Institution: Anglia Ruskin University

Unit of Assessment: 24

Title of case study: Improving Health Through Reducing Sitting Time in the Workplace and Education

Period when the underpinning research was undertaken: 2017-March 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:**
Dr Lee Smith	Associate Professor in Physical Activity and Public Health; Director of the Cambridge Centre for Sport and Exercise Sciences	June 2016-present

Period when the claimed impact occurred: 2018-December 2020

Is this case study continued from a case study submitted in 2014? N

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

Smith's research demonstrated that replacing sedentary behaviour with physical activity benefits health. The findings of his research led to the development and implementation of a workplace wellbeing initiative, which subsequently improved health, e.g. body composition and workplace stress, of 8,600 employees. In addition, Mitie Corporation which commissioned the initiative generated income from its sale.

Dr Smith's research also led to the development and implementation of a school wellbeing initiative called Active Movements, which, working across London and the Home Counties, has supported 25,000 pupils with beneficial health parameters, such as physical functioning and body composition.

Between both initiatives, three jobs have been created.

Impact is also demonstrated through initiatives in the College of West Anglia and a primary school based in Murcia, Spain, with observed health benefits as above.

2. Underpinning research (indicative maximum 500 words)

The underpinning body of research for this ICS predominantly utilised epidemiological, as well as meta-research techniques, and demonstrates that replacing sedentary behaviour with physical activity is associated with positive mental and physical health across all ages.

Smith utilised an isotemporal substitution model to identify that the substitution of 30 minutes of sedentary behaviour with 30 minutes of physical activity was associated with improved anxiety symptoms in adults (Reference 1). His other epidemiological analyses have demonstrated that each weekly hour of physical activity reduced sickness absence by 1.20 days per year (Reference 2). His work has identified several factors that play a role in workplace physical activity levels and sedentary time, such as: habits for movement, distance from each workstation to all other office destinations, nearest office destinations to workstation, visibility of workstations when standing, and perceived management discouragement of unscheduled breaks (References 3 and 4).

Smith has also published research about the implementation of sedentary reduction and improvement of physical activity interventions in educational environments (References 5 and 6).

For example, key findings from the Camden Active Spaces Project, a large trial investigating the impact of school and playground layout on movement, observed a reduction in sedentary time in young children from before to after active playgrounds were implemented (Reference 5). Dr Smith's other epidemiological work identified that, as children age, their physical activity levels decrease, and their sedentary time increases (Reference 6).

Taken together, this work demonstrates that replacing sedentary behaviour with physical activity may improve mental and physical health. Moreover, this work identifies appropriate correlates and strategies that may be employed to achieve the displacement of sedentary time with time spent in physical activity. The initiatives that Dr Smith designed to displace sedentary time spent with physical activity drew solely on this underpinning research.

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

1) Tully MA, McMullan I, Blackburn NE, **Lee Smith**, et al. (2020) Sedentary behavior, physical activity, and mental health in older adults: An isotemporal substitution model. *Scandinavian Journal of Medicine & Science in Sports*. 30, pp.1957-1965. https://doi.org/10.1111/sms.13762
2) López-Bueno, Rubén and **Smith, Lee** and Andersen, Lars L. and López Sánchez, Guillermo F. and Casajús, José A. (2020) Association between physical activity and sickness absenteeism in university workers. *Occupational Medicine*, 70 (1). pp. 24-30. https://doi.org/10.1093/occmed/kqz158
3) Sawyer, Alexia and **Smith, Lee** and Ucci, Marcella and Jones, Russell and Marmot, Alexi and Fisher, Abigail (2017) Perceived office environments and occupational physical activity in office-based workers. *Occupational Medicine*, 67 (4). pp. 260-267. https://doi.org/10.1093/occmed/kqx022
4) **Smith, Lee** and Sawyer, Alexia and Gardner, Benjamin and Seppala, Katri and Ucci, Marcella and Marmot, Alexi and Lally, Pippa and Fisher, Abigail (2018) Occupational physical activity habits of UK office workers: cross-sectional data from the Active Buildings Study. *International Journal of Environmental Research and Public Health*, 15 (6). p. 1214. https://doi.org/10.3390/ijerph15061214
5) Hamer, Mark and Aggio, Daniel and Knock, Georgina and Kipps, Courtney and Shankar, Sahana and **Smith, Lee** (2017) Effect of major school playground reconstruction on physical activity and sedentary behaviour: Camden Active Spaces. *BMC Public Health*, 17. p. 552. https://doi.org/10.1186/s12889-017-4483-5
6) **Smith, Lee** and Aggio, Daniel and Hamer, Mark (2018) Longitudinal patterns in objective physical activity and sedentary time in a multi-ethnic sample of children from the UK. *Pediatric Obesity*, 13 (2). pp. 120-126. https://doi.org/10.1111/ijpo.12222

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

Smith's research and subsequent well-being initiatives have impacted the improvement of physical and mental health for approximately 8,600 employees and over 25,000 pupils. As a direct result, this work has created 3 jobs across all projects and generated income for both Mitie corporation and Active Movements (neither will disclose the total sum made as commercially sensitive).

Impact for improvement of physical activity in the workplace:

After reading his research, Mitie, one of the UK's leading facilities management and professional services companies, approached Smith. This led to a £30,000 commission to Anglia Ruskin University for Smith to develop a workplace well-being initiative designed to reduce sedentarism and increase physical activity. Mitie now sells and implements the initiative as a service package to various clients.

The initiative has generated income for Mitie. The cost to clients of the package ranges between £1,500 and £10,000 (Mitie will not disclose the exact sum they have made from the initiative nor

details of organisations to whom they have sold the package). Mitie has employed one full-time member of staff to deliver the service (Source 1).

Mitie rolled out the service at Essex County Council in January 2019, to all its 8,600 employees. Data on the behaviour of council employees was collected to determine the effectiveness of the initiative. The evaluation shows positive behavioural outcomes among those who experienced the initiative: self-reported increased desire and motivations to be physically active and less sedentary, and self-reported reductions of at least 8% on workplace stress and general anxiety scales (Source 2).

Impact for improved physical activity and wellbeing in Further Education:

The College of West Anglia (CWA) approached Smith to advise on the implementation of standing desks. Awareness of such equipment and its potential health and cognitive impact came about after Dr Smith presented to college staff regarding his research (Sources 3 and 4).

Approximately 200 students were initially exposed to the standing desks from March 2019, and their performance was evaluated. Smith helped collect detailed data on the impact of the standing desks on the students' activity levels, health, and attention in class (Sources 3 and 4). As a result, college lecturers, using an effort and attention scale, reported that students were able to engage at a higher level when they used the standing desks than when they used usual seated desks (Source 3 and 4). It is expected that this will subsequently lead to better course performance.

The evaluation report from CWA shows that standing desks increased students' standing time, reduced students' sitting time, decreased waist circumference, increased grip strength, and increased attention in class over a 6-month period (Sources 3 and 4).

Due to the success of standing desks on students' health, CWA has started to introduce standing desks across all three of its campuses (King's Lynn, Wisbech, and Milton), serving a total of 10,000 students.

Impact for active movement in schools in UK and Spain:

Active Movements is a large initiative set up by Dr Mike Loosemore MBE (Chief Medical Officer for two GB Olympics sports teams) that seeks to integrate low-level activity into daily routine for health and well-being. Active Movements has been developed and continuously updated based on Smith's research, and further consultation with Smith (Sources 5 and 6). Active Movements became aware of Smith's research after reading a number of his peer-reviewed manuscripts on physical activity promotion and sedentary behaviour reduction in young people.

Active Movements' flagship programme for children is a year-long intervention designed to displace sitting with movement in primary and secondary schools. Since 2016, the programme has been implemented across Berkshire, Greater London, Sussex, Essex, and Buckinghamshire. Approximately 70 schools and 25,000 children have been exposed to the initiative to date (Sources 5 and 6).

Delivering the initiative has resulted in the creation of one full-time position within the Active Movement company (Sources 5 and 6).

Active Movements is having profound impact on school children's activity levels and health, evidenced through the evaluation report (Source 6). Compared to a matched comparison school, children in an Active Movements intervention school exhibited a better physical activity and sedentary behaviour profile, a reduction in waist circumference from an average baseline of 65.24 cm to 63.41 cm at follow-up (whereas waist circumference in the intervention school increased over the same period) and, an improvement in handgrip strength of over 3kg compared to 2kg in the intervention school (the latter being the natural increase expected over time as children develop).

Smith is also an Honorary Professor at the University of Murcia, Spain. In this position he was contacted by the representatives of CEIP Andrés Baquero, a primary school based in Murcia, to adapt the Active Movement programme specifically for their school. The amended version of Active Movements programme has been rolled out, and 200 students have been exposed to the intervention, with similar impacts observed to those listed above (Sources 7 and 8).

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

1) Testimony from Mitie and the initiative
2) Evaluation reports carried out in organisations where the Mitie initiative has been delivered
3) Evaluation report from CWA
4) Testimony from CWA Assistant Principal
5) Testimony from Active Movements
6) Evaluation report for Active Movements
7) Testimony from Andrés Baquero school
8) Evaluation report from Andrés Baquero school