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Technology assisted reciprocal physical activity (TARPactivities)

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Abstract: At times technology is seen as a niche that holds out tremendous promise but falls short of a comprehensive tool that can produce sustained transformation. This narrow view must be overcome if technology is to increase its impact on physical activity. A broader view suggests that technology is an expansive term and includes the ideas, devices, or methods that result from the use of past knowledge, application of knowledge and the introduction of new knowledge derived from research and study. This paper suggests that technology assisted reciprocal physical activities (TARPactivities) can serve as a framework for the inclusion of persons with disabilities in physical education, sport, recreation, and fitness while expanding findings to other populations. TARPactivities can serve as a unifying framework and provide support for education, training, and research aimed at helping transform the lives of persons with disabilities, their families, and their communities with physical education, sport, recreation, and fitness.

Subjects: Community Sport Development; Disability Sport; Sports Technology and Engineering

Keywords: exergames; persons with disabilities; intergenerational; fitness; sport; recreation

1. Introduction

The United Nations Educational, Scientific, and Cultural Organization (UNESCO) identifies as one of its initiatives "Transforming the Lives of People with Disabilities, their Families, and Communities, Through Physical Education, Sport, Recreation, and Fitness" (UNESCO Chair, n.d.). The mission is to encourage activities that can help develop increasingly inclusive egalitarian societies across the

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The author has been researching the use of active video games (AVGs) between participants over the Internet for the past 5 years. This research has shown that AVGs are viable options for connecting participants from a variety of populations for physical activity when they are at a distance. This paper posits that technology that is ubiquitous, utilitarian, and understandable is needed to help the world's populace connect for relevant meaningful physical activity. Increasing our view of what technology is and can do may help to uncover new ways to help persons from populations that are often excluded from physical activity due to a variety of barriers become more involved in the future.

PUBLIC INTEREST STATEMENT

Technology assisted reciprocal physical activities (TARPactivities) are needed to help those with special needs and by extension those who traditionally do not engage in physical activities (PA) with each other. TARPactivities can help similar and divergent populations interact in meaningful PA. The authors present TARPactivities as available, simple, and easy to access activites that rely on technology. Technology is defined as the ideas, devices, or methods that result from the use of past knowledge, application of knowledge and the introduction of new knowledge derived from research and study. This expansive definition of technology is a natural fit for the promotion of reciprocal physical activities. The door is now open for more new and innovative technologies that can help to engage populations locally, regionally, and globally in ways that allow interactive PA within and between populations that have struggled to do so in the past.

fields of sport, physical education, fitness, recreation, and leisure (International Council of Sport Science & Physical Education (ICSSPE), 2014). This can be accomplished with education, advocacy, and collaboration (UNESCO Chair, n.d.). Several diverse yet connected groups will be pursued to accomplish this mission including: education, training, adapted physical education, social sciences, agents of social change, experts in teaching, assistive technologies, information and communication technologies, and leaders in policy and policy development (ICSSPE, 2014). Persons and groups from private and government agencies can help to move this initiative forward.

The success or failure of this initiative may depend upon factors both external and internal to stakeholders. Within the special needs community there are many individuals, organizations, and government programs aimed at helping to foster transformative physical activities (PA) for persons with disabilities. Outside the special needs community there is a desire to see persons with special needs live successful lives but many who lack exposure to this population are still fearful of contact (Kooiman, 2015). Teachers, who may encounter more of this population than most groups, have not embraced students with special needs (Campbell, Gilmore, & Cuskelly, 2003; Southern, 2010). Many teachers feel that they lack the training to deal with students with special needs (Campbell et al., 2003) and that the inclusion of students with a disability will negatively affect the typically developing peers in the class (Cairns & McClatchey, 2013).

If persons with disabilities are to be included more work needs to be done. In a recent study only half of undergraduate students demonstrated complete social acceptance of students with disabilities (Kowalska & Winnicka, 2013). Physical activity may offer an opportunity for all stakeholders to increase their acceptance and understanding towards each other. Social acceptance is increased when populations participate in PA together (Gibbons & Bushakra, 1989; Weiss & Wiese-Bjornstal, 2009). Increasing the opportunities for differing populations to interact while engaged in PA can improve understanding between participants (Wright, 2008). Interaction between generations enables all parties to establish common interests that lead to deeper personal bonds (Hebblethwaite & Norris, 2011) and help older generations reflect on past experiences resulting in their increased participation (Davis, Larkin, & Graves, 2002).

The transformative pursuit indicated by the UNESCO initiative can become part of a broader transformation. Technology may also be useful for collaborative participation within and between populations. Those who work in sports, physical education, recreation, and fitness may benefit from a focus on reciprocal PA using technology. Reciprocal play between and within populations may help to increase motivation to move resulting in a connected populace that comes to appreciate diversity through play. Play allows for new creative ideas because it engages the creative side of the brain where ideas flow freely and new heretofore unmade connections are made (Tarkan, 2012). In this way, populations who engage in PA that is oriented towards play may be able to connect in ways not possible through other encounters.

2. TARPactivities

PA that use technology to help bring populations together are referred to as technology assisted reciprocal physical activities (TARPactivities) in this paper. TARPactivities are technology assisted reciprocal physical activities and are ubiquitous, utilitarian, and understandable. Tarp is a shortened form of the word Tarpaulin. A real life tarp is a piece of canvas or polyethylene typically in the shape of a rectangle with grommets around the edges. Tarps can be found all over the world (ubiquitous), can be used for many different purposes (utilitarian), and are easy to use (understandable). Similarly, TARPactivities may be found globally in a worldwide search of literature related to PA in varied populations. They are useful in multiple settings and with diverse populations, and TARPactivites can be easily used by participants.

A TARPactivity is any physical experience that involves technology that allows for differentiated participation, and is useful to many populations. Specifically, a TARPactivity is easy to use in varied populations and perpetuates continued movement and a persistence to play. It uses technology, of

any type, to assist in reciprocal PA between and within populations. These populations may be from similar or different generations, ability levels, genders, cultures, and any other group that finds it difficult to engage in or seldom connects for relevant meaningful PA. Reciprocal participation occurs when different or similar populations engage in PA and they both contribute to the shared outcome. Reciprocal participants learn from each other and receive simultaneous benefit from each other.

In many settings and situations PA is inhibited by environmental, social, cognitive, and emotional barriers. Environmental barriers can prevent populations, such as those with disabilities, from participation (Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004) but other populations are also restricted from participation because of environmental barriers (Rimmer et al., 2004). Persons who are not in proximity to those whom they typically engage experience an environmental barrier created by distance. Those who cannot safely engage in PA outdoors because of adverse weather or unsafe environments can also encounter a barrier. Additionally, many persons, including those with disabilities can experience emotional barriers to participation (Rimmer et al., 2004). Those who lack motor skills are often not comfortable or confident with PA (Bunker, 1991) despite the fact that PA can increase the self-image of an adolescent (Kirkcaldy, Shephard, & Siefen, 2002). PA can also help participants with social interaction by providing opportunities for self-expression which lead to increased self-confidence (World Health Organization (WHO), 2013). Recent studies have also connected PA to improved executive functioning skills (EFS), a measure of cognitive ability (Best, 2010; Centers for Disease Control & Prevention (CDC), 2010; Haapala, 2012). EFS are mental activities which assist in planning, organization, strategizing, focus, memory and the administration of time and space (Executive Function Fact Sheet, 2015). These skills help to link past experience with present action (Haapala, 2012). Cognitively-engaging activities help actualize a positive effect on EFS (Haapala, 2012; Tomporowski, 2003). An effective TARPactivity has potential to overcome multiple barriers and provide a way for participants to interact in relevant meaningful PA.

3. Technology assisted

Technology has been useful in eliminating barriers to PA for many populations (Bort-Roig, Gilson, Puig-Ribera, Contreras, & Trost, 2014). Many may view technology as only electronic devices, but the broader definition of technology includes an expanded view that reveals an expansive perspective. Technology can be holistically defined as: the practical application of knowledge, the capacity knowledge brings, or a way to accomplish a task using previous or new knowledge from a specific field or domain (Technology, n.d.). When described this way technology is regarded as knowledge, and not simply electronic devices. Progress towards knowledge can be made through ingenuity, innovation and invention. Ingenuity refers to the ability to come up with new ideas, devices or methods that lead to knowledge (Ingenuity, n.d.). Innovation, in the form of a new idea, device or method and can also be linked to the introduction of new ideas, devices, methods, and knowledge (Innovation, n.d.). Invention, related to this topic, would be a device, contrivance, or process that comes from research or the study of existing or new knowledge (Invention, n.d.). These definitions provide us with a broad view of technology. The definition each person favors is likely dependent upon their perspective (What is Technology?, 2001).

4. What should our perspective be?

The UNESCO mandate to transform the lives of persons with disabilities, their families and communities requires an inclusive/reciprocal approach. An inclusive approach infers a course of action that is broad and presents possibilities (Inclusive, n.d.). An expansive view of the future of persons with disabilities signifies that they have abilities or qualities that can lead to a better future wherein they experience their greatest growth in ability and capacity (Possibility, n.d.). Technology is defined as the ideas, devices, or methods that result from the use of past knowledge, application of knowledge and the introduction of new knowledge derived from research and study. This expansive definition of technology is a natural fit for the promotion of reciprocal PA. Technology allows for new devices, new understandings, and new methods to be generated from past, present, and future studies. This knowledge can be used in the transformation of how varied populations view technology and its relationship to physical activity.

The technology assisted (TA) in TARPactivities points to the use of technology (idea, device, or method) to enable access or improve access. While TA movement is popular not all of the technology being used is rapidly available to the public (Levine, Savarimuthu, Squires, Nicholson, & Jay, 2014). Technology that cannot be accessed by the general population is not useful enough to be considered a TARPactivity. TARPactivities are experiences that present ideas, devices, or methods that can be used by similar and divergent populations in varied ways in a simple format.

5. Reciprocal

When students are allowed to interact with their learning several positive outcomes occur: Members of learning groups achieve more and exhibit increased positivity towards school, staff, curriculum, other students, and interact with increased interpersonal results (Johnson & Johnson, 1988). Reciprocal PA presents potential as a construct for transformative effects through physical education, sport, recreation, and fitness. Research shows that reciprocal learning occurs between populations (Galvan & Parker, 2011). Reciprocal learning posits that participants acquire new information when they interact with another person (Johns & Lixun, 1999; Mccloy, 2011). Participation with others in a PA benefits both parties. Inclusion often refers to the insertion of a person with a disability with those who do not have one (Inclusion, n.d.). At times inclusion is focused on equity. The problem with equity is it is seldom fair for persons with different strengths and abilities to participate together when no adjustments are made for abilities. Equality indicates that all participants have value and status resulting in fair treatment during activities. Equality, based upon fairness, can be a better way to approach inclusion as it acknowledges that there are always differences between participants and that PA that allows each participant to get what they need while engaging the activity can be a better experience. Additionally, when inclusion is viewed as benefiting only the person with the disability the give and take of cooperative and competitive physical activity is overlooked. Reciprocal PA is a better fit for transformative participation. Reciprocal PA acknowledges that all parties can and will contribute to the experience of PA resulting in mutual benefit.

Technology affords us the ability to remove some of the barriers that exist for many populations. Reciprocal PA asserts that all participants can benefit from their interaction during PA and not just the participant deemed less able. This is not solely about including persons with disabilities in PA but about finding ways to expand and extend PA towards many populations. This perspective of the benefits of PA can highlight the give and take present during PA, pointing to the reciprocal nature of interactive PA. Technology can play an important role in helping seemingly divergent populations engage in reciprocal PA. New methods, ideas and devices can help eliminate barriers to participation for many populations by helping them access PA in ways they could not in the past (Rimmer et al., 2004). These same technologies can help to reduce the impact of environmental, cognitive, social, and emotional barriers to PA between and within populations (Kooiman & Sheehan, 2013, 2014a, 2014b, 2015b).

6. Physical activity

Literature suggests that if identified trends continue much of the current generation and part of the next generation of children and adolescents in the United States will mature to become overweight or obese adults by the year 2030 (Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008). Worldwide populations of developed and developing countries face the same future. This may be due to several "obesogenic" factors (Hill, Wyatt, Reed, & Peters, 2003; Huneault, Mathieu, & Tremblay, 2011; Popkin, Duffey, & Gordon-Larsen, 2005; Swinburn & Egger, 2002; Wang et al., 2008). Obesogenic factors are defined as environmental factors which lead to obesity. These factors appear in the developing world where the environment for living has changed dramatically. The population of developed countries has shifted from a scarcity of food sources, labor intensive work and physically demanding modes of transportation to living the "good life" (Carrera-Bastos, Fontes-Villalba, O'Keefe, Lindeberg, & Cordain, 2011; Hill et al., 2003).

Persons with disabilities get less PA than the general population, and report more health problems (Rimmer et al., 2004; Winnick & Short, 2007). These problems intensify after the age of 21 when fewer recreation and physical education programs are available (Rimmer et al., 2004). Obesogenic

factors have an even greater effect on persons with disabilities because they face more barriers to movement. Some, but not all of these barriers are similar to the general population. Consistent among all populations is the struggle to find the time or motivation to participate in PA (Kooiman & Sheehan, 2013; Mullahy & Robert, 2008). While persons with disabilities generally have more free time, they struggle with the expense of fitness memberships, access to equipment, equipment design, lack of transportation, and lack of acceptance in social settings (Rimmer et al., 2004). Physical activity can help to overcome the loss of traditional activities from the past that required more energy expenditure at work, home, and recreation (Fox & Hillsdon, 2007).

7. A path to change

The change to TARPactivities needs to be guided by knowledge from research. Those who want to improve PA can learn from the campaign to change public perceptions of tobacco (Yach, McKee, Lopes, & Novotny, 2005). There are seven corollaries between the effort to change the worldwide perception of tobacco and the UNESCO initiative to transform the lives of persons with disabilities through PA.

> First, once effective interventions are found they should be fully implemented. Second, larger comprehensive outcomes have greater impact than smaller partial outcomes. Third, broad, well networked coalitions are more effective when they include vertical and horizontal components. Fourth, durable change takes time and the persons who lead the change need to understand both media and politics. Fifth, moderate funding can be effective but it must be accompanied by clear goals if funding is to continue. Sixth, conceptual designs may be implemented before extensive evidence exists. Finally, agents of change should not rely on past success but should look to the future for continued progress. (Yach et al., 2005)

A path for success needs to be identified if new knowledge is to be shared within and between stakeholders. This path needs to allow for the integration of new ideas, methods, and devices (technology) from contemporary and relevant literature. Traditional partners in the quest for greater PA need to be expanded to include those who are on the fringes and whose research can contribute to new knowledge (Schmid, Pratt, & Witmer, 2006). Schmid et al. (2006) posit that multiple partners from an ever expanding base of researchers can help to extend research beyond the known into new frontiers and lead to an increase in social awareness and political will. Further research suggests that when political will is low research can help to increase the knowledge base and lead to effective social policies for intervention (Schmid et al., 2006; von Lengerke et al., 2004). Research can counteract the lack of political will instead of depending on it (von Lengerke et al., 2004). “One size does not fit all” when looking for transformative interventions (Rasinaho, Hirvensalo, Leinonen, Lintunen, & Rantanen, 2006). While many populations encounter similar barriers to PA differing ages, abilities, social, and cultural settings require a diversity of approaches. Technology assisted reciprocal PA present a framework for the identification, investigation, and invitation of the many new ideas, methods, and devices being developed around the world.

8. Relevant studies

Projects in the fields of education, training, and research can help to extend and expand this UNESCO initiative and provide impetus for further development of ideas, methods, and devices that can help in the transformation of the PA landscape for persons with disabilities and the populations they interact with. Universal Fitness Inclusion Training (UFIT) is a UNESCO venture designed to help hone and handover techniques developed for working with persons with disabilities in fitness settings. Two UFIT projects are in process at this time: one aims to facilitate competences in fitness professionals that help them become comfortable and confident in their work with persons with disabilities, the second strives to create a toolkit that will help fitness center managers accept a framework designed to provide guidance for inclusive practices (UNESCO Chair, n.d.). UNESCO is also sponsoring a study on Hope Community Resources a private group in Alaska, USA that provides for persons with disability. The impact of volunteers on the Hope program and the impact of the program on the volunteers will be examined for the reciprocal effect of volunteer and program. In another study civic government commitment to sport and PA will be analyzed to determine what effect the

increase in commitment may have on the life of the citizenry as related to cohesion, quality of life and the intensity and patterns of PA (UNESCO Chair, n.d.). In a major project the UNESCO chair has partnered with two other organizations for work with assistive technology and autistic populations. This expansive program will involve post-doctorate fellowships at numerous universities from around the world, including all of the institutions of higher-education on the island of Ireland.

TARPactivities are under study as virtual online active games in the military. Deployed military personnel experience difficulty participating in PA because of environmental factors such as poor weather conditions or an unsafe outdoor environment. They also lack contact with their friends and family due to distance resulting in loss of their social network. Virtual online active games can help provide deployed troops with a PA that has potential physical, emotional, and social benefits (Kooiman & Sheehan, 2013, 2014a, 2014b; Kooiman, Sheehan, Wesolek, & Reategui, 2016). By extension, wounded warriors (injured service personnel) may also benefit from this type of intervention. Virtual online active games allow for differentiated play between persons of different skill levels. The ability to connect with family and friends while rehabilitating from a permanent or temporary injury could provide emotional, social, cognitive, and physical benefits.

TARPactivities are under study for their potential in an elementary physical education classroom that includes students with disabilities. Mobile smart devices will be studied for their potential in grades 1–5 physical education. The mobile devices will be studied for their usefulness as a way to ameliorate the lack of movement space that occurs when physical education classes must be moved to an indoor location that does not afford much more than a seating area for each participant. When space is limited mobile devices may be used to support a relevant meaningful physical education lesson using movement apps that engage the user in PA similar to exergames played on a console (WII, Xbox). Mobile devices will also be studied for their utility in presenting information that is "just in time" in a typical circuit training lesson.

Additional studies on the viability of TARPactivities for prison populations, workforce applications, undergraduate students, and intergenerational participation are also indicated. New and emerging technologies need to be identified as to their potential for TARPactivities and their use for breaking down barriers to PA. TARPactivities offer an efficacious path to follow as we seek interventions that can impact populations from within and without while promoting relevant meaningful PA in today's contemporary world.

New research on the use of exergames in online PE shows that TARPactivites can have a positive impact on those who play them. Exergames have been around for a decade and are of interest to many populations (Kooiman & Sheehan, 2014b, 2015a). Online Physical Education does not have to be an oxymoron. In the past the idea of an online PE class conjured up images of a student sitting at a computer working on writing assignments. This does not have to be the case. The use of exergames in online PE has shown to have potential benefit to the participants in four different ways. In research into online PE it was found that students are benefited physically, emotionally, cognitively and socially when they engage in exergames over a distance via the internet (Kooiman & Sheehan, 2013, 2014a, 2015b; Kooiman et al., 2016). This new use of an existing technology can serve as an example of how future TARPactivities may be identified and applied. The door is now open for more new and innovative technologies that can help to engage populations locally, regionally, and globally in ways that allow interactive PA within and between populations that have struggled to do so in the past.

9. Discussion

In a view of the future from 1984 Catherine Ennis (Ennis, 1984) portends that by the year 2025 the earth's populace will be working fervently towards a "movement for life" curriculum. Earth's inhabitants will pursue this curriculum as a means to obtain a newly developed longevity drug that is proven to work best in persons who develop healthy movement patterns and are literate in principles of fitness from an early age. Computers help groups and individuals monitor their health and fitness

and are capable of instant feedback and instruction. This view of the future has many corollaries in a world where TARPactivities are being developed by researchers around the world. The UNESCO initiative strives to transform the lives of persons with disabilities, their families, and communities. This will be done through physical education, sport, recreation, and fitness activities. Many researchers around the world are already working to transform lives through PA. The goal of this UNESCO initiative is to identify and stimulate relevant education, training, and research that can assist in the collaboration and exchange of knowledge and pursue change that can lead to the transformation of lives through PA within and between populations. With the cooperation and contributions of all related stakeholders this UNESCO initiative can help promulgate the transformative power of TARPactivites in the lives of our contemporary world.

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References

Best, J. R. (2010). Effects of physical activity on children's executive function: Contributions of experimental research on aerobic exercise. *Developmental Review, 30*, 331–351. http://dx.doi.org/10.1016/j.dr.2010.08.001

Bort-Roig, J., Gilson, N. D., Puig-Ribera, A., Contreras, R. S., & Trost, S. G. (2014). Measuring and influencing physical activity with smartphone technology: A systematic review. *Sports Medicine, 44*, 671–686. doi:10.1007/s40279-014-0142-5

Bunker, L. K. (1991). The role of play and motor skill development in building children's self-confidence and self-esteem. *The Elementary School Journal,* 467–471. http://dx.doi.org/10.1086/461669

Cairns, B., & McClatchey, K. (2013). Comparing children's attitudes towards disability. *British Journal of Special Education, 40*, 124–129.

Campbell, J., Gilmore, L., & Cuskelly, M. (2003). Changing student teachers attitudes towards disability and inclusion. *Journal of Intellectual & Developmental Disability, 28*, 369–379.

Carrera-Bastos, P., Fontes-Villalba, J. H., O'Keefe, J. H., Lindeberg, S., & Cordain, L. (2011). The western diet and lifestyle and diseases of civilization. *Research Reports in Clinical Cardiology, 2011*, 15–35. doi:10.2147/RRCC.S16919

Centers for Disease Control and Prevention, (CDC). (2010). *The association between school based physical activity, including physical education, and academic performance.* Atlanta, GA: U.S. Department of Health and Human Services. Retrieved from http://www.cdc.gov/healthyyouth/health_and_academics/pdf/pa-pe_paper.pdf

Davis, L., Larkin, E., & Graves, S. B. (2002). Intergenerational learning through play. *International Journal of Early Childhood, 34*, 42. http://dx.doi.org/10.1007/BF03176766

Ennis, C. D. (1984). A future scenario for physical education: The movement for life curriculum, 2017–2035. *Journal of Physical Education, Recreation & Dance, 55*, 4–6. doi:10.1080/07303084.1984.10630586

Executive Function Fact Sheet. (2015). *National Center for Learning Disabilities (NCLD)*. Retrieved from: http://www.ldonline.org/article/24880

Fox, K. R., & Hillsdon, M. (2007). Physical activity and obesity. *Obesity Reviews, 8*, 115–121. http://dx.doi.org/10.1111/obr.2007.8.issue-s1

Galvan, C., & Parker, M. (2011). Investigating the reciprocal nature of service-learning in physical education teacher education. *Journal of Experiential Education, 34*, 55–70. http://dx.doi.org/10.5193/JEE34.1.55

Gibbons, S. L., & Bushakra, F. B. (1989). Effects of special olympics participation on the perceived competence and social acceptance of mentally retarded children. *Adapted Physical Activity Quarterly, 6*, 40–51.

Haapala, E. (2012). Physical activity, academic performance and cognition in children and adolescents. A systematic review. *Baltic Journal of Health and Physical Activity, 4*, 53–61. http://dx.doi.org/10.2478/v10131-012-0007-y

Hebblethwaite, S., & Norris, J. (2011). Expressions of generativity through family leisure: Experiences of grandparents and adult grandchildren family relations. *Family Relations: Interdisciplinary Journal of Applied Family Studies, 60*, 121–133. http://dx.doi.org/10.1111/fare.2011.60.issue-1

Hill, J. O., Wyatt, H. R., Reed, G. W., & Peters, J. C. (2003). Obesity and the environment: Where do we go from here? *Science, 299*, 853–855. http://dx.doi.org/10.1126/science.1079857

Huneault, L., Mathieu, M. E., & Tremblay, A. (2011). Globalization and modernization: An obesogenic combination. *Obesity Reviews, 12*, e64–e72. http://dx.doi.org/10.1111/obr.2011.12.issue-5

Inclusion. (n.d.). Retrieved November 21, 2014, from http://www.merriam-webster.com/dictionary/inclusion

Inclusive. (n.d.). Retrieved November 21, 2014, from http://www.merriam-webster.com/dictionary/inclusive

Ingenuity. (n.d.). Retrieved November 19, 2014, from http://www.merriam-webster.com/dictionary/ingenuity

Innovation. (n.d.). Retrieved November 19, 2014, from http://www.merriam-webster.com/dictionary/innovation

International Council of Sport Science and Physical Education, (ICSSPE). (2014). *Margaret Talbot to hold UNESCO chair. Inclusion in sport and physical education.* Retrieved from http://www.icsspe.org/content/margaret-talbot-hold-unesco-chair

Invention. (n.d.). Retrieved November 19, 2014, from http://www.merriam-webster.com/dictionary/invention

Johns, T. F., & Lixun, W. (1999). Four versions of a sentence-shuffling program. *System, 27*, 329–338. http://dx.doi.org/10.1016/S0346-251X(99)00028-7

Johnson, R. T., & Johnson, D. W. (1988). Cooperative learning: Two heads learn better than one. *Transforming Education, 18*, 34–37. Retrieved from http://www.context.org/ICLIB/IC18/Johnson.htm

Kirkcaldy, B. D., Shephard, R. J., & Siefen, R. G. (2002). The relationship between physical activity and self-image and problem behaviour among adolescents. *Social Psychiatry and Psychiatric Epidemiology, 37*, 544–550. http://dx.doi.org/10.1007/s00127-002-0554-7

Kooiman, B. J. (2015). Fear of the unknown: Dealing with disabilities in an inclusive physical education class. *Runner, 47*(1).

Kooiman, B. J., & Sheehan, D. P. (2013). Motivation to move with exergaming in online physical education. *International Journal of Physical Education, Fitness and Sports, 3*(2), 1–24.

Kooiman, B. J., & Sheehan, D. P. (2014a). The efficacy of exergames played proximally and over the internet on cognitive functioning for online physical education. *American Journal of Distance Education, 28*, 280–291. http://dx.doi.org/10.1080/08923647.2014.957946

Kooiman, B. J., & Sheehan, D. P. (2014b). Intergenerational remote exergaming with family and friends for health and leisure. *Journal of Intergenerational Relationships, 12*, 413–424. http://dx.doi.org/10.1080/15350770.2014.962442

Kooiman, B. J., & Sheehan, D. P. (2015a). Interfacing with the past, present and future of exergames. *Society and Leisure, 3*, 55–73.

Kooiman, B. J., & Sheehan, D. P. (2015b). The efficacy of exergames for social relatedness in online physical education. *Cogent Education, 2*(1), 1–15. doi:10.1080/2331186X.2015.1045808

Kooiman, B. J., Sheehan, D. P., Wesolek, M., & Reategui, E. (2016). Exergaming for physical activity in online physical education. *International Journal of Distance Education Technologies, 14*, 1–16. doi:10.4018/IJDET.2016040101

Kowalska, J., & Winnicka, J. (2013). Attitudes of undergraduate students towards persons with disabilities; the role of the need for social approval. *Polish Psychological Bulletin, 44*, 40–49. doi:10.2478/ppb-2013-0005

Levine, D. M., Savarimuthu, S., Squires, A., Nicholson, J., & Jay, M. (2014). Technology-assisted weight loss interventions in primary care: A systematic review. *Journal of General Internal Medicine*.

Mccloy, D. (2011). *Learning teaching reciprocal learning* (Order No. 3453503, Dissertations and Theses, 102). Arizona State University, Tempe, AZ. ProQuest.

Mullahy, J., & Robert, S. A. (2008). *No time to lose? Time constraints and physical activity* (Working Paper No.14513). Cambridge, MA: National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w14513

Popkin, B. M., Duffey, K., & Gordon-Larsen, P. (2005). Environmental influences on food choice, physical activity and energy balance. *Physiology & Behavior, 86*, 603–613.

Possibility. (n.d.). Retrieved November 21, 2014, from http://www.merriam-webster.com/dictionary/possibility

Rasinaho, M., Hirvensalo, M., Leinonen, R., Lintunen, T., & Rantanen, T. (2006). Motives for and barriers to physical activity among older adults with mobility limitations. *Journal of Aging and Physical Activity, 15*, 90–102.

Rimmer, J. H., Riley, B., Wang, E., Rauworth, A., & Jurkowski, J. (2004). Physical activity participation among persons with disabilities: Barriers and facilitators. *American Journal of Preventive Medicine, 26*, 419–425. http://dx.doi.org/10.1016/j.amepre.2004.02.002

Schmid, T. A., Pratt, M., & Witmer, L. (2006). A framework for physical activity policy research. *Journal of Physical Activity and Health 2006, 3*, S20–S29. Retrieved from http://activelivingresearch.org/sites/default/files/JPAH_3_Schmid_0.pdf

Southern, C. L. (2010). *General education teachers' attitudes toward the inclusion of students with severe disabilities* (Order No. 3432514). Walden University, Minneapolis, MN. ProQuest.

Swinburn, B. B., & Egger, G. G. (2002). Preventive strategies against weight gain and obesity. *Obesity Reviews, 3*, 289–301. doi:10.1046/j.1467-789X.2002.00082.x

Tarkan, L. (2012). Work hard, play harder: Fun at work boosts creativity, productivity. *FoxNews*. Retrieved from http://www.foxnews.com/health/2012/09/13/work-hard-play-harder-fun-at-work-boosts-creativity-productivity/

Technology. (n.d.). Retrieved November 19, 2014, from http://www.merriam-webster.com/dictionary/technology

Tomporowski, P. D. (2003). Cognitive and behavioral responses to acute exercise in youth: A review. *Pediatric Exercise Science, 15*, 348–359.

UNESCO Chair. (n.d.). *Transforming the lives of people with disabilities, their families and communities, through physical education, sport, recreation and fitness*. Tralee: Institute of Technology Tralee. Retrieved from: http://www.ittralee.i.e./en/InformationAbout/Research/ResearchCentres/UNESCOChairinInclusivePhysicalEducationSportFitnessandRecreation/

von Lengerke, T., Rütten, A., Vinck, J., Abel, T., Kannas, L., Lüschen, G., & Rodríguez Diaz, J. (2004). Research utilization and the impact of health promotion policy. *Social Preventive Medicine, 49*, 185–197. http://dx.doi.org/10.1007/s00038-004-3110-2

Wang, Y., Beydoun, M. A., Liang, L., Caballero, B., & Kumanyika, S. K. (2008). Will all americans become overweight or obese? Estimating the progression and cost of the us obesity epidemic. *Obesity, 16*, 2323–2330. doi:10.1038/oby.2008.351

Weiss, M. R., & Wiese-Bjornstal, D. M. (2009). Promoting positive youth development through physical activity. *Research Digest, 10*(3), 1–8.

What is Technology? (2001). *Computer fraud & security, 7*, 17–19. doi:10.1016/S1361-3723(01)00720-5

Winnick, J. P., & Short, F. (2007). A comparison of the physical fitness of nonretarded and MMWR CDC. *Physical activity among adults with a disability—United States, 2005, 34*, 1021–1024.

World Health Organization, (WHO). (2013). *Physical activity and young people: Global strategy on diet, physical activity and health*. Retrieved from http://www.who.int/dietphysicalactivity/factsheet_young_people/en/

Wright, S. (2008). *A guide to intergenerational physical activity: A practical guide to implementing IGPA programs*. Retrieved from http://lin.ca/resource-details/12810

Yach, D., McKee, M., Lopes, D., & Novotny, T. (2005). Improving diet and physical activity: 12 lessons from controlling tobacco smoking. *British Medical Journal, 330*, 898–900. doi:10.1136/bmj.330.7496.898

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