Institution: Ulster

Unit of Assessment 26: Sport and Exercise Sciences, Leisure and Tourism

Title of case study: The development of physical activity guidelines for public health

1. Summary of the impact

Research undertaken at the Centre for Physical Activity and Health Research within the Sport and Exercise Sciences Research Institute has directly contributed to changes in public policy surrounding the health benefits of exercise and has informed the development of international and national physical activity guidelines.

2. Underpinning research

Over the past 50 years epidemiological, clinical, and applied research demonstrates that engaging in physical activity reduces the risk of coronary heart disease, obesity, type 2 diabetes, and other chronic diseases. Over a similar period public health recommendations for the amount and type of physical activity have been developed to reflect our understanding of the health benefits of exercise. These pronouncements from government agencies (e.g. DoH), professional bodies (e.g. ACSM) and authoritative global organisations (e.g. WHO) have attempted to delineate the quantity and quality of physical activity required to gain the health benefits associated with exercise. Successive refinements to these guidelines have emerged, concomitant with evolving scientific research. During the 1970s-80s vigorous-intensity exercise in the pursuit of cardiorespiratory fitness was advocated. The 1990s witnessed a paradigm shift by exploring the amount of physical activity necessary to produce significant health benefits; with moderate-intensity exercise emerging as sufficient to yield health benefits. Professor Murphy's work has contributed to the evolution of the physical activity guidelines to advocate accumulating short bouts of brisk walking as an effective means of accruing the health benefits of physical activity.

Professor Murphy leads the Centre for Physical Activity and Health Research. Her research has focussed on establishing the optimal type, duration, and intensity of exercise required to elicit health benefits. Results from her research, including randomised controlled trials, systematic literature reviews, and meta-analysis, have directly contributed to changes in public policy surrounding the health benefits of exercise.[1-6] Since 1998 Professor Murphy has contributed to crucial research questions regarding the nature of the relationship between physical activity and health, as well as being at the forefront of international, national and local bodies responsible for the transformation of such research into guidelines for physical activity. Two unifying themes have underpinned this research: type of activity and duration of activity bouts. In terms of the former, walking was identified as an ideal activity because it is accessible to all, requires no skill, has low injury risk, and has been identified as the most popular exercise choice. Since 'lack of time' is habitually cited as a barrier to physical activity, a crucial issue was to investigate whether the established health benefits of a single bout of continuous exercise could be replicated by accumulating shorter bouts of the same intensity of exercise throughout the day.[1,4,5,6] Murphy's work has made a substantial contribution to the evidence base for walking as a cornerstone of physical activity promotion internationally and her seminal work in accumulated bouts of walking[6] has resulted in her being regarded as a leading research authority in this area.

Murphy's research findings on accumulated exercise and the role of brisk walking for health benefit provides evidence that healthy but sedentary individuals undertaking a programme of regular brisk walking will improve a range of cardiovascular disease risk factors.[1,2,4,5,6] Moreover, self-selected

walking speeds have been shown to effectively increase fitness in this population.[3] This research programme has contributed to the evidence base underpinning physical activity guidelines in the UK, Ireland and the USA, in addition to being cited in the Canadian and Australian guidelines.[1,5,6] Specifically, these guidelines now include a recommendation for activity accumulated in bouts of 10 minutes or more and a specific reference to the role of walking at a moderate to vigorous intensity activity and cite Murphy's work as an important part of the evidence base for this recommendation.[1,6] Furthermore, worldwide recognition of her research has precipitated Murphy's invitation onto various national and international scientific and advisory panels responsible for devising public policy documents where the evidence base for walking and/or accumulated exercise is being examined.

3. References to the research

1. **Murphy MH**, Blair SN, Murtagh EM. Accumulated vs Continuous Exercise for health benefit: A review of empirical studies. *Sports Medicine*. 2009;39(2)33-41. (77 citations).
2. **Murphy MH**, Nevill AM, Murtagh EM, Holder RL. The effect of walking on fitness, fatness and resting blood pressure: a meta-analysis of randomised, controlled trials. *Preventive Medicine*. 2007;44:377-85. (141 citations, one of the most cited articles in Preventive Medicine: http://www.journals.elsevier.com/preventive-medicine/most-cited-articles/).
3. Murtagh EM, Boreham CAG, **Murphy MH.** Speed and Exercise Intensity of Recreational Walkers. *Preventive Medicine*. 2002;35:397-400. (78 citations).
4. **Murphy MH,** Nevill AM, Biddle SJH, Neville C, Hardman AE. Accumulating brisk walking for fitness, cardiovascular risk and psychological health. *Medicine and Science in Sports and Exercise*. 2002;34(9)1468-74. (185 citations).
5. **Murphy MH,** Nevill AM, Hardman AE. Different patterns of brisk walking are equally effective in decreasing post-prandial lipaemia. *International Journal of Obesity*. 2000;24(10) 1303-09. (61 citations).
6. **Murphy MH,** Hardman AE. Training effects of short and long bouts of brisk walking in sedentary women. *Medicine and Science in Sports and Exercise*. 1998;30(1)152-57 (228 citations).

Professor Murphy's research has been supported by grants from national and international agencies and research councils including the Northern Ireland Chest, Heart and Stroke Association (£57K, 2012-2013), and the MRC NPRI programme (£4K, 2009-2012).

4. Details of the impact

Globally, ill-health attributable to physical inactivity is economically costly. Physical inactivity has been estimated to cost the National Health Service more than £1.06 billion per year with physical inactivity being responsible for more than 35,000 deaths each year in the UK. In America, direct medical costs associated with physical inactivity were $76.6 billion in 2000. Emerging estimates from European studies suggest that physical inactivity costs €300 per citizen per year. Consequently, many countries advocate the development of national activity guidelines as part of public policy and health services with a view to saving public money by avoiding health care costs and increasing productivity through a healthier population.

The research carried out by Professor Murphy and colleagues at Ulster between 1998 and 2013 has unequivocally contributed to the scientific evidence base underpinning the development of such national activity guidelines (Sources 2, 3, 5 and 6). Individually, Professor Murphy has been directly involved in drafting the physical activity guidelines for the UK and Ireland (Sources 7 and

8); additionally, she is an invited expert on two international advisory panels convened by the World Health Organisation. (Source 1)

The significance of establishing that walking is a suitable physical activity from which to derive health benefits should not be underestimated. Public health policy guidelines are necessarily directed at a considerable portion of the population who may be obese, sedentary, at risk of cardiovascular disease and for whom more strenuous forms of exercise may be unsuitable. Prior to Murphy's 1998 study the research evidence for the health benefits of accumulated bouts of walking was inconclusive. A key finding of this seminal research was to establish that previously sedentary individuals who participate in short bouts of brisk walking improve cardiovascular fitness and several other known risk factors of cardiovascular disease.

The discovery by Murphy and colleagues that accumulated bouts of exercise are as beneficial as one longer continuous bout has had an impact on public policy initiatives by making physical activity more amenable to the population as a whole by allowing it to fit more easily into busy lives.

A concomitant and complementary impact is evident by Murphy's direct involvement in various international, national and local scientific and advisory panels responsible for drafting public policy documents and initiatives:

- Invited member of the scientific advisory group for the Department of Health review of the current UK physical activity guidelines and a member of the small editorial team which produced the 2011 guidelines issued by the 4 Chief Medical Officers (DoH 2011 Start Active Stay Active – Murphy responsible for writing adult guidelines). (Source 7)
- Invited member of the British Association of Sport and Exercise Sciences expert panel which reviewed the scientific evidence and provided a widely cited consensus statement on the health benefits of physical activity (The ABC of Physical Activity)
- The World Health Organisation has invited Murphy onto two different European scientific panels: i) the International Advisory Group responsible for developing a Health Economic Assessment Tool (HEAT) for walking (Source 1) which agreed a tool to be used in assessing the cost effectiveness of the development of walking paths for the European population; ii) the Physical Activity Networking (PHAN) group which was responsible for writing the case studies and reviewing available evidence on the promotion of physical activity in socially disadvantaged groups
- As a direct result of her research Murphy was the only member from NI invited onto the UK Government's Department of Health Obesity Review Group chaired by the Parliamentary Undersecretary for Public Health. The group's role is to advise on policy and practice for tackling obesity in England.
- Invited member of a pressure group of experts responsible for convincing Ireland's Department of Health of the need for a National Physical Activity Plan and subsequently for advising and writing the Physical Activity Guidelines for Ireland (DHC, Get Ireland Active). (Sources 6, 7 and 8)

The research and policy documents contributed to by Professor Murphy and colleagues are frequently cited as impacting on other worldwide initiatives relating to physical activity guidelines for adults in USA, Canada, and Australia.

5. Sources to corroborate the impact

1. http://www.euro.who.int/_data/assets/pdf_file/0003/155631/E96097.pdf and http://www.heatwalkingcycling.org/
   (World Health Organisation acknowledges Murphy's work in developing HEAT for walking)
2. http://circ.ahajournals.org/content/116/9/1081.full.pdf
   (American Heart Association references Murphy's work in updated guidelines 2007)
3. https://www.presidentschallenge.org/informed/digest/docs/200406digest.pdf
   (USA references Murphy's work when updating the previous guidelines for children)
4. http://healthwellventures.com/activity.pdf
   (American College of Sports Medicine references Murphy's work in public policy initiative)
5. http://www.ijbnpa.org/content/7/1/39
   (Reviewers for Canadian physical activity guidelines reference Murphy and colleagues)
6. http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4080994
   (UK Chief Medical Officer's report references Murphy's work)
7. http://www.paha.org.uk/File/Index/858ea512-2e1d-4b77-a3eb-9f1d00fcd0fd
   (Murphy named as author and expert panel member)
   http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3098122/
   http://www.biomedcentral.com/1471-2458/6/136/
   http://www.bhfactive.org.uk/userfiles/Documents/startactivestayactive.pdf
8. http://www.getirelandactive.ie/content/wp-content/uploads/2011/12/Get-Ireland-Active-Guidelines-GIA.pdf
   (Murphy named as author and advisor on developing Irish guidelines)

Individual users/beneficiaries who could be contacted by the REF team to corroborate claims.

1. Chair, British Association of Sport & Exercise Sciences
2. Head of Physical Activity, Department of Health, Health Improvement and Protection Directorate
3. UWA Lead for the UK PA Guidelines, University of Western Australia