Institution: Loughborough University

Unit of Assessment: C26 Sport and Exercise Sciences, Leisure and Tourism

Title of case study: The first national policy recommendations on sedentary behaviour

1. Summary of the impact (indicative maximum 100 words)

The further development of the UK Physical Activity guidelines in 2010 highlighted the need to consider the emerging research in the area of sedentary behaviour. Prof S. Biddle at Loughborough University, based upon his and the Unit's leading research in this area, was invited to Chair a working group to review and make recommendations regarding the incorporation of guidance on sedentary behaviour into these new national policies. This group, drawing on the original work of Biddle and co-workers, set out clear recommendations for the incorporation of sedentary behaviour into the UK national Physical Activity Guidelines through the 'Sedentary Behaviour and Obesity: Review of the Current Scientific Evidence' report (2010).

Physical Activity guidelines in the UK had never included recommendations for sedentary behaviour, until the publication of 'Start Active, Stay Active' (2011), as a direct result of the Unit's research.

2. Underpinning research (indicative maximum 500 words)

Since 2000, the Loughborough University's research group of current (Prof Stuart Biddle [1998-], Prof Noel Cameron [1997-], Dr Stacy Clemes [2007-]) and former staff (Drs Trish Gorely [1999-2011], Simon Marshall [1998-2002], Len Almond [1978-2005]) have been undertaking research into sedentary behaviour in young people and adults. Sedentary behaviour – operationally defined as 'sitting time' is distinct from moderate-to-vigorous physical activity (MVPA), the latter being more extensively researched. Work from the *Behavioural Medicine* research theme **[G3.3]** has demonstrated the significance of this area of work recently by providing an analysis indicating that sedentary behaviour has been implicated in markers of cardio-metabolic health and that it may be a more important indicator of poor health than MVPA (Henson et al 2013, Diabetologica) **[3.1]**. Our initial research in youth, the significance of which is evidenced through the observation that sedentary behaviour patterns track from childhood into adolescence or adulthood [**3.4],** was through Project STIL (Sedentary Teenagers and Inactive Lifestyles) **[G3.1].** This was the first large-scale sedentary behaviour study of teenagers in the UK. It produced one of two main UK data sources for self-reported levels of multiple sedentary behaviours **[3.3]**. Very detailed momentary assessment diaries were used to plot the nature, duration and context of sedentary and other behaviours (e.g., MVPA) across weekday and weekend leisure time. This was the only UK data set to investigate sedentary behaviours beyond screen time (TV and computers) and concluded that about one-quarter to one-third of young people watch 4 hours per day or more. Data on computer game playing are more variable, but with a significant number reporting to play for more than 1 hour/day in the mid-2000s **[3.3]**. The 'Sedentary Behaviour and Obesity: Review of the Current Scientific Evidence' report drew its evidence on prevalence of sedentary behaviour in UK youth from several papers published from Loughborough University **[3.2, 3.3]**. The latter research being funded through the Health Education Board for Scotland **[G3.2]**.

Two systematic reviews were conducted specifically to inform the 'Sedentary Behaviour and Obesity: Review of the Current Scientific Evidence' report: one on tracking of sedentary behaviour of youth over time **[3.4]** and one on sedentary behaviour and diet **[3.5]**. The review on tracking analysed 21 studies, showing that TV viewing tracks with moderate strength similar to MVPA. This is important in showing some stability of the behaviour in question and the need for well-designed interventions for behaviour change with good fidelity.

The 'Sedentary Behaviour and Obesity: Review of the Current Scientific Evidence' report had a strong focus on obesity. Our earlier meta-analysis **[3.6]** on the association between some sedentary behaviours (e.g. TV viewing) and indicators of body fatness in youth, suggested that this association was surprisingly small. This may be due to confounding factors such as diet. The second systematic review for the DoH report, therefore, investigated the association between dietary patterns and sedentary behaviour **[3.5]** - the first such review. Analysing 19 study samples

for children and 26 for adolescents, results showed consistent associations between sedentary behaviour, mainly screen time/TV viewing, and unhealthy diet. This is important in suggesting an association between these types of sedentary behaviours with some negative health outcomes, such as obesity and diabetes, and strengthened the justification for national guidelines. This research has been widely disseminated via Scivee.tv (http://www.scivee.tv/node/32396).

The reach of the work is demonstrated by the incorporation of the recommendations in the four home countries Chief Medical Officers' report 'Start Active, Stay Active'. This new physical activity guidance for all age groups now includes explicit statements on minimising time spent being sedentary each day.

3. References to the research (indicative maximum of six references)

Papers [*all >/= 2*; international refereed journals with good impact factors for the field*]

3.1. Henson, J., Yates, T., Biddle S. J. H., Edwardson C.L., Khunti, C.L., Wilmot E.G., Gray L.J., Gorely T., Nimmo M. A., Davies M.J (2013) Associations of objectively measured sedentary behaviour and physical activity with markers of cardio-metabolic health. *Diabetologia 56*, 1012-1020. DOI 10.1007/s00125-013-2845-9

3.2. Biddle, S. J. H., Gorely, T., Marshall, S. J., & Cameron, N. (2009). The prevalence of sedentary behavior and physical activity in leisure time: A study of Scottish adolescents using ecological momentary assessment. *Preventive Medicine, 48*(2), 151-155. DOI: 10.1016/j.ypmed.2008.10.025

3.3. Gorely, T., Biddle, S. J. H., Marshall, S. J., & Cameron, N. (2009). The prevalence of leisure time sedentary behaviour and physical activity in adolescent boys: An ecological momentary assessment approach. *International Journal of Pediatric Obesity, 4*(4), 289-298. DOI: 10.1080/17477160902811181

3.4. Biddle, S. J. H., Pearson, N., Ross, G. M., & Braithwaite, R. (2010). Tracking of sedentary behaviours of young people: A systematic review. *Preventive Medicine, 51*, 345-351. DOI: 10.1016/j.ypmed.2010.07.018

3.5. Pearson, N., & Biddle, S. J. H. (2011). Sedentary behaviour and dietary intake in children, adolescents and adults: A systematic review. *American Journal of Preventive Medicine, 41*(2), 178 –188. DOI: 10.1016/j.amepre.2011.05.002 [IF = 4.044]

3.6. Marshall, S. J., Biddle, S. J. H., Gorely, T., Cameron, N., & Murdey, I. (2004). Relationships between media use, body fatness and physical activity in children and youth: A meta-analysis. *International Journal of Obesity, 28*, 1238-1246. DOI: 10.1038/sj.ijo.0802706 [IF = 4.691]

Grants

G3.1. Grant awarded to: Professor Stuart Biddle (PI); Co-Is – Dr Simon Marshall, Dr Len Almond, Dr Nick Cavill, Professor Noel Cameron
Grant title: 'Sedentary behaviour in youth: Prevalence and determinants'
Sponsor: British Heart Foundation (*PG/2000124)*
Period of the grant: 3 years: 2001-2004
Value of the grant: £111,000.

G3.2. Grant awarded to: Professor Stuart Biddle (PI); Co-Is – Dr Simon Marshall, Dr Len Almond, Dr Trish Gorely, Professor Noel Cameron
Grant title: 'Sedentary behaviour among Scottish youth: Prevalence and determinants'
Sponsor: Health Education Board for Scotland (NHS Health Scotland)
Period of the grant: 2 years: 2002-2004
Value of the grant: £19,258.

G3.3. Grant awarded to: Professor Stuart Biddle (PI) Co-Is - Prof.M.Nimmo and Dr T. Gorely
Grant title: 'An intervention to decrease sedentary behaviour in young adults at risk of type 2 diabetes mellitus'.
Sponsor: Medical Research Council
Period of the Grant: 3 years: 2010 - 2013
Value of grant: £448,772.

4. Details of the impact (indicative maximum 750 words)

The review undertaken to inform the further development of the Physical Activity guidelines in 2010 ('Making the case for UK Physical Activity Guidelines for Early Years: Recommendations and draft summary statements based on the current evidence') highlighted the need to consider the emerging research in the area of sedentary behaviour. As a consequence, Professor S. Biddle at Loughborough University, based upon his and the Unit's leading research in this area, was invited to Chair a working group to review and make recommendations regarding the incorporation of guidance on sedentary behaviour into these new national policies. The group comprised a further thirteen members, including Dr. T. Gorely (Loughborough, 1999-2011).

This working group published the 'Sedentary Behaviour and Obesity: Review of the Current Scientific Evidence' report in March 2010 **[5.1]**. The report drew upon the emerging evidence on prevalence of sedentary behaviour in UK youth and its associated health implications, from the underpinning research set out in the papers published by Unit members **[3.2, 3.3]**. Having highlighted the paucity of evidence-based policies to date, it also references the comprehensive analyses of the new research area and its evidence base published by members of the Unit **[3.4, 3.5]**.

Professor Biddle's working group set out clear recommendations in their report for the incorporation of sedentary behaviour guidance, based on the findings from the Unit's underpinning research publications, into the UK national Physical Activity Guidelines. These recommendations were that UK guidance on physical activity; should contain a specific recommendation that children and young people, adults, and older adults should aim to minimise the time they spend being sedentary each day; should not set a quantified target for sedentary time, but emphasise minimising time spent being sedentary each day; should include specific recommendations for limiting sedentary time among children of pre-school age; and should suggest the strategies to reduce sedentary behaviour **[5.1]**.

These recommendations have significantly transformed the physical activity guidelines, which are manifested in the 'Start Active, Stay Active' report (2011) from the Chief Medical Officers of the four home countries. This is a UK-wide document that presents guidelines on the volume, duration, frequency and type of physical activity required. At p.7, the report highlights the need for minimising the amount of time spent being sedentary for extended periods for all four categories of individuals (Early Years, Children and Young People, Adults and Older Adults) **[5.2, 5.7, 5.8]**. The report does not specify a quantified target for sedentary time, as per the recommendation from the working group. It does give tailored guidance on limiting sedentary time for early years children (pp.22-25) **[5.2, 5.7,5.8]**. The report also includes details of strategies to reduce sedentary behaviour, for example 'children and young people may engage in light activity and reduce sitting and lying time by playing active computer games or engaging in activities that involve moving in and around the home, classroom or community' (p.29) **[5.2,5.7,5.8].**

From these new UK physical activity guidelines, factsheets have been derived that clearly highlight the guidance in relation to sedentary behaviour that emerged from the working group **[5.3].**

These new policy guidelines have been published by the UK government for use by health professionals and practitioners, providing the first step in raising awareness of the critical health issues of sedentary behaviour for the whole UK population.

Wider dissemination and incorporation into guidance documents has also taken place. The Loughborough University research findings on sedentary behaviour in Scottish youth **[G3.2]** have been summarised in a 5-page 'research brief' flyer for NHS Health Scotland **[5.4]** and supported by a stakeholder dissemination day. The British Heart Foundation National Centre for Physical Activity & Health has also incorporated findings from the underpinning research at Loughborough into its fact sheets **[5.5]** and Weight Watchers has produced a practical guide for members, which was written by Biddle **[5.6]**.

5. Sources to corroborate the impact (indicative maximum of 10 references)

The following sources of corroboration can be made available at request:

5.1. The 'Sedentary Behaviour and Obesity' report (2011), Department of Health and Department of Children, School and Families http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_128225.pdf

5.2. Chief Medical Officers of England, Scotland, Wales and Northern Ireland. (2011). *Start active, stay active: a report on physical activity from the four home countries' Chief Medical Officers*. London: Department of Health. http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_128209

5.3. The UK Physical Activity Factsheets 1-5 (2011). https://www.gov.uk/government/publications/uk-physical-activity-guidelines

5.4. NHS Health Scotland, Research in Brief #16. Nature and extent of inactive behaviour among Scottish youth. PDF available.

5.5. BHF National Centre for Physical Activity & Health sedentary behaviour fact sheets: http://www.bhfactive.org.uk/homepage-resources-and-publications-item/335/index.html

5.6. Weight Watchers support guidance available for members (72 page booklet 'Move More, Sit Less' available).

5.7. Strategic Lead for Health, Sport England. Was at Department of Health at time of Working Group.

5.8. Director, Cavill Associates – research and consultancy services in public health. Consultant to Department of Health at time of Working Group.