

Institution: University of Bristol		
Unit of Assessment: 24) Sport and Exercise Sciences, Leisure and Tourism		
Title of case study: Development and adoption of national and international physical activity guidelines		
Period when the underpinning research was undertaken: 2014 - 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Charlie Foster Russell Jago	Professor of Physical Activity & Public Health Professor of Paediatric Physical Activity & Public Health	07/2017- present 07/2005 - present
Ashley Cooper Simon Sebire Miranda Armstrong	Professor of Physical Activity & Public Health Senior Lecturer in Physical Activity Lecturer in Physical Activity and Adults	01/1997 - 12/2020 09/2012 - present 04/2017 - present
Period when the claimed impact occurred: 2017 - 2020		
Is this case study continued from a case study submitted in 2014? No		

1. Summary of the impact

Physical inactivity is a global risk factor for noncommunicable disease, which damages individual physical and mental health and generates a significant economic cost in both medical care and lost productivity. University of Bristol research has standardised and expanded the evidence available to inform physical activity guidelines and developed novel infographic dissemination methods to improve professional awareness and implementation. These data and outputs have been used by national and international governments, policy makers and health organisations to update and create new guidance for previously underrepresented groups. Infographic dissemination methods have changed health practitioner knowledge to support patients' changes in physical activity behaviour and are embedded in the UK's and WHO's Global Physical Activity Action Plan and new Global Physical Activity guidelines.

2. Underpinning research

Physical activity guidelines are the rubric for setting population levels of physical activity for optimum physical and mental health and provide benchmarks for national surveillance. The 2011 UK Chief Medical Officers' (CMOs) physical activity guidelines highlighted a lack of evidence on the health implications of sedentary behaviour, along with an absence of large scale, objective, time-stamped measurement techniques in population surveillance and the monitoring of trends over time. One priority identified by the CMOs was standardised data cleaning, reduction and analysis procedures for objective device-derived data. University of Bristol (UoB) researchers have established the world's largest body of research on methods to develop and disseminate physical activity guidelines. They developed standard methods for harmonising data from over 37,000 young people aged 3 to 18 years across studies from Europe, the US, Brazil and Australia.

Work conducted by Cooper using the International Children's Accelerometer Database (ICAD) database [1], and Jago in the B-Proact1V cohort [2,3], changed the landscape on understanding how children were active by shifting away from reliance on self-reported data to objectively assessed children's physical activity and sedentary behaviour (SB). This was a significant contribution to the study of sedentary behaviours where the relationship between SB and health outcomes was uncertain due to imprecision in the measurement of SB. Work led by Cooper provided key evidence to identify the links between objectively assessed sedentary behaviour and both child and adult metabolic health [1].

In 2017, an evidence review carried out in collaboration with Public Health England (PHE) reported that over 6.3 million adults aged 40 to 60 do not achieve 10 minutes of continuous brisk walking over the course of a month and are missing out on important health benefits [4]. For currently inactive individuals, the review suggested that 10 minutes of brisk walking per day could ease performance of everyday physical activities, improve mood and quality of life, as well as reduce risk of early death by 15%. The review also produced novel evidence-based guidelines for the promotion of 10-minute bouts of brisk walking as the focus [4].

The 2011 guidelines identified that dissemination of national physical activity guidelines to priority groups was critical but that no established methods existed. A novel method was developed by Foster to review and integrate different types of research evidence (systematic reviews of RCTs, prospective cohort studies, qualitative studies, grey literature, web-based resources) into infographics and evaluate their utility with panels of health professionals and the public using co-production techniques [5]. This was the first time the use of infographics to disseminate evidence-based physical activity guidelines to health professionals had been attempted. To construct the new physical activity guidelines for disabled adults, the UoB team worked alongside University of Birmingham colleagues with over 350 disabled adults, ten disability organisations and 50 health professionals (HPs) to test how the recommendations could be presented and co-produce a resource. The result was the first infographic co-produced with disabled adults to communicate evidence-based physical activity recommendations for a range of experiences of disability [5].

Following the development of the physical activity infographics [5], the UK CMOs commissioned UoB to lead the updating and revision of the UK physical activity guidelines. Foster was the overall PI for this process, supervising the construction of evidence-based guidelines and reporting on academic output from ten Expert Working Groups (EWGs), made up of a collaboration of over 90 UK academics, policy makers and practitioners. Jago was the Chair of the Children & Young People's EWG, and Cooper was the Chair of the Sedentary Behaviour Group, with Foster also chairing the Pregnancy, Post-Partum, Muscle, Bone and Balance Health Expert Working Groups. Sebire and Armstrong led work packages for Children & Young People and Muscle, Bone and Balance Health respectively.

The UoB team also identified the need for physical activity guidelines for three key underrepresented population groups that had not been included in the past: women pre- and post-partum, and adults with disabilities. UoB led evidence reviews to create new guidelines for pre- and post-partum (Foster) and children (Jago). The updated guidelines, published in September 2019 [6], are now relevant to over 67.6 million UK children and adults, by providing evidence-based physical activity guidelines from preconception to older years, (PI -Foster). It provides a benchmark for the surveillance of population interventions and first contact in their clinical management.

3. References to the research

1. **Cooper AR**, Goodman A, Page AS, *et al.* (2015). Objectively measured physical activity and sedentary time in youth: the International children's accelerometry database (ICAD). *International Journal of Behavioral Nutrition & Physical Activity* 12:113 DOI:[10.1186/s12966-015-0274-5](https://doi.org/10.1186/s12966-015-0274-5)
2. **Jago R**, Solomon-Moore E, Macdonald-Wallis C, Thompson JL, Lawlor DA, **Sebire SJ**. Association of parents' and children's physical activity and sedentary time in Year 4 (8-9) and change between Year 1 (5-6) and Year 4: a longitudinal study. (2017). *International Journal of Behavioral Nutrition & Physical Activity* 14:110. DOI:[10.1186/s12966-017-0565-0](https://doi.org/10.1186/s12966-017-0565-0)
3. **Jago R**, Salway R, Lawlor DA, Emm-Collison L, Heron J, Thompson JL, & **Sebire SJ**. (2018). Profiles of children's physical activity and sedentary behaviour between age 6 and 9: a latent profile and transition analysis. *International Journal of Behavioral Nutrition & Physical Activity* 15:103. DOI:[10.1186/s12966-018-0735-8](https://doi.org/10.1186/s12966-018-0735-8)

Impact case study (REF3)

4. Brannan M, Varney J, Timpson C, Murphy M, **Foster C.** (2017). 10 minutes brisk walking each day in mid-life for health benefits and achievement of recommended activity levels- Evidence summary. Public Health England, London
5. Smith B, Kirby N, Skinner B, Wightman L, Lucas R, **Foster C.** (2019). Infographic. Physical activity for disabled adults. *British Journal of Sports Medicine*, 53, 335–336. DOI:[10.1136/bjsports-2018-100158](https://doi.org/10.1136/bjsports-2018-100158)
6. UK Chief Medical Officers' Physical Activity Guidelines, (2019). Department of Health. <https://www.gov.uk/government/publications/physical-activity-guidelines-uk-chief-medical-officers-report>

Grant Information

- i) **Cooper A** (co-PI). Pooling of children's physical activity data, MRC, 2008-2010, GBP296,000
- ii) **Jago R.** The influence of families and friends on change in physical activity, sedentary behaviour and screen-viewing from years 1 to 6 in the B-PROACTIV cohort: Finding new ways to change behaviour, British Heart Foundation, 2015-2019, GBP538,247
- iii) **Foster C.** Updating UK CMO Guidelines for Physical Activity, Department of Health, 2017-2018, GBP99,132
- iv) **Foster C.** CMO Physical Activity and Pregnancy Study, DH & UK CMOs Offices, 2017 2018, GBP25,000
- vi) Smith B. **Foster C.** Evidence Review for physical activity and disabled adults, PHE, 2017, GBP25,000

4. Details of the impact

Globally, one in four adults and three in four adolescents do not currently meet the global recommendations for physical activity set by the World Health Organisation (WHO). In 2013, the global cost of physical inactivity was estimated to be INT\$54 billion per year in direct health care. Physical activity guidelines act as a gold standard for assessing behaviour in clinical interventions and setting targets for chronic disease management, set effectiveness levels of programmes and research interventions, and offer the public a behavioural benchmark. UoB evidence reviews, infographics and production of the UK CMO Physical activity guidelines has created new guidelines for underrepresented population groups and improved UK and global policy dissemination and practice knowledge. Foster was awarded an OBE in the Queen's 2019 New Year Honours list, in recognition of his work to promote physical activity.

Improved UK health policy dissemination and practitioner knowledge

The 2019 update of the UK CMO physical activity guidelines, led by Foster (outlined in Section 2), generated a revised and extended national health policy guidance document [6]. This included a suit of six infographics [Aiii], developed by UoB research and methods [e.g. 4, 5], presenting recommended levels of physical activity across all groups. *"The guidelines underpin the Government's policy on physical activity and are the official source of UK physical activity information. The [Bristol] team has provided a critical role to support the construction of evidence, evidence-based guidelines and policy."* [Ai]. In a personal note, the CMO England said, *"Without you none of this would happen. Thank you from me and also from the Nation for your hard work"* [Aii].

Since their release these guidelines have been downloaded over 100,000 times [Ai], and have been disseminated via UK CMOs to Royal Colleges, NHS Trusts and Care Agencies (potentially reaching 1.4 million NHS workers and 1.6 million social care workers), offering a summary of the correct information about physical activity to use in their daily practice. A Senior Policy Manager for the Department of Health and Social care reported that *"Since 2015 each new infographic has been year on year the most downloaded resource from the Gov.uk website"* [Ai]. New WHO Physical activity Action Plan and Global PA guidelines have included infographics as mechanism for dissemination [Fii, Action 1.1].

Impact case study (REF3)

Heath practitioner understanding was assessed by PHE, who reported in their evaluation survey (2018) that the knowledge of UK health professionals of current physical activity guidelines had increased from 15% to 77% in 2018. The report stated *‘the majority (77%) of respondents believe they have good awareness of UK physical activity guidelines from the Chief Medical Officer, reflecting the substantial efforts that have been made to publicise the latter over the last four years’* [B].

The update to the UK physical activity guidelines has also prompted the construction of a new (November 2020) CMO Expert Committee for Surveillance, co-chaired by Foster, that will review the current surveillance measures of physical activity across the UK.

New guidance for unrepresented population groups

The 2019 update to physical activity guidance [6] also identified the need for physical activity guidelines for i) women pre- and post-partum and ii) adults with disabilities. The pregnancy infographic [Aiii] was developed and tested with panels of health professionals and pregnant women before consultation with more than 250 UK-based doctors and midwives. In the UK this is relevant to over 650,000 women annually during and after their pregnancies, a time when women’s physical activity levels decline. This development has led to changes in pregnancy services within CCG areas – for example, in Oxfordshire all pregnant women now have their physical activity assessed at booking in clinics for the first time and have the CMO infographic discussed by their midwife or doctor [C].

The UK disabled adult community of over 11 million people with a limiting long-term illness, impairment or disability was also a new constituency for physical activity guidelines. The assessment of physical activity using the new guidelines, is now an integrated part of the revised Care Needs Assessment protocol [Ei] and supported by Sport England and Disability Rights UK’s pilot programme “Get Yourself Active” [Eii]. This new programme connects adults with their social workers and local activity coordinators to offer opportunities for activity. It has also been approved by PHE and endorsed by the four UK CMOs. An independent evaluation found that *“The proportion of respondents who undertook physical activity at least once a week or more increased from 28% at the start of the programme, to 68% six months into the programme.”* [Eii].

A novel approach to increase physical activity

The UoB-led evidence briefing [4] was used by PHE as the foundation for creating their Active10 national walking campaign targeting low socioeconomic status (SES) adults [Di]. Our work [4] produced evidence-based guidelines for the promotion of 10-minute bouts of brisk walking as the focus and connected our work with the production of the 2019 UK CMO physical activity guidelines [6], where 10-minute walks were used as a key example of starting activity. The Active 10 campaign achieved around 500,000 downloads of the mobile phone app, with evaluation suggesting increases in brand and app awareness, and those taking action [Dii].

Improving international public health policy dissemination

Jago was appointed to the WHO Global Physical Activity Guidelines Expert Group to update the WHO’s physical activity guidelines, published in November 2020 [Fi]. In response to the development of UK infographics, the dissemination of physical activity guidelines using infographics and targeted campaigns were recommended among 20 national actions by the WHO Global Physical Activity Action Plan 2018 [Fii, Action 1.1]. The updated 2020 guidelines built on the existing UK physical activity guidelines, developed by Jago, and include disabled adults for the first time [Fi, Action 1.4 & 3.5]. The WHO Secretariat has undertaken to disseminate physical activity recommendations for children, young people, adults, pregnant women and people living with disabilities, mirroring the UK [Fi, p87]. The new 2020 Guidelines [Fi] include infographics for all these groups and advises countries to use infographics and tailor their guidance to specific population groups. *‘Providing information on the national guidelines in a variety of formats is also useful. For example, a relatively new but increasingly common approach to communicating physical activity guidelines is through the use of infographics’* [Fi].

Impact case study (REF3)

UoB development of infographics using new methods [4, 5] has also stimulated other nations to adopt similar methods for co-creation. The Canadian Physical Activity Under 5's guidelines followed the testing and co-creation phase piloted by UoB to produce a single page infographic to present their 2017 guidelines [H]. The role of infographics as part of dissemination pathways and models of communication of physical activity guidelines to health professionals and beyond has also been replicated by other international Public Health agencies including in the USA [Ii], and New Zealand for maternity care [Iii]. Our disability infographic [5] has been directly adopted by the national governments of South Korea [Ji], Finland [Jii] and Spain [Jiii].

UoB research has also contributed directly to the development of the national physical activity guidelines and plans of several countries. For example, our research was cited in the recent USA 2018 Physical Activity Guidelines Advisory Committee Scientific Report [Gi] and 2017 National Physical Activity Recommendations for Adults and Older Adults in Germany [Gii].

5. Sources to corroborate the impact

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- A) i) DHSC (2020). Supporting Letter - Senior Policy Manager - Physical Activity
 ii) Chief Medical Officer for England (2019). Corroborating statement
 iii) DHSC (2019). Physical activity guidelines: infographics
- [Physical activity for early years: birth to 5 years](#) (Jago & Foster)
 - [Physical activity for children and young people: 5 to 18 years](#) (Jago, Sebire & Foster)
 - [Physical activity for adults and older adults: 19 and over](#) (Cavill & Foster)
 - [Physical activity for disabled adults](#) (Foster)
 - [Physical activity for pregnant women](#) (Foster)
 - [Physical activity for women after childbirth](#) (Foster)
- B) ICF Consulting Services Limited. (2018). [A Review of the Implementation of Everybody Active, Every Day at National and Local Level](#), p.12.
- C) Oxfordshire CCG (2018). [Physical activity in pregnancy infographic: guidance](#)
- D) i) PHE (2017). Active 10 Advisory Group Presentation
 ii) Brannan MGT, **Foster CE**, Timpson CM, Clarke N, Sunyer E, Amlani A, Murphy MH. (2019). Active 10 - A new approach to increase physical activity in inactive people in England. *Prog Cardiovasc Dis*, 62(2):135-139. DOI: [10.1016/j.pcad.2019.02.001](#)
- E) i) Which? (2020). Carers & caring: Needs Assessment: [Preparing for the needs assessment](#)
 ii) Traverse (2019). [Increasing participation in physical activity and sport – Evaluation of Get Yourself Active](#)
- F) i) WHO (2020). [WHO guidelines on physical activity and sedentary behaviour](#)
 ii) WHO (2018). [More Active People for a Healthier World – Global Action Plan on Physical Activity 2018-2030](#)
- G) i) U.S. Department of Health and Human Services (2018). [2018 Physical Activity Guidelines Advisory Committee Scientific Report](#)
Jago cited pages: F7-21, F11-97, F11-98; Foster cited pages: F3-58, F11-93, F11-100
 ii) Füzéki et al. (2017). German National Physical Activity Recommendations for Adults and Older Adults: Methods, Database and Rationale. *Gesundheitswesen*, 79(S01): S20-S28. DOI:10.1055/s-0042-123700
- H) Canadian Society for Exercise Physiology (2017). [Canadian Physical Activity Guidelines - For the early years \(0-4 years\)](#)
- I) i) US Department of Health & Human Services (2019). Move Your Way – [What's your move?](#)
 ii) HealthEd (New Zealand) (2019). [Being active during pregnancy and breastfeeding](#)
- J) i) South Korean Olympic Association (2020). Physical Activity and disability for adults
 ii) SoveLi (Finland) (2019). [Recommendations of physical activity for adults with disabilities](#)
 iii) Monforte J, Úbeda-Colomer J, Smith B, **Foster C.** (2019). [Physical activity infographics for adults with disabilities](#). *Revista Española de Discapacidad*, 7(1), 257-265.