1. Introduction

China has been transforming. Since the late 1970s, China’s economy has increased many fold, the proportion of Chinese living in urban areas has more than doubled, life expectancy has increased by 10 years\(^1\) and the country has transitioned from the “bicycle kingdom” to the world’s largest “auto market”.\(^2\) As a result, China is now confronted with “side effects” of economic development at a much larger scale and a faster pace than any other country in history. These problems include, but are not limited to, population aging, rising non-communicable disease (NCDs), and environmental pollution.

Currently, people aged over 60 years account for more than 15% of the population and the percentage is expected to grow due to improvements in life expectancy and reductions in birth rates.\(^3\) Major NCDs, such as cardiovascular disease, cancer, chronic obstructive pulmonary disease, and diabetes, bear the largest disease burden in China\(^4\) and NCDs account for 87% of total deaths overall.\(^5\)

Central to the dual problems of population aging and rising NCDs are lifestyle behaviors, such as physical activity (PA). The evidence suggests a marked decrease in PA, particularly in the domains of occupational and domestic activities.\(^6\) Unfortunately, PA research is still at an early stage in China. Globally, China accounts for around 20% of the pandemic of physical inactivity, but contributes to less than 3% of the research outputs on PA.\(^7\) There is little research examining population trends in PA across different age groups, the associations between PA and health outcomes, the correlates and determinants of PA and the efficacy, effectiveness, and cost-effectiveness of interventions for promoting PA.

To reverse the trend of the epidemic of physical inactivity, it is critical to step up research to build evidence base in China. Special issues on PA, such as the current one in the *Journal of Sport and Health Science*, are critical in catalyzing the process. In this commentary, we discuss the areas of challenges and improvements in PA and public health in China and provide suggestions for future research and practice.

2. Areas of improvements and suggestions for future research

2.1. PA across domains and the intensity continuum

In the past 2 decades, the field of PA and health has evolved from a central focus on sports and exercise to more recently recognizing the benefits of PA from different domains, of different levels of intensity, and in long or short bouts. This paradigm change has led to growing global research on active travel, incidental (daily lifestyle) PA, and prolonged sedentary behavior (sitting time). Currently, most research on PA in China has focused on leisure-time physical activity (LTPA). Given that LTPA is uncommon in China and only represents a small proportion of total PA,\(^8\) it is important to better understand other domains, such as transport-related activity, where potential opportunities of promoting population-level PA exist.

Another major breakthrough in the understanding of PA and health is the increasing evidence on the health effects of light-intensity PA\(^9\) and sedentary behavior,\(^10\) which are particularly relevant to seniors due to the overall lower PA levels and physical function. Some proposed that PA should be considered as a continuum where various intensities offer unique health benefits. To date, most studies on PA in China focused on moderate-to-vigorous intensity PA, which accounts for only a small fraction of the total daily energy expenditure. More research on light-intensity PA and sedentary behavior across different domains and demographic subgroups could shed light on the overall patterns and distributions of PA in China, and its relationship to obesity.\(^11\)

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* Peer review under responsibility of Shanghai University of Sport.
* Corresponding author.
  E-mail address: melody.ding@sydney.edu.au (D. Ding)
2.2. PA in a broader context of prevention

PA is not just about energy expenditure and obesity prevention. More research in China should explore the comprehensive outcomes of PA with a particular focus on the areas where evidence is still accumulating, such as mental health\(^\text{13}\) and cognitive function.\(^\text{14}\) Furthermore, beyond disease prevention, PA could promote positive mood, well-being, quality of life, and have positive social and environmental implications.

It is important to note that the benefits of PA not only apply to primary prevention, but also lie in secondary prevention/disease management. For example, PA is an important component of diabetes management\(^\text{15}\) and cardiac rehabilitation.\(^\text{16}\) Despite the high prevalence of diabetes and rising cardiovascular disease, lifestyle-based secondary prevention is still an under-developed area in China. This is an adjunct to clinical therapy, and the co-benefits of PA in people with established chronic disease could save substantial healthcare costs.\(^\text{17}\)

2.3. Interdisciplinary and cross-sectoral collaboration

Redefining PA is essential to making a population-wide difference. It is not only relevant to sports scientists, but also to a range of health professionals, gerontologists, social scientists, urban planners, psychologists, educators, transportation engineers’ and others. Promoting PA requires interdisciplinary and cross-sectoral collaboration that makes active choices the accessible, cheap, and easy choices. Currently, this collaborative approach to PA is rarely reflected in research in China. In fact, this is a larger issue that is commonly documented in health behavior research in China.\(^\text{18}\)

The current research gaps in China present great opportunities for exploring the frontiers of PA and public health using collaborative approaches. For example, the relationship between aspects of urban environments, transportation systems and PA has not been well explored; there is a dearth of research on community-based interventions to promote PA among seniors; PA-related myths and misunderstandings are widely held (e.g., vigorous PA is sometimes considered harmful to health), particularly among seniors, but are seldom documented by research, health professionals have rarely been utilized as the “agent of change” for PA promotion; and economic evaluations have not been widely applied to PA interventions. Meanwhile, many unique types of PA and their cultural perspectives should be explored to encourage participation in culturally appropriate and socially reinforcing activities. For example, dancing at public places has grown “organically” throughout the country as one of the most popular forms of exercise among senior women in urban areas.

2.4. Opportunistic evaluation of policies, programs, and environmental changes

China is changing at a rapid pace. Change presents opportunities for evaluation. Many programs implemented at a local or national level may have implications for PA and overall lifestyle behaviors in China, such as “Healthy Lifestyle Action for All”, co-sponsored by the Disease Prevention and Control Bureau of the Ministry of Health of China, the National Patriotic Public Health Office, and the Chinese Center for Disease Control and Prevention. Other changes to the built, social, and policy environments may indirectly affect PA, such as restrictions on car ownership, development of new neighborhoods, and construction of public recreational spaces. It is important to opportunistically capture these ever-present changes and evaluate their impacts on PA and health, using pragmatic yet robust methodologies. This does not imply the need for randomized trials, which, in reality, are less feasible at the community level. Instead, innovative PA programs in schools, districts, or community centers can be compared with their counterparts that have not yet implemented these programs, to assess the effectiveness of these programs in the real world. If demonstrated to be effective, China has excellent capacity to scale up specific interventions and deliver them across many communities. This provides research opportunities to assess the implementation and reach of these “scaled up” programs.\(^\text{19}\)

3. Conclusion

Economic development has brought prosperity to China, but has also created problems. To counter rising NCDs, it is important to promote a healthy and physically active lifestyle. The field of PA and public health is growing in China, but is still disproportionate to the size of the epidemic of physical inactivity. Gaps and limitations exist but also present opportunities for future research and practice. The current special issue on PA, aging, and health in China is a promising step toward more comprehensive, cross-disciplinary, and culturally relevant research in China. Through this special issue, we urgently advocate for stepping up research on PA in China. In this commentary, we provided specific suggestions as a potential “roadmap” for this endeavor.

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Authors’ contributions

DD and AEB conceptualized this paper; DD drafted the first version of this paper; and FH and AEB provided critical feedback. All authors have read and approved the final version of this paper, and agree with the order of presentation of the authors.

Competing interests

None of the authors declare competing financial interests.

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