Access Clinical Sports Medicine

Access Provided by: SILVERCHAIR INFORMATION SYSTEMS

Chapter 1: Physical inactivity: a global public health problem

Daniel Friedman

INTRODUCTION

> *I believe that evidence supports the conclusion that physical inactivity is one of the most important public health problems of the 21st century, and may even be the most important.*
>
> Professor Steven N Blair, Arnold School of Public Health, University of South Carolina, USA

Read any blog, newspaper, journal article or social media feed and you will find they are all telling you the same thing: physical inactivity is a problem—a big one. Physical inactivity causes alarming levels of chronic disease now; and the future predictions of societal costs and decimated quality of life are dire.

This is not new information. There have been calls to address the problem for decades. Global action plans and national strategies declared war on physical inactivity long ago, yet it seems many countries are still struggling to mobilise the troops. How many more times do we need to be reminded that physical inactivity is one of the leading risk factors for global mortality and is estimated to cause 3.2 million deaths annually,[1] before we finally decide to get off the couch?

The four previous editions of *Clinical Sports Medicine* shone a spotlight on the burden of physical inactivity and sedentary behaviour, but clinicians also appreciate the importance of other pressing behavioural contributors to health. As the World Health Organization (WHO) reminds us, unhealthy eating habits, tobacco consumption and harmful use of alcohol contribute to the tsunami of non-communicable disease (NCD). The concern, as Professor Steven Blair underlined so clearly in 2009, is that 'the crucial importance of physical activity is undervalued and underappreciated by many individuals in public health and clinical medicine'.[2]

To raise awareness and provide the clinician with even more motivation to promote physical activity to their patients, family and friends, this chapter records the economic and health costs of physical inactivity. We outline some of the key policies and actions that could reverse downward trends. A global health problem of this magnitude demands a calculated, methodical and consistent plan of attack. To make progress we must first understand the problem.

PHYSICAL INACTIVITY TRENDS

The WHO Global Recommendations on Physical Activity advise that adults should do at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic physical activity throughout the week. Additionally, muscle-strengthening activities should be done at least twice weekly.[3] While there are no global recommendations on sedentary behaviour, emerging consensus indicates it should be limited whenever possible.[4]

From an evolutionary perspective, humans are primed to move; daily hunting and gathering for survival necessitated continual movement and exertion. However, today, many in the wealthy West no longer need to run, climb or even walk to procure food and water (Fig. 1.1). Everything is available at the touch of a button.

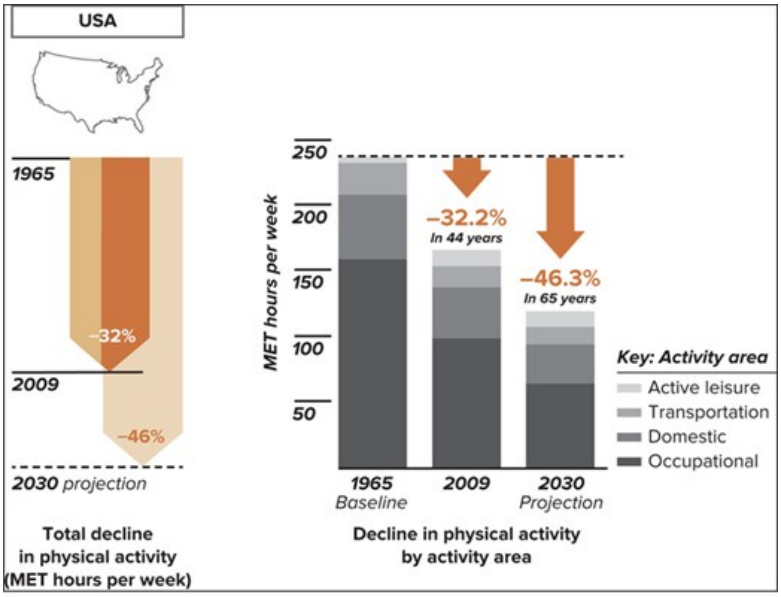
Figure 1.1

Figure 1.1 Historic and projected physical activity levels: the dramatic reduction in physical activity in the United States. One metabolic equivalent (MET) is defined as 1 kcal/bodyweight kg/hour and is roughly equivalent to the energy cost of sitting quietly

Downloaded 2025-6-7 11:58 A Your IP is 45.145.110.245
Chapter 1: Physical inactivity: a global public health problem, Daniel Friedman
©2025 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility

Access Provided by:
SILVERCHAIR INFORMATION / SYSTEMS

ADAPTED FROM 'DESIGNED TO MOVE' (P.3), ACSM/NIKE WWW.RACKCDN.COM/RESOURCES/PDF/EN/FULL-REPORT.PDF



Source: Peter Brukner, Karim Khan: *Brukner & Khan's Clinical Sports Medicine*, 5e
Copyright © McGraw-Hill Education. All rights reserved.

The rapid development of technology has engineered physical labour out of most of our lives. In the 1960s, almost half of private industry occupations in the USA required at least moderate intensity physical activity and now fewer than 20% demand this level of activity.[5]

Global estimates[6] indicate that:

- 31% of adults are physically inactive; 34% of women and 28% of men
- 80% of 13–15 year olds are physically inactive; girls are less active than boys
- physical inactivity is more common in countries of high income than in those of low income
- physical inactivity increases with age
- the proportion of adults spending four or more hours per day sitting is 42%.

THE COSTS OF PHYSICAL INACTIVITY

Direct healthcare costs of physical inactivity combine with indirect costs (productivity losses due to morbidity and premature mortality etc.) to contribute to a hefty physical inactivity price tag that affects society and ultimately individuals through poor health.

Healthcare costs

Physical inactivity is responsible for approximately 30% of cardiovascular disease, 27% of diabetes, and 21–25% of breast and colon cancer.[7] The overall direct healthcare costs of physical inactivity can be calculated by estimating the proportions of diseases that can be directly attributable to physical inactivity, multiplying those by the relative risks for different diseases associated with physical inactivity and applying economic cost estimates from the healthcare system for treating the associated chronic diseases.

In 2013, the total direct healthcare cost of physical inactivity attributable to five major NCDs was US$53.8 billion:[8]

- $5 billion was spent on coronary heart disease
- $6 billion on stroke

Downloaded 2025-6-7 11:58 A Your IP is 45.145.110.245
Chapter 1: Physical inactivity: a global public health problem, Daniel Friedman
©2025 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility

- $37.6 billion on type 2 diabetes
- $2.7 billion on breast cancer
- $2.5 billion on colon cancer.

This estimate does not include costs attributable to musculoskeletal conditions, falls or depression and anxiety, and is limited by availability of country data. All of these costs (Table 1.1) are shared among governments, through public and private healthcare, and by patients who are forced to make out-of-pocket payments.

Table 1.1
Costs attributable to physical inactivity by country in 2013 (US$ million)

https://www.sciencedirect.com. Due to rights and permissions restrictions, this content cannot be reproduced in a digital format. The content is available in the print edition at page 3.

According to 2017 data, if all Australians did an extra 15 minutes of brisk walking for at least five days each week, Australia's physical inactivity disease burden would be reduced by 13%.[9] In other words, Australians could save nearly A$60 million in healthcare dollars every year by simply going for a stroll!

NEED TO KNOW

If physical inactivity were not eliminated, but could be decreased instead by 10% or 25%, more than 533 000 or 1.3 million deaths, respectively, would be avoided each year.[10]

Productivity costs

The burden of physical inactivity extends well beyond healthcare dollars (Table 1.2). Indirect costs (Fig. 1.2) that are not often considered include productivity losses due to premature mortality, disability, absenteeism, presenteeism (employees who come in to work but have compromised productivity due to ill health), as well as informal care and other non-medical costs.

Figure 1.2

Direct and indirect costs of physical inactivity in the past and as predicted for the future (US$)

ADAPTED FROM 'DESIGNED TO MOVE' (P. 9), ACSM/NIKE

	Total spend (US$) in 2008	2008 Direct costs	2008 Indirect costs	2030 Direct costs projection	% Increase in direct costs 2008–2030
USA	$147.0b — OR — ~2× the federal budget for the Department of Education (based on US$77.4b 2012 budget)	$90.1b	$56.5b	$191.7b	↑113%
UK	$33.0b — OR — Close to the National Health Service's annual efficiency target (based on £20b of annual efficiency savings over the next four years)	$16.1b	$16.7b	$26.0b	↑61%

Source: Peter Brukner, Karim Khan: *Brukner & Khan's Clinical Sports Medicine*, 5e
Copyright © McGraw-Hill Education. All rights reserved.

©2025 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility

Access Provided by: SILVERCHAIR INFORMATION SYSTEMS

Table 1.2
Counting the cost of inactivity in Australia in 2013 (in A$)

https://www.sciencedirect.com. Due to rights and permissions restrictions, this content cannot be reproduced in a digital format. The content is available in the print edition at page 4.

- In Canada, osteoarthritis is projected to cost C$18 billion a year in lost productivity by 2031, as the condition causes substantial long-term absenteeism and disability, reduced employment and early retirement.[11]
- In Australia, the national impact of diabetes through lost labour-force participation of people aged 45–64 years is projected to reach A$807 million in lost income, $350 million in extra welfare payments, $166 million in lost taxation revenue and $3 billion in lost gross domestic product (GDP) by 2030.[12]
- In the USA, obesity-attributable absenteeism among employees costs over US$8.5 billion per year.[13]

In 2013, the total cost of productivity losses from physical inactivity-related deaths worldwide was US$13.7 billion. Of this, $3.2 billion was in North America and $3.8 billion was in Europe. When these indirect costs are combined with the direct healthcare costs, physical inactivity is estimated to be responsible for $67.5 billion in costs worldwide (Table 1.3).[8]

Table 1.3
Total economic cost of physical inactivity attributable to five major NCDs in 2013 (US$ billion)

https://www.sciencedirect.com. Due to rights and permissions restrictions, this content cannot be reproduced in a digital format. The content is available in the print edition at page 5.

The costs of physical inactivity versus smoking

Yes, physical inactivity is extremely costly. But how does it compare with other risk factors for poor health, such as smoking? In 2012, the total healthcare expenditure due to smoking was US$467 billion, or 5.7% of global health expenditure. When including indirect productivity costs, the total economic cost of smoking totalled US$1.9 trillion.[15] This seems like it is exponentially greater than the cost of physical inactivity, until you crunch the numbers.

Let's use Canada as an example. In 2013, the total economic burden attributable to smoking in Canada was C$18.7 billion.[16] For each of the 5.7 million smokers in Canada in 2013,[17] these costs represent approximately $3280 in total expenditure per smoker.

Compare this to the total economic burden attributable to physical inactivity in Canada in 2013, which was $10.8 billion.[16] In 2013, four out of five Canadians did not meet the recommended physical activity guidelines,[18] which is 28.13 million out of 35.16 million people. Therefore, the per person cost of physical inactivity in Canada in 2013 was $10.8 billion divided by 28.13 million, or $384—an amount equivalent to roughly one ninth of the attributable cost per smoker.

Now consider that the average smoker in Canada consumes 14 cigarettes per day,[19] or 98 per week. If we assume a linear relationship, the attributable cost per inactive Canadian mirrors the total economic burden of smoking 11 cigarettes per week. Therefore, according to our assumptive back-of-the-envelope calculations, the cost of physical inactivity in Canada is approximately that of smoking about half a pack of 20 cigarettes per week.

These costs are distributed unequally and disproportionately throughout the world. High-income countries carry a larger proportion of the economic

Downloaded 2025-6-7 11:58 A Your IP is 45.145.110.245
Chapter 1: Physical inactivity: a global public health problem, Daniel Friedman
©2025 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility

burden and low- and middle-income countries suffer a larger proportion of the disease burden.[8]

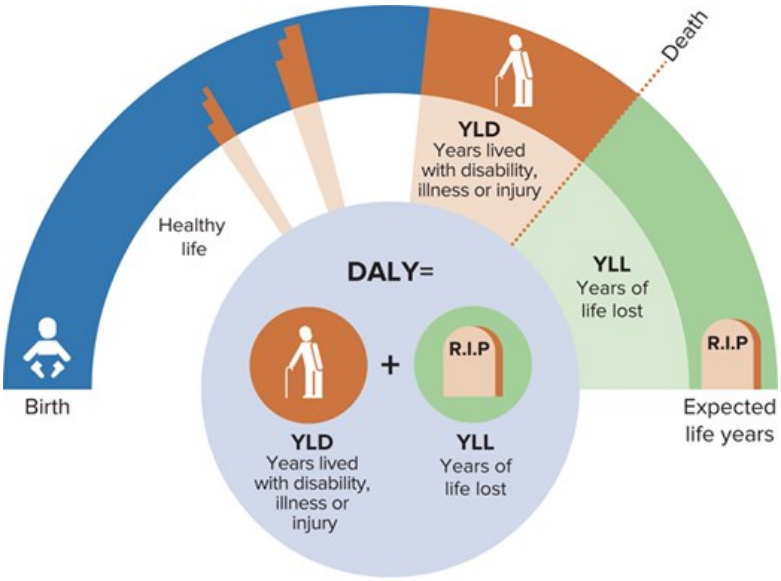
Quality of life

Physical inactivity and subsequent ill health limits the degree to which we can enjoy the important possibilities of our lives. This subjective concept can be quantified using disability-adjusted life years (DALYs) (Fig. 1.3). One DALY can be thought of as one lost year of 'healthy' life. Therefore, the sum of DALYs, or burden of disease, across the population can be thought of as a measure of the gap between current health status and an ideal health situation, where the entire population lives to an advanced age, free of disease and disability.[14]

Figure 1.3

The concept of disability-adjusted life years (DALYs) and its components

© CROWN COPYRIGHT HTTPS://WWW.GOV.UK/GOVERNMENT/PUBLICATIONS/BURDEN-OF-DISEASE-STUDY-FOR-ENGLAND



Source: Peter Brukner, Karim Khan: *Brukner & Khan's Clinical Sports Medicine*, 5e
Copyright © McGraw-Hill Education. All rights reserved.

In 2013, the lifetime disease burden associated with physical inactivity for the major NCDs was 13.4 million DALYs worldwide.[8]

THE WAY FORWARD

If we continue to remain on the couch, the global burden of physical inactivity will continue to gain weight, particularly in low- and middle-income countries. There are obviously economic and health arguments for solving the physical inactivity pandemic, but what exactly needs to be done?

Given the diversity of ways to be active and the multiple settings in which we must look to increase participation, the solution to physical inactivity lies beyond the scope of any single agency. As the WHO's Global Action Plan on Physical Activity 2018–2030 (GAPPA)[20] emphasises, a major reduction in the burden of physical inactivity and subsequent NCDs will come from a whole-of-system approach which implements effective population-wide interventions that address both upstream and downstream factors of participation.

Downloaded 2025-6-7 11:58 A Your IP is 45.145.110.245
Chapter 1: Physical inactivity: a global public health problem, Daniel Friedman
©2025 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility

Access Provided by: SILVERCHAIR INFORMATION SYSTEMS

NEED TO KNOW

WHO's Global Action Plan on Physical Activity 2018–2030: proposed targets for 2025

25% reduction of premature mortality from NCDs + 10% relative reduction in the prevalence of insufficient physical activity

25% reduction of premature mortality from NCDs+10% relative reduction in the prevalence of insufficient physical activity

The '7 Best Investments for Physical Activity' from the International Society for Physical Activity and Health, in 2011,[21] captured this multidimensional approach, which has been revitalised in the most recent GAPPA. Both promote common key action areas, including:

- the built environment and transport (Chapter 27)
- schools and other educational institutions
- community and grassroots-based initiatives
- sports systems and programs
- public education
- healthcare
- advocacy and leadership
- monitoring and surveillance.

Every one of us must do our part to increase physical activity in all areas of society. We must find ways to integrate physical activity back into our daily lives through implementation of effective evidence-based policy actions that make the healthier choices easier.

Physical inactivity's costs, whether human or economic, direct or indirect, are entirely preventable. Armed with an understanding of the size and consequences of the problem, it is clear that the time for action is now.

REFERENCES

1. World Health Organization (WHO). Physical inactivity: a global public health problem. Geneva, 2018. http://www.who.int/dietphysicalactivity/factsheet_inactivity/en/.

2. Blair SN. Physical inactivity: the biggest public health problem of the 21st century. *Br J Sports Med* 2009; 43(1):1–2. [PubMed: 19136507]

3. World Heath Organization (WHO). Global Recommendations on physical activity for health. Geneva, 2010.

4. Katzmarzyk PT, Lee IM. Sedentary behaviour and life expectancy in the USA: a cause-deleted life table analysis. *BMJ Open* 2012; 2(4).

5. Church TS, Thomas DM, Tudor-Locke C et al Trends over 5 decades in U.S. occupation-related physical activity and their associations with obesity. *PLoS ONE* 2011; 6(5).

6. Hallal PC, Andersen LB, Bull FC et al Global physical activity levels: surveillance progress, pitfalls, and prospects. *Lancet* 2012; 380(9838):247–57. [PubMed: 22818937]

7. World Health Organization (WHO) Global health risks: mortality and burden of disease attributable to selected major risks. Geneva, 2009.

8. Ding D, Lawson KD, Kolbe-Alexander TL et al The economic burden of physical inactivity: a global analysis of major non-communicable diseases.

Downloaded 2025-6-7 11:58 A Your IP is 45.145.110.245
Chapter 1: Physical inactivity: a global public health problem, Daniel Friedman
©2025 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility

Lancet 2016; 388(10051):1311–24. [PubMed: 27475266]

9. Australian Institute of Health and Welfare (AIHW). Impact of physical inactivity as a risk factor for chronic conditions: Australian Burden of Disease. Canberra, Australia: 2017.

10. Lee IM, Shiroma EJ, Lobelo F et al Impact of physical inactivity on the world's major non-communicable diseases. *Lancet* 2012; 380(9838):219–29. [PubMed: 22818936]

11. Sharif B, Garner R, Hennessy D et al Productivity costs of work loss associated with osteoarthritis in Canada from 2010 to 2031. *Osteoarthritis Cartilage* 2017; 25(2):249–58. [PubMed: 27666512]

12. Schofield D, Shrestha RN, Cunich MM et al The costs of diabetes among Australians aged 45–64 years from 2015 to 2030: projections of lost productive life years (PLYs), lost personal income, lost taxation revenue, extra welfare payments and lost gross domestic product from Health&WealthMOD2030. *BMJ Open* 2017;7(1).

13. Andreyeva T, Luedicke J, Wang YC. State-level estimates of obesity-attributable costs of absenteeism. *J Occup Environ Med* 2014; 56(11):1120–7. [PubMed: 25376405]

14. World Health Organization (WHO). Metrics: disability-adjusted life year (DALY). 2018, http://www.who.int/healthinfo/global_burden_disease/metrics_daly/en/.

15. Goodchild M, Nargis N, Tursan d'Espaignet E. Global economic cost of smoking-attributable diseases. *Tob Control* 2018; 27(1): 58–64. [PubMed: 28138063]

16. Krueger H, Krueger J, Koot J. Variation across Canada in the economic burden attributable to excess weight, tobacco smoking and physical inactivity. *Can J Public Health* 2015 May 1; 106(4):e171–7. [PubMed: 26285186]

17. Statistics Canada. Smoking, 2013. 2015, http://www.statcan.gc.ca/pub/82-625-x/2014001/article/14025-eng.htm.

18. Statistics Canada. Directly measured physical activity of adults, 2012 and 2013. 2015, http://www.statcan.gc.ca/pub/82-625-x/2015001/article/14135-eng.htm.

19. Reid J. *Tobacco Use in Canada: Patterns and Trends*, 2017 edition. Waterloo, ON: Propel Centre for Population Health Impact, University of Waterloo, 2017.

20. World Health Organization (WHO). Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva, 2018.

21. Global Advocacy for Physical Activity (GAPA), the Advocacy Council of the International Society for Physical Activity and Health (ISPAH). NCD Prevention: Investments that Work for Physical Activity, 2011.

Downloaded 2025-6-7 11:58 A Your IP is 45.145.110.245
Chapter 1: Physical inactivity: a global public health problem, Daniel Friedman
©2025 McGraw Hill. All Rights Reserved. Terms of Use • Privacy Policy • Notice • Accessibility