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Editorial

Physical activity continuum throughout the lifespan: Is exercise medicine or what?

In 2007, the American Medical Association and the American College of Sports Medicine co-launched a health initiative called "Exercise is Medicine". It soon became a multinational collaboration, currently involving 43 national centers across the globe.[1] Moreover, the slogan "Exercise is Medicine" has quickly spread outside healthcare settings and has become a popular discourse surrounding exercise. In recent years, however, some exercise scientists began to question if the medical model of exercise makes it an attractive approach for promoting exercise. In this special issue of *Journal of Sport and Health Science*, we present the views of leading researchers in exercise sociology, sport and exercise psychology, exercise physiology, as well as sports and exercise medicine who participated in an international symposium on "Physical activity continuum throughout the lifespan: Is exercise a medicine or what?". This symposium was organized by the Shanghai Jiao Tong University and the China Sport Science Society in Shanghai on November 11–12, 2015.

In the first paper of this special issue, Dr. Andy Smith,[2] a social scientist, argues that exercise is recreation not medicine. Dr. Smith analyzed the development of a sport park at York St John University to show that exercise is a recreation that enables individuals and communities to reach a state of well-being. He points out that more research is needed to investigate the phenomenon of exercise as recreation and its links with well-being. This work should move from metaphor to model.

Dr. Mark Nesti,[3] a sport and exercise psychologist, questions whether physical activity for health is fun. He points out that sport goes way beyond the idea of exercise as medicine; the most important of this is that sport is grounded in the innate human capacity for play. He argues that "We *play* sport, badly or well, gently or with intensity, but usually with passion. In contrast, we *do* exercise, or *participate in* physical activity, and it is very rarely described as a passion. In order to understand and get to grips with this global phenomenon, it may be time to return to the individual and the local, and come out from the halls of academia and into the streets."

When it comes to natural scientists, there are mixed views with regard to "Exercise is Medicine". Dr. Larry Durstine and colleagues[4] tackled the subject of "high-intensity interval training (HIIT) for chronic diseased individuals". They summarize the current literature regarding the effect of HIIT on every-day functioning in patients with cardiovascular and pulmonary problems, and in diabetics. They point out that "HIIT was first used early in the 20th century and popularized later that century for improving performance of Olympic athletes. Emerging research suggests that this same training method can have a beneficial impact on patients with chronic disease. It is safe to use and should be included in the comprehensive health management plan." Therefore, developing individualized exercise prescriptions for patients with chronic diseases is an appropriate training strategy. From their perspective, "Exercise is Medicine".

Although the majority of cardiovascular diseases manifest in adulthood, their origins may be traced to childhood or even the embryonic state. In their insightful review, Dr. Anders Grøntved and colleagues[5] conducted a narrative review to synthesize the evidence for a prospective association between exercise and adiposity and other well-established biological cardiovascular risk factors in healthy young people. Physical activity appears to elicit long-term beneficial effects on adiposity and selected markers of cardiovascular health. However, as they point out, the results from different studies are inconclusive. They discuss the uncertainties in the underlying causal chain and consider a number of alternative modeling strategies, which could improve our understanding of the relationships between physical activity/inactivity, adiposity, and cardiovascular risks in future studies.

Dr. Petri Wiklund[6] examined "Exercise is Medicine" in the context of obesity and weight management. He outlined the role of physical activity in obesity development and its usefulness in weight management. He argues that, "Whereas reduced energy expenditure in activities is unlikely to be the primary cause of obesity, exercise (and physical activity) does play an important role in weight management and thus holds potential as part of the solution for obesity. There is a large body of literature demonstrating that regular exercise has far reaching health benefits even without any changes in body weight, thus people should be encouraged to exercise and to adopt physically active lifestyle, whether they lose weight or not."

Dr. Zhengtang Qi and Prof. Shuzhe Ding[7] argued that the concept of "Exercise is Medicine" should be challenged because of the steep increase in the prevalence of non-communicable chronic diseases. They suggest that to harness the benefits of exercise for non-communicable diseases, much work still needs to be done to improve health effectively on a societal level, i.e.,

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developing personalized exercise interventions aided by advances in high-throughput genomics, proteomics, and metabolomics. They propose that understanding the mitochondrial phenotype according to the molecular information of genotypes, lifestyles, and exercise responsiveness in individuals will optimize exercise effects for prevention of non-communicable chronic diseases.

Dr. Gisela Sjøgaard and colleagues[8] conducted 15 randomized studies on exercise interventions in working populations. These studies included different intervention durations and "intelligent physical exercise training" (IPET) programs based on evidence of sports sciences training principles and tailored to work exposure, employee health status, and physical capacity. They conclude that "physical exercise training at work as IPET benefits the worker in terms of decreasing health risk indicators, improving physical capacity and functions as well as perceived health. Also, the employer may benefit from allowing the employees work time for such training through decreased sickness absenteeism and presentism in terms of improved or maintained productivity and work ability." Therefore, exercise is more than medicine.

In the final paper of this special issue, Dr. Lijuan Mao and colleagues[9] provide 2 examples that the effects of exercise vanish if exercise is not maintained. In an 8-month moderate aerobic exercise program in pre-diabetic women, the intervention was effective in reducing fat mass and insulin resistance. However, 24 months after the exercise intervention was discontinued, the beneficial effects of the intervention was lost. In another short-term 6-week exercise intervention study on obese women, they found that the benefit of the intervention had completely disappeared at a 4-year follow-up testing. Thus maintaining exercise seems to be required if one wants to reap the benefits of exercise in the long-term.

While the purpose of this special issue is to stimulate further discussion on the topic of "Is exercise a medicine or what?", we realize that the topics covered are not comprehensive and there are many more questions that must be addressed for our understanding of lifelong exercise intervention on health. One of the key issues is to find more effective ways in which scientific knowledge can be transferred to improve practice and to focus on psychological and social implications of contemporary views surrounding exercise and health. How does science impact the ways in which people exercise and how do people understand the meaning and beneficial effects of these activities? In addition, cultural differences in the attitudes toward exercise and physical (in)activity and their impact on health must be taken into account. Who is transferring the scientific knowledge into practice, and what are the implications of such a transfer? Moreover, when prescribing exercise to individuals, the beneficial and detrimental effects of exercise and issues in combining exercise with medication and diet must be addressed. Finally, we hope that we all agree that exercise is more than medicine. However, recognizing this fact is not sufficient, we need to be active to get the benefits from exercise, and we need to maintain our exercise habits if we want to maintain its health benefits.

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