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Keynote Address **Open Access**

Physical Activity: The Pill Not Taken

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Abstract

This paper summarizes the first-ever IOHSK distinguished lecture. It briefly describes Dr. McKenzie's lengthy research career, identifies the importance of physical activity to public health, emphasizes the need for research and program collaborations, and highlights systematic observation as a tool for generating contextual information on the occurrence of physical activity. It concludes with suggestions about how IOHSK members can become more involved in physical activity promotion.

Keywords: research, physical activity, systematic observation, collaborations

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Physical Activity: The Pill Not Taken

It is a tremendous honor to have been selected to deliver the first-ever distinguished lecture for the International Organization for Health, Sport, and Kinesiology (IOHSK). I want to extend special thanks to Dr. Hosung So and to the Organizing Committee for the opportunity to share my background at such a notable event.

I have had a long, diverse background that initially included working with schools (i.e., teacher, administrator, sport coach, athletic director, researcher), obese individuals in summer residential camping settings (McKenzie, 1986), and Olympic-level athletes (Gipson, McKenzie, & Lowe, 1989). More recently, I began to focus my work on public health, and I have been fortunate to have been able to travel to 64 countries and visit schools, community centers, and parks there.

Physical activity (PA) is a major part of the three facets of the IOHSK (i.e., health, sport, kinesiology), and I am grateful for my extensive background in physical education (PE), sport, and public health. With concern for the current global low levels of PA, I titled my paper, *Physical Activity: The Pill Not Taken*, and in it I briefly highlight some of our studies related to investigating PA and getting people to be more active. As background, I believe: (a) PA is a behavior--an action that is positively associated with both physical and mental health, (b) PA is not random, but is contextual and occurs differentially among specific settings; (c) and evidence matters. All three suggest the need for IOHSK professionals to generate practical data to in order assess and improve their programs.

I will frequently use the word "we" because I believe in the importance of collaborative works. They bring together people with the different interests and expertise, both which are essential to program development and large-scale research. For four decades I have been fortunate to have had numerous national and international research partners and collaborators.

Physical Activity and Health

Regular PA can help prevent and treat noncommunicable diseases such as heart disease, stroke, diabetes, and breast and colon cancer. As well, it can help prevent hypertension, overweight, and obesity and improve mental health, quality of life and well-being (WHO, 2018). Nonetheless, sedentary living (at 6%) has been identified as the fourth leading risk factor for global mortality, surpassing overweight and obesity which are at 5% (WHO, 2010). For the U.S., the first PA goals/recommendations were identified in the 1996 Surgeon General's report (USDHHS, 1996). Those recommendations have been revised several times--most recently in the *Second Edition of Physical Activity Guidelines for Americans* (Piercy et al., 2018). Unfortunately, over 42% of the adult population in the U.S is obese (Trust for America's Health, 2020) and the burden from physical inactivity is estimated to be between 200 and 300 thousand preventable deaths yearly (Piercy et al., 2018). Meanwhile, except for athletes and those in rigorous training, there are concerns about insufficient amounts of engagement in PA worldwide (WHO, 2018).

Most countries have PA recommendations (WHO, 2018), and similar to the U.S. (Katzmarzyk et al., 2018) many countries (Aubert et al., 2018) also periodically generate report cards for children and youths that have different indicators (e.g., overall PA, sedentary behaviors, active transportation, organized sports, health related fitness, PA among family and peers, schools, and the built environment). Such indicators make it possible to identify trends over time. As an example, *Healthy People 2010* (USDHHS, 2000) has identified specific public health objectives for youth PA on U.S. school campuses, both within and outside of PE. These include the promotion of youth PA of moderate and vigorous intensities, daily PE lessons that are highly active, access to school facilities beyond the school day, and having students walk and bicycle to school. Unfortunately, the report card grade for how U.S. schools are doing relative to PA has declined from a "C minus" in 2014 to a "D minus" in 2018.

Evidence Matters: Assessing Physical Activity and Its Contexts

IOHSK professionals should be able to justify their programs, including their objectives facilities, equipment, personnel, and budgets. Meanwhile, to be successful at improving population PA (or even that of an individual), we need to first understand the characteristics (i.e., antecedents and consequences) of the settings in which PA could occur. Subsequently, generating, analyzing, and sharing data are important for assessing baseline levels of PA and program use, evaluating interventions and program changes, and advocating for program components. To do this we need to collect relevant information, not only about PA levels (e.g., frequency, duration, intensity), but also about the events that control them. Thus, we need quality assessment tools.

There are very many ways to assess PA, and each method has advantages and disadvantages. Based on pragmatism (e.g., cost, feasibility) and the goal of a particular study, I have used diverse methods (e.g., heart rate monitoring, accelerometers, self-reports). Nonetheless, my favorite method involves the use of systematic direct observation. Direct observation enables us to assess PA engagement simultaneously with detailed data on the context in which it occurs (e.g., where, when, with whom, and other relevant antecedents and consequences). The method has strong internal/face validity, is flexible, and requires low participant burden (e.g., people are not asked to recall details, wear a monitoring device, or provide a fluid sample). As well, the data can be collected in locations where other assessment tactics do not function well (e.g., in aquatic and martial arts settings). Nonetheless, systematic observation does have disadvantages, including the need for observer training and monitoring and potential subject reactivity.

We recently identified considerations for selecting observation techniques and instruments and how to train observers for using them in both structured (e.g., physical education, sport practices) and unstructured settings (e.g., recess, parks) in "*Top 10 Research Questions Related to Assessing Physical Activity and Its Contexts*" (McKenzie & van der Mars, 2015) and in "*Context matters: Systematic observation of place-based physical activity*" (McKenzie, 2016). A brief description of three related observation systems follows. While we created them for different purposes, they have commonalities including: (a) being published and widely used; (b) having similar validated PA codes (e.g., via accelerometry, heart rate monitoring) and useful with different populations (e.g., age groupings, special needs children); (c) having cost-free protocols available to facilitate observer reliability; and (d) being well supported by both behavior analytic principles and social ecological theory.

SOFIT: System for Observing Fitness Instruction Time. SOFIT is used primarily during instructional sessions (e.g., physical education, dance, sport practices) to simultaneously assess (a) *participant PA levels,* (b) *lesson/session/practice context* (i.e., how content is delivered, including time allocated for physical fitness, motor skill development, game play, knowledge, and session management), and (c) *teacher/coach behavior* relative to the promotion of PA, skills, and fitness (McKenzie et al., 1991). The main focus is on individuals, and observers are paced by a visual or audible signal using an interval recording format (e.g., 10-sec observe/10-sec record). Typical

SOFIT outcome data include minutes and proportion of time participants spend in various postures (i.e., lying down, sitting, standing) and in walking/moderate and vigorous activity. SOFIT also provides important information on: (a) session *schedule* (e.g., frequency, adherence to schedule, duration of scheduled and actual session length, and number of participants), (b) *session context* (i.e., minutes and % of time spent in management, instruction, fitness, skill drills, game play, and free play), and (c) *instructor behavior* (e.g., intervals instructors spend promoting PA, fitness, and skill engagement). SOFIT (and its adaptations) has been used widely in the USA (McKenzie & Smith, 2017) and internationally (Smith, McKenzie, & Hammons, 2019) in a variety of settings (e.g., preschools, sports instruction, special needs classrooms, after school programs) for over 30 years.

SOPLAY: System for Observing Play and Leisure in Youth. SOPLAY provides data on the number of participants and their PA levels in predetermined target areas. It uses a group momentary time-sampling format (i.e., a series of observation "snapshots") to record the PA level and additional characteristics of each individual (e.g., gender) in an area using systematic scanning (McKenzie, 2016; McKenzie et al., 2000). Separate scans are typically made for males and females with entries for area contextual characteristics being recorded simultaneously (e.g., whether they are *accessible* and *usable*, and whether or not *supervision*, *organized activities*, and *loose equipment* are being provided). These characteristics are observed because they impact the number of participants and their PA levels within a space and they can be modified via policy and programming changes.

SOPARC: System for Observing Physical Activity and Leisure Time in Communities. SOPARC expands SOPLAY to include the recording of the age (i.e., child, teen, adult, senior) and race/ethnicity (e.g., white, black, Latino, other) grouping of each area user (McKenzie et al., 2006). It is typically employed to investigate park and recreation areas, including assessing community/school shared use of facilities (Evensen et al., 2016; McKenzie, 2016; McKenzie & van der Mars, 2015). SOPLAY/SOPARC have been widely used internationally (Evenson, et al., 2016). Their typical outcome data include the number and proportion of participants in an area overall by variable of interest (e.g., gender, age grouping) as well as the frequency and the proportion of times during observation visits that a facility was *accessible*, *usable*, *supervised*, and had *organized activities* and *loose equipment* available. Energy expenditure rates for areas (e.g., MET values) can be calculated (using number of people present, their observed activity levels, and validated energy constants for each activity level). Additionally, an associated environmental inventory can provide information on area characteristics such as location, type, size, surface area, and structural enhancements.

Sample PA Contexts

In 1985, I became involved in studying PA as part of public health and have been a part National Institutes of Health (NIH) supported projects ever since. During my first study we observed Anglo- and Mexican-American families in their homes using BEACHES-Behaviors of Eating and Activity Children's Evaluation Study (McKenzie, Sallis, Patterson et al., 1991). We assessed PA and food ingestion relative to parent and peer prompts and consequences during both baseline and intervention periods. Later we investigated the generalizability of the intervention by taking both intervention and control families to the San Diego Zoo where their PA and eating behaviors were assessed in a novel setting.

After that study, we began doing PA interventions in schools. The most prominent of these was a 7-year study (SPARK-Sports, Play, and Active Recreation for Kids) (McKenzie et al., 2016) which was funded by the National Institutes of Health (NIH) and included schools being assigned randomly to treatment conditions. Later we extended the research into secondary schools (McKenzie et al., 2016; Sallis et al., 2003). SPARK still continues, and is in its thirty-first year of being disseminating nationally and internationally (see sparkpe.org). Meanwhile, our extensive work in studying PA in park and recreation settings began in 2002 (McKenzie et al., 2006) and it still continues (e.g., Cohen et al., 2020).

Community Collaborations. I want to emphasize the importance of conducting PA research that is useful and can be disseminated broadly. While elaborate statistics may identify small differences among variables, those findings may not necessarily be useful in bringing about changes. It is important that we translate our research for policymakers and for people that influence them and to remember that not all research is designed for publication. Below are brief descriptions of three projects I was/am involved in that had/have practical importance.

In the first project I trained physical education supervisors in school districts to use SOFIT to assess PE classes and they used the tool to observe 1582 lessons during regular visits to schools. Unfortunately, the data showed PA during lessons was far below recommended levels. Additionally, a large number of lessons (n=212) that they went to observe were never conducted. The primary reasons for classes not being held were that the regular PE teacher was not available and there was no substitute (24%), special school events (20%), other academic priorities (20%), and holiday celebrations (19%). Fortunately, the data collected by the supervisors resulted in staff development and curricular and policy changes within in the districts.

The second example involves OPEN (Observing Park Environments in Nevada), a partnership between the University of Nevada, Las Vegas (UNLV), City of Las Vegas, and Clark County. Under the direction of Monica Lounsbery, UNLV provided leadership and conducted observer training and focus groups while the city officials selected parks in low-income areas and assigned 22 staff to use SOPARC as part of their workload. The staff observed 238 different PA areas in the parks for user (i.e., number, gender, age, PA levels) and area characteristics during three temperature seasons. Assessors, who made 11,424 area visits and observed 33,362 individuals, found differences in use by park location (geography, population density), day of week, time of day, season, and facility type. Most park users were adults (37%), with 26% being children, 21% teens, and 6% seniors. More males than females at all age levels were seen in the parks (overall, 61 vs. 39%) and they were more physically active. Areas were usually accessible (98%) and useable (94%), but they were rarely supervised (4%) or had organized activities (5%). In summary, park staff accrued objective data on patron behavior and on facility use that assisted them in making policy and program changes. As well, they were trained to collect data they could use in other projects. This project, which received unprecedented visibility among policy makers, illustrates the value of building research partnerships.

The third example is a project we just initiated in August. Given concerns related to the COVID-19 pandemic and with support from the National Institutes of Health, we modified SOPARC to create SOMAD (System for Observing Mask Adherence and Distancing). We are using it in two large studies. The first is currently taking place in Philadelphia (SOMAD REPORT, 2020) and the second will involve observations throughout the U.S.. In August, 2020, nearly 5000 individuals were observed in 30 different Philadelphia sites, and preliminary analyses indicate there were disparities in mask use by city district and area type (i.e., commercial streets, playgrounds, parks). There were also differences in mask use by gender, age, and race/ethnicity groupings and by PA levels. For example, while 43% of the people observed were wearing masks appropriately only about 23% of those engaged in vigorous activity did. This project shows, once again, how collaborations using systematic observation in the field can be useful in helping agencies/communities plan for creating a healthier society.

Closure

In closing, I want to reiterate the importance of PA to public health, and I believe there are ways IOHSK members can become more involved in this endeavor. One way is to work together with others--and in terms of collaboration, the World Health organization has a new global action plan to promote physical activity (WHO, 2018). This plan was developed through an extensive worldwide consultation process involving governments and stakeholders from diverse sectors including health, sports, transport, urban design, civil society, academia, and private business. The plan identifies the importance of global leadership and strong regional and national coordination as well as the need for society to increasingly support the notion of all people being physically active across their life spans. Specifically, IOHSK could conduct trans-disciplinary meetings to engender academic discourse related to PA promotion and the organization's sub-disciplines.

Meanwhile, at the local level many parents are not yet attuned to the importance of PA. Even in schools, settings where children and adolescents accrue about 25% of their PA on days they have PE, do little to promote PA beyond their walls (Kahan, & McKenzie, 2020). Subsequently, I encourage members to consider what I refer to as the "the bigger bang theory"—the notion that we can make greatest contributions by focusing on policy changes that affect all people within a particular setting, not just simply targeting individuals (McKenzie, 2019). In doing so, we need to be mindful that policies exist at different levels and with different language strengths (e.g., "should" vs. "will") and levels of formalization and accountability. I hope IOHSK members will help develop and implement strongly worded PA policies that start at the top level of their organizations (e.g., government, education, corporate) and ensure ample accountability measures are built in.

Finally, and once again, I am thoroughly honored to have been selected the first-ever distinguished IOHSK lecturer. I look forward to future meetings and to reading about your successes in your journal. For references to my other works, see my website (*thomckenzie.com)*.

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Original Research **Open Access**

Development of a Customized Mobile Application in Sport Education

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Introduction

Sport education (SE) aims to help students to be three kinds of sportspersons: (a) a competent sportsperson, (b) a literate sportsperson, and (c) an enthusiastic sportsperson (Siedentop et al., 2020). Experienced teachers reported that SE provided them with time for observing, giving feedback, and praising students individually (Brunton, 2003). However, pre-service teachers may have a hard time using the model because of a lack of full understanding about the curriculum as well as the large amount of time it takes to prepare for seasons (McMahon & MacPhail, 2007). The preparation may be a burden for pre-service teachers if it is their first-time implementing SE (Deenihan & MacPhail, 2013).

The appropriate use of technology such as mobile applications (Apps) may provide another vehicle to assist teachers with teaching the SE curricular model. For instance, the season schedules, game scores, individual/team data, and other information can be managed by the Apps. However, very few studies have addressed the integration of Apps into physical education. Therefore, the purpose of the study was to design and develop a customized App named *Smart Sports* for the SE curricular model and to examine the utility of the App based on physical education teacher education (PETE) students' feedback.

Keywords: mobile application, technology, sport education

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Methods

Two sport pedagogy experts (2 Caucasians; 1 male, 1 female) and eight graduate students (7 Caucasians, 1 African American; 3 males, 5 females) in a PETE program in the Southwestern USA participated in this study. Informed by the Analysis, Design, Development, Implementation, and Evaluation model (ADDIE), which is one of analysis methods for effectiveness of use of many types of instruction, the five phases: (a) analysis of curriculum, (b) design, (c) development of an App, (d) implementation of the App, and (e) evaluation of the APP, can be performed to build effective curriculum support tools (Hannum, 2005). A discussion for designing the *Smart Sports* App with two sport pedagogy experts was held prior to developing the App. All the necessary features for teachers were discussed in the meeting. Based upon the summary of suggestions from the experts, the customized App (*Smart Sports*) was developed and updated on weekly basis. Participants utilized the App in the SE class for three

weeks and gave feedback through open-ended pre/post surveys.

From the first day of the study, students were asked to take the pre-survey by answering the questions: (a) their experiences teaching the SE curriculum, (b) their paperwork before SE lessons, (c) familiarity with mobile Apps, and (d) expectations of using the SE App. With five rounds of revisions and updates, the *Smart Sports* App had been implemented in the SE classes. The post-survey was conducted after a three-week period of using the App and the survey questions included: (a) overall thoughts about the SE App, (b) interesting moments while using the App, (c) features in the App (advantages/challenges), and (d) willingness to use the App in their classes.

Results

According to the results of the pre-survey, all but one of the participants had previous experience with SE. Only two participants were familiar with using Apps in their teaching. They mentioned copies of contract forms and rules, signs, team information, expectations and guidelines, team organization, statistics sheets, team binders, and lesson plans as the paperwork teachers have to prepare before SE seasons. Three of participants were looking forward to reducing the paperwork by using the *Smart Sports* App and two participants wanted to learn how to incorporate the App for recording game statistics.

Three participants reported in the post-survey that, as to the interesting moment that happened while they were using the SE App, they enjoyed using the countdown timer and scoreboards. All the participants mentioned that the App would motivate student learning because they, as students, enjoyed new ways of learning with the App technology. All the respondents commented that they would like to offer the use of the App to their peers or other physical education teachers because they found the App's potential to enable teachers to teach SE during team practice and formal competitions. Three of participants commented that the App would be helpful for out of class practice or physical activity because students might want to keep track of their activity and perhaps have contests with peers. Overall comments were very positive that the App had a great deal of potential for helping keep track of season statistics, scores, fair play points, etc. and that it made using the SE curricular model less stressful for teachers and students. After the post-survey, the *Smart Sports* App was updated for a final (6^{th}) time. This final update included scoreboards being divided into different types of sports/activities (i.e., scoreboard for coach, net/court sports, striking/fielding sports, basketball, football, and track/field sports).

Discussion

Framed by ADDIE model, the effectiveness of the customized App in a formal SE course in a PETE program was evaluated in the study. In spite of the pre-service teachers' positive impression of SE in PETE, the gap of experiences between PETE training and real teaching may lead to difficulties for PETE students in starting SE seasons (McMahon & MacPhail, 2007). The appropriate delivery of the SE in PETE with scaffolding strategies is therefore essential. Appropriate use of technology (e.g., mobile Apps) will help them deliver SE effectively. Teacher educators in PETE should provide the pre-service teachers with proactive and supportive lessons using appropriate technology along with many examples of teaching scenarios and how to handle events in the classes.

Physical education teachers should be exposed to cutting-edge technologies so that they know the possibilities of what they can do and what students can do in their educational contexts. However, it is important for teachers to select appropriate technologies due to the lack of Apps that match with physical education pedagogical models. In this study, the faculty members' suggestions for the App design and the pre-service teachers' feedback played important roles in developing the customized App that may affect their ability in teaching the model. Considering that this study was based on the investigation of one educational App after consultation with sport pedagogy faculty in a PETE program, further investigation and application in other settings are needed.

Conclusion

This study provided information regarding how to design and develop a physical education App for effective teaching. Using the customized App in the SE class of a PETE program had a positive effect on teachers' delivery of the model. Further examination of the integration of technology into other curricular models for physical education are warranted.

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Original Research **Open Access**

Effects of a Sport Education Intervention on Students' Self-Esteem and Sport Confidence in University Badminton Classes

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Introduction

Sport education curriculum model (SEM) is a curriculum, unit, or method of teaching used in physical education programs, and has three major goals for students to become competent, literate, and enthusiastic players (Siedentop, Hastie, & van der Mars, 2020). Alexander and Luckman (2001) described that the SEM offers an extended season, persisting groups, less direct teaching, and more responsibility for students which can create meaning, purpose, and enjoyment for students in physical education.

Self-confidence is recognized as vital to both development and performance enhancement (Weinberg & Williams, 1993; Feltz, 1988). The term self-confidence refers to one's belief that he or she can successfully execute a desired behavior. Self-esteem is the extent to which an individual likes, values, and accepts the self (Schacter, Gilbert, & Wegner, 2009) and is related to self-confidence, and pertains to one's personal judgement of worthiness. Compared with people with low self-esteem, those with high self-esteem tend to live happier and healthier lives, cope better with stress, and be more likely persist at difficult tasks (Baumeister, Campbell, Krueger, & Vohs, 2003).

Keywords: sport education model, self-esteem, state sport confidence

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A sport-specific model of self-confidence was conceptualized into trait and state components (Vealey, 1986). The state confidence is related to a special situation or very limited time episodes (Weinberg & Gould, 2007). Sport confidence is defined as the belief or degree of certainty individuals possess about their ability to be successful in sports. Although self-confidence and self-esteem may be related, certain individuals do not have high self-confidence for a given activity, but still "like themselves". By contrast, there are those who may regard themselves as highly competent at a given activity but do not have corresponding feelings of self-worth (Feltz, 1988). The purpose of this study was to determine the effect of two contrasting courses on self-esteem and state sport confidence.

Methods

Two intact co-educational badminton classes in a comprehensive university located in Southern California were selected for this study. A total of 49 college students (26 students in a traditional teacher-led class (GE) course and 23 kinesiology students (Pedagogy) in a sport education model course) participated and completed a survey at pre- (1st week) and post-test (10th week). The course instructor of the two intact classes had 18 years of teaching experience and a USBA certified coaching license as well as previous experience with SEM in badminton.

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965), consisting of 10 statements related to overall feelings of self-worth or self-acceptance on a 4-point scale (0 to 3) ranging from strongly agree (3) to strongly disagree (0) was used, scores ranging from 0 to 30 and indicating with *cut-off scores of* 0-15 (low self-esteem), 15-25 (normal self-esteem), and 25-30 (high self-esteem). The State Sport-Confidence Inventory (SSCI; Vealey, 1986) was used to measure state sport confidence using 13 questions on a 9-point scale (low 1 to high 9), resulting in a possible score range of 13 to 117.

Due to the use of intact classes, the study utilized a nonequivalent control group design (Campbell & Stanley, 1963), signifying the two groups may be nonequivalent prior to intervention. In the experimental condition, the SEM was delivered with a three-phase format: a teacher-directed skill development phase for 4 weeks, a preseason scrimmage phase for 2 weeks, and a formal competition phase 4 weeks. For the traditional style of instruction, the format of every lesson was similar, consisting of a 10-min warm-up followed by a 30-min skill related practice and ending with a 15-min random single or double games.

Results

Table 1 shows the means and standard deviations in student self-esteem and state sport confidence for the sport education (Pedagogy) and the traditionally taught (GE) groups before and after the intervention. The Box M results indicated that the observed covariance matrices of the dependent variables were equal across groups (χ^2=3.09, *df*=3, *p*=0.40). Repeated-measures ANOVA revealed no significant Group X Time interactions for self-esteem [$F(1,46)=3.53$, $p > .05$, $\eta^2 = .07$] and state sport confidence [$F(1,46)=2.42$, $p>.05$, $\eta^2=.05$].

However, both self-esteem and state sport competence showed a significant effect on Time. There was no significant effect of SEM on sport state confidence. Effect Sizes (*d*) on RSES and SSCI were calculated (Cohen, 1992) and found the GE group showed a large effect size (d=.96, p<.001) on the SSCI, whereas the Pedagogical Badminton class showed a moderate Effect Size (*d*=.67, p<.01) on the RSES (see Figure 1).

Table 1. Means and Standard Deviations for Self-Esteem and State Sport Competence Scores at Pre- and Post-Intervention

	GE Class (n = 26)		Pedagogy Class (n = 23)	
Measure	**Pre**	**Post**	**Pre**	**Post**
Rosenberg Self-Esteem Score (0-30)	19.54 ± 4.59	20.15 ± 4.63	25.27 ± 4.75	27.27 ± 4.41
State Sport Competency Score (13-117)	68.42 ± 21.27	87.08 ± 20.74	95.65 ± 20.56	104.86 ± 15.98

Independent sample t-tests revealed no significant differences between two classes on students' self-esteem and state sport competence prior to the intervention. However, independent sample t-tests on self-esteem [$t(46)=-5.42$, $p<.001$] and state sport competency [$t(46)=-3.31$, $p<.01$] at post-test showed significant differences. Paired-sample t-tests also revealed significant mean differences on self-esteem for the SEM class, $t(21)=-3.14$, $p<.01$ and state sport competency for the GE class, $t(24)=-4.80$, $p<.001$.

Conclusion & Discussion

The purpose of the present study was to assess the effectiveness of a sport education curriculum model in improving self-esteem and state sport competency. Students in the sport education group reported significant pre- to post-intervention increases in self-esteem, but not in the state sport competence. The results could be interpreted by Vealey's (1986) recommendations that the state sport competence is hypothesized to be positively related to performance orientation primarily focused in general college physical activity class, and negatively related to outcome orientation which is a core element of the SEM. However, self-esteem is positively related to outcome orientation (e.g., feelings of success, accomplishment, belongings, team affiliation, and formal competition).

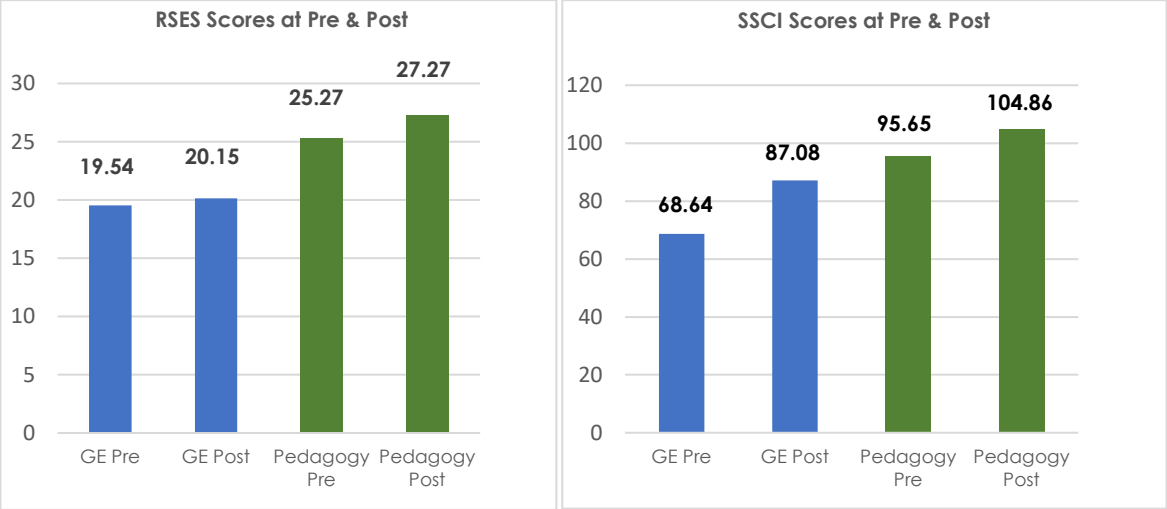

Figure 1. Scores on Rosenberg Self-Esteem and State Sport Competence at Pre and Post-Intervention in GE and Pedagogy/SEM class

Similar to Wallhead and Ntoumanis' (2004) study, although a primary goal of sport education is to develop competence in sport (Siedentop, 1994), implementation of the course SEM may indirectly affect the SEM's potential for developing student skill. The lack of significant improvement in the sport education student's state sport competence might be due to the relatively short duration of the intervention and fewer opportunities for students to practice skills in badminton that is easy to play but hard to master. Further research is required to examine the potential effect on student skill development and perceptions of competence in the sport education courses.

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Original Research **Open Access**

Teacher Challenges with Assessment Practices in Elementary School Physical Education: A Literature Review

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Introduction

Elementary school physical education (PE) has historically been recognized as an essential subject in school curricula (Graber et al., 2008; Kirk, 2005). Meaningful experiences of participating in PE have a significant impact on students' development of fundamental motor skills, positive behaviors, and fostering physically active lifestyles (Hunter, 2006; Morgan et al., 2013). Assessment in PE is one of these experiences and has become a central concern in PE pedagogy as it is considered necessary for students to be assessed in order to achieve the desired learning outcomes in school contexts (Elwood, 2006).

Assessment is defined as "the process of gathering, recording, interpreting, using and reporting information about students' progress and achievements in developing knowledge, skills and attitudes" (National Council for Curriculum and Assessment, 2007, p. 7). Siedentop and Tannehill (2000) described PE assessment as "a variety of tasks and settings where students are given opportunities to demonstrate their knowledge, skill, understanding and application of content in a context that allows continued learning and growth" (p. 179).

In PE, assessment is one of the vital components that teachers use to measure student progress toward skill development throughout the learning process (Rink, 2010; Siedentop & Tannehill, 2000) and use that information to guide instructional practices and enhance student learning (DinanThompson & Penney, 2015; Shepard, 2008). Moreover, it has the potential to improve pedagogical practices (Wiliam, Lee, Harrison & Black, 2004). That is, feedback gained through assessment allows teachers to adjust their planning to include what students still need to learn in PE (Fisette & Franck, 2012; Hay, 2006; Wright & van der Mars, 2004).

Keywords: assessment, barriers, teacher education

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However, studies show that PE teachers expresses concerns that the implementation of assessment takes away from time dedicated to class time and can lead to student misbehavior (Gallo et al., 2006; James, Griffin, & France, 2005; Lander et al., 2016). Secondary school PE teachers consider assessment unnecessary and perceive it negatively (Kneer, 1986).

In addition, teachers feel they cannot use the assessment properly due to their lack of knowledge (Morgan & Hansen, 2007). Although research into the impact of assessment has been widely conducted in other disciplines (Wiliam et al., 2004), little efforts have been made to review the research on elementary school PE teachers' challenges in assessment. The purpose of this literature review is to examine teachers' practices and identify the challenges in elementary school PE assessment implementation.

Methods

A literature search was conducted to identify all published research, in English, that reported teachers' challenges with assessment practices in elementary school PE. The search was conducted using three databases: Google Scholar, PubMed, and Educational Resources Information Center (ERIC). These were selected because they are three of the major databases in the field of education. In searching for the data, multiple combinations of the following key terms were used: "physical education", "assessment", "evaluation", "elementary", "practice*", "barrier*", "difficult*", and "challenge*". The search yielded a total of 846 unique records, which were screened by title, then by abstract, and finally by full text, resulting in 8 records that were obtained for the review. The data were qualitatively synthesized using a thematic analysis (Thomas & Harden, 2008). Specifically, the researchers independently searched for the teachers' challenges and/or barriers to assessment practices in PE. Lastly, the researchers examined the list for redundancies and similarities and grouped all challenges thematically (see Table 1).

Table 1. Themes and Factors of Teachers' Challenges with Assessment Practices

Themes		Factors	Sources
Perceived Barriers to Assessment Practices	1.	Lack of time (e.g., management, planning, scheduling, school disruptions, etc.)	Lander et al. (2016); Matanin & Tannehill, (1994); Morgan & Hansen, (2007)
	2.	Lack of assessment knowledge	Lander et al. (2016); Morgan & Hansen, (2007); Richard et al. (1999)
	3.	Lack of confidence (e.g., teacher readiness, ability to implement, etc.)	Morgan & Hansen, (2007); Patton & Griffin, (2008)
	4.	Lack of training (access to professional development)	Matanin & Tannehill, (1994); Morgan & Hansen, (2007)
	5.	Impracticality (e.g., large class size, increase workload, unfairness)	Landers et al. (2016); Patton & Griffin, (2008); Richard et al. (1999)
Value of Assessment Practices	6.	Low priority compared to other PE curricula (physical activity)	James et al. (2005); Patton & Griffin, (2008); Richard et al. (1999)
	7.	Students' lack of engagement (e.g., low motivation, inactivity, enjoyment)	Matanin & Tannehill, (1994); Morgan & Hansen, (2007)
	8.	Increase in student misbehavior	Patton & Griffin, (2008); Richard et al. (1999)
Assessment Practices within School Environments	9.	Lack of administrative support (administrators, principal & school board)	Chróinín & Gosgrave, (2013); Hastie & Siedentop, 2006; James et al. (2005); Matanin & Tannehill, (1994); Morgan & Hansen, (2007); Patton & Griffin, (2008); Richard et al. (1999)
	10.	Low student support	James et al. (2005)

Results

Perceived Barriers to Assessment Practices

Studies illustrate that PE teachers perceived assessments as being time-consuming, being impractical with large class sizes, creating too much work for both teachers and students, and taking the enjoyment out of PE (Lander et al., 2016; Morgan & Hansen, 2007). Other studies indicate that PE teachers feel they have not been adequately trained to assess students' performances of the skills they learn in class (Matanin & Tannehill, 1994; Morgan & Hansen, 2007). Moreover, PE teachers do not know how to appropriately use assessments due to their lack of knowledge about assessment design and delivery (Lander et al., 2016; Morgan & Hansen, 2007). Additionally, students resist assessments as they feel assessments' practices are unclear and fail to underscore the learning outcomes that they should achieve in PE (Richard et al., 1999).

Value of Assessment Practices

Literature shows that teachers did not value assessment as an essential component in PE and perceived there to be a negative connection between assessment and students' behavior (Patton & Griffin, 2008). For instance, Matanin and Tannehill (1994) described that PE teachers stated that it was more important to keep the students busy than to assess students' progress because assessment inhibits student enjoyment. Similarly, Richard et al. (1999) presented that teachers temporarily discredit assessment since these practices increased student misbehavior and decreased student motivation due to inactivity during assessment.

Assessment Practices within School Environments

Research describes that school contexts (e.g., classroom ecology, other teachers, administrators, environment, etc.) influence PE teachers' implementation of assessment (Hastie & Siedentop, 2006; James et al., 2005). For instance, Hay and Penney (2013) discuss assessment practices being impacted by the school environment. Studies show that PE teachers believe that the use of assessment can enhance students, teachers, and administrators' support and value of PE (Chróinín & Gosgrave, 2013; James et al., 2005). On the other hand, some PE teachers express that they were negatively influenced by other teachers in their department to dismiss assessment practices as inconsequential. This resulted in a decrease in their use of assessment practices (Matanin & Tannehill, 1994) and that a perceived lack of support and value for PE from school administrators (Morgan & Hansen, 2007).

Conclusion

This review adds a comprehensive view of PE teachers' challenges with assessment implementations to the current literature base. In conclusion, researchers have shown that PE teachers face several barriers with regards to implementing assessment practices in PE instruction. These include lack of time, large class sizes, lack of administrative accountability, lack of professional preparation, and belief that assessment is not necessary in PE. Additionally, although the descriptions of assessment practices in PE education have been a feature of education research for a while now, teachers remain incapable of implementing assessment appropriately and are making decisions regarding assessment results without proper training programs (Lund & Veal, 2008).

Discussion

Assessments perform an important role in student learning in elementary school contexts. This review was intended to support multiple audiences (i.e., practitioners, teacher educators, and administrators) by discussing barriers teachers have with PE assessment practices. Ideally, based on these findings, teacher educators and schools will provide a teacher education program for professional development to help PE teachers overcome difficulties and allow them to implement effective assessment practices.

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Original Research **Open Access**

Korean Sports Crime and Its Responsibility for the Enactments of Sports Law

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Introduction

Sports are a significant part of people's lives around the world. According to modern sports theory, sports are defined as "the sum of physical activities as games and play including competition" (Ryu, 2001, p.11). In Korea, along with the expansion of various areas (i.e., education, economy, etc.), improvements in sports are being made at the national and cultural level. Accordingly, sports-related laws are also being reorganized by enacting important principles (Kang, 2005). The purpose of this paper is to discuss the history and theory of sports law and sports crimes in Korea by referring to existing studies.

Keywords: Korean crime theory, Korean sports law, Korean criminal law

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Methods

First, a literature review was widely conducted to examine the concepts and etymology of sports through exploring existing studies. Next, the concepts and histories of Korean sports law were investigated in accordance with its development in the past few decades. Finally, the theory of Korean sports crime and its responsibility for the enactment of sports laws were established and described.

Results

History of Korean Sports Law

Since the introduction of sports into Korea more deeply, laws have developed alongside their growth. As the importance of sports was recognized in the 1960s, related laws were enacted at the government level (Shin & Jang, 2010). Many studies note that a turning point in Korean sports occurred in the 1980s; sports became more popular with the successful hosting of the Asian Games and Olympic Games in the 1980s (Yeon et al., 2018; Kang, 2005). Since then, professional sports have been established and expanded. Article 1 of the Korean National Sports

Promotion Act, which is a representative law of the Sports Act, stipulates, "The purpose of the Act is to contribute to the promotion of Korean national sports, to promote the physical strength of the people, to cultivate the healthy spirit of the people, and to promote the Korean national prestige through physical education" (Yeon, 2015). Next, Article 1 of the Act on the Installation and Utilization of Sports Facilities stipulates that, "it aims to encourage the installation and use of sports facilities, to develop the sports facilities business, and for contribution to the promotion of Korean national health" (Yeon, 2015). In addition to sports laws, administrative laws include sports-related clauses. Examples include the Act on Welfare of Persons with Disabilities, the Korean National Health Promotion Act, the Juvenile Protection Act, and the Basic Youth Act (Lee, 2005).

Theory of Korean Sports Crime

Crime theory refers to the nature of crime, which is the basis of punishment. Crime theory has a subjective and an objective side (Shin, 2013; see Table 1). Objectivist crime theory emphasizes the objective facts of crime, in which the subject and the situation become one. The objective aspect means actions and results. In contrast, the subjective aspect focuses on understanding the person who committed the crime.

Table 1. Objectivism and Subjectivism in Crime Theory

Objectivist	Subjectivist
Objective elements such as actions and consequences, which are external facts in crime, are subject to penalty evaluation.	Subject of punitive evaluation of the actor's antisocial character and criminal risk.

Korean Sports Crime and Its Responsibility

Sports crimes can be understood as sports-related criminal acts. Sports include various elements, such as competition, entertainment, and physical training, and sports accidents are those that occur during these physical activities or in connection with a sporting event or competition (Lee, 2005). The most frequent crimes that occur in sports are deliberate foul, violence, gambling/betting, and sometimes even murder. When a crime occurs, the victim and the perpetrator each have their own responsibilities, which can be divided into criminal responsibility and judicial responsibility (Lee, 2019). In general, liability for compensation arises when damage is caused by illegal activities (Shin, 2006).

Discussion

In the field of sports, the autonomous norms that are recognized by authorized associations are socially acceptable. In particular, crimes occurring in sports can be judged from the perspective of general crime theory based on the sport's personality, characteristics, or rules. Therefore, it is essential to discuss the range of autonomous recognition within the realm of sports (Shin, 2006). For example, if during a tennis game a ball hit by a racket bounces and hits a person's eyes, causing injury, it is necessary to decide whether this was an injury or a crime. Also, hitting a person in a boxing game is not a crime because players agree with boxing rules, and the rules are socially sanctioned. A clear definition of sports crime is required.

As the sports industry develops, sports crime increases. However, sports laws cannot keep up (Kang, 2005). For example, the scope of sports crime is not yet clear, so there is difficulty making a legal interpretation when a sports crime occurs. There is the need for a legal mechanism that can accurately overcome this ambiguity. According to survey data from Korea's Ministry of Culture, Sports and Tourism (2019), the Korean sports industry grew between 2016 and 2018 (see Figure 1), as did the number of cases of sports violence (National Human Rights Commission of Korea, 2019; see Figure 2).

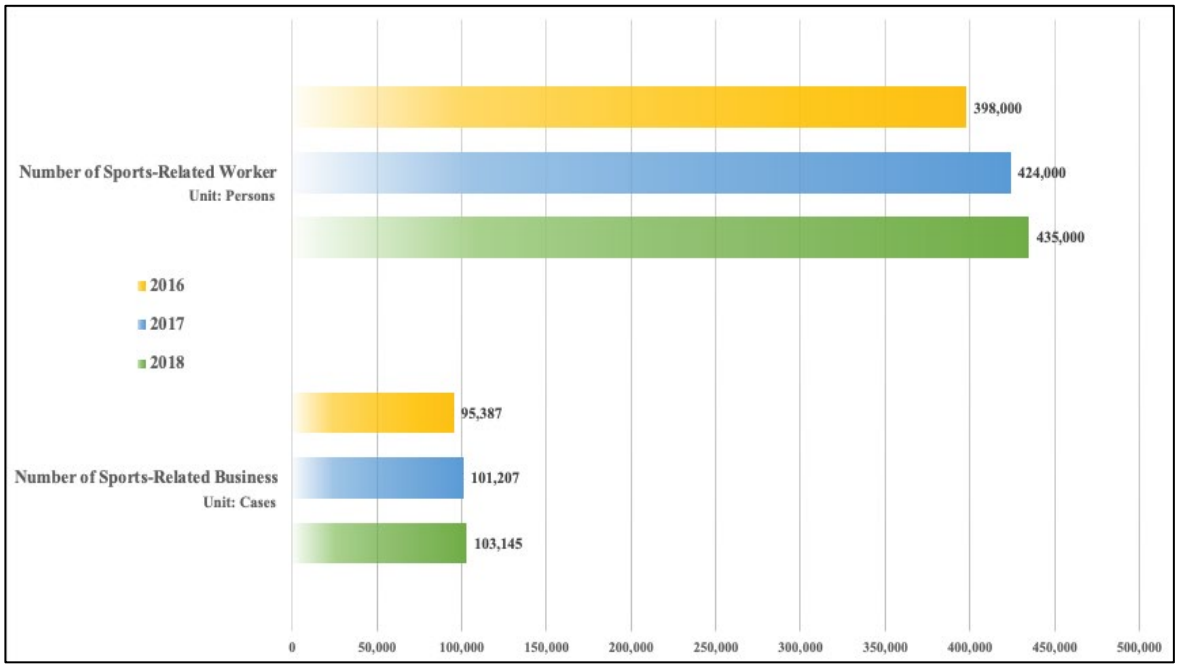

Figure 1. Korean Sports Industry: Development Status, 2016-2018 (Ministry of Culture, Sports and Tourism, Korea, 2019)

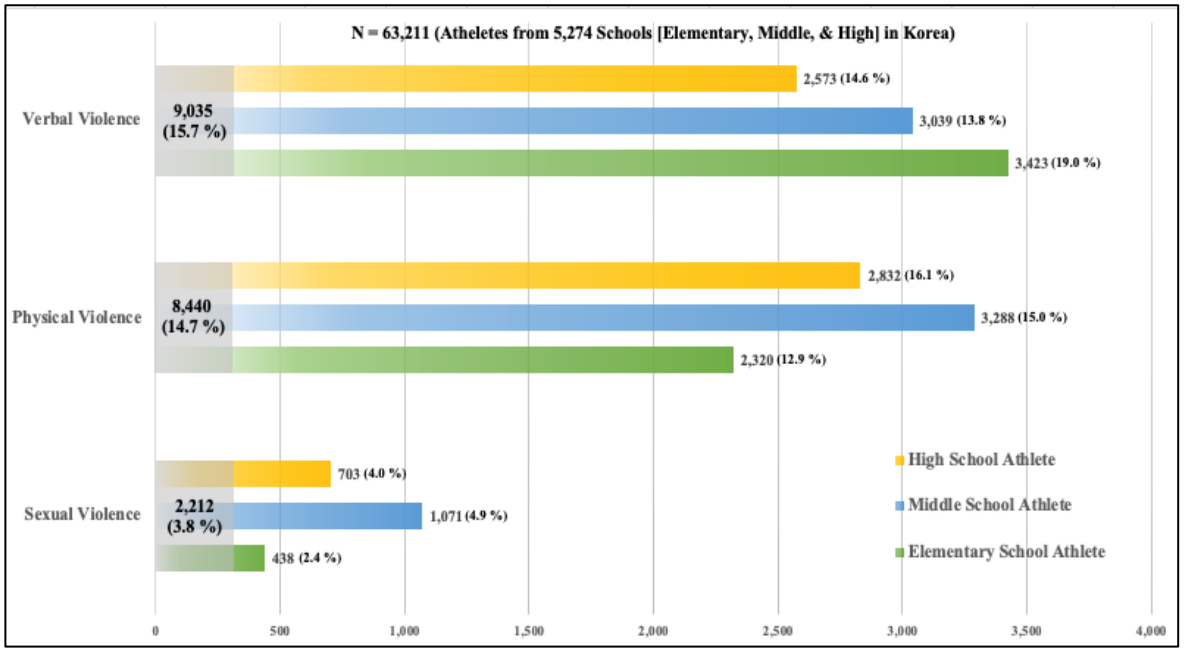

Figure 2. Korean Student Athletes' Experience of Violence, 2016-2018 (National Human Rights Commission of Korea, 2019)

Conclusion

In Korea, sports crimes are currently addressed by only a few general laws, such as Article 1 of the National Sports Promotion Act and Article 1 of the Sports Industry Promotion Act, that cannot deal with many different types of sports crimes. The field of sports will develop more and more, and it would lead to more crimes. It is highly required to strengthen and supplement sports laws to protect people's rights and interests, and by extension, the movement would create a healthier sports community.

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Original Research **Open Access**

Incretin as a Pathophysiological Component and Target for Treatment in Youth Type 2 Diabetes (T2D)

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Introduction

Incretin hormones have recently been considered an important pathophysiological factor for T2D in adults and youth due to their role in augmenting insulin secretion (Michaliszyn et al., 2014). It is recognized that glucagon-like peptide-1 (GLP-1) and glucose-dependent insulinotropic peptide (GIP) are glucose-dependent hormones released from the gut that stimulate insulin release from pancreatic β-cells (Muscelli et al., 2006). Thus, the insulin response to oral glucose is significantly greater than the intravenous (IV) glucose administration response; this is known as the incretin effect (Michaliszyn et al., 2014). To date, adults with T2D demonstrate a remarkable decrease in the incretin effect (Nauck et al., 1986), whereas there is lack of evidence in pediatric populations. The incretin effect is also associated with β-cell glucose sensitivity (βCGS), attesting incretins as a high-promising target for T2D treatment (Michaliszyn et al., 2014). Utilizing GLP-1 receptor agonists can be advantageous as a therapeutic option for both adults and youth (Tamborlane et al., 2019; Vanderheiden et al., 2016; Yeow et al., 2017).

Keywords: Youth-onset type 2 diabetes, incretin effect, glucagon-like peptide-1

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Overview

Literature has consistently described that a core defect in the pathogenesis of T2D is pancreatic β-cell dysfunction against the backdrop of insulin resistance (Michaliszyn et al., 2014). It is proposed that incretins enhance insulin release by sensitizing pancreatic β-cells to glucose (Michaliszyn et al., 2014; Muscelli et al., 2006). Thus, incretin defect could contribute to the β-cell dysfunction, which is considered the most powerful metabolic predictor of T2D, and the mechanisms surrounding a decreasing incretin effect have been explored in recent literature (Michaliszyn et al., 2014).

Evidence has consistently demonstrated a reduced, and sometimes even absent, incretin effect in adults with T2D (Nauck et al., 1986). The incretin effect has been quantitated as the percent difference or ratio between the insulin response seen during an oral glucose tolerance test (OGTT) in relation to IV glucose administration (Muscelli, et al., 2006; Nauck et al., 1986). During an OGTT, adults with T2D exhibited a significantly reduced (36%) incretin contribution to the total insulin response compared to healthy adults who demonstrated a 73% incretin contribution in response to oral glucose challenges (Nauck, et al., 1986). Despite no clear difference in the incretin effect observed between adults with normal glucose tolerance (NGT) vs. impaired glucose tolerance (IGT), the incretin effect on potentiation (i.e., the phenomenon encompassing glucose-induced and incretin-induced potentiation of insulin release) differs significantly (Figure 1), emphasizing potential contribution of incretin defects from NGT to IGT (Muscelli, et al., 2006). Specifically, in IGT adults, a significant rise in GLP-1 corresponded with a flat, unresponsive time course of potentiation following an OGTT, whereas adults with NGT expressed a rise in potentiation in correspondence to an increase in GLP-1 (Figure 1) (Muscelli, et al., 2006).

To our knowledge, data regarding the incretin effect in IGT and T2D are sparse in pediatrics. One pediatric study showed that obese adolescents have a reduced incretin effect (estimated by the ratio OGTT-βCGS/hyperglycemic clamp-βCGS) in both IGT and T2D compared with NGT (32% and 38% reductions, respectively), with no difference between IGT and T2D (Michaliszyn et al., 2014). It is noted that adolescents with IGT and T2D exhibit similar circulating concentrations of total GLP-1 and GIP to adolescents with NGT following an OGTT (Michaliszyn et al., 2014). In terms of incretin response (no effects), data are still controversial in adults. One study showed similar levels of intact GLP-1 and GIP in adults with IGT and T2D compared to NGT following an OGTT (Lee et al., 2010). In contrast, a different study reported that GLP-1 secretion was significantly impaired in adults with T2D vs. NGT (total 2-hour GLP-1 = 16.49 ± 14.11 vs. 35.39 ± 15.40 pmol/L, $p<0.005$) (Zhang et al., 2012). Furthermore, total 2-hour GLP-1 secretion was positively correlated with the homeostasis model assessment of β-cell function ($r = 0.186$, $p<0.0001$) (Zhang et al., 2012), testifying an important interplay of incretin hormones and β-cell function in the evolution of T2D. Collectively, based on studies in adults and limited pediatric evidence, it is postulated that absolute concentrations of GLP-1 and GIP could indicate only a partial segment of the pathophysiological role in T2D, signifying incretin effects function independent of circulating levels.

Given collective evidence on incretins as a key pathophysiological component of T2D, enhancing incretin response and its effects has become a promising target of T2D treatment. In line with this interest/potential, new forms of T2D treatment have targeted GLP-1 receptors. Metformin monotherapy is predominantly used for youth-onset T2D (Y-T2D), but incretin mimetic drugs are being added to this therapy to improve glycemic control (Tamborlane et al., 2019). A recent 52-week (26 weeks double blinded and randomly assigned; 26 weeks open label) phase III clinical trial in obese youth with T2D illustrated that a combination of metformin and liraglutide, an incretin mimetic, improved glycemic control (measured by glycated hemoglobin [HbA1c]) at 26 and 52 weeks to a greater extent than metformin treatment alone at 26 and 52 weeks (HbA1c percentage point change from baseline after 26 weeks = -0.64 vs. 0.42, $p<0.001$, and 52 weeks = -0.50 vs. 0.80 [p-value not reported]) (Tamborlane et al., 2019). Additionally, liraglutide has shown potential in adults with longstanding, uncontrolled T2D using high-dose insulin; compared to placebo, 6 months of liraglutide treatment improved insulin secretion, measured by area under the curve (AUC) of C-peptide, during a mixed meal challenge, (AUC_C = 1234.6 ± 588.6 vs. 922.9 ± 470.5 μg/L/min, $p = 0.002$) (Vanderheiden et al., 2016). Taken together, these studies prove the efficacy of focusing treatment on GLP-1 receptors rather than solely GLP-1 total secretion.

Considerations

While metformin and insulin were the sole treatment options for Y-T2D prior to FDA approval (in 2019) for the use of GLP-1 agonists, a recent RISE (Restoring Insulin Secretion) clinical trial reported disappointing results that both metformin alone and insulin glargine for three months followed by metformin for nine months were not effective in restoring/preserving β-cell function in youth with prediabetes and T2D (RISE Consortium & RISE Consortium Investigators, 2019). On the contrary, the role of GLP-1 and the efficacy of the GLP-1 receptors in T2D signifies a strong target for potential treatment. Additional clinical trials are warranted to see if monotherapy of GLP-1 agonist vs. combined (metformin + liraglutide) therapy is effective to reserve Y-T2D to prediabetes and/or normal state.

More importantly, future research should focus on disease prevention rather than treatment to avoid aggressive complications and metabolic degradations of Y-T2D (RISE Consortium & RISE Consortium Investigators, 2019). Altogether, it would be germane to investigate whether lifestyle changes (diet, physical activity, exercise medicine) can improve the incretin effect in conjunction with glycemic control in youth.

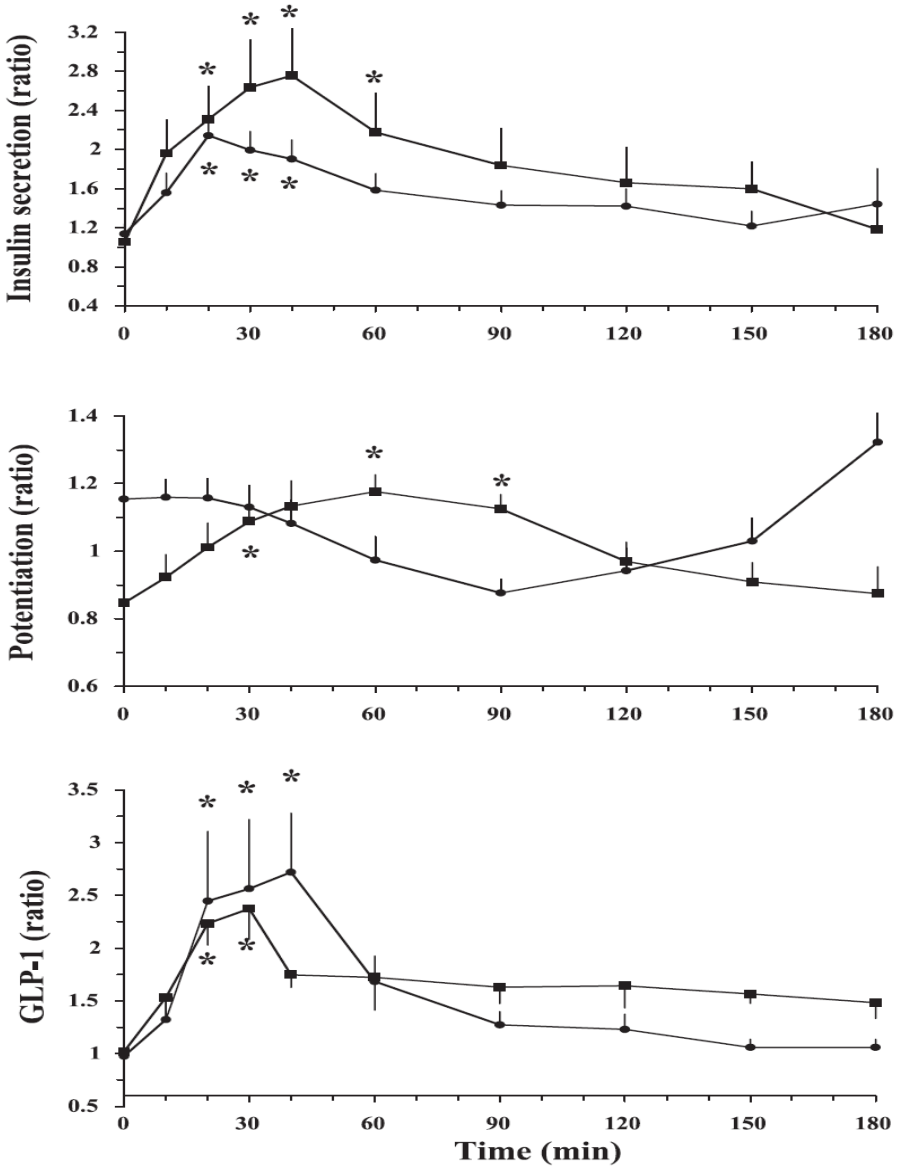

Figure 1. Adopted from Muscelli et al. (2006). Time course of oral-to-IV ratios for insulin secretion rate, potentiation, and GLP-1 in NGT subjects (squares) and IGT subjects (circles). Asterisks denote time points at which mean values differ from baseline (time 0) at the level of P < 0.006.

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Original Research **Open Access**

Sports' Role in Education for Sustainable Development: Prospective

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Introduction

There is no doubt that sport has taken pivotal parts in development and peace as people gather for fair competitions and friendship sharing, regardless their belongings by gender, race, age, ethnicity, ideology, and nationality (UNOSDP, 2015; Wilson, 2012).

Keywords: sustainable development Goals, physical education, sport

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Sport for Sustainable Development

Sport was highly recognized and became a significant component of international efforts to achieve genuine development as the United Nations set out the 2030 agenda as a shared blueprint and framework for sustainable development, entitled "Sustainable Development Goals (SDGs) in 2015 (see Figure 1)." It is succinctly described as:

"Sport is also an important enabler of sustainable development. We recognize the growing contribution of sport to the realization of development and peace in its promotion of tolerance and respect and the contributions it makes to the empowerment of women and of young people, individuals and communities as well as to health, education and social inclusion objectives" (UNOSDP, 2015, p. 1).

It is not only limited to the goal for 'ensuring healthy lives and promoting well-being for all at all ages (Goal 3)' as a key concerning area, but also every target in 17 goals of SDGs, including poverty reduction, education for all, and sustainable energy that is highly connected and related to the contribution of sports for development (Collison, 2018; UNOSDP, 2015). When international competitive games, such as the Olympics, made peaceful paths toward inclusive and compassionate culture to the world even during the time of physical conflicts, more hopeful role of sports to play are wanted in this enduring-hard time as a key agency for development and peace for all.

Gaps Between Rhetoric and Practice

It was 1978 that the UN declared that "spots and physical education was a fundamental right for all" and the UN Office on Sport for Development and Peace (UNOSDP) was established in 2001 to support the agenda. Since then, international organizations designated to the agenda, such as UN, UNDP, UNESCO, UNICEF, and ILO have continuously worked to spur sport to deepen and widen the degree of peace with many sports bodies until the SDGs were emerged. By this, sport was highly expected to play a powerful role in international development and peace.

However, the expectation to sport in international level has hardly been achieved while more athletic games took place with record-breaking participants every time (Coakley, 2009). There has been limited and unstructured framework to measure how sport contributes to international concerns in the development and peace. Scholarly works to problematize the role of sport in development and peace, according to the proclaimed agenda by the UN, criticize that sport has been manipulated by the power with various types of capital, national interest-driven sports games harshly deteriorated physical surroundings in communities, and current sport practice and structures scarcely reflect its expected role in inclusiveness and peace (Darnell, 2012; Wilson, 2012). Although most criticisms related to such problems have targeted against ideologically dominant groups to control sport in national and global level, investigations on the role of sport, physical education, and physical activity in community level are quite few to reveal its critical part in development.

In short, as the claim that sport needs to get engaged in international development and peace is undoubtedly high on one hand, the actual practice and involvement of sport, physical education and physical activity to the agenda in various dimensions remain dormant. It is obvious that more actions need to be put into place as it has long been claimed for.

Sport and Education for the Same Goal

In the meantime, sport cannot be separated from education as education retains a cross-cutting aspect for international development by calling for formulating learning communities. As sport has primarily something to deal with healthy body and sound mind, education could facilitate and fill those with innovative knowledge and imaginative reckoning based upon them. The SDGs also claim that the education should be globally and locally recognized to connect human actions in daily lives to idealism under which the right to learn cannot be obstructed at any time and place by appearance. Then, both sport and education need to be taken as a significant avenue toward global development as they are closely interrelated with every aspect of problematic situations globally spread (Lemke, 2020).

In this context, sport together with education is necessarily supposed to be involved more actively and widely in international development and cooperation, while sport itself has traditionally conceived as games for excellence and pride among elite athletes. However, it is critically necessary to perceive the role of education in development as mentioned in regards with sport's roles.

Despite people's quest for hope and potential progressive transformation in, through and by education and as described in McCloskey's (2015) viewpoints on the important role of education in fostering transitions to sustainability, education mainly functions to make a given societal structure unchanged. Therefore, there is not a clear-cut direction of such a chronological and persistent reforms of education potentially to attain better system of teaching and learning for all since public schooling as a system was pursued (Ravitch, 2016).

However, education has been widely recognized as an active area to deliver quality education to developing countries from early child-care and education (ECCE) to tertiary education to youth and adult education. One of the evidences that could be applied to physical education including physical activities and sports as an important part of education and school curriculum is "Education for Sustainable Development (ESD) that is commonly understood as education encouraging changes in knowledge, skills, values and attitudes to enable a more sustainable and just society for all (UNESCO, 2018).

Moreover, UNESCO and OECD have deeply been engaged in the process of education development by providing adequate support and setting off framework for evaluation. In addition, various tools for policy making and advocacy in local community in developing countries have been disseminated to ensure that education as an unalienable right will be put into action. Then, sport as a global agenda for development needs to move forward beyond well-recognized field competition upon a given ground.

Figure 1 Sustainable Development Goals (SDG), Reprinted from *https://www.un.org/development/desa/disabilities/about-us/sustainable-development-goals-sdgs-and-disability.html*

Conclusion

Prospective Role of Sports in Sustainable Development

It is necessary and urgent that sport, physical education, and physical activity seriously play its role in international development and peace. As international development and cooperation is an interdisciplinary area of actions, sport needs to get more actively involved and be part of various activities for genuine development in local, national, and international level. More involvement particularly in education development through sport, physical education, and physical activity in developing countries can be advocated for each government to employ. Sport for international development cannot stay as a rhetoric but maintain its power to put every social sectors and factors together for more right-based development, which we believe is an authentic education itself.

Note: The Sustainable Development Goals are a call for all countries (poor, rich and middle-income) to promote prosperity while protecting the planet. Information can be found at https://www.un.org/sustainabledevelopment/

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Original Research **Open Access**

Physical Activity Participation During the COVID-19 Pandemic

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Introduction

Physical activity is a significant factor in enhancing quality of life due to its various physical and mental benefits. According to the World Health Organization (WHO, 2010), the recommended amount of physical activity for adults (>17 years old) is a minimum of 150 minutes of moderate-intensity activity or 75 minutes of vigorous-intensity activity every week, while the recommended amount for children and adolescents (5-17 years old) is at least 60 minutes of moderate-to-vigorous physical activity daily. However, when coronavirus disease 2019 (COVID-19) was declared a pandemic on March 11th, 2020 (WHO, 2020a), people around the world had to adapt to new lifestyles involving shelter-in-place and social distancing orders. This phenomenon has disrupted the ability to reach the recommended amount of physical activity for people of all ages (Carvalho & Gois, 2020). The sedentary behaviors adopted during this unprecedented time could, for many people, give rise to an unhealthy lifestyle, which by extension may lead to an increased risk of coronavirus. The purpose of this paper is to review the issue and discuss ways to participate in health-enhancing physical activity during the COVID-19 pandemic.

Keywords: health, exercise, coronavirus

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Overview

The latest report of Global Health Observatory (GHO) data has shown that 27.5% of adults (older than 18 years old) are physically inactive, and 81% of school-aged youth (6 to 17 years old) are not meeting global recommendations for physical activity (WHO, 2016). Furthermore, the number of obese adults throughout the world has nearly tripled since 1975 and is now over 650 million, while obesity rates of children have risen to more than 340 million (WHO, 2020b). These facts were reported before the pandemic began, and this has led to even fewer opportunities for physical activity (Sallis et al., 2020).

Participation in physical activity helps to reduce the risk of developing health conditions such as obesity, cancer, osteoporosis, type 2 diabetes, heart disease, and high blood pressure (U.S. Department of Health and Human Services, 2018), all of which can increase susceptibility to COVID-19 (Kalligeros et al., 2020; Shah et al., 2020;

Yu et al., 2020). In addition, a number of studies have proven that low levels of physical activity are associated with an increased prevalence of anxiety and depression (Korczak et al., 2017; Stubbs et al., 2017). The lockdown has resulted in reduced opportunities for physical activity, as many indoor and outdoor sports, leisure activities, and recreational facilities, such as gyms, playgrounds, and public swimming pools, are unavailable in many countries (Shahidi et al., 2020). Thus, doing intentional physical activity at home or while practicing proper social distancing outdoors should be considered as a strategy for maintaining both a healthy body and mind.

Considerations

With the continuance of COVID-19, a variety of home-based physical activities have been proposed and recommended by many different scholars, experts, and organizations. For example, the American College of Sports Medicine (ACSM, 2020) recently released information on how to stay physically active during the COVID-19 pandemic, including diverse home-based aerobic activities and strength training. In addition, the Society of Health and Physical Educators (SHAPE) America (2020) has provided K–12 health and physical education teachers with at-home fitness ideas that they can incorporate into their teaching curriculum for both synchronous and asynchronous remote instruction. Exercising at home with these and other safe, simple, and easily implementable workout routines is a suitable way to maintain physical fitness and mental health while avoiding COVID-19 (Marcos-Pardo et al., 2020).

A specific form of exercise that is considered a great home-based physical activity to help maintain cardiovascular, metabolic, and musculoskeletal fitness and decrease the severity of depression is dance (Hammami et al., 2020). There are many types of dances, such as contemporary, jazz, salsa, and hip-hop, that embrace the use of diverse body movements and routines that require both flexibility and strength. Dance, often considered a universal language, knows no cultural barriers; every culture includes some type of dance that is accompanied by music, which helps regulate emotions, provides comfort, and improves cognition (Alpert, 2011). As a sustainable form of physical activity and a fundamental of the arts, dance allows all ages of people to stay fit and benefits both musculoskeletal and psychological health.

Resistance training is another exercise that is well-suited as a home-based physical activity that can help increase muscle strength and functional capacity, especially in older adults who may be more concerned about contracting COVID-19. Marcos-Padro et al. (2020) introduced home elastic-resistance training recommendations for older adults following the *Position Statement of Resistance Training for Older Adults* (Fragala et al., 2019) from the National Strength and Conditioning Association (NSCA) and the ACSM's *Guidelines for Exercise Testing and Prescription* (Pescatello et al., 2014). The recommendations consist of nine different movements: (a) elbow curl, (b) squat, (c) elbow extension, (d) knee extension, (e) chest press, (f) leg press, (g) shoulder overhead press, (h) knee curl, and (i) shoulder seated row. By following these recommendations, older adults can also do physical self-care that is safe, simple, effective, and low-cost.

The emergence of COVID-19 has created extraordinary challenges. Rather than preparing for a life post-COVID-19, people around the world may need to figure out how to live with its existence. In response to the concern, an international group of researchers and investigators who have interdisciplinary expertise in behavioral science, spatial epidemiology, urban health, physiotherapy, and health promotion, have proposed and been conducting studies to evaluate interventions of various types during the context of the current pandemic (Sallis et al., 2020). The research team believes those results could be directly applicable to improving responses to the current and future crises. Recent research by Carvalho and Gois (2020) supports that it is still possible to meet the WHO recommendations for physical activity while spending most of one's time at home during the pandemic situation. Home-based physical activity enables people of all ages to remain fit and healthy while still following stay-at-home policies. Although the pandemic situation will, at some point, end, until then, hopefully the world will recognize the efficacy of home-based physical activity.

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Opinion Paper **Open Access**

Should We Wear Masks While Exercising Outdoor During COVID-19?

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Overview

While safety is a high priority for our community during the Covid-19 pandemic, exercise is essential to improve and maintain a healthy lifestyle (ACSM, 2018). Fitness centers are reopening across the county with various safety precautions including masks and social distancing. Although the Centers for Disease Control and Prevention (CDC, 2020) recommends all people to wear a mask (except for children younger than 2 years old, anyone who has trouble breathing, and anyone who is unconscious, incapacitated, or otherwise unable to remove the cloth face-covering without assistance), wearing a mask may not be possible in every situation. For example, during outdoor exercises, wearing a mask contributes to issues of potential breathing restrictions (lower the oxygen gas concentration levels in the recirculated air). This column concerns views on wearing masks while exercising, especially when doing it outdoors.

Keywords: COVID-19, mask, Centers for Disease Control and Prevention (CDC)

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The World Health Organization (WHO, 2020) recommends people not wear masks while exercising on June 16, 2020. According to the WHO, "sweat can make the mask become wet more quickly which makes it difficult to breathe and promotes the growth of microorganisms. The important preventive measure during exercise is to maintain physical distance of at least one meter from others."

The CDC recommends on July 16, 2020, all people 2 years of age and older wear a cloth face covering (or a mask) in public settings and when around people who don't live in your household, especially when other social distancing measures are difficult to maintain. The CDC recognizes that wearing cloth face-coverings may not be possible in every situation or for some people. "People who are engaged in high intensity activities, like running, may not be able to wear a cloth face covering if it causes difficulty breathing. If unable to wear a cloth face covering, consider conducting the activity in a location with greater ventilation and air exchange (for instance, outdoors versus indoors) and where it is possible to maintain physical distance from others."

The largest state by population in US, California has started requiring people throughout the state to wear masks in most indoor settings and outdoors when distancing isn't possible as the coronavirus continues to spread on June 18, 2020; however, it includes several exceptions, including outdoor recreation and exercise such as walking, hiking, running, or bicycling. But if people doing such activities can't stay six feet (1.8 meters) apart from others, the state orders they should wear masks (Ronayne & Taxin, 2020).

The Central Disease Control Headquarters (Korea Centers for Disease Control & Prevention, KCDC) announced on June 22, 2020, that "although mask wearing is important for COVID-19 prevention, wearing masks in a high-heat outdoor environment may cause serious physical stress such as rise in heart rate, respiration rate, and body temperature. Therefore, masks are not recommended in outdoor environments where it is possible to maintain 2 meters or more of physical distance from other people."

However, mandatory wearing of masks or face-coverings in Covid-19 observed in some countries coincides with a reduction in rates of transmission (Greenhalgh, 2020), and more countries are making masks mandatory (O'Grady, 2020; Ingraham, 2020).

British Journal of Sports Medicine (BMJ) released their guidance on June 12, 2020, (Blanco & Rensburg, 2020) that people should wear a face mask during an outdoor exercise session, and BMJ also clearly mentioned issues of potential breathing restriction and discomfort in mind. The BMJ recommended practicalities of wearing a face mask during exercise include (1) securing the face-covering in a comfortable manner before leaving the house, (2) maintaining social distancing during exercise, (3) sanitizing by taking along travel-sized sanitizers in a pocket, (4) exercising at a lower intensity than usual while wearing a mask, (5) avoiding touching face during exercise, and (6) taking a second mask along during exercise sessions for replacement.

According to the WHO and the CDC, people should not wear masks while exercising, but the BMJ recommends people wear a face mask during exercise with some guidance.

Summary

- You need to consider both the benefits of wearing a mask, its adverse effect on performance and health during exercise, and the absence of evidence-based research regarding the effect of the use of a mask during exercise.
- If you follow the guidelines of either the WHO of the CDC, you must maintain physical distance of at least one meter (WHO) or 1.8 meters (CDC, https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/personal-social-activities.html) from others during exercise.
- If you follow the guidelines of BMJ, you must follow BMJ's recommended practicalities aforementioned.
- Lastly, if you have cardiovascular, respiratory, or metabolic conditions, you must consult your physician before attempting exercise while wearing a mask.

Disclaimer: This content including advice provides generic information only. It is in no way a substitute for a qualified medical opinion. Always consult your physician and your specialist for more information. IOHSK does not claim responsibility for this information.

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