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No PE Degree?
Foundational Knowledge to Support Generalist Teachers of Physical Education

CHUNLEI LU
Brock University

JENNA R. LORUSSO
Western University

Abstract

While generalist teachers of physical education typically receive instruction about the curriculum and pedagogy of physical education in their teacher education programs, they do not typically receive instruction on the disciplinary foundations of physical education as specialist teachers do, which includes the biological, physiological, and developmental factors of human movement. Such foundational knowledge is critical for teachers of physical education to understand the physical and movement characteristics of the children and adolescents in their classes, and to implement the curriculum and pedagogy of physical education in a developmentally appropriate way. The purpose of this paper is to provide generalist teachers of physical education with a synthesis of the disciplinary foundations of physical education, specifically key information regarding children's and adolescents' (ages 6-18) physical growth, movement development, and physical fitness. The information presented in this paper is based on the examination of: (a) literature obtained from major academic databases; (b) leading textbooks in the fields of physical growth and movement development; (c) information accessible online via the websites of relevant organizations; and (d) the authors' teaching experience and expertise as specialist physical educators, scholars of physical education, and instructors of physical education teacher education. This paper is intended to offer a relevant, simplified, and easy-to-understand reference guide to help deepen generalist teachers' understanding of the learners in their classes, and ultimately enhance their teaching of physical education, so as to advance their students' development of healthy active lifestyles.

Introduction

By definition, it is the preparation of specialist and generalist teachers of physical education that differentiates the two groups. In Canada, most specialist teachers of physical education have studied the subject area in both their undergraduate education and teacher education, whereas most generalist teachers of physical education have studied the subject area in their teacher education only (Lu & Lodewyk, 2012; Spence et al., 2004). It is important to

note that in Canada, instruction in physical education provided in teacher education is typically limited to only one course (in contrast to four years of comprehensive courses in physical education undergraduate education). These teacher education courses often focus on the content of physical education (e.g., movement forms/categories; foundational movement concepts such as body, space, effort, and relationship awareness), and how to teach this content (e.g., task presentation, instructional strategies and models; Melnychuk, Robinson, Lu, Chorney, & Randall, 2011). However, what these teacher education courses often neglect to include (mostly due to time constraints), is another important subset of knowledge, a foundational knowledge, which is essential for teachers to understand when integrating the content and pedagogy of physical education into practice effectively. The missing foundational knowledge sets the watershed between generalist and specialist teachers of physical education.

A specialist teacher of physical education is not only educated on the content of physical education, and how to teach it during their undergraduate education and teacher education, but is also extensively educated on what can be called the disciplinary foundations of physical education during their undergraduate education. The disciplinary foundations of physical education can be understood as "the facts and hypotheses arranged around the understanding of the human body performing exercise" (Brooks, 1981, p. 3). In Canada, the undergraduate physical education programs accredited by the Canadian Council of University Physical Education and Kinesiology Administrators (CCUPEKA) require a variety of *disciplinary* and *health/development* courses (in addition to courses on *activities* and *special populations*), such as human anatomy, human physiology, exercise physiology, biomechanics, motor learning/motor control, psychology of physical activity, and human growth and development (Canadian Council for University Physical Education and Kinesiology Administrators, 2015). Therefore, one of the critical differences between specialist and generalist teachers of physical education is the specialist teachers' foundational knowledge of the biological, physiological, and developmental factors of human movement. An example that attests to the relevance and importance of this type of knowledge is offered by Brooks (1981), who explains that in order to "understand the limits of physical performance" a physical educator relies on the "results of studies by physiologists" (p. 4). It is important to note the reality that in Canada, and across much of the world, teachers of elementary physical education are mostly generalists (Lu & Lodewyk, 2012; Marshall & Hardman, 2000), and are likely without this important foundational knowledge. This is

concerning, as inadequate and inappropriate preparation during teacher education has been identified as a major barrier for elementary generalists to develop and implement a quality physical education program (Lu & De Lisio, 2009).

The purpose of this paper is to provide generalist teachers of physical education with a synthesis of the disciplinary foundations of physical education, which they likely did not receive in their teacher education. To be specific, this paper summarizes and highlights key information regarding children's (ages 6-12) and adolescents' (ages 13-18) physical growth, movement development, and physical fitness. The information presented in this paper is based on the examination of: (a) literature obtained from major academic databases (e.g., PsycINFO, Education Source including ERIC, Web of Science Complete including MEDLINE, SPORTDiscus, Google Scholar); (b) leading textbooks in the fields of physical and movement development that were chosen in consultation with academic researchers in relevant fields; and (c) information accessible online via the websites of relevant organizations (e.g., Physical and Health Education Canada, Ontario Physical and Health Education Association, Ontario Ministry of Children and Youth Services, Ontario Ministry of Education, Ontario Ministry of Tourism, Culture and Sport, Public Health Agency of Canada, etc.); and (d) the authors' teaching experience and expertise as specialist physical educators, scholars of physical education, and instructors of physical education teacher education. We aim to offer a relevant, simplified, and easy-to-understand reference guide for generalist teachers of physical education that may deepen their understanding of their students, and enhance their teaching of physical education, so as to advance their students' development of physical literacy, and healthy active lifestyles.

This paper is significant for a number of reasons. First, it may assist a generalist teacher of physical education in better understanding the *physical* (i.e., biological, physiological, developmental) characteristics of learners in their classes. Such knowledge is necessary in order to interpret content knowledge and pedagogical knowledge, to then generate appropriate pedagogical content knowledge (i.e., the ability to know what teaching approaches fit the content). In addition, although there are papers written specifically for generalist teachers of physical education (e.g., Lu & De Lisio, 2009), they are few in number, and do not discuss the disciplinary foundations of physical education. While information on the disciplinary foundations of physical education is offered in some research papers and textbooks, these sources are not often summarized or synthesized in a way that is relevant, understandable, and

practical for a generalist audience, and thus may not be useful resources to generalist teachers who are busy managing multiple curricular demands (Decorby, Halas, Dixon, Wintrup, & Janzen, 2005).

Synthesis of the Disciplinary Foundations of Physical Education

There are three critical components of the disciplinary foundations of physical education that are important for generalists to understand: physical growth, movement development, and physical fitness.

Physical Growth

In order to understand the multi-faceted aspects of physical growth, one must first understand *physical growth* and *development*. To begin, physical growth may be referred to as the dominant biological activity that occurs for approximately the first two decades of human life (Malina, Bouchard, & Bar-Or, 2004). Physical growth primarily occurs up until young adulthood, in which there is an increase in the size of the body as a whole, or the size attained by specific parts of the body. On the other hand, physical development may be viewed as the process of continuous change throughout the lifecycle (i.e., from conception until death; Gallahue, Ozmun, & Goodway, 2012). Human development is influenced both by nature (i.e., heredity) and nurture (e.g., environment, training; Haywood & Getchell, 2014).

Children of the same chronological age may differ in their biological and physical maturity (Malina et al., 2004). For example, two children who are 11 years old may vary significantly in regards to biological maturity status; that is, one may have begun experiencing pubertal changes, while the other may not have as of yet. As such, individual differences in maturity status influence measures of growth and performance during childhood, and particularly during adolescence (Malina et al., 2004). Therefore, the present paper takes an age-*related* (rather than age-*dependent*) approach to its discussion of the physical growth, and developmental movement patterns of children and adolescents.

In childhood, approximately ages 6-12, an individual's growth and maturation typically maintains a steady progression. Adolescence, however, is a relatively difficult period to define in terms of chronological age, because the onset and termination varies between individuals and sexes (Malina et al., 2004). In regards to functional development, the onset of adolescence may

be viewed, as it is in this paper, in terms of sexual development (e.g., development of reproductive organs, breast development, facial hair). With respect to the termination of adolescence, this may be viewed in terms of the attainment of mature reproductive function (Malina et al., 2004).

When examining the physical transition from childhood to adolescence, one must understand physical growth during puberty (Shaffer & Kipp, 2013). The adolescent growth spurt, which includes a rapid acceleration in height and weight, marks the beginning of adolescence. On average, females typically have their growth spurt around age 10, often reaching a peak growth rate by age 12. Females will then typically return to a slower rate of growth by approximately age 13. Males, on the other hand, will often not experience this growth spurt until two to three years later than most females. On average, males typically have their growth spurt around age 12, and often reach a peak growth rate at age 14. Males will then typically return to a more gradual growth rate by approximately age 16 (Feldman, 2013; Lightfoot, Cole, & Cole, 2009). In general, males usually begin puberty between 11 and 15 years old (or at the average age of 14) whereas females usually begin puberty between 9 and 13 (or at the average age of 12).

Children's movement or motor development is dependent on and influenced by their growth and maturity characteristics, and the environment in which they are situated. Early-maturing males tend to be stronger and taller than later-maturing males, providing them with performance advantages in many physical activities early on; however, late-maturing males tend to catch-up in late adolescence, and may surpass the physical capabilities of their early-maturing peers. Females who mature earlier tend to be heavier in late adolescence than their late-maturing peers; thus, those females maturing later may have performance advantages (Malina et al., 2004). To explain, males tend to improve in power-oriented physical tasks after puberty, due to physical changes mainly associated with large elevations in testosterone; in contrast, females tend to level off or decline in such tasks after puberty, due to increases in fat percentages and changes in proportions (e.g., widening of the hips relative to the shoulders; Gabbard, 2011).

Movement Development

There are two important aspects of movement development**:** Fundamental movement skills, and specialized movement skills.

Fundamental movement skills. Fundamental movement skills are the common underlying skills of basic movements (Gallahue et al., 2012). They are the necessary foundation a mover requires in order to develop physical literacy (Mandigo, Francis, Lodewyk, & Lopez, 2009), and perform specialized movement skills, such as sport-specific skills (Gabbard, 2011). Fundamental movement skills can be classified into three categories: stability, locomotion, and manipulation.

Stability. Stability is the ability to balance the body in one place (static), or keep the body balanced while moving (dynamic), by sensing the shifting relationship of moving body parts and adjusting and compensating for these shifts in balance (Gallahue et al., 2012; Ontario Ministry of Education, 2015). All movement involves an element of stability. In other words, stability skills constitute the basis for all other locomotor and manipulative skills (Gallahue et al., 2012). Therefore, in order for any child or adolescent to be an effective mover, it is necessary for them to be able to apply a variety of stability concepts, skills, and patterns regularly. Within the stability category, there are a variety of fundamental movement skills including both axial (rotational) movements, and static and dynamic postures, such as bending, stretching, twisting, turning, swinging, swaying, rocking, rolling, starting, stopping, pushing, pulling, spinning, shaking, balancing, and dodging.

Locomotion. Locomotion involves movements that transport the body either horizontally or vertically from one point to another (Gallahue et al., 2012). There are a variety of fundamental movement skills within the locomotion category, including both basic and combination movements, such as walking, running, leaping, jumping (vertically and horizontally), hopping, climbing, galloping, sliding, skipping, chasing, and fleeing.

Manipulation. Manipulation can be gross motor manipulation involving giving force to objects (i.e., sending an object), and absorbing force from objects (i.e., receiving an object), or fine motor manipulation involving control, precision, and accuracy with an object (e.g., retaining or traveling with an object; Gallahue et al., 2012). There are a variety of fundamental movement skills within the manipulation category, including both propulsive and absorptive skills, such as object rolling, throwing, kicking, punting, striking, volleying, bouncing, catching, and trapping.

Specialized movement skills. Specialized movement skills are mature fundamental movement skills that have been refined and combined to adapt to the specific requirements of a sport, daily living activity, or recreational activity (Gallahue et al., 2012). They are used in a variety of physical activities including games, sports, dance, and gymnastics (Pangrazi & Beighle, 2014). Specialized movement skills differ from fundamental movement skills, in that they are task-specific (Gallahue & Donnelly, 2007). Some examples of specialized movement skills include performing a basketball lay-up, a grapevine dance pattern, or a yoga pose.

There are considered to be three stages of specialized movement skill development, with approximate age periods*: the transition stage* (ages 7-10), *the application stage* (ages 11-13), and *the lifelong utilization stage* (ages 14+; Gallahue et al., 2012). It is important to note, however, that the three stages are not discrete, but rather overlapping, and may be best thought of as existing on a continuum. Moreover, even though students may be considered to be in the lifelong utilization stage overall, if they begin to learn a new skill, their ability will likely reflect that of a previous stage, and through practice of the new skill they will progress through the stages. Nevertheless, it is important to keep the ages suggested by the literature in mind when dealing with children and adolescents, because previous research has shown that failure to develop fundamental movement skills along the timeline suggested, can result in failure and frustration in current and future movement endeavours (Gallahue et al., 2012).

During the development of specialized movement skills, there are drastic improvements in performance due to an individual's improvements in strength, endurance, reaction time, speed of movement, and coordination, as they progress from a child to an adolescent (Gallahue et al., 2012). Yet, it is critical to note that the improvements do not necessarily stem from a change in an individual's technique when performing a particular movement skill. To explain, at this point, the individual has already achieved the mature stage of the particular skill, and it is through repetition of the skill that an individual's performance is subtly refined. Although some stylistic variations occur as greater accuracy and control is gained, the individual's basic form or movement pattern remains unchanged (Gallahue et al., 2012).

Transition stage *(ages 7-10).* The transition stage is exactly as its name describes, an individual's transition from mastering basic fundamental movement skills (e.g., run, balance, bounce a ball), to being able to combine those skills to meet the requirements of various physical

or daily living activities (e.g., performing a basketball lay-up or painting a deck; Weiller-Abels & Bridges, 2010). In this stage, individuals attempt to use their skills in a task-specific manner, which is not required in the fundamental movement skills phase (Gallahue et al., 2012). During this stage, individuals are just beginning to understand what is required of them in order to be successful in achieving specialized movement skills, so it is likely that their skill, proficiency, and ability will be limited (Gallahue & Donnelly, 2007). A lack of skill progression, often referred to as the *proficiency barrier*, has been identified as occurring during the transition stage in some cases (Gallahue et al., 2012). The proficiency barrier occurs when fundamental movement skills have not been developed to mature status during the fundamental movement skills phase, and thus cannot be successfully applied in task-specific situations (e.g., sport-skill acquisition). Essentially, a significant movement limitation occurs when individuals attempt more sophisticated specialized skills without establishing the proper foundation in earlier developmental stages (Weiller-Abels & Bridges, 2010).

Application stage *(ages 11-13).* Unlike the transition stage where the individual often demonstrates little actual ability in specialized movement skill performance, in the application stage individuals have become more aware of their personal movement assets and limitations, and have accordingly developed sufficient skill and knowledge of the particular activities that suit them and/or that they are interested in (Gallahue & Donnelly, 2007; Gallahue et al., 2012). As the individual's interest becomes more focused, there is often an accompanying desire for competence in these particular activities; therefore, it is suggested that the emphasis of this stage is improving proficiency through practice (Gallahue & Donnelly, 2007; Gallahue et al., 2012). Practice is key to developing the precision, accuracy, and standard of performance the individual desires at this stage (Gallahue et al., 2012).

Lifelong utilization stage *(ages 14+).* The final stage of specialized movement skills development is the lifelong utilization stage, beginning approximately around the age of 14 and continuing throughout an individual's lifetime. During this stage individuals will make decisions regarding the physical activities they will engage in across their lifespan, and will do so based on a variety of factors, including their interests, capacity, goals, access, and past experiences. At this

point individuals should focus on specializing in the activities of their choice, and refining their skills (Gallahue et al., 2012).

The importance of developing specialized movement skills. It should be noted that although specialized movement skills are the foundation of lifetime physical activity, there are a number of factors that affect an individual's physically active lifestyle. These factors are interactive and ecological and include individual characteristics (e.g., genetics/traits, knowledge, education, physical fitness), the social environment (e.g., socioeconomic status, educational and family structures, support from family or friends), and the physical environment (e.g., neighbourhood safety, residential environments, convenient facilities, weather; Cherubini, 2009; Clark, 2014). In addition, fundamental movement skills, foundational movement concepts, and specialized movement skills should be developed through the five broad categories (DAIGG) of physical activities, that is: (a) dance; (b) alternative environment physical activities; (c) individual physical activities; (d) gymnastics; and (e) games (Lu, Francis, & Lodewyk, 2014). These five categories facilitate the understanding and conceptualization of numerous physical activities, help educators provide a variety of physical activities for students in curricular planning in physical education, and design recreational programs to ensure that all students find their enjoyed physical activities for participation across their lifetime (for further information, refer to Lu et al., 2014).

Physical Fitness

Physical fitness is a set of attributes related to the ability to perform daily activities (e.g., personal tasks, occupational actions, recreational physical activities), coupled with one's genetics, nutrition, physical exercise, and rest (Gallahue et al., 2012). Being physically fit refers to an individual's ability to meet the physical demands of one's life efficiently (Graham, Holt/Hale, & Parker, 2012). Physical fitness can be broken down into the following two categories: health-related physical fitness and skill- or performance-related physical fitness (see Table 1). In general, there is much overlap between males' and females' physical fitness throughout childhood (Malina et al., 2004). In adolescence, these similarities typically diverge until an eventual plateau is reached. Differences in individuals' physical fitness are connected to genetic predisposition, sex, motivation, opportunities for practice and instruction, habitual

physical activities, and the cultural environment (Malina, et al., 2004). In Tables 2 and 3, each component of health- and skill-related physical fitness is further depicted, in relation to human development.

Table 1
Health- and skill-related physical fitness

Health-related physical fitness	Skill-related physical fitness
• muscular strength and endurance • cardiovascular endurance • joint flexibility • body composition	• balance • coordination • agility • speed • power

Health-related physical fitness. Health-related fitness is not an ability or skill, but rather is a relative state of being that is transient, and in flux across a lifetime (Graham et al., 2012). As such, it is different from skill-related physical fitness that is reflective of an individual's skill or performance (Graham et al., 2012). In recent years, the major focus of physical fitness has centered upon factors pertaining to health-related fitness and a healthy lifestyle, with an emphasis on learning fitness knowledge, skills, and behaviours that will enable children to be physically active now and in their adult years (Graham et al., 2012).

It is important that when teachers engage children in endurance training programs, these programs should involve progressive overload, and be of sufficient length and intensity, but should not be too demanding (e.g., individualized, fun, low pressure; Gallahue et al., 2012; Malina et al., 2004). Training can become more intense and focused during adolescence. Strength training programs designed for children and adolescents must also account for the readiness of their bones, muscles, nervous system, and joints, to handle load-bearing exercises. Since the growth-plate sections of prepubescents' bones have yet to fully mature, this age group is particularly vulnerable to bone and joint injuries from excessive activities that require the lifting of heavy loads. While prepubescents are physically capable of gains in strength, which can lead to improvements in motor and sports skills (e.g., jump, running speed, and agility), it is crucial for teachers to clearly distinguish weight-training (for fitness), weight-lifting (for power or competition), and body-building (for appearance such as size; Gallahue et al., 2012; Malina et al., 2004).

Table 2
Health-related physical fitness

Cardiovascular Endurance	• Cardiovascular endurance is the ability to perform sustained physical activities that require substantial use of the circulatory and respiratory systems (Ontario Ministry of Education, 2015). • After the age of 12, females are expected to have reached their VO_2 max[1] and should begin to level off, whereas males tend to continue to improve in VO_2 max through adolescence (Gallahue & Donnelly, 2007). • Cardiovascular endurance is reflective of the growth of the heart, which progressively occurs from birth until adolescence, even within a state of rest (Malina et al., 2004). • In adulthood, individuals will experience a decrease in oxygen uptake and maximum heart rate, and an increased risk of cardiovascular disease and hypertension (Taylor & Johnson, 2008).
Muscular Strength	• Muscular strength is the ability of muscles to exert force (Ontario Ministry of Education, 2015). • From age 7, an individual will experience an increase in muscular strength. At the age of 12, a female is thought to have reached the maximum point of strength development, whereas a prepubescent male will likely experience slow muscular strength development, and then a rapid increase throughout adolescence, until approximately ages 13-14 (Gallahue et al., 2012). • In adulthood, individuals will generally experience a decrease in strength, size of muscle fibers, number of fast-twitch fibers, and physical fitness (Taylor & Johnson, 2008).
Muscular Endurance	• Muscular endurance is the ability of a muscle or muscle group to exert force over an extended period of time without fatigue (Ontario Ministry of Education, 2015). • There are similar muscular endurance abilities between the sexes throughout childhood, slightly in favour of males on most aspects. • There is generally a lull in muscular endurance prior to age 12, and large increases are often seen in males from ages 12 to 16, which then level off. Females generally show no significant increases without special training after age 12 (Gallahue et al., 2012).

[1] VO_2 max stands for 'volume of oxygen.' To explain, when exercise intensity increases, the body increases its uptake of oxygen to produce the energy needed to meet this increased intensity. VO_2 max is an individual's maximum level of oxygen uptake; that is, the point at which increases in exercise intensity do not produce further increases in oxygen uptake, and thus reflects an individual's aerobic/endurance capacity.

Flexibility	• Flexibility is the ability to move a joint through its range of motion (Ontario Ministry of Education, 2015). • Flexibility is body joint specific. • A female is typically more flexible than her male chronological equivalent across each age level. • Both females and males will experience a decline in flexibility around age 17 (Gallahue et al., 2012).

Skill-related physical fitness. Skill-related physical fitness refers to components of fitness that are related to motor skills including balance, coordination, agility, and speed (see Table 3; Gallahue et al., 2012). Skill-related fitness can be significantly improved through developmentally appropriate instruction and enjoyable practice (Kamla, 2013). It is important for physical educators to teach skill-related fitness, and help children develop confidence to engage in an array of physical activities. Physical education should thus emphasize transferable, skill-related fitness, as opposed to sport-related skill development (Rink & Hall, 2008).

Table 3
Skill-related physical fitness

Balance	• Balance is the ability to maintain the body in a stable position while remaining still (static balance) or moving (dynamic balance; Ontario Ministry of Education, 2015). • Balance is required in practically every movement we make because each requires the management of gravitational forces (Gallahue et al., 2012). • There will be an improvement with balance for each chronological year (Gallahue et al., 2012). • Females are thought to outperform their male equivalents until age 8, at which point their balance abilities are thought to appear similar (Gallahue et al., 2012). • Holding a stork stand posture (static) or walking a beam (dynamic) are examples of activities requiring balance.
Coordination	• Coordination is the ability to use different parts of the body together effectively (Ontario Ministry of Education, 2015). • Coordination is developed primarily by repetition of the physical activity involved. The demand for coordination increases in complex skills due to their need for greater integration of multiple systems (e.g., muscles, vision), segmentation (e.g., upper and lower body), and timing (e.g., ready position, action, follow-through; Clark, 2007; Watkins, 2007). • Dribbling activities are examples of physical activities that require coordination.
Agility	• Agility is the ability to change the position of the body with speed and accuracy, while moving from one location to another (Ontario Ministry of Education, 2015).

	• Agility is dependent on reaction time and cognitive processing speed. • Agility is developed primarily by repetition activities, such as performing a folk dance routine that requires agility to move smoothly between skill items (Gallahue et al., 2012).
Speed	• Speed is the ability to move the body or a part of the body from one point to another in a short period of time (Gallahue et al., 2012). • Speed is developed through exercises that involve a lower number of repetitions (e.g., 5-7), and bursts of maximum effort. • When applied with maximum muscular force, speed becomes power (strength x speed = power). • There is generally an improvement in speed with age. Typically, males and females share a similar improvement pattern until age 6 or 7, at which point males are thought to make a more rapid improvement (Gallahue et al., 2012). • An example of speed is short sprinting movements.

Conclusion

As is clear from the literature synthesized in this paper, the physical and movement characteristics of children and adolescents are laden with complexities. This speaks to the importance of an instructor of physical education having an understanding of these complexities through the foundational knowledge we have referred to as the disciplinary foundations of physical education. With such foundational knowledge, an educator can better ensure that their lessons and programs best reflect and accommodate the needs and abilities of their learners. An educator that understands physical growth, movement development, and physical fitness will be better equipped to plan opportunities that maximize children and adolescents' achievement in the realm of physical education.

While this paper presented many important highlights of the foundational knowledge within the disciplinary foundations of physical education, it is only a synthesis of some of the extensive information specialist teachers of physical education study during their undergraduate education. However, we hope that this paper can be used to help generalists deepen their understanding of the physical and movement aspects of the learners in their classes, enhance their effective and quality teaching practice, and ultimately help their students to develop the necessary knowledge, skills, enjoyment, and habits for healthy active lifestyles. Further, we encourage all teachers of physical education to attend professional development workshops, take online courses, learn from reliable professional online resources (e.g., Physical and Health Education Canada; Ontario Physical and Health Education Association), speak with colleagues,

and confer with physical education consultants, to advance their foundational knowledge of physical education.

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Dr. Chunlei Lu is a Professor in the Department of Teacher Education, Faculty of Education, Brock University, Canada. He has teaching experiences in seven universities in three countries. Based on these cross-cultural experiences, his research interests include curriculum and instruction in health and physical education, East-West approaches to health and physical education, wholistic health, mindfulness, and language teaching and learning. He has published two books, six book chapters, and nearly 60 refereed articles in Africa, Asia, Europe, North America, and Oceania.

Jenna R. Lorusso is a PhD Candidate in the Education Studies Program (Critical Policy, Equity, and Leadership) at Western University in London, Ontario, Canada. Her current research interests centre on leadership and policy issues in higher education, particularly in the areas of physical education and kinesiology.

References

Brooks, G. A. (1981). *Perspectives on the academic discipline of physical education*. Champaign, IL: Human Kinetics.

Canadian Council for University Physical Education and Kinesiology Administrators. (2015). *Summary of CCUPEKA accreditation standards*. Retrieved from http://www.ccupeka.ca/ en/index.php/accreditation

Cherubini, J. M. (2009). Intentional development: A model to guide lifelong physical activity. *Physical Educator, 66*(4), 197-208.

Clark, J. E. (2007). On the problem of motor skill development. *Journal of Physical Education, Recreation, and Dance, 78*(5), 39-44.

Clark, W. (2014). *Kids' sports*. Retrieved from http://www.statcan.gc.ca/pub/11-008-x/2008001/article/10573-eng.htm#archived

DeCorby, K., Halas, J., Dixon, S., Wintrup, L., & Janzen, H. (2005). Classroom teachers and the challenges of delivering quality physical education. *The Journal of Educational Research*, *98*(4), 208-220.

Feldman, R. S. (2013). *Development across the life span* (7th ed.). Upper Saddle River, NJ: Pearson-Prentice Hall.

Gabbard, C. P. (2011). *Lifelong motor development* (6th ed.). Toronto, ON: Allyn & Bacon.

Gallahue, D. L., & Donnelly, F. C. (2007). *Developmental physical education for all children* (4th ed.). Champaign, IL: Human Kinetics.

Gallahue, D. L., Ozmun, J. C., & Goodway, J. (2012). *Understanding motor development: Infants, children, adolescents, adults* (7th ed.). New York, NY: McGraw-Hill.

Graham, G., Holt/Hale, S. A., & Parker, M. (2012). *Children moving* (9th ed.). New York, NY:

McGraw-Hill.
Haywood, K. M., & Getchell, N. (2014). *Life span motor development* (6th ed.). Champaign, IL: Human Kinetics.
Kamla, J. (2013). Minute to win it: A fun alternative to improve skill-related fitness. *Strategies*: *A Journal for Physical and Sport Educators, 26*(5), 25-29.
Lightfoot, C., Cole, M., & Cole, S. R. (2009). *The development of children* (6th ed.). New York, NY: Worth.
Lu, C., & De Lisio, A. (2009). Specifics for generalists: Teaching elementary physical education. *International Electronic Journal of Elementary Education, 1*(3), 170-187.
Lu, C., Francis, N., & Lodewyk, K. (2014). Movement domains. In D. Robinson & L. Randall (Eds.), *Teaching physical education today: Canadian perspectives* (pp. 208-225). Toronto, ON: Thompson Educational Publishing.
Lu, C., & Lodewyk, K. (2012). The physical education profession in Canada. *Journal of Physical Education & Health, 1*(1), 15-22.
Malina, R. M., Bouchard, C., & Bar-Or, O. (2004). *Growth, maturation, and physical activity* (2nd ed.). Champaign, IL: Human Kinetics.
Mandigo, J., Francis, N., Lodewyk, K., & Lopez, R. (2009). Physical literacy for educators. *Physical and Health Education Journal, 75*(3), 27–30.
Marshall, J., & Hardman, K. (2000). The state and status of physical education in schools in international context. *European Physical Education Review*, *6*(3), 203-229.
Melnychuk, N., Robinson, D. B., Lu, C., Chorney, D., & Randall, L. (2011). Physical education teacher education (PETE) in Canada. *Canadian Journal of Education, 34(*2), 148-168.
Ontario Ministry of Education. (2015). *The Ontario curriculum Grades 1-8: Health and physical education*. Retrieved from http://www.edu.gov.on.ca/eng/curriculum/elementary/health1to8.pdf
Pangrazi, R. P., & Beighle, A. (2014). *Dynamic physical education for elementary school children* (18th ed.). Boston, MA: Pearson.
Rink, J., & Hall, T. (2008). Research on effective teaching in elementary school physical education. *The Elementary School Journal, 108*, 208–218.
Shaffer, D. R., & Kipp, K. (2013). *Developmental psychology: Childhood and adolescence* (9th ed.). Belmont, CA: Wadsworth.
Spence, J. C., Melnychuk, N., Mandigo, J. L., Marshall, D., Schwartz, M., Thompson, L. P., & Dunn, J. C. (2004). A descriptive profile of physical education teachers and related program characteristics in Alberta. *Alberta Journal of Educational Research, 50*(1), 87.
Taylor, A. W., & Johnson, M. J. (2008). *Physiology of exercise and healthy aging*. Champaign: IL: Human Kinetics.
Watkins, J. (2007). Developmental biodynamics: The development of coordination in children. In N. Armstrong & W. Van Mechelen (Eds.), *Paediatric Exercise Science and Medicine* (pp. 169-185). New York, NY: Oxford University Press.
Weiller-Abels, K., & Bridges, J. M. (2010). *Teaching movement education*. Champaign, IL: Human Kinetics.