

## EP editorial

### “Time bombs, Sport & Exercise Science and the future of society”

Mike Tipton

Recently the Physiological Society and Guild HE partnered with Emsi (data analysts) to produce the report “Sport and Exercise Science Education – impact on the UK economy” (The Physiological Society, 2019) This provided a fascinating and objective assessment of Sport and Exercise Science’s (SES) contribution to those who study it, as well as society in general. Its first paragraph stated that ‘*the exercise component of SES is intimately related to important health outcomes*’ in part through ‘*investigation of the positive and preventative impact of exercise on a wide range of major physical and mental health conditions, including inactivity, obesity, diabetes, cancer, cardiac rehabilitation, and depression*”.

It is generally posited that most cultures move from barbarism through civilisation to decadence (<https://quoteinvestigator.com/2011/12/07/barbarism-decadence/>). Some manage to go directly from the first to the last conditions (The Sunday Times, 1926). The loss of physicality in society, which appears causal for the transition from civilisation to decadence, has raised concerns for millennia; the Romans were constantly worried about the impact of luxury on their society, and recognised the importance of maintaining physical capability “*Mens sana in corpore sano* “. More recently, in mid-nineteenth century England, the philosophical movement “Muscular Christianity” stressed the importance of physicality for the maintenance of character (Watson *et al.* 2005). Having probably originated with Paul the Apostle, it reappeared in the Victorian era in response to increased industrialisation and urbanisation, and was reflected in Rousseau’s argument of the importance of physical education for the establishment of a moral character (Boyd, 1963).

Fast forward to today, we now have a “First World” defined by possession, inactivity and consumption. But, in evolutionary terms, we have only very recently acquired

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cars, escalators, lifts and seated work stations: fundamentally we remain an ambulatory ape-like animal for which exercise should be an integral and important part of everyday life. One of the consequences of a life lacking physicality is obesity; inactivity is not the whole story, but it is certainly part of the (energy balance) equation. The Health Survey for England 2016 estimated that over one in four adults in England are obese<sup>1</sup> and over one in three overweight. One quarter of children between two and ten years of age are obese. Fibrous atherosclerotic plaques have been found in both the aorta and carotid artery of children and young adults (Berenson *et al.* 1998). By 2034, 70 % of adults in the UK are expected to be overweight or obese (<https://www.nuffieldtrust.org.uk/news-item/can-the-nhs-help-tackle-the-uk-s-obesity-epidemic>). These figures have health as well as financial consequences. Obesity increases the risk of hypertension, heart disease, stroke, cancers, depression and anxiety, and is the major modifiable risk factor for Type 2 diabetes. The scale of the problem is vast: taking as an example just Type 2 diabetes, the number of adults (20-79 years) affected is expected to rise from 425 million worldwide to 629 million between 2017 and 2045, only 28 years later. Over the last five years in the UK there has been an 18 % increase in people diagnosed with diabetes. Four million people died of diabetes in 2017 (one person every 6 seconds) (<https://www.idf.org/aboutdiabetes/what-is-diabetes/facts-figures.html>); as Dame Frances Ashcroft pointed out at Europhysiology 2018, this is about the same number of casualties per annum as that caused by the Great War.

As noted, the consequences of a sedentary lifestyle would have previously raised concerns about moral lassitude and the ability of people to work and fight. Now we must also worry about the burden that resulting poor health will place on our society and its institutions. Consider healthcare. Obesity cost the UK National Health Service (NHS) 6.1 billion in 2014/15 (9). Severely obese individuals are three times more likely to require social care at a cost of £352 million in extra hours of help (<https://www.england.nhs.uk/expo/wp-content/uploads/sites/18/2018/09/14.00-Tackling-obesity-is-everybodys-business.pdf>). The UK spends about £1.5 billion per year (up to £13 billion per year, 0.6 % of UK GDP) on Type 2 diabetes (<https://www.idf.org/aboutdiabetes/what-is-diabetes/facts-figures.html>). The amount

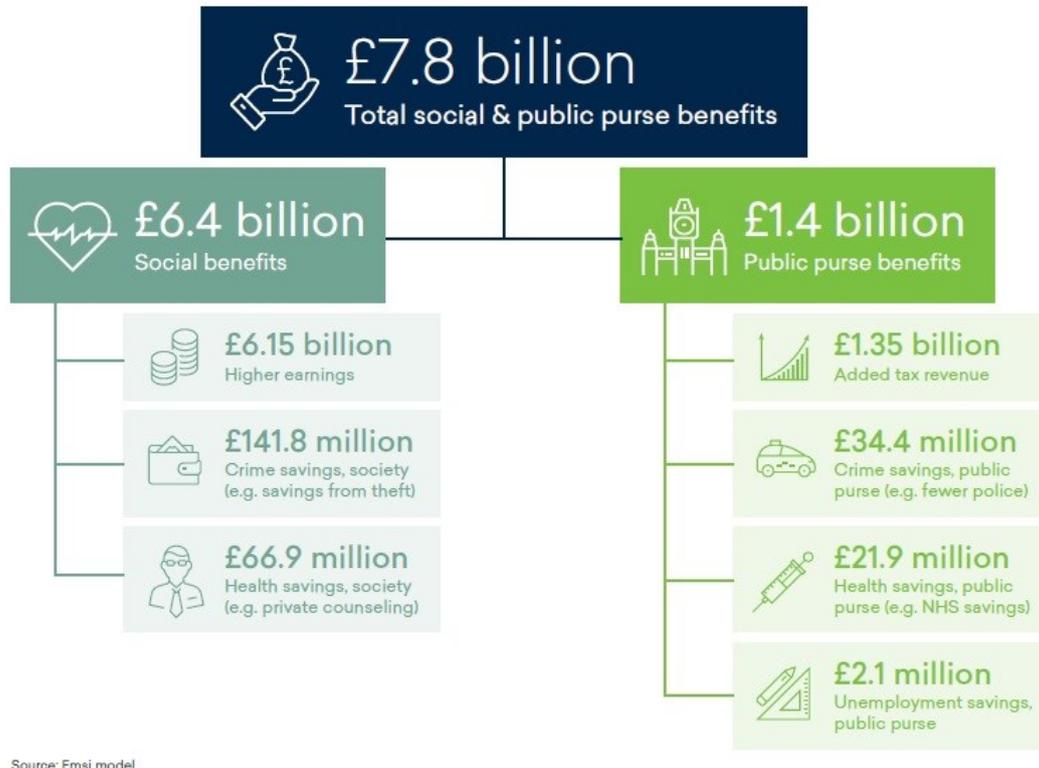
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<sup>1</sup> For most adults, a BMI of: 18.5 to 24.9 is a healthy weight. 25 to 29.9 is overweight. 30 to 39.9 is obese. 40 or above is “severely obese”

of money spent on the treatment of obesity and diabetes is greater than the combined amount spent on the police, fire & rescue service and judicial system (<https://www.gov.uk/government/publications/health-matters-preventing-type-2-diabetes/health-matters-preventing-type-2-diabetes>). Worldwide, the healthcare costs of diabetes were at least \$727 billion in 2017, 12 % of the total healthcare spend on adults; and we have to add to these costs those of the other conditions (such as cancer) with which obesity is associated.

The problems the modern sedentary, consumption-based lifestyle has produced have, to a degree, been hidden by advances in medicine, but the time bombs are beginning to explode. Recently, the British Heart Foundation reported that deaths from heart and circulatory disease among people under 75 years old are on the rise for the first time in 50 years, due to increasing rates of obesity and diabetes. In 2017 there were 42,384 deaths in the under 75s from these conditions an increase of 1,342 on the number in 2014 (British Heart Foundation, 2019).

In these areas there is little doubt that “prevention is better than cure”, and this is where the health-related research of SES becomes critical; in providing the evidence-base for the efficacy of exercise prescription for a variety of conditions. As stated in the Physiological Society’s report: *“Much of the research undertaken within SES has health benefits and thereby reduces NHS costs in areas such as exercise for people receiving treatment for cancer and healthy ageing”...“Research in this area helps prevent and treat conditions and diseases, such as diabetes, that accrue significant direct costs to the National Health Service, as well as resulting in indirect costs to the UK economy, such as due to loss of productivity”...“Health service savings include avoided medical costs associated with smoking, obesity, and mental ill-health”.*



**Figure 1.** Figure 3.2 from reference “The Physiological Society, Emsi & Guild HE (2019)”.

It is accepted that exercise and an active lifestyle can protect against, and treat, a wide range of physical and mental health conditions that can be debilitating to individuals and, as a consequence, society (e.g. Gordon *et al.* 2018; Bullard *et al.* 2019; Zanuso *et al.* 2010). Moderate aerobic energy expenditure of around 4,200 kJ (1000 kcal) per week (e.g. brisk walking for 30-60 minutes a day, 5 days per week), or vigorous-intensity aerobic physical activity (e.g. jogging) for a minimum of 20 min, three days each week are associated with the promotion and maintenance of health (Warburton *et al.* 2006; Haskell *et al.* 2007), and exercise offers a viable alternative to pharmaceutical interventions for the prevention and treatment of many physical and mental health conditions (Naci & Ioannidis, 2013; Van Tulleken *et al.* 2018).

How we get individuals to recognise these facts and the associated responsibility of avoiding obesity are important matters for society in general. The Physiological Society’s recent report recognises (along with much more) that physiological/health-related research in sport and exercise science in these areas is crucial. That the

majority of the papers published in The Physiological Society journals fall under the heading “exercise” further reaffirms the importance of this area of physiology.

**Experimental Physiology** publishes research papers that report novel insights into homeostatic and adaptive responses in health and pathophysiological mechanisms in disease. We welcome papers that embrace the journal’s orientation of translation and integration, which includes studies of the adaptive responses to exercise, acute and chronic environmental challenges, growth and aging, and diseases where integrative homeostatic mechanisms play a key role in the response to and evolution of the disease process.

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