

Physical Activity and Sedentary Behavior: Independent or Interrelated Public Health Issues?

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The papers published in this issue of *Kinesiology Review* are based on scholarly presentations delivered at the 88th annual meeting of the National Academy of Kinesiology (NAK) held in Chicago, IL, from September 20 to 22, 2018. The theme of the conference was “Physical Activity and Sedentary Behavior: Independent or Interrelated Public Health Issues?” Exploring the nature of the relationship between physical activity and sedentary behavior is extremely timely given the scientific and media attention being devoted to understanding its association with health-related outcomes. As the past president of the Academy, it was my honor to invite distinguished scholars from within the Academy, as well as experts external to the Academy and/or discipline of kinesiology, to address important topics associated with the conference theme. Topics explored over the course of the 2-day meeting focused on how to define and measure physical activity and sedentary behavior and how to promote higher levels of physical activity and reduce sedentary behavior associated with negative health outcomes in a variety of contexts (e.g., schools, workplaces, community) and across different populations (e.g., youth, individuals with disability, older adults).

Keynote Lecture

The annual meeting began with the presentation of the Julie and Rainer Martens Keynote Lecture. We were honored to hear Dr. Ken Powell, MD, MPH, a public health epidemiologist who served in that capacity with the Centers for Disease Control and Prevention for 25 years, deliver a thought-provoking opening keynote presentation titled “Physical Activity: Cornucopia and Conundrums.” He extolled the health benefits derived from engaging in physical activity but also explored a number of perplexing issues about the physical activity–health relationship. Examples included whether moderate to vigorous physical activity (MVPA) and sedentary behavior are independent or interrelated, whether replacing sedentary time with light-intensity physical activity also provides health benefits, and how much physical activity is really needed to improve health. As Powell and Steven Blair point out in their paper, the supporting evidence for some earlier recommendations is weak and studies have shown that lower and less intense bouts of physical activity also benefit health and are more in line with the point-of-decision prompts (e.g., take the stairs vs. the escalator, park the car farther away from the mall entrance) previously recommended by the Community Preventive Services Task Force. Powell and Blair beautifully describe the complex relationship between physical activity and health that is continuing to unfold.

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Conference Subthemes

Measuring Physical Activity and Sedentary Behavior

During the conference’s first session, addressing old and new approaches to measuring physical activity and sedentary behavior, the benefits of monitor- and report-based estimates of physical activity were both compared to and contrasted with each other. Dr. David Bassett, the Academy’s representative on the Physical Activity Guidelines (PAG) Scientific Advisory Committee, began by discussing the changing landscape of physical activity measurement and the diagnostic and motivational benefits of activity trackers and other wearable medical devices for documenting different health behaviors. Despite the upsurge in the adoption of monitor-based activity trackers as the scientific standard for measuring physical activity since the publication of the 2008 Physical Activity Guidelines for Americans, Bassett identified a number of shortcomings associated with their use that have yet to be resolved. The lack of a gold standard against which to measure the time spent in MVPA, the different methods used to convert acceleration into MVPA, and the use of different body sites from which to collect the data were identified as important problems that needed to be resolved as the science evolves. In his paper, Bassett emphasizes the need to align research-grade devices with consumer-grade activity trackers as a means of facilitating the translation of research findings into public health recommendations, to develop criterion-referenced standards for identifying the total volume of activity needed for good health, and to move beyond the current one-size-fits-all recommendation of 150 min of aerobic activity, which is likely not appropriate for older adults and certain clinical populations (i.e., spinal-cord injured, nonambulatory).

In his paper devoted to the measurement of physical activity and sedentary behavior, Greg Welk focused his presentation on reconciling the large discrepancies that have been reported in the physical activity research literature when monitor-based measures (generally viewed as objective estimates of physical activity), as opposed to report-based measures (considered to be subjective estimates of physical activity), are used to estimate the percentage of persons currently meeting current physical activity recommendations. Welk proposes using calibration methods to better understand the discrepancies that currently exist and to harmonize the outcomes currently being derived from these two different methods of estimating physical activity. He posits that while both methods are not without their shortcomings and tend to capture different types of physical activity, the richness of report-based data could be preserved while enabling the estimates to match those from monitor-based measures through the use of calibration methods.

In her paper titled “Toward Comprehensive Step-Based Physical Activity Guidelines: Are We Ready?” Catrine Tudor-Locke and Elroy Aguiar review the current knowledge base related to step-based metrics and begin outlining a research-driven road map to formulating comprehensive step-based physical activity guidelines as a more accessible and meaningful method of estimating physical activity. They argue that developing steps-per-day guidelines might improve the translation of research findings into more readily understandable public health recommendations, programs, and policies. In addition to answering the question of “how many steps per day,” Tudor-Locke suggests that future physical activity research also examine a broader set of step-based metrics encompassing one or more of the physical activity dose components (i.e., intensity, frequency, duration) as a means to establish a new set of benchmark values based on dose-response relationships between step-based metrics and health outcomes. Tudor-Locke believes that the scientific community is “ready” to embark on such a course of action; all that remains is to “set” the research agenda and put it into motion, or “go.”

Interpersonal, Environmental, and Contextual Influences on Physical Activity and Sedentary Behavior

The importance of interpersonal, environmental, and contextual influences on physical activity and sedentary behavior was addressed in a number of presentations delivered at this year’s meeting. The focus of Thelma Horn’s presentation was on describing how the attitudes, values, beliefs, and behaviors of significant adults (especially parents, teachers, and coaches) shape the perceptions of physical competence and intrinsic joy during the early childhood years and thereby influence physical activity and sedentary behavior in later years. In addition to the influential role played by significant adults as a result of their parenting or instructional practices, Horn examined the importance of selected socioenvironmental factors (e.g., access to opportunities to learn fundamental motor skills and experience mastery, outdoor play) in predicting behavior at later developmental time points. In contrast to the focus of Horn’s paper, Alan Smith, in his paper, addresses the potentially important role of peers as social agents in the promotion of physical activity in children and adolescents. Smith argues that while the importance of adult role models (e.g., parents, teachers, coaches) as prominent social agents of physical activity promotion has been well studied, far less attention has been directed at understanding how peer relationships (e.g., acceptance or rejection by teammates or classmates, social support from peers both within and external to the physical activity context) might influence young people’s desire or motivation to engage in physical activity. Smith stresses the need for future theory-driven and multilevel research that more fully explores the richness of peer relationships and their potential to explain the effectiveness of different intervention strategies aimed at promoting positive peer dynamics in physical activity settings. Finally, Thomas “Sheldon” McKenzie, in his presentation titled “Physical Activity Within School Contexts: The Bigger Bang Theory” examined specific physical activity contexts (i.e., physical education and other leisure-time activity programs) within the broader school environment and how the implementation of physical activity policies, whether formulated at a regional, state, or federal level, can determine how well schools actually meet the public health recommendations of providing youth with at least half the amount of physical activity needed. Rather than evaluating the merits of

physical activity policies and practices in schools using current survey methods that offer only a distant view, McKenzie recommends the use of direct observation as a superior method for assessing physical activity practices in schools. He describes two such systems that are currently being used to provide a more in-depth and systematic evaluation of physical activity levels in the school environment. Commensurate with his paper’s title, McKenzie argues that the “biggest bang” will result from the development and implementation of effective school physical activity policies.

Strategies for Promoting Physical Activity and Reducing Sedentary Behavior

The focus of the paper delivered by Dr. Jennifer Copeland, an associate professor in the Department of Kinesiology and Physical Education at the University of Lethbridge in Alberta, Canada, was on reviewing the physical activity and sedentary behavior literature as it applies to the older adult segment of the population. Although based largely on cross-sectional data, clear associations have been found between time spent in sedentary behavior and physical function (e.g., reduced muscle strength, lower cardiorespiratory fitness, and cognitive decline) in older adults. Despite these documented associations, Copeland questions whether all sedentary behavior is detrimental to the health of older adults given the prevalence of “geriatric syndromes” that do not fit into specific categories of disease but still negatively affect older adults’ physical and cognitive function. To better address the complex interaction between sedentary behavior and physical activity in the older adult population and identify future research priorities, Copeland shared the outcomes of a panel of international experts that was assembled in 2017 to formulate a consensus statement based on what is currently known about sedentary behavior in older men and women. While the primary conclusion by the panel was that there was insufficient evidence to provide specific quantitative recommendations about sedentary time for older adults, a public health message that could be confidently disseminated to older adults, regardless of age, ability, home setting, and working status, was to strive to sit less and move more throughout the day!

What is currently known and unknown about the measurement of sedentary behavior and promotion of physical activity in persons with multiple sclerosis (MS) was the focus of a presentation delivered by Robert Motl, a professor of physical therapy at the University of Alabama. Due to the paucity of evidence on both the rates and the health-related consequences of sedentary behavior in this clinical population, Motl proposes that the research agenda first focus on measurement, correlates, and consequences of sedentary behavior in MS as a precursor to designing targeted interventions aimed at reducing and/or replacing sedentary behavior with light-intensity physical activity.

The 2018 C. Lynn Vendien keynote lecture was delivered by Dr. Kathleen Martin Ginis, professor at the University of British Columbia, Kelowna. In her paper co-authored with Kendra Todd titled “Physical Activity and Spinal Cord Injury: Lessons Learned at the Lowest End of the Physical Activity Spectrum,” Dr. Martin Ginis discusses the “who, what, and how” of physical activity interventions for people with spinal cord injury: who should deliver physical activity information and interventions, what should be included in physical-activity-enhancing interventions, and how the intervention should be delivered. She also challenges the ableist assumption that sitting is synonymous with sedentary behavior. On the contrary, she argues that many sitting behaviors are “active,”

requiring >1.5 METs in persons with and without disabilities. In the final section of the paper, Todd and Martin Ginis share three key lessons they have learned from the many intervention studies they and their colleagues have designed for increasing physical activity in low-active populations that should serve as a road map for future intervention studies. While the focus of Dr. Martin-Ginis's paper is on designing and implementing physical activity interventions for the spinal-cord-injured population, there is clearly much to be garnered by all researchers interested in designing interventions to reduce sedentary behavior and promote health-enhancing physical activity, irrespective of the audience being targeted.

Conclusion

It is my hope that the Academy Papers presented in this issue of *Kinesiology Review* will not only provide readers with a better understanding of the complex relationship between physical activity and sedentary behavior but also spark increased interest in

addressing a number of critical research questions that have been raised in each of the papers published in this issue. While much progress has been made in accumulating and critically examining the research evidence that underpins current consensus statements and national guidelines related to physical activity and/or sedentary behavior, it is becoming increasingly clear that a one-size-fits-all set of recommendations regarding physical activity or sedentary behavior is not a tenable or desirable public health outcome.

In closing I wish to thank the 2018 Program Committee for their assistance in identifying an outstanding group of scientists to address the theme of the meeting and share their insights on the current state of the science and recommendations for future research related to physical activity and sedentary behavior. Thanks also to Kim Scott for her assistance in organizing the conference and Dr. Maureen Weiss, the outgoing editor of *Kinesiology Review*, who assisted both myself and the authors in the editorial process. It was a privilege and honor to serve as the guest editor of her final issue.