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Gamification for Physical Activity Behaviour Change

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Although the health benefits of sport, exercise, and physical activity (PA) are well established, low participation rates in PA continue to be a public health concern.¹ Novel interventions and techniques, such as gamification, are needed in the armoury of options for promoting PA.

Gamification is the term used to describe the application of gaming mechanics and principles to non-game contexts with the aim of increasing motivation and engagement within that situation.² Common attributes of gamification include rewards (e.g. badges, accruing of points, leader boards, progression bars), competition, consumer choice, tutorials, incremental challenges, and narrative.³ Gamification techniques have been applied across a range of disciplines to increase product engagement. Recognisable principles of gamification utilised within everyday non-game contexts include:

- Coffee shop stamp cards to receive a free drink.
- Loyalty schemes where accrual of points leads to a higher level of customer membership unlocking greater benefits.
- Leader boards and attendance charts in schools.
- Targets placed on the lids of public waste bins to reduce littering.

These widespread gamification strategies have similarities to commonly used behaviour change techniques (BCTs) in health promotion including goal setting, providing feedback on performance, reinforcement, comparing progress and social connectivity.⁴

Physical Activity and Behaviour Change

BCTs are the fundamental drivers of change of any health behaviour⁵ and are effective for increasing PA adoption.⁶ NICE⁷ state that self-monitoring, social support, reward incentives, and goal setting should be present in any behaviour change intervention. Evidence suggests that interventions incorporating a multitude of BCTs are more effective in meeting the challenge of long-term, sustainable change than those using few or a single BCT.⁸

The challenge of PA promotion

PA related behaviours are challenging to perform in comparison to other health behaviours⁹ due to socio-ecological factors.¹⁰ Socio-ecological variables that influence PA behaviours include psycho-social (an individual's previous experiences and attitudes towards PA), social environmental (societal norms of whether PA is accepted and supported within a person's social network), physical environmental (such as a reduction in the requirement of manual jobs, access to PA opportunities, and an increased reliance on technology), and policy level (policies within a person's region that support or promote PA access e.g. local active transport policies) factors.

Designing behaviour change interventions that address these complex multi-level determinants, encourage PA adoption in a broad demographic of individuals with a variety of needs, and are effective in leading to sustainable improvement in activity levels is therefore challenging. Such interventions not only need to be age and ability appropriate but also guide an individual through the process of participating in PA, increase motivation to participate whilst 'teaching' skills to self-regulate the behaviour longer term¹¹, be easily accessible and incorporate a suite of BCTs.

With such multifaceted determinants influencing PA adoption promoting the development of core behaviours which support PA engagement is therefore important. A systematic review identified 21 BCTs that produce significantly positive changes in PA behaviours with the techniques of 'teach to use prompts/cues' and 'prompt rewards contingent on effort or progress towards the behaviour' appearing to produce the greatest changes in PA levels.¹² Other studies state that the BCTs of goal setting; action planning; problem solving; goal review; social support;¹³ self-monitoring; giving feedback on outcome of behaviour; setting graded tasks;⁶ prompting; relapse prevention; instruction on how to perform the behaviour; and information on consequences of performing the behaviour¹² are also effective in improving PA adoption.

However, face-to-face, group-based interventions that incorporate such BCTs are generally costly to deliver, time-bound (usually lasting approximately 12 weeks in duration), aimed at specific population groups, are usually accessible only by referral from a healthcare professional, restricted to a set number of attendees, and take

place at a set time and day. As such, the reach and persuasive qualities of technology (Persuasive Technology - PT) are increasingly being explored as a cost-effective means of motivating, and guiding individuals through PA adoption and BC more broadly.¹⁴

Physical Activity and Gamification Apps

Gamified PA apps sometimes referred to as Exergames, include products such as Pokémon Go, Zombies Run and MyFitnessPal. Recent research identified that alongside the principles of gamification, BCTs that are effective for increasing PA are also incorporated into the design of gamified apps.¹⁵ Of the 64 apps included in this research the most commonly identified BCTs were self-monitoring of behaviour evident in 86% of the apps, non-specific reward and non-specific incentive observable in 82% of the apps, social support unspecified was seen in 75% of the apps and 73% had a focus on past success. The combinations of BCTs embedded within these gamified apps were reported as self-monitoring and goal setting with the addition of either a focus on past success or nonspecific rewards and incentives.

While gamification techniques and principles are common place in apps, their ubiquity in non-game and non-technology based contexts highlights their utility and potential for PA promotion. Given that effective PA promotion will be underpinned by a suite of promotional options, future research should explore how behaviour change and gamification can be combined in non-technology based interventions.

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