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EDITORIAL

The role of exercise physiology in the United Nations' sustainable development goals

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In 2015 the United Nations member states adopted the 2030 Agenda for Sustainable Development, which is a "blueprint for peace and prosperity for people and the planet, now and into the future" (https://sdgs.un.org/2030agenda). This includes 17 sustainable development goals (https://sdgs.un.org/goals). Sustainability Development Goal 3 promotes "Good Health and Wellbeing" with the specific goal to "ensure healthy lives and promote well-being for all at all ages". Sub-goal 3.4 is to reduce by one-third premature mortality from non-communicable diseases through prevention and treatment by 2030. Exercise physiologists have a role to play specifically for sub-goal 3.4.1, which is to reduce the mortality rate due to cardiovascular disease, cancer, diabetes, and chronic respiratory disease. The Sustainable Development Goal report of 2021 indicated that globally 74% of deaths were caused by these four non-communicable diseases (United Nations 2021). The probability of dying from these four diseases between the ages of 30 and 70y decreased from 19.9% in 2010 to 17.8% in 2019. While developed countries including Australia, New Zealand, and European and North American countries were on track to reach the 2030 goals, the decrease in pre-mature death from these four diseases internationally from 2010 to 2019 was of insufficient pace to reach the 2030 goals. The COVID-19 pandemic has slowed progress towards these goals, as people with these four diseases are at greater risk of mortality when contracting COVID-19 (United Nations 2021).

The European Journal of Applied Physiology has played a leadership role in developing an understanding of how exercise can prevent or treat these four diseases by assessing mechanisms by which exercise training alleviates the harmful effects of these diseases. For example, recent publications highlight advances in understanding how exercise training might affect people with cardiovascular disease. Repeated exposure to acute increases in blood flow during exercise increases the circulation of signaling factors, such as vascular endothelial growth factor (VEGF) which stimulates nitric oxide production and vasodilation (Weaver et al. 2022). Endurance exercise in the form of moderate-intensity continuous training or high-intensity interval training (i.e., HIIT) stimulates circulation of endothelial progenitor cells which contributes to vascular repair in people with conditions such as peripheral artery disease, heart failure, hypertension, or metabolic syndrome (Ferentinos et al. 2022). In addition to these different forms of endurance training, strength training (specially isometrics) is effective for improving myocardial function as assessed by echocardiography in hypertensive patients (O'Driscoll et al. 2022).

Recent European Journal of Applied Physiology publications indicate how different exercise strategies can improve physiological responses in people with type 2 diabetes. High-intensity interval training (HIIT) combined with or without resistance training can favorably down-regulate micro RNAs that are controllers of inflammation and muscle atrophy (Ghodrat et al. 2022), and down-regulate gene expression associated with atherosclerosis (Hamelin Morrissette et al. 2022). Either HIIT or traditional moderate-intensity continuous training is effective for improving peripheral oxygen extraction during exercise in diabetics (Ryckeghem et al. 2022).

Exercise physiologists have a role in helping to understand how exercise can alleviate respiratory diseases and cancers. For example, unique interventions such as eccentric cycling, which involves less cardio-pulmonary demand than traditional concentric cycling, may be better for maintaining blood oxygen saturation during exercise, leading to superior improvements in leg lean tissue mass and functional performance in people with chronic obstructive pulmonary disease (Inostroza et al. 2022). Exercise may help to regulate tumor growth in cancer patients through changes in circulatory proteins, micro RNAs, and metabolites that inhibit

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intra-cellular signaling pathways that activate cell proliferation (Metcalfe et al. 2021). Exercise may also positively regulate the immune system by affecting natural killer cell function in cancer patients (Pal et al. 2021).

This beneficial effect on the immune system could also affect susceptibility to COVID-19. As mentioned above, the UN's Sustainability Goal Report raised concerns that the COVID-19 pandemic will delay progress towards reducing mortality due to non-communicable diseases (United Nations 2021). A recent review in the European Journal of Applied Physiology outlined how physical activity affects cross-talk between skeletal muscle, adipose tissue, and the immune system to reduce susceptibility to COVID-19 infection, especially for those who are more susceptible to COVID-19 complications such as those with cardiovascular disease, diabetes, cancer, or chronic respiratory conditions (Nigro et al. 2020).

In summary, the United Nations has set important targets for improving health and reducing mortality from non-communicable diseases by 2030. Exercise physiologists and the European Journal of Applied Physiology can play an important role in understanding the biological mechanisms by which exercise alleviates these diseases, so that exercise prescriptions can be optimized to help meet the UN's Sustainability Development Goal targets.

As part of the European Journal of Applied Physiology's mission to embrace those UN Sustainability Development Goals that are related to the effects of exercise in reducing morbidity and mortality, the Editors invite submissions to a new Topical Collection called "Good Health and Wellbeing". When submitting your original research articles or state-of-the-art reviews please select the Topical Collection "Good Health and Wellbeing", and select Dr. Chilibeck as the handling editor.

Data availability Not applicable.

Declarations

Conflict of interest The author declares no conflicts of interest.

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