**How do we get adults and older adults to do more physical activity and is it worth it?**

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It is widely known that physical activity provides strong physical, psychological and cognitive health benefits, with over 20 different conditions showing prevention and treatment effects[1], including mortality reductions comparable to drug treatments in heart failure and stroke[2]. Economic effects are important with physical inactivity responsible for approximately 13.4 million disability-adjusted life years worldwide. >$100 billion in health care expenditure in the US[3] and £0.9 billion in the UK[1] annually. Yet despite this, around 40% of UK adults report being insufficiently active for health, worse with increasing age and socio-economic deprivation[1]. Objectively measured findings are much worse, only 5% achieve guidelines by accelerometry, compared to 50% by self-report[4].

Currently UK, US and World Health Organisation (WHO) aerobic guidelines all advocate at least 150 minutes weekly of moderate-to-vigorous physical activity (MVPA) in at least 10-minute bouts for adults and older adults[1, 5, 6], though the bout requirement is currently under debate[6] and even small amounts of physical activity provide protective health benefits. Walking is by far the commonest physical activity, a brisk pace (approximately 3 mph, 5km/hr) counts as MVPA and walking is considered a “near-perfect” exercise, with ability to gradually increase frequency and intensity with low risk of harm, whilst encouraging environmental sustainability[7]. Many people count steps and despite inter-individual variability, a cadence of ≥100 steps/minute (3000 steps in 30 minutes) is a consistent heuristic (evidence-based, rounded) associated with MVPA[8] and useful for patient advice in answer to the question “how much, how fast?”

The new WHO Global Action Plan on Physical Activity seeks to reduce physical inactivity by 15% by 2030, by creating active societies, environments, people and systems, with universally applicable policies[5]. Whilst such population approaches are vitally important, health care professionals also have a valuable role in getting their patients more active, with initiatives such as Exercise is Medicine in the US to “prescribe” regular physical activity[9] and drives to promote physical activity in UK primary care[10]. A recent review made the case more broadly that “Movement is Medicine” and that measurement of physical activity status and cardiorespiratory fitness should be vital signs that all health care professionals incorporate into their consultations[11]. The rest of this editorial focuses on how we can best get adults and older adults to do more physical activity, utilising effective behaviour change techniques (BCTs) and new technologies. Learning resources for health care professionals such as Motivate2Move (<https://gpcpd.walesdeanery.org/index.php/welcome-to-motivate-2-move>) also provide useful tools. Additionally, excellent guidance for patients with specific long-term conditions including ischaemic heart disease, heart failure, stroke, hypertension etc are provided at <http://www.benefitfromactivity.org.uk>.

**What role do behaviour change techniques (BCTs) play in effective physical activity interventions?**

Some of the biggest reductions in future health problems can be seen when moving people from inactive to moderately active lifestyles, but physical activity needs to be maintained to achieve sustained health benefits[1]. How do we first get people more active and then get them to stay active?

Self-efficacy (a person’s belief in their ability to succeed) is a key health psychology construct and a strong predictor of both adoption and maintenance of physical activity in adults. Many interventions have therefore focused on increasing self-efficacy[12]. Physical activity interventions typically contain multiple BCTs: whilst many are effective in increasing physical activity levels e.g. social support, goal setting and self-monitoring [13]; ‘graded tasks’ and ‘behaviour practice/rehearsal’ are effective in both increasing and maintaining physical activity levels[14]. Qualitative studies also provide valuable insights into important barriers and facilitators to physical activity adoption[15] and maintenance[16] for adults and older adults.

Another promising approach utilises technology to enhance BCTs, specifically step-counting devices, which encourage self-monitoring. Pedometer-studies have shown positive physical activity effects at 12 months [17], however, until recently, long-term effectiveness data were lacking. The PACE-UP and PACE-Lift primary care trials are novel in demonstrating long-term physical activity effects 3-4 years after a 12-week pedometer-based walking intervention (incorporating the 3000-in-30 message), provided either by post, or as part of practice nurse physical activity consultations[18]. Recent findings confirm that the long-term increases in physical activity achieved sustained health benefits[19]. As technology advances it is becoming easier to integrate different step-monitoring devices into physical activity interventions.

**What about the role of new fitness technologies?**

New fitness technologies, which include tracking devices and smartphone applications to motivate users, provide objective physical activity measures, including but not restricted to step-counts. Recent studies investigating a wide range of tracking devices and smartphone applications revealed moderate-to-strong validity[20, 21], though accuracy can be reduced with different body placement of tracking devices and smartphones and slower walking speeds in older adults and those with chronic diseases[21]. The adoption of such technologies is based on age, socioeconomic factors, such as being in employment, psychological factors, including level of motivation, and availability of time[21]. They have also not highlighted advantages over more standard behavioural interventions for weight loss[22] and this may in part be explained by the importance of incorporating appropriate BCTs within them. This is particularly important for sedentary adults whereby barriers to physical activity need to be identified to then promote individualized daily action plans[21]. Other areas of motivation may lie within healthcare whereby activity-monitor based counselling was shown to be effective in improving health outcomes in those with chronic illnesses, including chronic heart failure[23]. However, only a very small amount of applications include the recommended guidance of 150 minutes weekly, with further difficulties predicting intensity[24]. Therefore, in order to standardize and promote public health initiatives, considerations for those who are most at-risk of physical inactivity need to be addressed.

There have been significant developments in fitness technologies since the advent of pedometers to measure steps as a means of measuring physical activity. Though much of the current evidence on the newer technologies is short-term, they have the capability of incorporating longer-lasting effects, particularly using BCTs. The challenge therefore lies with the continuous collaboration between application developers, health researchers and behaviour change experts to develop evidence-based technology using a multi-faceted approach to encourage physical activity[21]. Nevertheless, these technologies have tremendous potential to impact public health and policies. Also looking to the future, it would be beneficial to better understand the ‘whiches conundrum’[25], that is determining ‘which BCTs delivered through which technology channels, should be employed for which behaviours and for which populations’. All of which should enable us to achieve the public health imperative of getting more people walking more often[7]. And if you are ever asked “is it worth it?” - remember that walking adds both years to life and life to years.

Word count: 1073

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