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Title

'Snacktivity™ ' to increase physical activity: Time to try something different?

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Abstract

Evidence demonstrates that participation in regular physical activity (PA) reduces the risk of morbidity and mortality. However, current PA guidelines are focused on weekly accumulation of 150 minutes of moderate intensity PA as a threshold. Although recent developments of this guidance have discussed the merits of short bouts of physical activity, guidance that sets large behavioural goals for PA has not been successful in supporting the public to become sufficiently physically active and a 'one-size fits all' approach to PA guidelines may not be optimal. A complementary 'whole day' approach to PA promotion (i.e. incorporating PA throughout the day) that could motivate the population to be more physically active, is a concept we have called 'Snacktivity™'. The Snacktivity™ approach promotes small or 'bite' size bouts (e.g. 2-5 minutes) of PA accumulated throughout the whole day. Snacktivity™ is consistent with the small change approach which suggest that behaviour change and habit formation are best achieved through gradual building of task self-efficacy, celebrating small successes. Snacktivity™ also offers opportunities to "piggyback" on to existing behaviours/habits, using them as prompts for Snacktivity™. Moreover, small behaviour changes are easier to initiate and maintain than larger ones. A plethora of evidence supports the hypothesis that Snacktivity may be a more acceptable and effective way to help the public reach, or exceed current PA guidelines. This paper outlines the evidence to support the Snacktivity™ approach and the mechanisms by which it may increase population levels of physical activity. Future research directions for Snacktivity™ are also outlined.

Introduction

Despite unequivocal evidence that physical activity (PA) reduces morbidity and mortality, many adults do not meet the accepted PA guidelines to perform at least 150-minutes of moderate-intensity PA/week[1]. This guidance has historically been promoted as 30 minutes of moderate-to-vigorous intensity physical activity PA (MVPA) on at least five days/week. Furthermore, adults are also advised to undertake PA that improves muscle strength on at least two days per week. However, despite PA guidance having existed for many years, population-levels of PA remain low. Based on accelerometer-measured PA, and with the removal from the guidelines of the necessity to accumulate PA in bouts lasting 10 mins or more, approximately 45-95% of the population are meeting PA guidelines depending on the approach to assement and analysis?;[2–4] however, this still means that approximately half of the population may be inactive. Of particular concern are data suggesting approximately 1-16% of adults participate in strength-based PA each/week [5–7]. Collectively, this suggests a need to consider more innovative, and translational guidance messaging to encourage the population to regularly engage in PA. Guidelines themselves do not change health behaviour, it is having the means and motivation to achieve them that matters.

One of the most critical obstacles to meeting PA guidance is it requires inactive populations to make significant lifestyle changes to achieve at least 150 MVPA minutes/week. Previous PA interventions have only had modest effects on initiation of PA behaviour, and we know very little about successful behavioural maintenance[8]. There is also concern about the amount of time the public spend in sedentary behaviours, with adults spending approximately 60-70% of waking hours sedentary[9]. For inactive adults, high levels of sedentary time have been associated with diease and all-cause mortality[10]. These data are of concern and there is no reason to assume this situation will improve unless effective strategies are put in place to address the problem. It is clear that guidance setting large goals for PA has not been successful in supporting those who are inactive, to become sufficiently physically active and current approaches to PA guidelines may therefore not be optimal. A shift in emphasis in facilitating PA behaviour is required.

Every minute counts: Snacktivity™ to promote physical activity

Updated guidelines from health agencies in 2019/20, has removed the need to complete PA in bouts of 10 mins or more[1,11,12]. Although revised guidance now recognises the importance of making small changes to PA behaviour and that any PA is better than none [1,11,12], guidance still focuses on the public needing to achieve a behavioural goal of at least 150 MVPA minutes/week, which can be a daunting task for inactive populations[1,12]. Additional or complementary strategies are needed to assist the public in becoming more physically active. A complimentary 'whole day' approach to PA promotion that seeks to motivate and support individuals to be more physically active throughout the day, is a concept we refer to as 'Snacktivity™'. Rather than broadly encouraging at least 150 MVPA minutes/week, Snacktivity™ focuses on promoting small (e.g., 2-5 minutes), but frequent, bouts of MVPA throughout each day, to accumulate at least 150 MVPA minutes/week. For example six 'activity snacks' lasting five minutes/daywould be required to meet the PA recommendations. Examples of Snacktivity™ include walk-talk conversations, using stairs rather than the lift/elevator, pacing whilst using the telephone, or squats while brushing teeth (**Error! Reference source not found.**)).

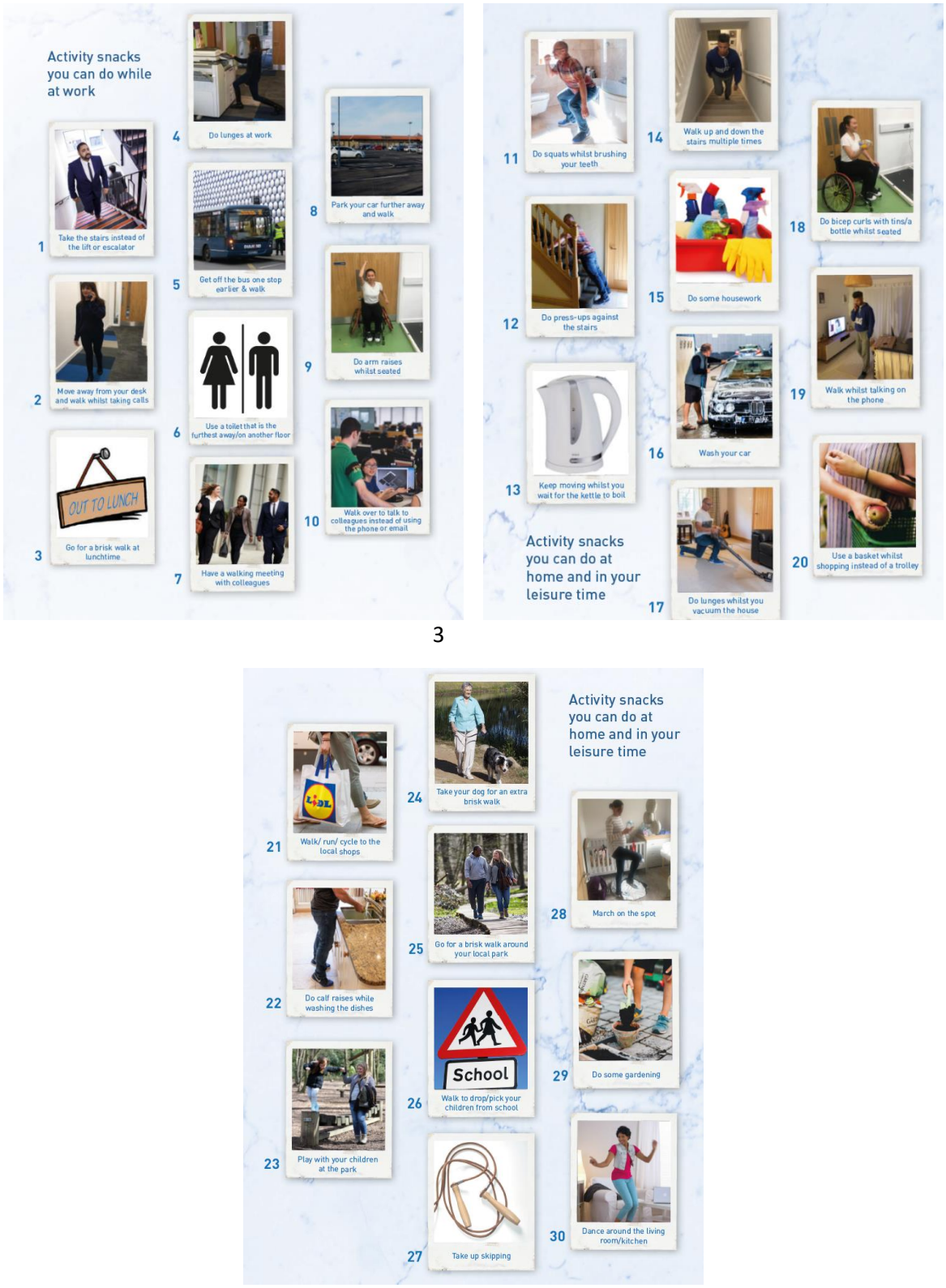

Figure 1 - Snacktivity ideas

What is the evidence that Snacktivity™ can improve health?

Evidence demonstrates an inverse dose-response relationship between PA and all-cause mortality. This means that for inactive people, any increase in PA is beneficial for health[13]. The relationship is also characterised by a steep early slope meaning the greatest gains in health are experienced with inactive people doing a little more activity per week (e.g. 2-3 MET/hrs per/week), rather than by encouraging those who are already physically active to do marginally more[14]. Improved cardio-metabolic health and aerobic fitness have been reported following brief bouts of PA[15,16], this association remained consistent across subjective and device based measures, with studies reporting no difference in cardiovascular fitness improvement between accumulated and continuous bouts of PA of the same total duration[17]. Furthermore, whilst evidence is limited, some research suggests that short bouts of PA can also reduce psychological parameters including stress, depressive symptoms, and improve self-esteem in adults [18,19], with recent data suggesting similar improvements in positive mood state and decrease negative mood state [20]. This suggests that achieving short(er) bouts of Snacktivity™ throughout the day may achieve similar health benefits to long(er) bouts. Moreover, whilst the idea that small bouts of PA may improved health outcomes is not new, as investigated in experimental studies [17,21] it is not a message that has been prominent in public guidance, in part, due to a lack of high quality, "real world" evidence.

How might Snacktivity™ work to improve population health?

A common barrier to PA is a perceived lack of time. For inactive adults, long(er) bouts of MVPA may seem difficult to achieve and it may be that many people believe that achieving 150 MVPA minutes/week requires too much cognitive effort, planning and physical exertion to be worthwhile. In contrast, Snacktivity™ may be perceived as more achievable because each 'snack' requires a small time commitment, and it involves less planning and effort. Snacktivity™ does not require skills, equipment, or a change of clothing, little or no preparation, can be performed in most settings, and easily incorporated into daily life, addressing both convenience and health inequalities[22], and allowing for greater population reach. Simple actions may become more habitual than complex ones. This suggests that the integration of Snacktivity™ into usual routines may be a more feasible and appealing approach to sustaining PA behaviour than trying to achieve larger changes[23]. One way this may be facilitated it through the use of action planning, to plan the when, where, and how to complete an activity snack within the day (e.g in the morning when I am brushing my teeth I will perform squats, or when I collect the children from school I will walk). This will help reduce the cognitive load of Snacktivity™, whilst utilising an effective behaviour change technique. Moreover, small changes are easier to initiate, and maintain, than large changes which is consistent with the small change approach to behaviour change.[24]

How people feel about PA is an important predictor of whether they continue to engage with a a behaviour. Snacktivity™ may help to develop confidence among those who awho are inactive by encouraging them to 'start small'. Psychological theory acknowledges that achieving small changes is important for individuals' task and self-regulatory self-efficacy and habit formation[25]. If individuals complete activity snacks, this should increase their self-efficacy for engagement, making them more likely to continue. Snacktivity™ might then be the gateway for more sustained participation in physical activity. Snacktivity™ may be particularly appropriate

for specific populations, such as the elderly and people with chronic diseases/disabilities, who may find it difficult to engage in PA.

An important component of PA guidance is that adults should undertake muscle-strengthening activity on at least two days/week. It is important that people perform strength-based activities, given its association with the risk of falls, fractures and osteoporosis[12]. Snacktivity™ provides an opportunity to promote this message since many muscle-strengthening activities lend themselves to Snacktivity™ (e.g When I am boiling the kettle, I will perform 20 squats) as they are traditionally shorter, stationery,and do not necessarily need special equipment or clothing.

A further benefit of Snacktivity™ is that it encourages PA while simultaneously breaking up prolonged periods of sedentary behaviour throughout the day. Snacktivity™ may therefore provide two health outcomes in a 'buy one, get one free' scenario, increasing the probability of cost-effectiveness. To support this hypothesis, experimental trials have shown that breaking up sedentary behaviour with periods of MVPA provides favourable changes in individuals' cardio-metabolic risk[26].

Issues to consider in promoting Snacktivity™

While there may be advantages to Snacktivity™, there are also some issues to consider. Snacktivity™ may be disruptive to the day and easily forgotten. It might be difficult for the public to achieve MVPA in 'bite sizes', or difficult to think of ways in which to implement Snacktivity™ into daily life. Indeed, incorporating activity snacks into the home or work life, may require a change in social norms (e.g. making it socially acceptable to leave one's desk to perform an activity snack).

Simply giving people information does not lead to sustained behaviour change. Additional strategies to encourage the public to engage in Snacktivity™ will be required, and a wide range of technologies are now available facilitate this process. Consideration needs to be given to whether an accumulated Snacktivity™ approach means the public to consider PA too many times in a day/week, and whether this then requires too much cognitive energy to enact. Given this, Snacktivity™ may not be flexible enough and/or convenient to the public. Whilst all PA is important for health, greater intensity PA provides more benefit for the same amount of time, particularly for non-communicable diseases[1]. However, Snacktivity™ may encourage participation in predominately light-intensity PA, without progressing towards sufficient MVPA leading to Snacktivity™ having a smaller impact on health. Furthermore, although Snacktivity™ encourages participants to break up sedentary behaviourwith MVPA, this relies on activating two motivational systems, which may limit engagement from the public.

Finally, short bouts might be useful in increasing PA, no randomised controlled trial has directly tested if Snacktivity™ derives the same health benefits as current PA guidelines; we are currently gathering such evidence (https://fundingawards.nihr.ac.uk/award/RP-PG-0618-20008).

Conclusion

Given the lack of success in encouraging inactive populations to achieve large(r) bouts of PA. Snacktivity™ may be a complementary public health message that offers a method of implementing this guidance. It is not suggested that current PA guidance should be abandoned, but current approaches may not be ideal. Snacktivity™ should be achievable by most of the population and therefore addresses health inequalities making it accessible to all of those who might benefit. Snacking is a common behaviour and for the first time, the public could be encouraged to snack as much as they like, just not with unhealthy foods, but with Snacktivity™.

Author contributions

AD developed the original Snacktivity idea and JS conceived the idea for this report. AD and JS wrote the initial draft for this report and SJHB, LS, KG, MS, HMP, NI, TY, NM and Snacktivity Investigators contributed at a later stage.

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Conflicts of interest/Competing interests (include appropriate disclosures)

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Ethical Compliance

No ethical approval was sought as this is a commentary and no data was collected or analysed by the authorship team in the production of this article.

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