

Elite sport methods for public health: the analysis of world practices

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Abstract

While increasing the level of physical activity and mass sport participation is one of the governmental priorities for many countries around the world, a current trend of strengthening the relations between high performance sports and mass sport participation appears to be relevant and important. This paper reveals the main trends in world practices of using elite sport methods for public health. These trends of physical activity and mass sport participation development appear to be common for the majority of the leading sporting world powers. In the course of the work, the following research methods were used: comparative analysis, generalization, and method of expert evaluation. The results show that mass participation contributes to the talent pathway and elite sport development, while elite sport methods of training could be used for improving public health, particularly when integrated into school physical education using key aspects of athlete development, including: physical training for general fitness and performance in specific sports, psychological training for mental strength and efficient rest, medical services for illness prevention and quicker recovery, diet for better performance, and health. Physical and health education supported by sport activities at schools are effective in introducing the sport practices of healthy training, restoration and diet, and also making these practices lifelong habits with specialized sport schools growing across the world and leading in these best practices. Following specialized sport schools, the physical, health and sport activities, including food preparation based on medical scientists' recommendations, could be provided to all students every school day, just as these activities should be part of every day for all citizens.

Key words: mass sport participation, high performance sport, athlete training, physical activity.

Introduction

Analysis of current trends in the sport development around the world shows an emerging policy of finding new mechanisms of healthy mass sport participation lead by high performance (HP) sport. The world's leading sports powers, such as the United States and Canada, have adopted documents providing a system of longterm athlete development (LTAD, 2019; ADM, 2019). These recommendations attempt to unite possible trajectories of development in sports for both elite athletes and recreational participants to stay healthy physically and psychologically from first steps in sport during childhood through competitive play during peak physical ages and again recreational participation for the rest everyone's life.

Canadian Long Term Athlete Development (LTAD) Framework provides a concept for promoting lifelong engagement in sport and physical activity for all Canadians, while also revitalizing Canada as a competitive force in the international arena (LTAD, 2019). LTAD is a multi-stage training, competition, and recovery pathway guiding an individual's experience in sport and physical activity from childhood through all phases of life. The American Development Model, adopted in 2014 by the United States Olympic & Paralympic Committee in partnership with the National Governing Bodies, helps Americans realize their full athletic potential and utilize sport as a path toward an active and healthy lifestyle (ADM, 2019). The model utilizes LTAD and quality coaching concepts to promote sustained physical activity, athlete safety, and age-appropriate development with the aim of creating a positive experience for American athletes across all levels of sport. These approaches to the development of sports in the United States and Canada emphasize the emerging trend of strengthening the interconnection between HP sports and mass participation. However, the early development stage and brief nature of LTAD and ADM guidelines make it hard for coaches and teachers to provide all the necessary instructions to their entrusted participants, demanding greater practical detail and further theoretical conceptualization of these recommendations, particularly at the micro-level of athlete development, which is in addition to the recent studies focusing on meso-level policies supporting elite and mass sport participation (e.g., De Bosscher, De Knop, Van Bottenburg & Shibli, 2006; Westerbeek, 2009). Most sport, education, and health

organizations ask for systemic solutions and practical information aimed to improve their nurturing of participants and patients at the micro-level utilizing the resources created at macro- and meso-levels (Smolianov & Smith, 2015; Ridpath et al., 2019).

Sotiriadou and De Bosscher (2017) stressed that more multidisciplinary synergies in HP sport and supporting research are needed, if we are to reach solutions based on a new understanding of complex systems. We might add that the multidisciplinary studies and solutions are, perhaps, even more important for mass than for elite levels of sport, education, and healthcare given that national and global socio-economic progress requires and is indicated by constant advancements as well as innovations in connected public health, education, and sport provisions (c.f., Matveev, 2008; Smolianov & Smith, 2015; Smolianov, Zakus & Gallo, 2014; Westerbeek, 2009). However, while growth is evident in research and instructional literature on different aspects of sport, still only a few manuscripts (e.g., Platonov, 2005; Tumanian, 2006) offer a holistic and practical approach encompassing all the important aspects of athlete services. The downside of these books is that they were written for highly educated coaches preparing elite athletes for national and international competitions, and elite sport continues to be increasingly subsidized through revenues generated by mass participants including research and its communication as coach and athlete education (Hopkinson et al., 2018; Ridpath et al., 2019). In the meantime, beginner and intermediate level coaches and physical education (PE) teachers need such information the most, ideally at no cost in open public access, in order to make everyone a lifelong sport participant educated in healthy recreational practices, therefore, positively influencing public health while contributing to LTAD and ADM for HP sport development (Fernandezrivas & Espada, 2020; June, Cameron, Patey, Loucks-Atkinson, Loeffler, Sullivan, McGowan, Borduas & Buote, 2020; Hopkinson et al., 2018).

Consequently, this study identifies the key types of services for elite athletes, provides examples of these services for international elites, and suggests ways in which sport policy makers, managers, coaches, and education professionals as well as governmental and business leaders could stimulate research and publication of innovative fitness methods in order to improve wellbeing of our communities across the world.

Material & Methods

Our paper reveals the main trends of world practice in using elite sport methods for public health. In the course of our work, the following research methods were used: comparative analysis, generalization, method of expert evaluation.

When rapidly advancing methods of HP training and caring for athletes are made available to the masses, our communities, even whole societies can prevent illnesses and individuals become healthier, happier, and more productive, many experts have found (c.f., Agus, 2011; Bubnovski, 2019; Dikul, 2019; Kelder, 1999; Matveev, 2008; Smolianov et al., 2014; Tumanian, 2006; Westerbeek, 2009).

Literature on HP sport from different countries (e.g., De Bosscher et al., 2006; Sotiriadou & De Bosscher, 2013; Gillett, 2014; Platonov, 2005; Smolianov & Smith, 2015) as well as the Professional Association of Athlete Development (PAADS, 2015) in the US and the “Athlete Learning Gateway” service by the International Olympic Committee (IOC, 2015a) suggest similar aspects of athlete development, including:

- physical training for general fitness and performance in specific sports,
- psychological training for mental strength and efficient rest,
- medical services for illness prevention and quicker recovery, and
- diet for better performance and health.

Kelder (1999), Smolianov et al. (2014) and Tumanian (2006) as well as the World Sport for All Congress (2002) and the US National Physical Activity Plan (NPAP, 2016) emphasized the importance of sharing elite performance and health improvement methods with the masses and increasing the number of active sport and recreation participants. In this article, we identify unique methods across the key areas of athlete training and support and discuss how these methods could be made useful for all.

Results

Physical training

Mass participation followed the elite sport trend of increasing exercise frequency. According to the Soviet sport scientists' recommendations in the former USSR and China in the 1950s, daily morning and afternoon ten-minute exercise breaks were broadcast for all and encouraged at places of study, work, and service (Smolianov et al., 2014). Tibetan exercises based on yoga and tai chi were recommended by Kelder (1999) to everyone in the West as a daily routine that should gradually increase in number of repetitions and duration of exercises. Medico-rehabilitation centers that treat an increasing spectrum of illnesses through exercise are growing. Dikul (2019) clinics in Russia, together with advanced technology and traditional forms of treatment, recommend quite intense exercises up to three times a day, including through pain, and for treatment and prevention of a broad spectrum of disorders. Nelson, Carpenter, Dreisinger, Mitchell, Kelly, and Wegner (1999) found aggressive strength training protocols for prospective spinal surgery patients were able to prevent cervical and lumbar surgeries in the majority of the studied participants, indicating a more intense preventative approach could be taken with patients. Bubnovski (2019) kinesiotherapy centers in Ukraine and Russia also recommend

exercising through pain for 30 minutes a day to treat and prevent various illnesses. Bubnovski also recommends to start and finish each day with strengthening and stretching exercises in order to treat and prevent spinal and joint disorders. Similarly, in the US, the New York Spine & Sport Rehabilitation Medicine center offers hands-on physical therapy with patient education, conditioning, and strengthening/stretching programs for various disorders.

The key instruments of lifelong mass fitness and healthy, long-term elite sport participation are general fitness tests that can be administered by participants without specialists and expensive equipment and that have requirements for each age so that school children can be taught to use them for life. FitnessGram® (2019) has the potential to become such a tool in the US if it is made less expensive, easy to administer by participants, and if it provides clear video instructions for performing each exercise. Adding fitness guidelines for ages beyond 17 helps it become more specific and comprehensive. Conducting the test, as done by the GTO (2019) fitness program (www.gto.ru), helps guide low cost activities used to test and train everyone for lifelong fitness and public health, as well as for preparation for elite sport performance in Russia and China. The current GTO (2019) program was found to be the most comprehensive and most validated by scientists and time, after comparing fitness testing practices in Asia, Eastern and Western Europe, and North America by Keating, Smolianov, Liu, Castro-Piñero and Smith (2018). These authors also identified such advancements towards a global lifelong fitness testing system as additional types of testing items focused on health and individualization, as well as better integration of fitness tests with all sports.

As research in strength training has evolved and biomechanical efficiencies have been identified, using strength training methodology for youth has been deemed safe and effective by fitness organizations as well as the medical community for LTAD (Faigenbaum, 2000). Resistance training at a young age enhances physical performance and reduces injuries. Early childhood strength programming should consist of developing proper strength in movement mechanics and movement competencies, creating a general base level of strength. This can be done with general body weight strength training protocols or youth involvement in sports, such as gymnastics. In middle childhood, the athlete can progress towards added resistance to their bodyweight, such as resistance bands, controlled weighted movements, plyometric, and speed development exercises. By adolescence, a more aggressive resistance training regimen can be applied, complete with sports specific developmental programs, and customized towards the individual's needs (Lloyd et al., 2015).

It should also be noted, an opportune window for a youth to develop strength occurs 12- to 18-months after peak height velocity. This will also correspond with peak weight velocity. The theory is during this time period, there will be rapid increases in muscle size due to an increase in concentrations of androgens (Lloyd & Oliver, 2012).

Parametric training is an example of a method we will see in the future as a trend of further advancement from classical periodization towards more individualized training—initially for elite athlete performance and then for fitness and health of everyone. The parametric method offers an alternative to the classic periodization approach, particularly in studying the development of individual athletes' special work capacity and devising a season plan based on adaptive abilities and rather than a sheer training volume. The training process requires calculation of changes in related physiological parameters (e.g. heart rate, VO₂, concentration of lactate in blood, cardiac output, stroke volume) over time, during different stages of a season, and in relation to a strategy. Leading American and Russian sport scientists and coaches continue to further develop the method in cooperation.

Individualized training programs based on classic periodization and personal characteristics and performance dynamics are becoming increasingly available for a few elite athletes and wealthy individuals but most of the population, even in developed countries, is still to gain access to simple, generic lifelong exercise programs such as the FitnessGram® (2019) or GTO (2019) as part of PE during all years of study.

Psychological training

Many formerly unique or esoteric holistic fitness methods, which integrate physical and psychological training, are growing from elite to mass activities in the West, often at accelerated rates and requiring advanced instruction. In 2011, yoga had an estimated 20 million US participants compared to about 4 million in 2001 (Broad, 2012). Tai chi and Qigong are becoming part of Eastern European medical and sport training methods and perhaps will also spread in the West. The psychological aspects of yoga training, while being adopted by Western HP sport, for example, in the form of autogenic training, are still in the process of being made available to mass participants with great potential benefits for health and performance.

A lucid dream, or a dream in which the sleeper is aware that he/she is dreaming, has been used by athletes in different sports where they can actively participate in and manipulate the imaginary experiences. Skills, confidence, and creative freedom are reinforced, which enhance performance.

Breathing and voice exercises are important activators of the body's reserves (c.f., Kelder, 1999; Tumanian, 2006). Up to an eight percent increase in grip strength has been noted when yelling or grunting in conjunction with maximum grip strength tests. The act of yelling facilitates increased force production in muscles. It stimulates the release of noradrenaline from the brain which, when used sparingly, increases heart

rate, blood pressure, alertness, and concentration. Sport participants start with a loud counting of exercise repetitions, singing songs, or reciting each letter of the alphabet while resting, then move to more demanding breathing and visualization exercises taught in yoga, Qigong, Tibetan, and other schools of performance and health improvement. Components of yoga and autogenic training currently used by innovative schoolteachers in North America are available for immediate inclusion into PE curriculum to help everyone better manage their emotions, improve academic performance, and productivity and minimize antisocial behavior.

In addition to performance, these methods can be used to help more serious psychological issues. A growing area of psychological concern is the rising suicide rate among youth and athletes worldwide. In the US, suicides have increased 10% from 2005 to 2015 with females seeing a 45% increase while males have experienced a 15% increase in rates, the trend similar to many other countries. Suicide is the third leading cause of death among those aged 15-44 across the world and among student athletes according to the National Collegiate Athletic Association (NCAA) (Howard, 2018). Moreover, with more brain research being conducted on the effects of mild traumatic brain injuries in contact sports, chronic traumatic encephalopathy (CTE) has been linked to depression in individuals who have suffered multiple concussions and has caused for many changes in sport to create a safer field of play. Wolanin, Hong, Marks, Panchoo, and Gross (2016) found 6.3% of NCAA athletes with severe to moderately severe depressive symptoms, while 23.7% exhibit symptoms labeled as clinically relevant. The NCAA recommends college athletic departments implement the following for suicide prevention: 1) have an identified mental health professional available for student athletes; 2) have an identified referral routine for students who exhibit mental health issues; 3) have pre-season screenings, conducted by mental health care professionals to identify potential at risk athletes; 4) create environments that promote resiliency, perseverance, tenaciousness, and growth as well as perceptiveness in regards to mental well-being. These sport practices could lead mental strength programs for all at universities, colleges and schools, and then by extension communities.

To address the growing concern of declining mental health in the sporting aged population and wider public many experts and coaches are recognizing mindfulness practices as a powerful mental health training technique. At the 2018 Mindfulness in America video workshop (video can be accessed here: https://www.youtube.com/watch?v=A27EQ1YsJ_E), CEO of Search Inside Yourself Leadership Institute, Rich Fernandez, introduced mindfulness guru George Mumford like this, “George has been working at a really interesting point of intersection of mindfulness, elite performance and, of course in the context of teams, community.” Mumford, who credits mindfulness practices with helping him overcome drug addiction and later incorporated them when working with Phil Jackson and Michael Jordan during their successful NBA championship reign, went on to describe mindfulness as “a way to align the whole person, mind body heart spirit soul, that allows all performers to be more ‘zone ready’ – that coveted performance state when time and space are distorted, actions are effortless and done without thought, and the athlete experiences a harmonious absorption or integration with the self and the external environment. Recent studies of mindfulness in the sport science literature largely stem from Jon Kabat-Zinn’s (2009) working definition of paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally.

The tools of mindfulness, Kabat-Zinn dutifully recognizes, are based entirely on well-known ancient traditions. Examples of the current research include Zhang, Si, Chung, and Gucciardi’s (2016) study of the role mindfulness plays with experiential avoidance in reducing burnout in elite junior athletes, Fogaca (2019) showing how mindfulness and other skills help student-athletes strengthen coping skills and develop healthy social support networks, as well as Baltzell, McCarthy, and Greenbaum’s (2013) approaches for teaching mindfulness to coaches of athletes for all age groups. Among the many benefits of practicing mindfulness are that it can be learned by anyone, can be done anywhere, and requires nothing more than a quiet, distraction-free space, and some time. In an electronic age driven by social media, mindfulness provides that crucial relief from constant online connectedness.

Conceptually similar to mindfulness, biofeedback is a cutting-edge method of autonomic nervous system and emotion regulation. While mindfulness practices utilize a variety of breathing and meditative strategies, biofeedback uses such instruments as sensors or transducers to detect and monitor of one’s biological systems (i.e. heart rate variability, muscle tension, skin temperature, or conductance and brain wave activity, all normally happening outside one’s conscious awareness) that are then displayed on computer or video monitors. Athletes train by “actively using the biofeedback information to gain voluntary control over ‘involuntary’ physiological states” (Tenenbaum, Corbett & Kitsantas, 2002, p.102). Biofeedback’s effectiveness relies on learning theory and rapid unambiguous feedback principles (Zaichkowsky, 2017) guided by experts trained in the use of biofeedback techniques. The evolution of more powerful yet portable biofeedback systems has allowed biofeedback to become readily available to the wider public. Some biofeedback training packages and products can even be downloaded as apps onto smart phones and found easily with a web search. Now almost anyone can access biofeedback methods, but there is a cost, and professional guidance and coaching is necessary for best results. Best practices of progressive school teachers and sport coaches who integrate free ancient methods with affordable modern technology for mental health and strength could be shared across the world for wellness and social harmony of each community.

Medicine

The leading role of HP sport is becoming more important in newly created models that integrate fitness services to elite athletes and the masses. For example, the University of Northern Iowa has partnered with a nearby medical center to allow for greater resources to be applied to surround the athlete, enhancing the athlete's opportunities for success. With this partnership, the hospital was able to place orthopedic surgeons, physical therapists, X-Ray equipment, Magnetic Resonance Imaging, a casting room, a complete physical therapy center, and a hydrotherapy center inside the Northern Iowa athletic facilities. All of this was done in exchange for billing of the athletic departments' 450 NCAA Division I athletes as well as adding a new position to Northern Iowa's Strength and Conditioning staff, a Strength and Conditioning Rehabilitation Specialist, and three new athletic trainers. Through the partnership, the University of Northern Iowa was also able to add isokinetic testing technology to determine unilateral and bilateral baseline strength levels in athletes to find objective deficiencies in strength levels between antagonist and agonist muscle groups throughout the body as well as the spine. With this data, coaches can identify actual weaknesses in the athlete's physical development and more accurately assign accommodating strength development methods to better balance the athlete versus guessing with subjective assessment protocols. The medical staff and coaches can also determine if an athlete has returned to baseline strength levels post injury to make a safe return to play.

The former Oregon Project, which was sponsored by Nike demonstrated, was an exemplary elite athlete service that lead mass running participants in placing emphasis on running technique, sports psychology, and healthy conditioning through one hour of non-running daily exercises that increase strength and flexibility. Athletes are adding yoga, or at least integrating selected asanas (yoga poses), which are beneficial to each specific sport to their daily training. Bikram yoga is used as a restoration process in which athletes can increase their career longevity and develop an inner balance that lasts a lifetime. Increasingly in North America acupuncture is covered by insurance together with more traditional physiotherapies. Leading masses, National Football League players visit rehabilitation specialists, chiropractors and massage therapists, practice yoga, undergo electronic stimulation and low level laser therapy, and nap in hyperbaric chambers. Increasing numbers also receive acupuncture.

The power of pharmaceutical corporations and gadget producers is increasingly challenged in the US through recognition of naturopathy and its coverage by health insurances which is emerging in the US, following Canada and many other Western countries. Natural, low cost ways to prevent illnesses and improve elite and mass sport performance have great potential. Sport, health, and education authorities are positioned to include cost-efficient, natural ways of improving performance and health into school PE curriculum and LTAD guidelines and coaching manuals for each sport. In 2013, the US Senate opened a new chapter in using nature to prevent and treat illnesses by recognizing the value of naturopathic medicine in providing safe, effective, and affordable health care; designating a "Naturopathic Medicine Week;" and encouraging Americans to learn more about the role of naturopathy. Somatic immunity to many infections and diseases can be naturally acquired through rational exposure to cold and hot air and water, sun, and wildlife. One basic natural illness prevention practice emerging in North America is to use outdoors for traditionally indoor activities, particularly by sport clubs and schools providing both elite and mass participants year-round training outdoors.

Diet

HP coaches and athletes experiment with such emerged dietary aspects as antibacterial, anti-inflammatory, and bioactive foods; by separating foods with different speeds and dynamics of digestion; and cross-enhancing different foods. Billing and Sherman (1998) identified the top 30 spices and foods with antimicrobial properties. Analyzing the health statistics of NFL players, Agus (2011) stressed that inflammation is an effect of both the excess weight of many American football players and of routine hits from other players. Recommendations on an anti-inflammatory diet could be found in works of Covas (2007) and Jętgvig (2009). Such natural supplements as American ginseng and Russian moomiyo or shilajit are increasingly used to enhance sport performance and have been the subject of scientific research confirming their medicinal benefits. Eleutheroandlimonnik, orschisandra, has also been proven as useful adaptogens. Energy is maximized and restoration is fastened through liquid supplements such as vitargo and herbal supplements. Another new trend is to customize vitamin packs based on personal genetic data to minimize the risk of non-contact injuries.

Scientific recommendations are given on the practice of separating and cross-promoting specific foods to improve both elite and mass performance. Following Kelder (1999), athletes drink water and eat fruits before meals and not after, and start a meal with salad followed by foods rich in starch, protein, or fat. These dietary practices for better performance and health can benefit public health if taught at school PE and health relates courses.

Conclusions and recommendations

More than ever, the elite sport methods can contribute to the public health and mass sport participation. The findings of the current study could provide the understanding that not only mass participation contributes to the talent pathway and elite sport framework, but methods of elite athletes training could be used for increasing

the level of public health as well. This fact reveals a strong trend of connection between HP sports and mass participation and vice versa. Physical and health education supported by sport activities at schools are effective in introducing the sport practices of healthy training, restoration and diet, and also making these practices lifelong habits, with specialized sport schools growing across the world and leading in these best practices (Ridpath et al., 2019). However, the North American trend of increasingly private education in the style of International Management Group and other preparatory sport academies is causing all countries, from Australia and Canada to China and Russia to move from public to more private education, which means good education only for the talented and the rich. As a result, the best US sport practices and the country's international successes are struggling to reverse the 30-year trend of declined sport participation (NSGA, 2016) and increased obesity which reached about 40% of the US population and \$147 billion in annual medical costs. For the mutually beneficial integration of mass and elite sport, the world needs free high quality education and healthcare for all as provided in such countries as Norway and Finland. Following specialized sport schools, not just education, but the actual physical, health, and sport activities, including food preparation based on medical scientists' recommendations, could be provided to all students every school day, just as these activities should be part of every day for all citizens (Zhamardiy et al., 2020). To cover additional expenses, governments could require school graduates to work in public sector after graduation, as done in many countries to pay back for university education. Increased investments into better PE and sport will be returned through increased productivity and decreased healthcare expenses.

Conflict of interest

The authors declare that there is no conflict of interest.

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