intrinsic motivation were two mediators between PE teachers’ support and physical activity (Zhang et al., 2011). More studies, however, are needed to examine the relationships among a need-supportive environment created by PE teachers (i.e., autonomy support, competence support, and relatedness support = need support), psychological need satisfaction, self-determined motivation, and achievement-related outcomes (i.e., perceived success, future expectancies for enjoyment) in middle school PE based on HMIEM (Ntoumanis, 2001, 2005; Standage et al., 2005; Zhang et al., 2011).

It is well documented that PE teachers can crucially impact students’ motivation and adaptive patterns of cognition, affection, and behavior because they design class materials, give recognition, group students, evaluate motor performance, assess health-related fitness, and promote physical activity engagement in PE classes (Standage et al., 2005; Zhang et al., 2012). In view of the importance of PE teachers’ behavior for students’ motivation and adaptive motivational patterns, it is necessary to examine not only the direct influence of a need-supportive environment created by PE teachers on students’ self-determined motivation, but also the influence of psychological need satisfaction on students’ self-determined motivation (Zhang et al., 2011). Furthermore, SDT and the HMIEM propose that satisfaction of the basic psychological needs for autonomy, competence, and relatedness facilitates self-determined motivation and achievement outcomes (Ryan & Deci, 2000). But such proposed relationships have not been extensively examined in school PE settings (Zhang et al., 2011).

Based on the literature reviewed above, this study aimed to replicate and extend previous research (e.g., Zhang et al., 2011) by using path analysis to test a hypothesized model focusing on relationships among perceived need support from PE teachers, psychological need satisfaction, self-determined motivation, and achievement outcomes (future expectancies for enjoyment and perceived success) in a middle school PE setting. As shown in Figure 1, we hypothesized that (a) there would be direct effects of perceived need support to self-determined motivation as represented by the relative autonomy index, need satisfaction to perceived success, and need satisfaction to future expectancies for enjoyment; (b) perceived need support would affect need satisfaction, which in turn would be expected to influence self-determined motivation, and self-determined motivation would mediate the effects of need satisfaction on future expectancies for enjoyment, all of which represent the first mediation pathway in the hypothesized model; and (c) self-determined motivation would mediate the effects of need satisfaction on perceived success, the second mediation pathway in the model.
Participants
The participants were 282 middle school students aged 12 to 16 (age $M = 13.4$ years, $SD = 1.0$; 147 girls, 135 boys) from a southeastern suburban public school. Students were in Grades 6 ($n = 90$), 7 ($n = 98$), and 8 ($n = 94$). The ethnic distribution of the students was as follows: 85.1% Caucasian, 7.1% African American, 1.1% Hispanic American, 1.8% Asian American, and 4.9% undeclared. Permission to conduct this study was obtained from the university’s institutional review board, the school district, the school principal, and the PE teachers. Additionally, parental consent and child assent forms were obtained prior to the study.

Measures
Demographic variables. Self-reported background information, such as grade, age, sex, and race, was obtained from the questionnaires to characterize participants.

Perceived need support. A previously validated self-reported inventory was used to assess participants’ perceived need support from PE teachers. Specifically, perceived need support was assessed using 15 items based on the recommendation of Standage et al. (2005). Example items include “My physical education teacher conveys confidence in my ability to do well in the course,” “The physical education teacher makes us feel like we are able to do the activities in class,” and “The physical education teacher encourages us to work together in practice.” The participants responded to these items with a scale ranging from 1 (strongly disagree) to 7 (strongly agree). Each item followed the stem “In my physical education class.” Evidence for the reliability of this self-reported inventory has been provided by Standage et al. (2005) and Zhang et al. (2011). The internal consistency of this inventory was satisfactory in the present study (see Table 1).

Psychological need satisfaction. Participants’ perceived psychological need satisfaction was assessed using a 15-item scale validated in previous research (Standage et al., 2005). Participants responded to items preceded by the stem “In my physical education class,” such as “I think I am pretty good at physical education,” “I can decide which activities I want to practice,” and “With the other students in this physical education class I feel supported.” All responses were made on 7-point Likert-type scales anchored by 1 (strongly disagree) and 7 (strongly agree). Previous work in PE has supported the internal reliability of this self-reported inventory by using Cronbach’s alpha coefficients (Standage et al., 2005; Zhang et al., 2011). The internal consistency of this scale for the present sample was satisfactory (see Table 1).
Self-determined motivation. To assess students’ self-determined motivation, a physical education-modified perceived locus of causality (PLOC) scale developed and used by Goudas, Biddle, and Fox (1994) was employed. The stem for the items was “I take part in my physical education class.” Example items (20 items, four for each subscale) include “because of the enjoyment that I feel while learning new skills or techniques” (intrinsic motivation), “because it is important for me to do well in physical education” (identified regulation), “because I will feel bad about myself if I didn’t” (introjected regulation), “because I will get into trouble if I don’t” (external regulation), and “but I really don’t know why” (amotivation). Students responded to each item on 7-point Likert scales with responses ranging from 1 (strongly disagree) to 7 (strongly agree). In the PE domain, the PLOC has been found to be reliable and valid (Goudas et al., 1994; Ntoumanis, 2001).

A composite index of self-determined motivation, the relative autonomy index (RAI), was calculated to facilitate testing the hypotheses in this study because it is a conceptually meaningful way of scoring PLOC (Goudas & Biddle, 1994). The RAI was computed using the individual scale average scores as follows: RAI = (3 x Intrinsic) + (2 x Identified) – (1 x Introjected) – (2 x External) – (3 x Amotivation). As an indicator of self-determined motivation, the RAI has been widely used in the physical activity field and the validity of this procedure has been frequently documented (e.g., Vallerand et al., 1997).

Perceived success. Two questions on a 5-point scale developed and used by Duncan (1993) were adopted in this study to measure students’ perceived success in PE. They were “How successful do you think you were in physical education this last semester?” and “How well do you think you did in physical education this last semester?” (1 = not successful/well at all, 5 = very successful/very much). The averaged value of these two items was used as a representative index of perceived success. The internal consistency of this scale for the present sample was satisfactory (see Table 1).

Future expectancies for enjoyment. Two questions derived from previous research (Duncan, 1993) were used to assess students’ future expectancies for enjoyment. They include the following: (a) How much do you think you will enjoy taking part in physical education next semester? (b) How much fun do you think it will be to do physical education next semester? Each question was scored on a 5-point scale ranging from 1 (not at all) to 5 (very/greatly). Students’ responses to the two questions were averaged and used to calculate a composite score. This scale has demonstrated validity and reliability in the PE domain (Duncan, 1993). The internal consistency of this scale was satisfactory in this study (see Table 1).

Table 1
Descriptive Statistics, Internal Consistency, and Correlations Among the Variables (N = 282)

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived need support</td>
<td>(.96)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Need satisfaction</td>
<td>.56**</td>
<td>(.81)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-determined motivation</td>
<td>.55**</td>
<td>.59**</td>
<td>(-)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived success</td>
<td>.31**</td>
<td>.55**</td>
<td>.46**</td>
<td>(.81)</td>
<td></td>
</tr>
<tr>
<td>Future expectancies</td>
<td>.43**</td>
<td>.52**</td>
<td>.62**</td>
<td>.56**</td>
<td>(.82)</td>
</tr>
</tbody>
</table>

M                     | 4.01  | 4.67  | -.98  | 3.98  | 3.67  |
SD                    | 1.40  | 1.08  | 11.52 | .89   | 1.11  |

Note. Cronbach’s alpha coefficients are provided along the diagonal. **p < .01.
Procedures
Data for this study were collected from the questionnaires that were administered to middle school students during their regular PE classes. After contacting PE teachers, the researchers provided the teachers the written information concerning the nature and purpose of the study. A brief explanation of the study was then presented to the students during a PE class and all students were invited to participate in this study. The students were informed that they could withdraw from the study at any time, that their responses would be confidential and remain anonymous, and that their PE teachers would not have access to their responses. The researchers provided necessary instructions and were available to answer questions during the data collection. Students took 20 to 30 min to complete the questionnaires.

Data Analyses
Three steps were used to analyze the data. First, descriptive statistics and scale reliabilities were calculated. Second, Pearson product–moment correlations were used to examine the relationships among perceived need support from PE teachers, psychological need satisfaction, self-determined motivation, students’ perceived success, and future expectancies for enjoyment. Third, path analysis (Mplus 6.1, Muthén & Muthén, 1998–2010) was used to determine the role of perceived need support from PE teachers, psychological need satisfaction, and self-determined motivation in predicting students’ perceived success and future expectancies for enjoyment in PE.

In line with the recommendation of Hu and Bentler (1999), various indices of fit were examined to evaluate the adequate fit of the model to the data. These indices included the chi-square ($\chi^2$), the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the standardized root mean square residual (SRMR). Specifically, the chi-square statistic tests measures whether a statistically significant difference can be found between model and sample data and degrees of freedom ($df$) for each model estimated. Furthermore, RMSEA is an absolute measure of fit based on the noncentrality parameter. Values less than .08 obtained from the RMSEA suggest a well-fit model, whereas values exceeding .10 are typically undesirable (Browne & Cudeck, 1993). In addition, possible values for CFI indices range between 0 and 1. CFI values greater than .90 indicate a good fit of the model to the data, and values greater than .95 are typically considered an excellent fit (Hu & Bentler, 1999). Finally, as an absolute measure of fit, SRMR is defined as the standardized difference between the observed correlation and the predicted correlation. A value of 0 for SRMR indicates perfect fit, and a value less than .08 is generally considered a good fit (Hu & Bentler, 1999).

Results
Scale Reliability and Descriptive Statistics
Alpha coefficients, mean, and standard deviations are shown in Table 1. In the present study, all self-report measures demonstrated acceptable levels of reliability based on Nunnally’s (1978) criterion of .70. The mean score for self-determined motivation (i.e., RAI) was negative, indicating the participants as a whole were motivated more externally than intrinsically in this study. The mean score for other constructs was above the midpoint, indicating students had positive perceptions of need support from PE teachers, need satisfaction, and achievement outcomes such as perceived success and future expectancies for enjoyment in PE.
Simple Correlations

As shown in Table 1, Pearson product–moment correlations analyses revealed a pattern of significant correlations among the perceptions of need support from PE teachers, psychological need satisfaction, self-determined motivation, perceived success, and future expectancies for enjoyment in PE. Consistent with the previous studies (Standage et al., 2005; Zhang et al., 2011), need support from PE teachers was positively correlated with need satisfaction, self-determined motivation, and achievement outcomes. Need satisfaction was positively associated with self-determined motivation and achievement outcomes. Additionally, self-determined motivation was also positively related to achievement outcomes such as perceived success and future expectancies for enjoyment in PE in the present study.

Path Analyses

The hypothesized model was tested using Mplus (v.6.1, Muthén & Muthén, 1998–2010). The model provided a good fit to the data according to suggested criteria (Browne & Cudeck, 1993; Hu & Bentler, 1999): RMSEA = .055, CFI = .997, SRMR = .013. As shown in Figure 2, all paths in the hypothesized direct effects from perceived need support to need satisfaction, from need satisfaction to self-determined motivation, and from self-determined motivation to future expectancies for enjoyment and perceived success were significant (Zs = 11.29, 7.34, 8.71, and 3.53, respectively, all ps < .001). Future expectancies for enjoyment and perceived success correlated with each other significantly (Z = 5.29, p < .001). Besides, the direct effects of perceived need support to self-determined motivation, as well as from need satisfaction to future expectancies for enjoyment and perceived success, were also significant (Zs = 5.91, 4.23, and 7.04, respectively, all ps < .001).

![Figure 2. Final Structural Model of the Variables (N = 282)](image)

The mediation effects for the two mediation pathways were tested by Sobel’s (1982) test of mediation effects. Sobel’s test result supported the hypothesized mediations. That is, need satisfaction partially mediated the effect of perceived need support on self-determined motivation, and self-determined motivation significantly mediated the effect of need satisfaction on future expectancies for enjoyment (Z = 5.03, p < .001) and perceived success (Z = 3.06, p = .002).

Discussion

The main purpose of this study was to determine whether perceived need support from PE teachers, psychological need satisfaction, and self-determined motivation can predict students’ achievement outcomes such as perceived success and future expectancies for enjoyment in PE by
testing a hypothesized model. This study represented a logical extension of the self-determination theory and Vallerand’s (2000) proposed motivational sequence based on previous research works (e.g., Zhang et al., 2011). The positive relationships among perceived need support from PE teachers, psychological need satisfaction, self-determined motivation, perceived success, and future expectancies for enjoyment were supported. Furthermore, the mediating role of need satisfaction and self-determined motivation on perceived success and future expectancies for enjoyment in PE were supported, which replicates and extends previous research evidence (Standage et al., 2005; Zhang et al., 2011). Need satisfaction significantly mediated the effect of perceived need support on self-determined motivation, and self-determined motivation significantly mediated the effect of need satisfaction on future expectancies for enjoyment and perceived success. The findings highlighted the contention that self-motivated students perceive themselves as having a higher level of perceived success and future expectancies for enjoyment (Ntoumanis, 2005; Standage et al., 2005; Zhang et al., 2012).

In the present study, self-determined motivation predicted students’ positive cognitive and affective outcomes such as future expectancies for enjoyment and perceived success. Therefore, to foster students’ higher levels of self-determined motivation in class, it is important to allow students the freedom to engage in the decision-making process whenever possible; to modify activities, space, and equipment to help students suit their individual needs; and to provide optimal challenges and various difficulties of a task for each student (Gao, Lodewyk, & Zhang, 2009; Gu et al., 2012; Hagger & Chatzisarantis, 2007; Standage et al., 2005; Zhang et al., 2012). For example, PE teachers can highlight the intrinsic reasons for activities and do it in an autonomy-supportive manner such as adopting a questioning approach, acknowledging competence, and using cooperative learning.

The results indicated perceived need satisfaction was the crucial contributor of the two achievement outcomes examined in the present study, suggesting that when students felt their psychological need was satisfied in their PE classes, they tended to be successful and express future enjoyment in PE. Thus, PE teachers should make every effort to ensure that activities are tailored to meet students’ current ability levels and maximize their perceptions of competence, autonomy, and relatedness (Gao et al., 2009; Standage et al., 2005; Zhang et al., 2011). Such effort can support or enhance students’ self-determination. Several strategies can be used to meet students’ psychological satisfaction in a quality PE program. For example, students should be given enough time to practice the motor skills without giving students a specific number that they should complete. Students should be instructed to focus on proper technique and be allowed sufficient time when learning a skill. PE teachers should provide positive and meaningful instructional feedback for students and make it easier for them to accept failure or make errors. Furthermore, teachers should instruct students to set personal achievement goals and emphasize personal improvement during the practice in class (Hagger & Chatzisarantis, 2007; Shen et al., 2010; Standage, Duda, & Ntoumanis, 2006).

More important, perceived need support emerged as a significant positive predictor of student need satisfaction and self-determined motivation in the present study. This finding supports the notion that perceived need support provided by PE teachers is essential for students’ motivation and subsequent achievement outcomes (Deci & Ryan, 2000; Standage et al., 2005). PE teachers can facilitate the development of school children’s motivation and achievement outcomes through the supportive environment they create (Zhang et al., 2012). That is, need-supportive PE teachers can affect students’ psychological need satisfaction, self-determined motivation, and adaptive achievement outcomes in class (Zhang et al., 2011). To
create a need-supportive environment in PE classes, therefore, we recommend that PE teachers provide students with choice as often as possible, involve students in the decision-making and goal-setting processes, acknowledge students’ perspectives and feelings, provide positive and appropriate informational feedback, focus on self-improvement rather than social comparison, highlight the importance of perseverance and effort, demonstrate or establish peer learning groups, give students cooperative tasks with a clearly defined goal, and develop positive teacher–student and student–student relationships based on respect, trust, and caring (Standage et al., 2006; Zhang et al., 2012).

It is noted that no significant direct relationship was found between perceived need support provided by PE teachers and students’ achievement outcomes such as perceived success and future expectancies for enjoyment in the current study. The results indicated that psychological need satisfaction and self-determined motivation mediated the relationship between need support and students’ motivational outcomes. Thus, PE teachers should create a need-supportive environment to enhance students’ psychological need satisfaction and self-determined motivation, which in turn increases their adaptive achievement outcomes such as perceived success and future expectancies for enjoyment in PE. This finding replicated and extended previous research evidence (Standage et al., 2006; Zhang et al., 2011).

Although the present results provide additional support for the utility of SDT and the HMIEM in the examination of middle school students’ motivation in PE, one limitation is that the measures of need-supportive environments created by PE teachers, need satisfaction, motivation, and students’ achievement outcomes were self-reported. Future research should include objective assessment or nonstudent-based assessment of the contextual factors and motivational behaviors in order to explore more fully what contributes to the students’ perceptions of the social environment and adaptive behaviors. In addition, the correlational nature of this study does not completely support a causal inference. A longitudinal research design or experimental research design is needed in the future work. Finally, the participants were recruited from one single school in the present study. Future studies are needed to obtain a stratified random sample from multiple schools to increase the generalizability of the findings.

In conclusion, the major contribution of this study was that it examined the direct and indirect influences of a need-supportive physical activity environment and need satisfaction on students’ self-determined motivation and achievement outcomes in middle school PE. This study adds to our knowledge base on student motivation by providing empirical evidence that students’ perceived need satisfaction has a direct effect, but also an indirect effect, on their adaptive achievement outcomes. The results of this study have provided us with a clearer understanding of social and individual factors to predict school students’ motivational outcomes in a middle school PE setting by testing a hypothesized model. Students are more likely to engage in PE when they are motivated and when PE teachers create need-supportive environments that enhance their choice, competence, and good interpersonal relations. Based on the findings of this study, creating a need-supportive physical activity environment, meeting or enhancing students’ basic psychological needs, and promoting self-determined motivation are three areas that we have identified as critical to students’ adaptive achievement outcomes, such as perceived success and future expectancies for enjoyment in PE. The results of this study also support the use of SDT and the HMIEM in understanding students’ motivational processes in PE.
References


Pedagogies for Teaching PE in the 21st Century

Rosa López de D’Amico
Universidad Pedagógica Experimental Libertador, Venezuela

Abstract

Pedagogy can be defined as the art, science, or profession of teaching. This can be easy to say yet complex in terms of educating a human being in a changing, demanding, competitive world. In the global context with all the available technology and scientific research, do all people agree on the importance of understanding the term pedagogy? How important is pedagogy in the training of professionals who will train others? Does everyone know about the history of pedagogy? Is it a standard term, or must it be evaluated and adopted only in terms of existing standards, norms, and patterns? Should our profession follow the tendency established by leading groups—meaning those with language or economic power? The word pedagogy is as old as civilization, which traditionally looks to its Greek etymology and how it has evolved in an educational context. The profession trains teachers to (a) review and reflect on their practice; (b) collaborate and discuss their practice with other professionals and students; and (c) be constantly creative, be innovative, and have fun with their teaching. These aspects have to be understood within different cultures, backgrounds, local economic development, and the possibilities of each individual. Individuals around the world do not have the same possibilities; cultures and societies have important differences, and these have to be embraced and considered when speaking about or addressing the needs some people might believe others have. Educational systems have been established with particular characteristics in each region; nevertheless, the influence of postcolonial education and globalization is present and must be analyzed by the proper regions and communities. The work teachers do impacts important aspects. Local communities need to be supported, and a comprehensive approach is required to work with local people, other professionals, and politicians. The 21st century professional also needs to listen to other voices and give them a chance to emerge. Pedagogues around the world can do this. Who is prepared to change?

Keywords: Pedagogy, education, physical education, sport, global, teaching

Rosa López de D’Amico is a professor, Universidad Pedagógica Experimental Libertador, Venezuela. Please send author correspondence to rlopezdedamico@gmail.com.

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Introduction

To speak about pedagogy is a complex task, and moreover, to speak about tendencies and views around the world is a challenge. This discussion looks at the principal difficulty and starts from the basics. The other element will be to share voices and perspectives from different contexts and especially from the wrongly called “minorities,” which in fact represent the majority based on numbers. This article begins with the basic definition of pedagogy in a broad sense, continues with a review from a historical perspective about pedagogy, and presents briefly the state of the art of physical education (PE) and sport in the world. Then it reviews the actual situation of the world population by reviewing the state of the millennium development goals and continues with considerations and concluding remarks. Discussion will continue, as it is a fascinating topic, and what is presented here is just the tip of the iceberg.

Pedagogy

To begin this presentation about pedagogy, let us look at basic dictionary definitions (Merriam-Webster, Diccionarios Rioduero Pedagogía, Diccionario de educación). They are all set together as they have common elements. Pedagogy is an art, the science, or profession of teaching; it establishes the principles and the goals toward which the educational act of learning and teaching is addressed. Pedagogy is connected with a comprehensive unity of the subject of education through the activity of the educator. Pedagogy arises when we reflect about the cultural assimilation of the community members. Pedagogy establishes the principles and the goals toward which the educational act should be addressed, connected with a comprehensive unity to the subject of education and through the activity of the educator. The pedagogical categories are student, education subject or cultural good, facilitator (Ramírez, 1999).

The word pedagogy comes from the Greek παιδαγωγέω (paidagōgeō), in which παῖς (país, genitive παιδός, paidos) means "child" and άγω (ágō) means "lead." So it literally means "to lead the child." According to Merriam-Webster.com, the Greek παιδαγωγός (pedagogue), in which παιδί (ped) means "child" and άγω (ago) means "lead," would also mean "to lead the child."

Luis Beltrán Prieto Figueroa (1984), a well-known Venezuelan educator, who also influenced Latin American education, indicated that “…for some pedagogy is a science; for others it is nothing more than a technique, some assign to it the category of art and there are many that connect it with the boundaries of philosophy” (p. 45).

The Argentinean pedagogue Nassif Ricardo (cite) pointed out that some people understand pedagogy as the identification and solution of a scientific educational problem; for other people, it is a group of rules that guide or should guide the educational praxis. Durkheim (cite) indicated that it is a discipline whose objective is to reflect about the systems and procedures of education in order to appreciate its value and to enlighten and guide the work of educators. For John Dewey (cite), pedagogy was the training theory of human beings. Every pedagogical proposal reveals a conception or a view of a human being; it is a process of constitution of a human being. Education is an art more than a science (Hubert, 1984).

To summarize, the following can be said about pedagogy:

• Since the 18th century, there have been movements to become independent.

• It is an independent science.
- It is a science that structures and educates.
- It works with value, cultures, interaction, and individuals.
- It is of practical nature.
- It works with human beings.
- It is connected with multiple disciplines such as philosophy, psychology, sociology, and biology, to mention a few.
- It is the science that studies education as a social phenomenon.
- It is the art of teaching.

In the second half of the 18th century, the term *pedagogy* appeared in courses connected to philosophy. Immanuel Kant (1724–1804) in his book *Pedagogy Treaty* published in 1803 is considered the first thinker to seriously attempt to formulate a systemic pedagogy. Johann Friedrich Herbart (1724–1804), the German educator, psychologist, and pedagogue, wrote the book *General Pedagogy*, which is considered the first attempt to present a systematic pedagogy. In France and England, the word *pedagogy* has been used since the 14th and 17th centuries, respectively. The term *pedagogy* was used in Spanish by father Siguenza in the 16th century and in the dictionary in 1884, meaning *art*.

Pedagogy and PE and sport share similar principles. In pedagogy, one principle is education, whereas PE educates and develops physical qualities. The other principle of pedagogy is training, whereas in PE, it is to train technical habits for life, sport, and psychophysical well-being (e.g., Ramírez, 2009)

**Review From a Historical Perspective**

The constitution of pedagogy as science is questionably new. Greeks, five centuries before Christ, used the Word *paidea* (*pais* = kid) to refer to the integral education of the child. Then from *paidea* it was generated *Paidogogía* (*pais* = kid and *agoo* = to conduct). Aristotle used the word; however, it was not used frequently. This section will summarize the contributions from various prominent personalities since ancient times, contributions linked not only to pedagogy but also with exercise and/or physical activity.

The Spartans (10th century, 345 BC) had a rigorous education system in which nutrition and physical exercise were relevant. The three types of teachings were *grammatistes* for arithmetic, *kitharistes* for music and dancing, and *Paedotribae* for sports. From the writings of Plutarc and Xenophon, we learn that the legislator Licurgus made it compulsory for Spartan women to have physical training to make them strong in mind and body. They had their own purposes, which are arguable, but the intention here is not to discuss it but to highlight the relevance they provided to men’s and women’s education (e.g., Nieto, 2007) clarify it/they. In Athens, there was an education for the body and spirit. The purpose was to have multilateral education in order to have harmonic development, that is, intellectual, moral aesthetic, and physical. In Athens, PE was more recreational. The legislator Solon made it compulsory for children to be sent to school. The Academy (*Akademia*) was founded by Plato in ca. 387 BC in Athens. Aristotle studied there for 20 years (367 BC–347 BC) before founding his own school, the Lyceum (*Likeium* in Greek). Before the Akademia was a school, the archaic name for the
site where it was built was Hekademia, the name which linked it to an Athenian legendary hero, Akademos or Hekademos.

During the Renaissance, relevant scientists studied the importance of physical (corporal) activity to the well-being of society. Besides the famous Leonardo da Vinci with his impressive studies of the body and the mechanics of movements, we find Francois Rabelais (1485–1553). This famous French scientist and writer in his controversial novel *Gargantua and Pantagruel* criticized scholastic education and supported the idea of a humanistic education in which creativity had to be developed and the activities had to be addressed toward a multilateral education of the child. He also dedicated an important space to PE (in the book, the father, Gargantua, exercises with games, a ball, jumping, running, swimming, bars, and a rope). He left some methodological considerations to appropriate practice of physical exercises. Other important characters are the humanists Thomas Moore (1478–1535), an English politician, and the Italian philosopher Tommaso Campanella (1568–1639), who, in their books *Utopia* and *The City of the Sun*, besides criticizing the feudal education system, considered that PE was an extraordinary element to the harmonious development of the personality. Consequently, the appropriate care for health and PE of all members of society had to be a matter of the state. They constantly enforced the universal principles of PE for men and women and highlighted the role of PE in the multilateral development of the personality.

**Important Personalities to the World of Physical Exercise**

The Italian humanist and teacher Vittorino da Feltre (1379–1446), who could be considered the father of PE, was the first person to develop a syllabus for PE. He not only taught the humanistic subjects but also specially emphasized religious and physical education; he included swimming, riding, and fencing. Da Feltre’s lessons were so enjoyable that his school was known as Casa Giocosa, “Merry House.” It soon became famous all over Italy, and noble children from other cities came to Mantua to study with da Feltre. In fact, so many young nobles were educated at Casa Giocosa that it also came to be called the School of Princes. Many of his methods were novel, particularly in the close contact between teacher and pupil and in adapting teaching to the ability and needs of the child. He also created special exercises for children with special needs or different abilities.

Zagalaz (2001) also references other important supporters of physical activity during the Renaissance. Juan Luis Vives (1492–1540), the Spaniard humanist, philosopher, and pedagogue, highlighted the importance of physical exercise for children with a more humanistic purpose than military. He also insisted on the importance of education for women in his books *The Teaching of Christian Women* in 1523 and *The Duties of Husbands* in 1528. Girolamo Merculiare (1530–1606), the famous Italian philosopher and physician, wrote the well-known book *De Arte Gymnastica*, which gave him fame. His studies of the attitudes of the ancients toward diet, exercise, and hygiene and the use of natural methods for the cure of disease culminated in the publication of *De Arte Gymnastica* in 1569. With its explanations concerning the principles of physical therapy, it is considered the first book on sports medicine. He is the first to theorize about the medical support to the gymnastics practice. Michel de Montaigne (1533–1592), the French humanist philosopher, writer, and politician, created the literary genre "the essay." He was one of the few humanists who regretted the conquest of the “New World.” In education, he proposed teaching with concrete examples and experiences more than through abstract knowledge. He insisted on education for children to make them stronger and free,
saying, “It is not enough to make the soul energetic, is it needed to strengthen the muscles.” He also promulgated the phrase “Mens sana in corpore sano” written by the Roman poet Juvenal.

Jan Amos Komensky (also known as John Amos Comenius, 1592–1670), the well-known Czech teacher, educator, and writer, became a religious refugee and one of the earliest champions of universal education, a concept eventually set forth in his book Didactica Magna (Great Didactic). He is considered the father of modern education and democratic pedagogic thought. He was first a teacher and an organizer of schools. In Didactica Magna, he outlined a system of schools similar to the existing system divided into four types of school: kindergarten, elementary school, secondary school, and university. Second, the influence of Comenius was in formulating the general theory of education. He is the first to formulate the idea of “education according to nature.” The third aspect of his educational influence was on the subject matter and method of education, exerted through a series of textbooks of an entirely new nature. Fourth, texts were based on fundamental ideas, among which is the distinguished idea of giving the child a comprehensive knowledge of his or her environment, both physical and social. Fifth, Comenius suggested making the acquisition of a compendium of knowledge a pleasure rather than a task and also making instruction universal.

John Locke (1632–1704), English philosopher and physician who was regarded as one of the most influential of Enlightenment thinkers, in his book Some Thoughts Concerning Education, referred to PE and conceptualized it as individual or social corporal activity that benefits education in general, stating it is an energetic way to keep the body strong and healthy, to have self-control, and to recreate the mind without ignoring the health, nutritional, and aesthetic principles.

Jean-Jacques Rousseau (1712–1778) was the Geneva philosopher, writer, and composer of 18th century Romanticism of French expression. His political philosophy influenced the French Revolution and the overall development of modern political, sociological, and educational thought. He gave great support to PE when he established the need for natural practice and the nature of physical exercises, along with the importance of cultivating the body as the fundamental component in education. His novel Émile, or On Education is a treatise on the education of the whole person for citizenship where he indicated the need to provide PE a place in pedagogy.

Johann Heinrich Pestalozzi (1746–1827), the Swiss pedagogue and educational reformer who exemplified Romanticism in his approach, is considered the first pedagogue. Many of his works explain his revolutionary modern principles of education. His motto was "Learning by head, hand, and heart." The first three “exterior” spheres—home and family, vocational and individual self-determination, and state and nation—recognized the family, the utility of individuality, and the applicability of the parent–child relationship to society as a whole in the development of a child's character, attitude toward learning, and sense of duty. PE is understood as a means to obtain strength and organic and mental resistance. He refers to integral education that goes from the spirit to the corporal, and vice versa

Johann Christoph Friedrich Guts Muths (1756–1852), teacher and educator in Germany, is especially known for his role in the development of PE. He introduced systematic physical exercises into the school curriculum, and he developed the basic principles of artistic gymnastics. He published the first systematic textbook in gymnastics in 1800, and his work on PE was translated into English and published in England under the title Gymnastics for Youth: or A Practical Guide to Healthful and Amusing Exercises for the Use of Schools where it became a standard reference.
Two important Russians included Mikhail Vasilyevich Lomonosov (1711–1765), a polymath, scientist, and writer whose contribution was to write and recommend to the Russian state the invaluable meaningful relevance of PE to develop and maintain a healthy society. Peter Frantsievich Lesgaft (1837–1909), teacher, anatomist, and physician, was the founder of the modern system of PE and medical-pedagogical control in physical training. Unity and integrity of all organs in the human body was the basis of Lesgaft’s system of the pointed exercises for both physical development and intellectual, moral, and aesthetic education. Outdoor games were his favorite means in both physical development and formation of the character of a child.

In Latin America, the most well-known is Simón Rodríguez (1769–1854), a Venezuelan, also known during his exile from Latin America as Samuel Robinson; he was a philosopher and educator and notably Simón Bolívar's tutor and mentor. He also embraced naturalistic teaching and highlighted the importance of teaching the spirit, as well as the body, to be free and independent. He struggled for inclusive education. His principal contribution was to teach all to be strong in mind and body and to learn to live with Mother Nature.

This section has presented interesting perspectives showing recognition of the importance of PE and physical exercises in the education process. Similarities exist in these famous voices. Professionals working in PE and sport should be proud that these famous personalities have dedicated words to highlight this area of knowledge. The implementation of PE and sport continues to be discussed and scrutinized as time goes by and as technology advances. But the situation of PE and sport in the education system is still weak. Policymakers do not understand the importance of PE and sport in education and thus struggle to understand the importance of this area, to update information, and to look for better practices. It is particularly here that questions arise: What has happened, and how will education manage?

**Pedagogy: Physical Education and Sport**

In terms of the situation with PE and sport in the educational system, this important quote from Zeigler (2011) illuminates the current situation:

> I believe physical activity education and educational/recreational sport competition are wonderful activities for all people of all ages and conditions throughout their lives. There is evidence that such activity will enable people to live more fully and also to live healthier lives longer! However, my fundamental point is that—for the good of humankind—we must build from the ground up with all people! As matters stand now, we do a fair to poor to “nil” job of physical activity education with the very large majority of youth (and somewhat worse for the “girl component of the mix”). (p. 218)

The situation described by Zeigler has been pointed out by many academics worldwide; many acknowledge the value of PE and/or exercise for human development and for the complete biopsychosocial development of the human being. But, in spite of this, in reality at schools, the work to promote it has been very poor. Many variables in regard to this have been discussed in the literature (e.g., Hardman, 2008; Hardman & Marshall, 2005). For example, see Hardman's (2008) presentation of the global situation about PE policy implementations in Table 1.
Table 1

Implementation of Physical Education: Global/Region (%) (Hardman, 2008, p. 8)

<table>
<thead>
<tr>
<th>Global/Region</th>
<th>%</th>
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<tbody>
<tr>
<td>Global</td>
<td>79</td>
</tr>
<tr>
<td>Africa</td>
<td>60</td>
</tr>
<tr>
<td>Asia</td>
<td>33</td>
</tr>
<tr>
<td>Central/Latin America</td>
<td>67</td>
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<tr>
<td>Europe</td>
<td>89</td>
</tr>
<tr>
<td>Middle East</td>
<td>67</td>
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<tr>
<td>North America</td>
<td>33</td>
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So in spite of the acknowledgement and historical perspectives that support the importance of PE and sport for human development and its relevance in the education system, we still find that it is not implemented 100% in any region of the world. Now, to speak from a global perspective and what comes next, it is important to have a reference from a broader view that looks at the needs of the world population. One of the most updated, but also officially accepted, references is the list of millennium development goals developed by the United Nations (UN):

1. End Poverty and Hunger
2. Universal Education
3. Gender Equality
4. Child Health
5. Maternal Health
6. Combat HIV/AIDS
7. Environmental Sustainability
8. Global Partnership

So discussion of pedagogies, and general guidance in terms of pedagogy, requires a close examination of the situation worldwide, looking at the actual situation of some of the goals established by the UN as priority. All of them are important, but briefly the situation of some of them can be highlighted.

Looking at the Goal 1, End Poverty and Hunger, disparities within and among regions are found in the fight against hunger (UN, 2011). Teaching a child while he or she is hungry is hard, so although what a teacher can do in this situation is arguable, we need to realize that this reality is not just a fact in developing countries. Similar situations can be found in developed countries as well.

In terms of Goal 2, Achieve Universal Primary Education, the following facts (UN, 2012a) are noted: (1) Enrollment in primary education in developing regions reached 89% in 2008, up from 83% in 2000. (2) The current pace of progress is insufficient to meet the target by 2015. (3) About 69 million school-aged children are not in school; almost half of them (31 million) are in sub-Saharan Africa, and more than a quarter (18 million) are in Southern Asia. (4) Hope dims for universal education by 2015, even as many poor countries make tremendous strides. (5) Sub-
Saharan Africa and Southern Asia are home to the vast majority of children out of school. (6) Inequality thwarts progress toward universal education. These facts reflect that still in the global village, millions of children do not have access to primary education, and the total number of primary-aged children in the world who are not enrolled in school, 42% or 28 million, live in poor countries affected by conflict (UN, 2011, p. 21). Some of them are the ones of which the world is aware. Over the decade, the share of girls in the total out-of-school population dropped from 58% to 53%.

Goal 3, Promote Gender Equality and Empowerment of Women, includes awareness of many organizations that have fought for gender equality (e.g., International Association of Physical Education and Sport for Girls and Women since 1949). Other organizations have promoted equality in their legislation articles, but it has not been achieved. In education, in 2008, 96 girls for every 100 boys were enrolled in primary school and 95 girls for every 100 boys in secondary school in developing regions (cite). But, “for girls in some regions, education remains elusive” (UN, 2011, p. 20). The report (UN, 2011) highlighted the following: (1) Poverty is a major barrier to education, especially among older girls. (2) Women are largely relegated to more vulnerable forms of employment. (3) Women are overrepresented in informal employment, with its lack of benefits and security. (4) Top-level jobs still go to men, to an overwhelming degree. (5) Women are slowly rising to political power, but mainly when boosted by quotas and other special measures. The global share of women in parliament continues to rise slowly and reached 19% in 2010, far short of gender parity (IDEM spell out).

Goal 4, Child Health, looks at “reduced child mortality.” To read about this topic at this stage of human civilization sounds impressive, but the truth is, that it is a reality for awareness in spite of the fact that many people might have thought that this does not happen in the world today unclear. not all people are aware that child mortality happens in the world today?.

The UN report (2012b) indicated the following:

- The number of children in developing countries who died before they reached the age of 5 dropped from 100 to 72 deaths per 1,000 live births between 1990 and 2008.
- Almost 9 million children still die each year before they reach their 5th birthday.
- Child deaths are falling, but not quickly enough to reach the target.
- Revitalizing efforts against pneumonia and diarrhea, while bolstering nutrition, could save millions of children.
- Recent success in controlling measles may be short lived if funding gaps are not bridged.
- The highest rates of child mortality continue to be found in sub-Saharan Africa, where, in 2008, 1 in 7 children died before their 5th birthday.
- Of the 67 countries defined as having high child mortality rates, only 10 are currently on track to meet the millennium development goals target.

The world is facing serious problems related to environmental sustainability with biodiversity, conservation, water supply in many places of the world, and millions of people who do not have access to safe drinking water or have minimal sanitation services (UN, 2011, p. 48).
Goal 8, Global Partnership, refers to developing a global partnership for development. Debt burdens have eased for developing countries and remain well below historical levels for most donor countries. Aid remains well below the UN target of 0.7% of gross national income. Demand is growing for information and communications technology. The reality is that two thirds of the world’s population has yet to gain access to the Internet; 74% of inhabitants of developed countries are Internet users, compared with only 26% of inhabitants in developing countries (UN, 2012c).

Knowledge is power and communication is power. Statistics have shown that access to the Internet is lower than desirable throughout the world (e.g., Miniwats Marketing Group, 2012), yet science and technology could impact the population as a whole. The World Bank presents a statistic in terms of technological innovation that is often fueled by governments, drives industrial growth, and helps raise living standards. Data presented aims to shed light on the technology bases of each country: research and development, scientific and technical journal articles, high-technology exports, royalty and license fees, and patents and trademarks. However, limited information is available from some areas in the world (The World Bank, 2012), so it is arguable that the information is available to all.

People also tend to believe that plenty of information and communication is available worldwide through publications. Nevertheless, the information that people consider in the statistics emphasizes what is traditionally presented in the English language. Not enough knowledge and information is available that is written in other languages. Furthermore, most of the world’s population does not speak English (e.g., Sayles, 2012). Many people will not have the chance to read and to understand publications that are mostly published in English.

Returning to the topic of PE and pedagogy, a crisis exists with PE at school (e.g., Hardman, 2008). Several groups and a world summit have spoken to this crisis. Reviews have indicated that there are problems with syllabus implementation and rationale that frame the inclusion of PE and/or sport in the education system. Amusa (2010), a well-known African academic, indicated that

Physical Education and Sport are not new to Africa. Rather what is new is the western model. The practice of PE and Sport in Africa is deeply rooted in the cultural fabric of its diverse ethnic communities…. The history of PE and Sport in Africa is that of “progressive-retrogression”, that is to say, you take one step forward and two steps backwards, meaning the journey will never be completed. As a continent, Africa has not enjoyed peace and tranquility necessary to stabilize its development…. Most African countries still implement the PE and Sport curricula similar to those in the western world. There is really nothing new.

The situation presented here indicates a reality that is found in many developing countries, most of them with a history of colonization. Many countries are still looking for what works in other places to imitate that without considering the diverse realities of needs that the locality or country might have. Support is not strong for endogenous development. It might exist in other areas, but in PE and sport it seems to move slowly.

Considerations

Now, what can be expected of a PE and/or sport course in the education system? What are the implications for pedagogy? A child should have access to education in which PE and/or sport classes are provided that allow him or her to participate in games and recreational
activities (e.g., D’Amico, 2007). The child should have the chance to experience diverse sport activities and also to create life habits of physical activity. Maybe the child could consider getting involved in sport development, but for sure the child should receive the necessary habits and preparation through education for personal development. Thus, the pedagogical model applied to a country should

- be based on its traditions, realities, perspectives, and goals for a better world;
- promote development as well as independence;
- review the educational model as it affects the individuals and consequently the community;
- look at its local needs but not be isolated; and
- connect the educational model with the reality in the community.

This demands that the trainers of future PE teachers look at ways to provide enough tools for their development as professionals once they finish their preparation. It requires the promotion of critical thinking, reflection, dissemination of concepts, education of teachers, and so forth. These are needed to improve the quality of teaching and coaching in PE as a means for a sport pedagogy for all levels and for all (Dinold, 2011). So, where to go? How do we work with pedagogy? To look at this answer, interesting philosophers and their views toward pedagogy are listed below.

Paulo Reglus Neves Freire (1921–1997) was a Brazilian educator and philosopher who is generally considered to be "the inaugural philosopher of critical pedagogy." He is best known for his influential work, Pedagogy of the Oppressed, which is considered one of the foundation texts of the critical pedagogy movement. Freire (2004) was convinced that education makes sense because women and men learn that through learning they can make and remake themselves, because men and women are able to take responsibility for themselves as beings capable of knowing—of knowing what they know and knowing what they don’t. (p. ??)

Freire’s pedagogy visualized that the center of the curriculum would use the fundamental goal based on social and political critiques of everyday life. Freire’s praxis required implementation of a range of educational practices and processes with the goal of creating not only a better learning environment, but also a better world. Students are driven to recognize connections between their needs and experiences with the social context in which they live and the education they receive. In this way, a meaningful process is going to stay with them and produce their own and community transformation.

Orlando Fals Borda (1925–2008), Colombian researcher and sociologist, was an important Latin American thinker and one of the founders of participatory action research. He supported the idea of an education based on action research in a holistic way in which all members of the community participate. Research is understood as an interaction, a mutual learning dialogue with mutual confidence essential between the researcher and the participants. Action research is multidisciplinary, applicable to both micro or macro universes of study (small communities or big societies). The syllabus should be concerned about the changes in society; education should look for respect among members of society and responsible citizenship, to defend peace and
tolerance among interpersonal and public matters. Education should motivate creativity and dynamic participation through an active and participant school unclear.

These thinkers who have influenced the education process in the 20th century are no doubt referring to humanism and the need to make education more useful to all its participants. The ultimate goal is a human being who is healthy in mind, spirit, and body, who is able to live in a society in which values such as tolerance, peace, and mutual understanding are important. The following ideas are from Rigoberta Menchú (1959), an indigenous Guatemalan of the K'iche' ethnic group. Menchú (2001) has dedicated her life to publicizing the plight of Guatemala's indigenous peoples during and after the Guatemalan Civil War (1960–1996) and to promoting indigenous rights in the country. She received the 1992 Nobel Peace Prize. In her speech to the Assembly of First Nations, Grand Council of The Crees, in Canada on September 03, 2001, she requested:

Let’s work together. There are immense prejudices that we have to eliminate, and that is a social fight. At schools, there must be reforms; at universities, there must be reforms; it is that education must be thought of in another way. It has to be a relationship based on confidence, mutual respect, equity, equality in conditions, and moreover, to give each other a chance. We can give us a chance…

Reflection

A diverse and rich world exists today, with a huge variety of races, beliefs, traditions, and social differences. Physical activities, PE, and/or sport practices are diverse as well. Each country needs to look at what not only works for each of them, but also what respects the principles of education, physical literacy, and long life habits with respect and tolerance and to give everybody a chance. Society must be educated about the benefits and the importance of exercise for the sake of human nature itself. Academics need to open more spaces to publish that might not be in the most famous databases read by a minority academic community. That knowledge must become accessible to the majority in a language that is understandable. In spite of all the difficulties and existing inequalities observed in the statistics and the goals that have to be achieved according to the millennium development goals, a lot can be done from educational practice. The pedagogies of the 20th century need in principle to be more humanistic, inclusive, and tolerant, and everyone must make all possible efforts so that all children, no matter their background, race, gender, and physical condition, have the chance to do physical activity and create habits that will accompany them through the life span. Much can be gained if all join efforts!

References


**Dictionary entries should be as follows: Word. (Year). Title of dictionary (edition). City, Country: Publisher.**


Effects of a Behavioral Economy-Based Recess Intervention on the Physical Activity Levels of Elementary-Aged Girls

Kacey DiGiacinto
Elizabeth City State College, USA

Emily M. Jones
Sean M. Bulger
West Virginia University, USA

James M. Wyant
Fairmont State University, USA

Abstract

The purpose of this study was to determine the effects of a system of goal setting and positive reinforcement on physical activity levels of elementary-aged children who were identified as sedentary during school-based recess. **Method:** Single case changing-criterion design was employed. Participants were fourth and fifth grade females identified as sedentary during recess ($N = 8$). Participants wore pedometers during a daily recess period during a 6-week intervention that included individual daily step goals and incentives. Criterion for change included participant ability to meet/exceed daily step goals on the majority of days of the week. **Results:** Five distinct linear, step-wise, and progressive interactions between independent and dependent variables were identified. Cases that reflected like patterns were grouped for interpretation. Seven of the eight participants exhibited meaningful physical activity increases across the intervention (average +487 steps). **Discussion:** Key findings suggest environmental modifications to recess settings can positively influence moderate-to-vigorous physical activity of elementary-aged females, individual differences including impulsivity and sensitivity to reinforcers are crucial when designing recess-based interventions, and initial goal setting can positively and negatively affect experimental control and participant compliance. **Conclusion:** Effectively structured incentive-based programs during school recess can effectively increase physical activity of sedentary fourth and fifth grade females.

**Keywords:** Recess, school-based physical activity, behavioral economic intervention
Introduction

In the United States, recess remains at the center of a vigorous debate regarding its role in schools and the associated physical, cognitive, emotional, and social benefits for children (Ramstetter, Murray, & Garner, 2010). The purported benefits of recess include greater physical health and well-being in addition to the development of various “life skills such as cooperation, taking turns, following rules, sharing, communication, negotiation, problem solving, and conflict resolution” (National Association for Sport and Physical Education [NASPE], 2006, p. 1). Despite these benefits, recess time is being significantly reduced in some schools as administrators struggle with federal mandates for improved academic performance (Siedentop, 2009). Given the increased prevalence of childhood obesity resulting from poor nutritional habits and insufficient physical activity behavior (NASPE, 2006), any school policies that seek to further restrict physical activity time for children should be met with considerable resistance by community members, parents, teachers, and children. Although, stakeholders will find it difficult to make these arguments if the time already allocated for recess in schools is not being maximized through the use of evidence-based strategies and associated recommendations for best practice.

In relation to physical activity, recess has been identified as an important component of a comprehensive school physical activity program by a variety of professional and governmental organizations (e.g., American Heart Association, 2006; National Association of Early Childhood Specialists in State Departments of Education, 2002; NASPE, 2008; U.S. Department of Health and Human Services, 2000). Based on these various position statements and the supporting literature, a child’s participation in recess can clearly make an important contribution to the accumulation of a health-enhancing amount of moderate-to-vigorous (MVPA) activity across the school day (Robert Wood Johnson Foundation, 2007). Toward this key outcome, NASPE (2006) described recess as a necessary educational component in elementary schools characterized by unstructured play opportunities and discretionary time for children to engage in health-enhancing and enjoyable forms of movement and activity. The related guidelines for best practice describe that recess should be scheduled daily, but not immediately before or after physical education (PE) classes. Furthermore, NASPE (YEAR) recommended that schools should (a) use recess as an unstructured complement to formal PE, not as a replacement; (b) avoid withholding recess for the purpose of behavior management or academic remediation; (c) afford children access to adequate amounts of equipment and physical space for play; (d) use outdoor spaces when possible to maximize participation; (e) establish safety rules and teach procedures for conflict resolution that minimize problem behaviors such as aggressiveness and bullying; and (f) provide qualified adult supervisors who intervene when needed. Although these types of recommendations for best practice are extremely informative, researchers and practitioners must also consider various behavior change theories and models that pertain to recess as a setting or context for a school-based physical activity intervention.

A number of behavior change models and related theoretical constructs have been applied to school-based physical activity intervention including social cognitive theory, social influences theory, self-regulation theories, organizational change theories, and ecological theories (Ward, Saunders, & Pate, 2007). Due to the less structured nature of recess, children are provided with frequent decision-making opportunities that lead to higher or lower levels of MVPA depending on choices they make such as the activity type, duration, and intensity; peers with whom they socialize; structure or organization of game play; and selection and use of available equipment.
DIGIACINTO, JONES, BULGER, AND WYANT

Given this fact, behavioral choice theory, or behavioral economics, can be particularly instructive in that it provides a theoretical framework for studying the different factors that influence whether people choose to be physically active or sedentary (Epstein & Roemmich, 2001; Epstein, Saelens, & Giancola O’Brien, 1995). Behavioral economic approaches can be used to increase understanding of “how people allocate their time among alternative behaviors and stimulate new ideas for behavior change” (Epstein et al., 1995, p. 114). During recess, for example, a number of environmental modifiers and individual differences interact to influence whether the child chooses physical activity over competing and concurrent sedentary behaviors such as reading or socializing with peers (Epstein & Roemmich, 2001). When confronted with the opportunity to engage in physical activity or sedentary behavior, children are influenced by these environmental modifiers (access, availability, reinforcing value, and timing) and individual differences (impulsivity and reinforce sensitivity; Epstein & Roemmich, 2001). The following subsections provide a brief review of literature related to the environmental factors and individual differences that have been found to influence children’s physical activity behavior during recess.

Environmental Factors

The amount of time that children spend engaged in MVPA during recess is significantly influenced by the “the organization and activity opportunities provided by playground design and equipment” (Siedentop, 2009, p. S174). Several studies have investigated the positive effects of environmental modification on MVPA levels during recess, and a range of key findings have emerged: increased access to adequate amounts of cost-effective playground equipment such as balls, jump ropes, and hula hoops results in higher levels of physical activity (Verstraete, Cardon, De Clrecq, & De Bourdeaudhuij, 2006) and a well-maintained and properly supervised environment for informal play needs to be established (Ramstetter et al., 2010). Unfortunately, economic considerations and policy decisions in schools often prohibit these types of environmental enhancements from taking place including training and pay for school personnel or adult volunteers who oversee recess programming (Ramstetter et al., 2010; Siedentop, 2009).

In response to public health concerns regarding childhood obesity, some researchers have called for increased structure to ensure that all children are achieving higher levels of MVPA during recess (Ramstetter et al., 2010). Proponents of increased structure have argued that “children often need help in developing games and require suggestions and encouragements to participate in physical activities. Having trained adults model and lead students in games provides a modicum of protection from unwanted playground aggression and behaviors” (Ramstetter et al., 2010, p. 522). Critics have argued that in some situations, structured recess has replaced PE, requires special training for staff members or adult volunteers providing supervision, and undermines many of the social, cognitive, emotional, and physical benefits associated with less structure. Alternatively, a number of environmental modifications have been recommended to encourage physically active recess without additional planning, managing, and instruction by adults: “offer well-kept playground equipment; games/boundaries painted on the ground; and instruction for children in games such as four square or hop scotch” (Ramstetter et al., 2010, p. 523).
Individual Differences

Across the related literature, gender differences have been identified as a critical determinant of children’s physical activity levels during recess. Numerous studies have demonstrated that boys tend to be more active than girls, and those differences are greater in unstructured play settings (e.g., Beighle, Morgan, Le Masurier, Morgan, & Pangrazi, 2006; Parrish, Iverson, Russell, & Yeatman, 2009; Sarkin, McKenzie, & Sallis, 1997). Beighle et al. (2006) found that boys and girls spent 78% and 63% of their recess time engaged in physical activity, respectively. Similarly, Parrish et al. (2009) studied the physical activity levels of children at 13 elementary schools with boys being more physically active than girls in all but one school. These gender-based differences regarding children’s physical activity during recess are due in part to various social influences. Sarkin et al. (1997) indicated that gender-based expectations are likely to influence the types of recess activities toward which children gravitate. Specifically, boys tend to select large field and court sports involving balls (e.g., soccer, basketball, football) that inherently require higher levels of MVPA during game play (Ridgers, Stratton, & McKenzie, 2010; Sarkin et al., 1997). Additionally, these sports and the associated rules are often modified to increase the fluidity of game play during recess (Beighle et al., 2006). By comparison, girls have been found to prefer social forms of interaction that involve smaller groups (Ridgers et al., 2010), to engage in more conversation and sedentary forms of play requiring less energy expenditure and physical space (Ridgers, Stratton, Fairclough, & Twisk, 2007), and to wear clothing that is less conducive to highly active play (Parrish et al., 2009).

Differences in physical activity levels during recess extend beyond gender. In addition to normal weight girls, overweight boys and girls are significantly less active than normal weight boys during recess (Stratton, Ridgers, Fairclough, & Richardson, 2007). Although normal weight boys were found to participate in highly active games such as soccer, football, and tag variations, their overweight peers opted for less active games played in more confined spaces. Stratton et al. (2007) identified the overweight boys’ lack of cardiovascular endurance and motor skills as key factors that prevented them from engaging in the types of activities that their normal weight counterparts preferred. Within the recess setting, overweight children were marginalized because the structure (or lack thereof) only addressed the physical activity needs of normal weight boys whose activities took up large portions of the playground, forcing others to the periphery for smaller, less active games. In summary, individual differences such as gender and body composition may predispose children to higher or lower levels of MVPA during recess, and any attempt at behavioral intervention should focus on those children who are at greatest risk for being marginalized.

Purpose

Given the considerable number of environmental factors and individual differences that have been found to influence children’s behavior during recess, it is critical that researchers develop effective intervention strategies that increase the likelihood children will make appropriate decisions regarding their own physical activity. These interventions should initially focus on the groups of children who are at greatest risk for marginalization within an unstructured play environment. The purpose of this study was to determine the effects of a behavioral economy on the physical activity levels of girls during elementary school recess.
Method

Prior to the beginning of the study, the involved school received a small service grant from a nonprofit group to increase physical activity levels among students, faculty, and staff. As a result, this study was conducted within the broader context of a schoolwide intervention to increase physical activity during daily recess. All fourth and fifth grade students in the school participated in a 6-week recess program that involved the provision of semistructured activity choices, use of pedometers for self-monitoring, recording of individual daily step count data through use of activity logs, tracking and mapping of group step count or mileage, and establishment of an interdependent group contingency based on class step count or mileage. See DiGiacinto and Jones (2010) for a more detailed description of this schoolwide intervention and its initial use with second and third grade students within the same school. During its initial use with the young children, several classroom and PE teachers raised concerns that despite a high degree of interest and enthusiasm for the recess program, sedentary behaviors persisted among a number of students, suggesting that the interdependent group contingency and related reinforcement were not meaningful enough to facilitate behavior change among all students. Consistent with the literature, the majority of these sedentary students were girls. In response to this concern, researchers from a local university partnered with school personnel to develop an additional level of intervention using a behavioral economy system (personal goal setting and positive reinforcement) for those girls who were identified as sedentary. This additional level of intervention and its influence on physical activity served as the focus of this study.

Participants

After Institutional Review Board approval, members of the research team clarified the intent of the study with school administrators, classroom teachers, and PE teachers. As a result of those discussions, 30 students in the fourth and fifth grades were identified as being sedentary during recess and selectively recruited for participation in the study. The families of eight female students consented to participate in the supplemental physical activity intervention (use of personal goal setting and positive reinforcement in combination with the interdependent group contingency already in place for all students).

Settings

The study was conducted in a rural elementary school located within the mid-Atlantic region of the United States. The school has a total enrollment of approximately 500 students in grades pre-K–5. As a component of the previously described schoolwide intervention, students were required to wear pedometers during recess for the purpose of measuring and monitoring their own physical activity levels across a 6-week period. At the end of each recess period, classroom teachers assisted students in recording their step count data, tabulating results for the class, and graphing group results using a map of the United States. Classes competed against each other to see which one traveled the greatest distance, and each student’s daily step count contributed to the class total (interdependent group contingency). The classes were permitted to select their own route on the map and the challenge was to visit as many states as possible within the prescribed time frame. Laminated copies of state flags were provided to each class when they crossed a new state line, as a form of positive reinforcement.

The recess periods were 30 min in length and students were provided with access to free play in the gymnasium or art, music, and remedial academics in the classroom. All bouts of free play were held in a medium-sized gymnasium across the study due to inclement weather.
The students were afforded three to four activity choices each day that were organized in a semistructured format to maximize use of limited space and equipment. The options provided to students were individualized activities (e.g., jump rope, walking, Frisbee) or small-sided game variations (e.g., basketball, football). It should be noted that these activity choices were not designed to replace free play but (a) to provide more attractive alternatives to sedentary pursuits (e.g., art, music, talking with friends), (b) to maximize the use of limited space and equipment (at any given point, approximately 50 to 100 students were in the gymnasium during recess), and (c) to provide a safe and equitable movement context for all interested students.

**Independent Variable**

The participants in the study engaged in all components of the previously described schoolwide physical activity intervention with their peers. This process included monitoring physical activity levels, recording daily step counts during recess, and tracking group mileage and mapping. The participants in the study received an additional level of intervention that included use of personal goal setting and reinforcement in the form of a behavioral economy system. The participants earned a sticker each day that they achieved their personal step count goals. At the end of the week, participants were awarded “dollars” for each sticker earned that could be saved and later exchanged in the school bookstore for incentive prizes. This form of reinforcement was selected because the “dollar” system was already in place within the school as a method for rewarding appropriate behavior in classroom settings.

**Dependent Variable**

The dependent variable was step count as measured by the Yamax Digi-Walker NL-800 pedometer. The NL-800 was selected because it stores up to 7 days of step count data in its memory. At the end of each week, members of the research team collected the step count data from each participant’s pedometer as a reliability check against their written activity logs. In the event of a discrepancy in recording, the actual step count data recorded on the pedometers were used for the purpose of data collection. The reliability and validity of the Digi-Walker pedometers as a measure of children’s physical activity has already been established through several research studies (e.g., Nevill, McKee, Boreham, & Murphy, 2005).

**Experimental Design**

A single case method with a changing-criterion design was employed to determine the effects of a behavioral economy (personal goal setting and positive reinforcement) on the physical activity levels of elementary-aged girls, who were identified as being sedentary during daily recess periods. The criterion was increased in graduated increments each time that the participant met or exceeded their daily step count goal on the majority of days during the previous week.

**Procedures**

After the recruitment phase of the study, all participants met with members of the research team for a group orientation. The participants received instruction in wearing their pedometers correctly, filling out activity logs, and goal-setting procedures. The participants wore the pedometers during recess for a 1-week period to acclimate them to the technology and pilot test all data collection procedures. The classroom and PE teachers who supervised that particular recess period were also instructed in the correct use of the pedometers and asked to specifically observe the study participants to ensure pedometers were being used properly in order to minimize measurement error.
Participants then completed a 1-week baseline as a means for determining a preliminary daily step count goal. The highest daily step count during baseline served as the initial goal for the 6-week intervention that immediately followed. Each participant was informed of the initial goal by means of the activity log sheet, which included a designated area for weekly goals to be written and updated throughout the intervention. Procedures for updates and modifications to goals included weekly monitoring of participant activity logs. At the end of each week during the intervention, the research team checked the written activity logs to calculate the mean daily step count total for each participant and determine the number of days that daily step count goals had been achieved. As a measure of reliability, the 7-day recall function on the pedometers was used to verify the accuracy of participant data recording. If the step count goal was met on the majority of days that week, the research team incrementally increased the goal for the following week. If participants did not meet the step count goal on the majority of days of the week, the goal remained static for the following week. In the event that a goal was consistently not met across 2 weeks of the intervention, the step goals were evaluated and reduced if necessary. Changes in step count goal from week to week were subject to the professional discretion of the researchers and based on periodic individual interactions with participants and the activity logs. Any changes to participant goals were noted on the activity log.

During the weekly review of participant activity logs and goals, the research team placed stickers on the participant activity logs for each day that the goal was achieved. At the same time, the research team calculated school “dollars” earned across the week, awarding 1 “dollar” for each day the step goal was met. Participants received the positive reinforcements (school currency and stickers) and a new/modified goal written on their activity log at the beginning of each week of the intervention. The reinforcements were delivered to the participants through their classroom teacher.

Social Validity

A social validation questionnaire was given to each participant at the end of the study. The questions related to the goal-setting process including activity preferences, effectiveness of the provided reinforcement, and perceived difficulty of achieving step count goals.

Data Analysis

Participants were selectively recruited based upon their observed sedentary behaviors during recess and related individual differences; each girl was treated as a separate case and served as her own control. Visual inspection of data was used to determine whether physical activity level changes matched the changing criterion. Criteria for visual inspection included (a) examination of the patterns and relationships among average daily step count (ADSC), (b) weekly goal and step count trends, (c) frequency of personal goal achievement, and (d) latency of change. To ensure trustworthiness, the data were initially reviewed by researchers independently and then analyzed collectively to evaluate independent analyses and establish agreement in observed data trends. We hypothesized that in cases with strong experimental control, the dependent variable would increase in a step-wise manner across the intervention in correspondence with changes in the established criterion. Responses from the social validation questionnaire assisted in understanding the level of difficulty participants perceived in meeting the goals.
Results

Analysis of the data revealed patterns of interaction between the independent (goal and reinforcers) and dependent (ADSC) variables. Five distinct patterns were identified and cases that reflected like patterns were grouped for interpretation. The five patterns were Excellent, Good, Moderate, Mixed, and Poor and reflect the linear, step-wise, and progressive interactions between the independent and dependent variables (see Figure 1). The following subsections outline the characteristics of each pattern.

Excellent Group

Participants in the Excellent group \((n = 2)\) demonstrated a meaningful increase in physical activity behaviors during recess and had strong experimental control. The average change in ADSC for participants in the Excellent group across the intervention was +722 steps, and the changes aligned with both incremental and step-wise increases in weekly step goals. These participants consistently achieved their weekly step goals, thus earning a greater number of incentive “dollars” than any other group (collectively 36). Both participants indicated on the social validation questionnaire that their weekly step goals were “easy to meet” and reported participating in vigorous physical activity during the recess intervention (e.g., running around play space, playing tag with friends).

Good Group

Participants in Good group \((n = 2)\) demonstrated increases in recess physical activity levels across the intervention. The average change in ADSC for participants in the Good group was +615. Although the participants in this group demonstrated consistent incremental increases in step count, their activity levels did not consistently correspond with their goals. Upon analysis, the initial goals for both participants were overestimated and therefore unattainable. Once realized, the Week 3 goals were adjusted downward to properly align with participant activity levels. Following this, participants began to consistently meet or exceed assigned goals, earning a collective 22 incentive "dollars." Both participants in the Good group indicated that properly adjusted weekly goals were not difficult to meet and reported moderate and vigorous forms of physical activity during recess (e.g., running and walking around play space, playing games with friends).

Moderate Group

Participants in the Moderate group \((n = 2)\) demonstrated modest increases in physical activity across the intervention (average change = +199 ADSC). The Moderate group physical activity patterns were variable and reflected a zigzag pattern. The zigzag pattern represented occasions of meeting, exceeding, and then failing to meet step goals during the intervention period. Moderate group participants were less consistent in achieving their weekly step goals than any other group, earning a collective total of 25 incentive "dollars." Data from the social validation questionnaire revealed that these participants found that meeting the step goals was difficult. Participants reported engaging in light to moderate forms of physical activity throughout the recess intervention (e.g., playing kickball, walking, and swinging).
Figure 1. Weekly Participant Data Trends
Mixed Group

One participant represented the Mixed group (n = 1). Demonstrating an increase of 958 ADSC across the intervention, this participant had a pattern of physical activity with slight increases each week and weak experimental control. Although she met her goal seven times throughout the recess program and earned 7 incentive “dollars,” she did not meet the criteria for change at any point, resulting in a relatively unchanged weekly goal. On a regular occurrence during the intervention (more than half), this participant selected nonactive recess alternatives (e.g., music- or art-related recess).

Poor Group

One participant represented the Poor group (n = 1). Although this participant chose active recess on all days of the intervention, data showed a decrease of 1,362 ADSC. She met or exceeded her goals 28% of the days, met the criterion for change during 2 of the 6 intervention weeks, and earned 7 "dollars" across the intervention. The research team reduced the goals on several occasions in an attempt to better align with participant activity levels and individualize the goals for the needs of the participant, yet the changes in the goal did not have the effect on physical activity levels as anticipated. Response on the social validation questionnaire revealed that she had difficulty meeting her goal during recess because of fatigue-related reasons. She reported light to moderate forms of physical activity during the recess intervention (e.g., walking, running).

Discussion

Findings of this study support the role of recess in assisting elementary-aged children in accumulating health-enhancing amounts of MVPA across the school day (Robert Wood Johnson Foundation, 2007). All participants, with the exception of one, exhibited meaningful physical activity increases from baseline to Week 6 of the intervention. The daily step count increase observed among seven participants was 487 ADSC (range of 108 to 961 steps per day), which corresponds with previous recess physical activity change findings (Tudor-Locke, Lee, Morgan, Beighle, & Pangrazi, 2006). Extrapolated across an entire school year, these step count increases could represent a clinically significant change in schoolwide physical activity and may assist in children meeting the 12,000 daily step recommendations outlined by the Physical Activity Guidelines for Americans (U.S. Department of Health and Human Services, 2008). If this program were to be implemented over an entire school year, certain considerations relative to goal setting, value-added incentives, and incentive reduction schedules may need to be examined if sustainable change in physical activity levels remains the objective (see DiGiacinto & Jones, 2010).

The intervention employed in this study incorporated the following recommended behavioral strategies to increase the physical activity levels of elementary-aged females: (a) environmental modifications such as availability of new nontraditional recess equipment, (b) use of semistructured physical activity offerings during recess, (c) use of an interdependent group contingency, and (d) behavioral economy system involving individual goal setting and positive reinforcement. Key findings of this study reveal that environmental modifications to recess settings can positively influence MVPA of elementary-aged females, individual differences including impulsivity and sensitivity to reinforcers must be considered when designing recess-based physical activity interventions, and initial goal setting can positively and negatively affect
experimental control and participant compliance. These key findings will be discussed along with recommendations for future research.

Environmental Modifications

In this study, behavioral choice theory was used to examine factors that influence whether adolescent girls choose to be physically active or sedentary during recess. The features of the elementary recess intervention aligned with the two constructs of behavioral choice theory: environmental modifiers and individual differences (Epstein & Roemmich, 2001). Modifications to the recess environment included enhanced opportunities for group and individual game play and physical activity through supplying new equipment. These modifications were made in correspondence with recommendations of best practices for an elementary school-based recess environment (Ramstetter et al., 2010; Verstraete, Cardon, De Clercq, & De Bourdeaudhuij, 2006). This study provided students with a recess experience that adopted features of structured (Robert Wood Johnson Foundation, 2007) and nonstructured (Barros, Silver, & Stein, 2009) recess, which we have termed semistructured. The semistructured recess experience in this study embodied the following nonstructured characteristics: voluntary student participation in games, play, and recess activities; supportive, but not instructive, adult supervisors; and recess activities supplemental to skill acquisition in PE class (Ramstetter et al., 2010). The primary structured recess characteristic embedded within this intervention was that trained staff and supervisors encouraged and assisted students in getting organized for active participation (Ramstetter et al., 2010); we believe this was an important feature as it prompted typically sedentary students to join in large group, small group, or individual play. The adult supervisors introduced various options for active recess, including traditional and nontraditional games, gender-neutral activities, and activities/games that had been introduced in PE. Findings from this study aligned with Beighle et al. (2006), who described the positive influence that playground environment and recess activities had on the accumulation of physical activity in elementary-aged children. Although these data support environmental modifications to recess in the promotion of physical activity, the inclusion of recess variables such as structure and context, social support and influence, and new and unique activities appears to also be important to the elementary recess experience and physical activity of children.

Individual Differences

Behavioral choice theory describes two factors within the individual differences construct: impulsivity and sensitivity to a reinforcer (Epstein & Roemmich, 2001). Participant impulsivity (e.g., an individual's preference for smaller immediate rewards or larger delayed rewards) in selecting physically active recess choices throughout this study was rewarded on a delayed schedule. At the start of each intervention week, participants were provided an external reinforcer for their goal achievement for the previous week. For individuals who exhibited low impulsivity to rewards, this delayed reinforcement schedule may have well suited their nominal desire for immediate rewards of their physical activity choices. However, individuals with high impulsivity who possess an enhanced desire for immediate reward of their physical activity behaviors (Epstein & Roemmich, 2001) may have found this reinforcement schedule to be less effective. With the individual differences among participants, greater awareness and response to impulsivity in future interventions would likely enhance consistency of behavioral outcomes. An example of this could include modifying the reinforcement schedule based upon individual preferences that may involve smaller daily rewards for attaining goals or choosing nonsedentary (or less sedentary) recess behaviors, rather than receiving the rewards all at once.
Caution, however, should be exercised if extending and sustaining reinforcement schedules that accommodate high degrees of impulsivity, as the participants’ learned reliance on external reinforcers for goal attainment may be adversely affected.

The second individual difference factor described within behavioral choice theory is sensitivity to the reinforcer (Epstein & Roemmich, 2001). Sensitivity to the reinforcer is described as the perceived value an individual places on an external reinforcer or reward that is introduced as a result of a desired/desirable behavior. Participant sensitivity to reinforcers varies based upon the value associated with the reinforcer and can influence future motivation and decisions to replicate the behavior. The reinforcers in this study included semistructured physical activities during recess, rewards for meeting step count goals (i.e., stickers and school currency), and publically displayed progress of class step totals (i.e., shown on map in school hallway). Results indicated that although some participants found the reinforcers to be of high value, this effect was not observed for all participants. Participants who demonstrated patterns within the Excellent and Good groups met or exceeded weekly step goals regularly, earning rewards for days their goal was met or exceeded. These four participants collectively earned 58 reinforcers (school currency, average 14.5) across the 30 day intervention and appeared to value the currency as a sufficient motivator for increased recess physical activity. Participants in the Moderate and Mixed groups did not consistently meet or exceed their daily step goals. These three participants met their step goals erratically, collectively earning 28 reinforcers (average 9.3). The value of the reinforcer appeared to not outweigh the perceived cost of physical activity (e.g., physical exertion, getting sweaty). Similarly, the participant in the Poor group was inconsistent in meeting the step goals, earning only seven reinforcers across the intervention. Upon closer examination, perhaps additional social support from teachers or peers may have influenced this participant’s success, as she had prediagnosed special needs. Taking into greater account individual differences (Epstein & Roemmich, 2001) and necessary accommodations for participants with special needs may produce increased consistency in behavioral outcomes relative to physical activity and participant compliance.

**Experimental Control and Participant Compliance**

Sufficient experimental control, as demonstrated by incremental step-wise increases in both weekly goals and step counts across the intervention, was evident in four of the eight participants. Within the remaining four cases, strong experimental control was less evident. Findings point toward the importance of initial goal setting as a means of initiating experimental control and participants’ ability of meeting step goals. In the interest of increasing experimental control and participant compliance, the goals set at the beginning of a changing-criterion behavioral intervention must align with current levels of physical activity and be perceived as attainable by the participant. Initial goals that are set too high or perceived to be unattainable clearly do not produce meaningful increases or sustainable behavior change, whereas appropriate initial goals, coupled with the changing-criterion design, can produce meaningful and sustainable changes in recess physical activity behaviors in elementary-aged female children.

**Recommendations**

Based upon the findings of this study, two important considerations should be made in future research and recess intervention program development. First, children who are predisposed to sedentary behaviors during recess (e.g., overweight boys, overweight and normal weight girls) may benefit from tailored recess physical activity programs. Second, engaging participants
in the development and management of personal activity goals may result in positive goal attainment and behavior-based outcomes. This section describes these recommendations for future programming.

**Tailored Physical Activity Programs**

Considering individual differences and physical activity interests of children (Beighle et al., 2006), particularly children who are predisposed to sedentary behaviors (e.g., overweight boys, overweight and normal weight girls), the option of tailoring recess programs to meet these needs has potential to elicit enhanced physical activity levels and behavioral outcomes. Suggestions for tailored programming include assistance with goal setting, increased social support from peers or teachers, student-selected physical activity options, behavioral contracts for recess MVPA, student-identified reinforcers, and schedules of reinforcer removal.

Program implementers are encouraged to partner with PE teachers and elicit student suggestions for activities that are perceived as enjoyable and of high value. Incorporating these types of activities into recess programming can promote physical activity and entice students to choose active rather than sedentary recess behaviors. Variation in recess opportunities across the duration of a program is also recommended as it assists in retaining participant interest and engagement while promoting skill acquisition. Finally, offering multiple recess activities that possess similar rules, goals, and/or required skills can enhance opportunities for students to translate and build upon existing skills and knowledge and can lead to greater success, enjoyment, and continued participation.

**Involve Children in Goal Setting**

In the interest of fostering supportive and motivating environments for children to choose physical activity, individual physical activity goals must be meaningful and perceived as attainable. Previous studies engaging upper elementary students in supervised goal-setting activities found that supporting realistic, attainable goals enhanced participant investment in regular physical activity and their satisfaction of goal achievement (Cullen et al., 2004; Shilts, Horowitz, & Townsend, 2004). Although the use of goal setting with children younger than 12 years old has been used to investigate changes in dietary, exercise, and physical activity behaviors, Shilts et al. (2004) recommended it be “used with prudence” (p. 92) until more is understood about what type of goal setting is most effective and appropriate for children. Although caution is needed in the use of goal setting in young children, providing youngsters autonomy to set goals, determine type and immediacy of feedback, select desirable activities, and/or contribute to the development of a reinforcement schedule is recommended for future recess-based programming.

**Conclusions**

As the debate about recess and its role in schools continues, professional and government organizations maintain their support for recess during the school day. These proponents indicate that recess offers a number of key physical, cognitive, emotional, and social benefits for children (Ramstetter et al., 2010) and consider recess to be “an essential component of a comprehensive school physical activity program and of the total education experience for elementary school students” (NASPE, 2006, p.1). Researchers have identified key variations in the quality of recess programs that influence observed occurrences of physical activity, play, and positive youth engagement (Ramstetter et al., 2010). Examples include availability and safety of play
space, equipment access, qualified supervision, and the structure of available recess time. The configuration of these factors within a school environment is often determined by school administrators without consideration for how these decisions may influence physical activity opportunities for children.

The intervention employed in this study incorporated a number of recommended behavioral strategies to increase the physical activity levels of elementary-aged female children: (a) environmental modifications such as availability of new nontraditional recess equipment, (b) use of semistructured experiences offered during recess, (c) use of an interdependent group contingency, and (d) behavioral economy system involving individual goal setting and positive reinforcement. Key findings of this study reveal that recess interventions can positively influence MVPA of elementary-aged females, individual differences including impulsivity and sensitivity to reinforcers must be considered when designing recess-based physical activity interventions, and initial goal setting can positively or negatively affect experimental control and participant compliance.

References


“Edubal” Educational Balls: I Learn While Playing!

Andrzej Rokita
Ireneusz Cichy
University School of Physical Education Wroclaw, Poland

Abstract

This study aimed to summarize the results of a 10-year research study on the effects of using educational balls, “Edubals,” during physical education classes with pupils attending Grades 1 to 3 of the primary school (i.e., children aged 7 to 10). Our research was conducted in Poland and Germany. Another purpose of our study was to present the possibilities of using exercises, play, and games with Edubals. The authors focused their attention upon objectives and tasks of the contemporary education of children aged 7 to 10. They are involved in supporting and stimulating the comprehensive development of children, especially in respect to motor abilities and, in particular, coordination skills that determine, reading and writing skills, among others. Use of Edubals in integrated education (Grades 1 to 3 of the primary school) activates a cognitive, emotional, and physical sphere of a child and also contributes to the integration beyond the scope of the subject content. The children, while participating in physical education classes with the use of educational balls, learn more about letters, spelling rules, and mathematical and punctuation signs, as well as many other principles connected with language and mathematical education. In addition to this, they shape their motor abilities and improve their physical skills.

Keywords: Education of children aged 7 to 10, physical education classes, Edubal educational ball
Introduction

Reforms of the Polish education system that were introduced in 1999 and 2009 brought about enormous changes in the educational process for Grades 1 to 3 of the primary school. In particular, the New School Curriculum Basis of 2009 specially emphasized an innovative approach to the concept of integrating early school education with physical education (PE). This document provided teachers with the possibilities of time planning according to the child’s needs, of showing his or her creativity in combining mobile activity with other school classes, of knowledge transfer by experience, of teaching by playing, of supporting each child in the process of holistic learning about the world, and so forth. As a response to these proposed changes, as early 2002 in the Faculty of Team Sports Games, Wrocław University School of Physical Education, the idea of "Edubal" educational balls was born.

Edubal Educational Balls

Because students are interested in mobile activity and the attractiveness of exercises, play, and games with the ball, modifications in traditional balls were introduced by placing on them letters of the alphabet, numbers, and signs (Rokita, 2000, 2001). In this way, educational balls, called Edubals, were created. There are 94 balls for mini-team games (basketball, football, volleyball, handball) in four colors with letters of the alphabet painted on each ball (capital and small letters) and with numbers from 1 to 9, as well as mathematical signs (adding, subtracting, multiplying, dividing) and an electronic mail sign, @ (Rzepa & Rokita, 2002).

Edubals received acceptance and approval from the Ministry of National Education and Sport. A set of Edubals was entered in the official list of didactic aids for use in schools and designated for general and integrated education at the level of the primary school (order number: 1566/2003 – on the basis of ordinance of the Ministry of National Education and Sport – Diary Acts of 2002, No. 69, item 635). Edubals were also given a positive recommendation from the Parliament Commission for Sport.

Numbers, letters, and signs, as well as colors of the educational balls, make their use extensively possible in almost all sciences that are comprised in school curricula bases. They facilitate the process of gaining teaching experience by searching and creating new solutions aimed at more effective accomplishment of various educational objectives (Rokita & Rzepa, 2002 2005? add new ref?). The authors enumerate many possibilities of using the balls in education while teaching Polish, foreign languages, mathematics, computer science, history, and so on. They also recommend their employment in higher grades, to teach intrasubject classes, to make PE lessons more attractive, and to provide a student with possibilities to reinforce knowledge in other school subjects. Within the literature of the subject, numerous monographs were written containing descriptions of exercises, play, and games with the use of educational balls (sets of exercises, play and games, topic scenarios, and lesson plans).

Pedagogical Studies and Edubals

Since Edubals came into existence, many pedagogical research studies have been conducted aimed at determining the effects of PE classes conducted with these balls. Within the body of this research, scientists have conducted studies connected with Wrocław University School of Physical Education.
Since 2002, some pilot research has been conducted (Cichy & Rzepa, 2005; Rzepa, 2003), as well as proper research (Cichy, 2008; Cichy, 2010; Cichy & Popowczak, 2009; Krajewski, 2007; Rokita, 2007a, 2007b; Rokita, 2008; Rokita & Kaczmarczyk, 2011; Rokita & Krysmann, 2011; Rokita, Malska–Śmiałowska, & Babiczuk, 2007; Rzepa & Wójcik, 2007a, 2007b) with regard to the use of Edubals in kindergarten and early school stages of education, which gave promising results. The research referred to the assessment of effects of introducing Edubals into PE classes (in the scope of physical fitness and chosen didactic abilities).

Cichy and Rzepa (2005), in their yearlong pedagogical experiment with the use of parallel group technique, noticed that a teaching program that accounts for educational balls influences the development of the motor sphere to the same degree as a traditional program in Grades 1 to 3 of the primary school. Krajewski (2007) drew similar conclusions; however, his research was concerned with 6-year-old children attending the kindergarten zero groups. He indicated considerable advantages of conducting a 6-month nonconventional program (with the use of educational balls, yoga, relaxation, and cloth games) over the effects of a traditional program for psychomotor development of children. After conducting an experiment with the use of Edubals, Cichy (2010) obtained similar research results. The employment of Edubals during PE classes does not bring about unfavorable changes in the scope of physical fitness; on the contrary, it improves results of general body coordination (Cichy, 2010; Cichy & Popowczak, 2009). It is a specific character of ball play and games that is more important for the development of a child’s coordination than for other constituents of physical fitness that are conditioned by biological development (speed and strength). Many other authors have confirmed this. According to Pawlucki (1984) and Wójcik-Grzyb (2005), the development of coordination abilities is directly connected with the speed of learning to read and write. In regard to intellectual abilities, we must admit that the research results conducted within the framework of grant KBN No 2PO5D058 (2004–2007) indicate that the employment of Edubals in integrated education brought about significant changes in reading skills in the experimental group as compared to the control group (independent of the environment city/village; Rokita, 2008, p. 74). In their studies, Rzepa (2003), Cichy and Rzepa (2005), Rzepa and Wójcik (2007 a or b or both?), and Rokita (2008) confirmed the existence of connections between the use Edubals in integrated education and the intellectual development of students.

Use of Edubals in early education (linguistic, mathematical) constitutes the topic of subsequent research studies. In the Faculty of Team Sports Games under the supervision of Professor Andrzej Rokita, the subsequent areas of the child’s psychomotor development that often condition the process of acquisition of didactic competences have been examined. Problems such as dyslexia, dysgraphia, and spatial orientation have been discussed. In the Faculty of Team Sports Games, two doctoral dissertations connected with the use of Edubals in Grades 1 to 3 of the primary school have been written.

The Faculty of Team Sports Games has also studied the intensity of PE classes with the use of Edubals in relation to traditional PE classes. The results obtained shall be used to correct problems in the programs of these classes in order to optimize the teaching process. This research has shown that heart rate levels change during effort due to the classes.

The originators of the innovative method, Rokita and Rzepa (2005), in one of their first studies, suggested that “exercises, play, and games with the educational balls can be used in working with integrative groups in which the ball becomes the greatest attraction of the class for a student” (p. 15).
When reviewing the literature of the issue in question more thoroughly, we noticed general studies whose authors employed Edubals in the process of integrating healthy children and children with disabilities in schools (Krajewski & Cichy, 2009; Pyra, 2003). The results presented by Cichy (2010) with regard to the children who have special educational needs clearly prove that their participation in conducting a nontraditional program with Edubals did not contribute to any deterioration of their results; moreover, with 50% of the subjects, it probably brought about positive changes. Although such comparisons are not usually advisable, Cichy (2010) emphasized that in some cases, the better results of the children with dysfunctions prove that differences between them and healthy children are beginning to disappear.

Considering these findings, we note this method may constitute an attractive supplement to standard classes conducted within integrated school groups. An appropriate use of Edubals in the educational or therapeutic process becomes a helpful tool in the versatile preparation of a child to social life because, through the specific character of the classes, the entire sphere of physical, mental, and social experiences is involved here (Krajewski & Cichy, 2009).

As it turns out, the area of interest in impingements of Edubals has recently become broader. Kasperska and Białoszewski (2009) indicated these areas of rehabilitation in which the use of Edubals is possible. They emphasized the need to familiarize the students of physiotherapy with this method within the subject of movement teaching methodology. Moreover, they think that physical therapists’ work can undoubtedly be made more effective by encouraging children to make mental and physical effort and be creative, by introducing a pleasant atmosphere during classes, using praise, and adapting the way the classes are run to the children’s individual needs and possibilities.

This “new Polish method ‘edubal’ becomes a part of such renowned methods of psycho-physical rehabilitation as, for example, Paul Dennison’s Educational Kinesiology (the so called ‘brain gymnastics’), Good Start Method, Weronika Sherborn’s Developing Movement Method” (Kasperska & Białoszewski, 2009, p. 29).

Various popular-science publications in magazines and on the Internet refer to the topics discussed in this study. Many of these elaborations (Biegało & Melasa, 2007; Kaufer-Rudak & Pyra, 2003; Kruk, 2006; Kubicka, 2006) indicate positive impingements of physical classes with the use of educational balls on the development of physical fitness. Although these reports are not always confirmed empirically, many of them point to the development of social values and accompanying ubiquitous cooperation, which can be seen during classes where the aforementioned balls are used.

The presented research results not only confirm the obvious advantages of using Edubals in kindergarten and early school education, but also prove their merits empirically. It seems necessary to conduct further research aimed at determining the connections of a child’s participation in classes where the educational balls are used with the development of its social sphere as one of the most significant indexes of functioning of man in the future.

**Conclusion**

An individually elaborated teaching program with the use of Edubals can have an interdisciplinary nature that a teacher can impinge upon the student in a holistic way. Moreover, such classes may constitute a perfect supplement to a broadly understood process of integrating children with special educational needs with healthy children. Consequently, such classes are characterized by a friendly atmosphere, build up a sense of safety, and lead to the acceptance of a child as a person who is needed by the group, and vice versa—this person needs a group, too.
These aspects accompanying the child’s education lead to an efficient and permanent process of learning by acquiring knowledge and experiences.

Long-term (over 10 years) activities connected with the use of Edubals in education resulted in a cooperation with Deutsche Sporthochschule in Köln, which in turn led to an invitation to run regular classes under the name Educational Balls "Edubal" at 30 hours during the summer term of the academic year 2010–2011 and the winter term of 2011–2012 at this prestigious German University. Moreover, because of the Deutsche Sporthochschule, a cooperation was started with an inclusive education development foundation, Gold Kraemer Stiftung Fundation. In the German town Frechen on November 15, 2011, a presentation was made of the possibilities of using educational balls during classes with persons with intellectual and physical disabilities. This presentation aroused great interest among teachers and methodologists. This cooperation provides enormous chances for introducing PE classes with educational balls into schools in Germany.

References


Examples of Plays With Edubals

**Topic:** Improvement of mathematical skills with the use of Edubals

Place where classes are held: sports hall  
Duration: 45 min  
Teaching aids and materials: Edubals (94 pieces), 9 sashes, 4 gymnastic hoops, 2 rubber rings

1. **Meeting:** The participants are informed about the subject of the class.

2. **Running tag:** All of the participants have balls, and the participant who has the number 5 on the ball is a tag. The person who is touched by the tag exchanges his ball for the tag’s ball, and then he or she becomes the tag.  
   **Interpretation:** During the game, the children must carefully observe the running persons so that they can detect the ball with number 5 on it, and consequently the tag.

3. **Friendly numbers:** The participants move around the hall dribbling the balls freely. At a signal, they try to make pairs with other participants so that the sum of the numbers that are on both balls would be the same as the number the teacher indicates.  
   **Interpretation:** The teacher who conducts the game is also a referee who decides whether the task is completed correctly. In some cases, three persons could group together.

4a. **Numerical sets:** The participants are divided into two groups. Each team has sets of Edubals prepared in two hoops, and these sets must be balanced but without rearranging the balls from the existing sets; only the remaining Edubal balls scattered around the room can be used for this purpose. The winning team is the one that correctly balances the sets and makes as many shots as the sum of the Edubals in both sets.  
   **Interpretation:** The teacher supervises the correctness of the task and evaluates the speed of performance. The winning team earns 2 points and the losing team earns 1 point. This scoring helps all of the participants, even those who lose, feel appreciated for their efforts.

4b. Two sets of Edubals are arranged inside the two gymnastic hoops. The task is to count the balls as quickly as possible within their sets and to use the appropriate ball with the less than (<), equal to (=), or greater than (>) sign in order to make the right comparison. Moreover, after the task is complete, the team must run around their sets twice and come back to the place of start–finish as quickly as possible.  
   **Interpretation:** The teacher observes the players and tries to notice which persons have problems with comparing sets and do not want to participate in the performance of the task, and the teacher also pays particular attention to an element of cooperation, or lack of cooperation, in the group.
5. **Races of rows:** Participants in the same teams stand in two rows.

- At a signal from the teacher, two persons run from each row up to a certain place and they collect balls from 1–2, 3–4, 5–6, and so on.

- As above, the persons who run have in their hands the results of math operations, for example,
  - \(2 + 3 =\)
  - \(6 + 1 =\)
  - \(9 - 3 =\)

- **Solve a problem at a halfway point:** At a signal from the teacher, one person from each row runs up to a certain point where they try to arrange an answer to the question that is written down (e.g., the date Germany became united – 1989), using all of the educational balls for this purpose.

**Interpretation:** Races of rows, which combines skills from many subjects, enables persons who are less physically skillful to show their intellectual values, which is impossible during typical races of rows competition. Therefore, persons who are less fit and more fit need one another because they can achieve the goal only by working together.

6. In the same teams, the participants perform the last task, which consists of collecting the balls and putting them into three sacks:

- Team 1 collects yellow and blue balls.

- Team 2 collects green and red balls.

**Interpretation:** The teacher observes which persons are the most active in collecting the balls and teaching aids that are used during the class. The most active students are rewarded.

**Summary of the class, the winning team is elected.**

**Topic: Improvement of language skills with the use of Edubals**

**Place where classes are held:** sports hall  
**Duration:** 45 min  
**Teaching aids and materials:** Edubals (94 pieces), 10 sashes, 16 rubber rings

1. **Words, words:** Each participant has one Edubal. Moving around freely, the participants throw their balls up. At a signal from the teacher, all the participants stop and say out loud words beginning with the letter that is on the ball they are holding (e.g., the person who has the ball with the letter B might say bred, Bernard, or Barbara). After saying the word, the participant has the right to perform a throw to the basket as many times as the number of letters in the word.  

**Interpretation:** This sort of task improves the ability to remember the spelling of chosen words, and at the same time, the participants improve their movement skills.
2. I improve spelling of B: The group of participants is divided into two subgroups. All of them have Edubals, but without the letter B. At a signal, the teacher gives the participants balls with B. The participants’ tasks are to create as many syllables and words containing the letter B as possible using the balls they have. After making each word or syllable, the players are supposed to return the ball overhead 10 times between each other using both hands. The team that creates more words or syllables is the winning team.

**Interpretation:** This sort of task improves the participants’ abilities to remember the spelling of chosen words containing the letter B, and at the same time, they improve their movement skills performed in a team.

3. Words: The game is played in the same teams. One team is asked to make and write down as many words as possible, in English, that start with the prefix “edu,” and the other team makes words that end in the suffix “ball.” The winning team is the one that makes more words than the other team within 5 min.

**Interpretation:** The teacher observes interactions between the participants and tries to find out which persons in the teams are their leaders or whether the participants share their tasks (i.e., one person fetches the ball, the other one writes down a word, yet another one arranges the balls into words).

4. Running tag letters K and P: The participants move around the hall dribbling the Edubals freely. The person who is the tag has a red ball. The participant who is touched by the tag can be protected against the tag if he or she says the word beginning with or containing the letters K or P. If he or she fails to do so or hesitates too long, the tag is changed.

**Interpretation:** The teacher can help the participants who hesitate in a discreet way so that they do not feel embarrassed and, at the same time, keep the play going.

5. Vowels and consonants: Each participant has an Edubal and moves freely around the sports hall. At a signal from the teacher, the participants pair up according to the letters they have on their balls. The person who has the ball with a consonant makes a pair with the person who has a vowel, and in this way, they create syllables. Afterward, they group into threes or fours and create short words.

**Interpretation:** This sort of task improves the participants’ abilities to remember consonants and vowels and to learn how to create syllables and words. They also enrich their vocabulary and improve their movement skills.

6. Favorite sport: In the same teams, the participants are asked to create and write down in English as many names of their favorite sports as possible. All members of a team, after creating each word from Edubals, have to run around a specific area designated by the teacher and dribble balls at the same time. The team that creates the most words within 5 min is the winning team.

**Interpretation:** The teacher is a referee in this competition, decides whether given answers are correct, and does not allow a word that was already used to be repeated. The teacher also observes cooperation within teams and monitors and corrects the way participants move around with the ball after creating each word.
BEST PRACTICES ~ FROM THE FRONT LINES

Getting to Know Physical Activity

Iradge Ahrabi-Fard
Shelley McCumber
Forrest Dolgener
University of Northern Iowa, USA

Introduction

For years, literature has supported the undeniable benefits of physical activity to health. Numerous scholarly attempts have advocated daily dosage and other specific activity conditions for the best outcome. The public is aware of these guidelines, but we still find the majority do not take advantage of the maximum benefits of physical activity. The Centers for Disease Control and Prevention (CDC, 2012) stated that only 48% of adults meet the 2008 Physical Activity Guidelines for Americans, which were created by the U.S. Department of Health and Human Services.

One of the important missing links has been lack of proper education to lead lifelong drastic physical changes and design the most suitable activity to match the conditional needs of individuals. Prescriptions may be accurate, but they have to match the patients’ numerous physical conditions and emotional readiness. To design the right type of activity with correct duration, intensity, and frequency for an expected outcome, the professional needs a detailed awareness of an individual’s abilities and conditions to help his or her specific situation with positive results. Millions of people with millions of different physical conditional needs, abilities, limitations, and mental inclination are exposed to a set of researched and accurate recommendations that may or may not match their physical condition and lifestyle.

Furthermore, recent research has surfaced suggesting that excessive amounts of exercise can also be detrimental to our health, just as lack of physical activity. We attempt in this article to clarify lack of understanding and some misconceptions about physical activity and to bring awareness of the nature of physical activity, its harms and positive influences on
health. It is understood that our educational units are responsible for fostering individuals with understanding of the condition under which the physical activity can be helpful to health or harmful. Educationally, our population is missing educational leadership to foster the ability to adjust and match people’s lifelong changing physical condition with their physical condition involvement.

Benefits of Physical Activity

Several conditions can make a physical activity beneficial to health: an adequate amount of developmentally appropriate (age and ability) physical activity, with corresponding duration, intensity, and frequency. For simplicity, we refer to Adequate Amount of Developmentally Appropriate Regular Physical Activity as AADARPA. We also discuss two different focuses of physical activity benefits on healthy living. One is during the growth and development phase to maximize proper growth and reach one’s physical best. The other is to influence the maintenance of health through adequate amounts of developmentally appropriate regular physical activity. Adequate amounts of AADARPA are extremely important during the growing years to physiologically improve the quality and quantity of body systems and organs for the best functioning. During these crucial years, empowerment with a variety of motor skills, passion for physically active experiences, and development of personal physical activity culture occur. In other words, these years are the foundation for future adherence to a physically active lifestyle and influence quality living.

The CDC lists heart disease and stroke as the two leading causes of death in the United States (Kung, Hoyert, Jiaquan, Murphy, & Division of Vital Statistics, 2008). However, by following the recommended guidelines of 150 min of moderate physical activity per week, a person can decrease the risk for a number of different diseases including heart disease, stroke, cancer, and diabetes. Physical activity can also lower blood pressure and improve cholesterol levels. Science actually shows that AADARPA as part of a lifestyle can reduce the risk of premature death. “People who are physically active for 7 hours a week have a 40 percent lower risk of dying early than those who are active for less than 30 minutes a week” (CDC, 2012).

In addition to medical prevention, a number of other physical benefits occur due to AADARPA. Improvement and protection of bones, joints, and muscles as a person ages is an important goal. The early habit of skillful mobility and passion for physically active experiences results in movement efficiency and better physiological functioning. Research has proven that performing aerobic, muscle-strengthening, and bone-strengthening physical activity at a moderate level can slow down the loss of bone density and joint problems, such as arthritis, which occur as a person ages (Dembo, 2000).

Although physical benefits from physical activity are the most discussed topic, many mental and social benefits are also associated with AADARPA. Research has shown that with aerobic and muscle-strengthening exercises a person may sleep better, reduce risk of depression, and keep cognitive functions such as thinking, learning, and judgment skills sharp as he or she ages (CDC, 2012; Weuve et al., 2004).

Detrimental Effects of Participation in Physical Activity

Surprisingly, although AADARPA is good for health, research has proven that physical activity can be harmful if it is overdone (Lee, Patte, Lavie, & Blair, 2012; O’Keefe et al., 2012). Multiple studies have shown adverse effects of physical activity, such as musculoskeletal
trauma, cardiovascular trauma, and osteoarthritis. A recent study has proven "intense chronic exercise" has negative side effects. O’Keefe et al. (2012) recently published a report, stating that evidence exists of damage to the heart in athletes who sustain high levels of extreme exercise over multiple years in events such as marathons or iron man competitions. The study found that this “chronic exercise” can cause premature aging of the heart, stiffening of the heart muscles, and an increase in arrhythmias and atrial fibrillation.

Another study found similar results to O’Keefe et al.’s (2012) findings. A 15-year observational study of 52,000 adults found that those who run 20 or fewer miles per week at moderate speeds were associated with lower all-cause mortality than those who ran more frequently (Lee et al., 2012). These studies suggest the best health outcomes are found at a much less intense level of sustained exercise than even the casual endurance athletes.

Other adverse side effects of physical activity are also being studied. A recent study conducted by Link et al. (as cited in Radiological Society of North America, 2012) showed that high-impact physical activity may cause damage to the knee cartilage of middle-aged adults. When comparing the data from 205 patients, Link et al. found an accelerated progression of degeneration of knee cartilage in persons who were most physically active, specifically in high-impact activities such as running. The study also found that these high-impact activities might increase the risk of developing osteoarthritis. However, moderation to improve a person’s health will not cause simple or complicate health issues.

Recommendations for Appropriate Physical Activity

Regular exercise has always been promoted as an essential piece to the puzzle when a person chooses to live a healthy lifestyle. However, Medical News Today reported that new research aired on BBC News suggests that short bursts of intense exercise may be as beneficial, if not more effective, than regular moderate exercise at decreasing the risk of diabetes, as well as potentially improving aerobic fitness (Paddock, 2012). Many studies have proven that HIT (High Intensity Training) improves insulin sensitivity in adults with type 2 diabetes, as well as healthy adults, decreasing the risk of diabetes (Babraj et al., 2009; Little et al., 2011).

Michael Mosley, a British researcher, investigated whether adults could attain health benefits from just a 3-min session of intense exercise per week versus daily moderate physical activity using himself as the subject under the supervision of Dr. James Timmons, professor of ageing biology at Birmingham University. He completed HIT for 3 min per week for a period of 4 weeks. The HIT training consisted of three sessions per week of exercising on a stationary bike using interval training by completing several minutes of warm-up, followed by high-intensity pedaling for 20 s, followed by a more moderate speed to recover for several minutes, repeated three times each session. According to the researchers, HIT training uses significantly more muscle tissue than traditional aerobic exercise. This training engages 80% of your muscle cells in your legs and upper body, compared to the 20% to 40% engaged in more moderate exercises such as walking or jogging. At the end of the study, the subject’s insulin sensitivity had improved by 24%; however, his aerobic fitness did not improve. Timmons was not surprised in the lack of progress in aerobic fitness. In his own research, Timmons et al. (2010) has found that 20% of subjects participating in regular moderate physical activity for 20 weeks showed no improvement in their overall aerobic fitness due to genes. Mosley had completed a genetic test prior to the experiment, and it had been determined he was in the “non-responder” category due to his genes and that even participating in more frequent exercise may not have improved his fitness levels.
Despite these findings, when aiming to improve overall wellness, the potential to reach these health benefits is directly related to participating in the recommended amounts of physical activity written in the 2008 Physical Activity Guidelines for Americans established by the U.S. Department of Health and Human Services. The recommendations for adults aged 18 to 64 is 150 min of moderate-intensity or 75 min of vigorous-intensity aerobic physical activity per week and whole body muscle-strengthening activities on 2 or more days per week. The intensity level directly affects the impact that physical activity has on your body. The body’s response to the physical activity is dependent on a number of factors including current fitness levels, frequency, duration, intensity, genetics, age, and diet. Adults are recommended to choose the types and intensities that are appropriate for their current fitness levels.

In addition to participation in appropriate duration and intensity of physical activity, it is important to purposely design a personal physical activity program to target specific benefits such as muscle function, skeletal posture, heart and lung function, bone strength, joint function, and weight management. To promote and maintain good health and physical independence, adults should engage in a variety of physical activities targeted to meet their own personal needs and goals.

Physically active or physically fit individuals have a 25% to 50% lower overall risk of developing cardiovascular disease than those who lead sedentary lives (Williams, 2001). Moderate levels of exercise, such as brisk walking, for the recommended 150 min per week helps improve blood circulation, which reduces the risk of heart disease. Light to moderate exercise can also improve heart function in adults with existing heart disease or recovering from a heart attack. Low-impact activities to achieve these benefits include brisk walking, swimming, stair climbing, and rowing. High-impact activities, which will give equivalent benefits, may include running, dance, tennis, racquetball, and basketball. However, it is recommended that limited high-impact activities be used with the increase of age.

High-impact activity and weight-bearing/resistance activity have been identified to improve muscular function and skeletal health (Pollock et al., 2000). Resistance exercise also increases bone formation in young adults and slows down bone loss later in adulthood, which could lead to decreased risk of osteoporosis (Vuori, 2001 1986? add new ref?). The American Heart Association recommends performing eight to 10 weight-bearing exercises and using the major muscle groups at least twice per week for greater health benefits including heart function, mobility, and low back pain. To improve strength, a person should add resistance and perform until fatigue (Pollock et al., 2001 2000?). Weight-bearing activities may include weight training, stair climbing, or weight-bearing calisthenics.

**Concluding Comments**

The dramatic increase of obesity over the past 30 years demonstrates the lack of knowledge of how to effectively manage weight. Many adults are consistently consuming many more calories than they are expending through daily physical activity. Despite the evident concept that physical activity can lead to weight loss, it appears to produce only low levels of weight loss beyond the use of dietary measures, which varies among people (Stefanick, 1993). A review of studies where physical activity was the sole intervention or was added to caloric restriction found only modest weight loss from exercise, leading us to believe that calorie consumption might be important for a person to track when attempting to manage weight loss (Saris et al., 2003). Weight management requires physical activity that results in high caloric expenditure.
High caloric expenditure exercises include cycling, jumping rope, running, swimming, and weight training. Intensity of activity seems to be an important factor.

It is never too late to start exercising. Elderly adults who exercise twice per week can improve their body strength, flexibility, balance, and agility. It is recommended to begin with low-impact exercises, such as walking or swimming (CDC, 2011). Swimming is an excellent choice due to its low pressure on the joints. Warm-up and cooldown exercises are crucial to all physical activity, especially at a more intense level, to prevent injury and are even more crucial in older adults. As age increases, the length of the warm-up should increase as well. When cooling down, a person should participate in low level physical activity until the heart rate returns to 10 to 15 beats above resting heart rate. Stopping physical activity suddenly can cause a dramatic decrease in blood pressure, which is dangerous, especially in older adults.

References


The Global Journal of Health and Physical Education Pedagogy

Call for Expressions of Interest

Editor-in-Chief

A major outcome of the Global Forum for Physical Education Pedagogy has been the establishment of a journal named The Global Journal of Health and Physical Education Pedagogy. This journal aims to publish articles and features reflecting items of theoretical, applied, and professional interest drawn worldwide. In particular, the journal will seek to emphasize articles which advance best practice in the areas of health and physical education pedagogy and physical education teacher training.

The Global Journal of Health and Physical Education Pedagogy seeks to (1) promote dialog and discussion on critical issues related to health and physical education pedagogy, and physical education teacher training; (2) explore new and existing effective models of pedagogy for preparing health and physical education teachers, which promote accountability, build community life, employ a greater use of reflection to improve practice, and embed learning in practice; (3) examine the extension of health and physical education-based school programs into community life; (4) review the application of technology as related to the teaching of health and physical education; (5) promote the establishment of partnerships between the school, community, university, nongovernmental organizations, and commercial enterprises; and (6) rethink the relationship between health and physical education as a strategy for promoting lifelong active living.

The Global Journal of Health and Physical Education Pedagogy would serve as a communication tool for educators, professionals, government officials, and students in the fields of health and physical education. Published quarterly, The Global Journal of Health and Physical Education Pedagogy will be available in full-text electronic format and distributed worldwide to libraries, government agencies, institutions, and subscribers.

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Fax to: 1 319-273-6413

Or mail to:
The Global Journal of Health and Physical Education Pedagogy
ATTN: Dr. Christopher R. Edginton
107 HPC
University of Northern Iowa
Cedar Falls, Iowa 50614-0245
USA
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Send materials to Dr. Ming-kai Chin at mingkaihops@gmail.com or Prof. Dr. Christopher R. Edginton at christopher.edginton@uni.edu