

POPULATION HEALTH AND DIGITAL HEALTH PROMOTION – COMPONENT 1

BLOGS

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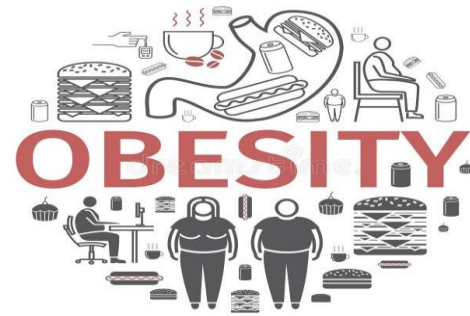
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BLOG 1 (Existing Digital Technology)

A Critical Evaluation of Physical-Activity Tracking Apps in Obesity Prevention

Obesity continues to impose a significant public health burden in England, with 64.5% of adults classified as overweight or obese in 2023–24 (Gov.uk, 2025). This persistent prevalence reflects long-standing challenges related to sedentary lifestyles, dietary patterns and environmental factors. Digital health technologies have increasingly been adopted to address physical inactivity, a major contributor to obesity. Among these, physical-activity tracking applications—such as Google Fit, Samsung Health and

Fitbit—have become integral components of modern self-monitoring and behaviour-change practices. This blog critically examines the effectiveness, limitations and public-health implications of such technologies in obesity prevention.



(WHO, 2023)

Functionality of Physical-Activity Apps

Physical-activity apps typically integrate sensors, accelerometers and optional wearables to capture step counts, time spent sedentary and intensity of movement. These platforms frequently incorporate behaviour-change techniques (BCTs), including self-monitoring, goal setting, tailored feedback and social comparison. The Behaviour Change Technique Taxonomy (BCTTv1) identifies these elements as key mechanisms that support meaningful and sustained behaviour change (Michie et al., 2013). These digital features aim to enhance user motivation, accountability and awareness of daily activity patterns, ultimately supporting the prevention or management of obesity.



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Evidence of Effectiveness

Evidence from contemporary literature underscores the potential of such apps to increase physical activity. A systematic review demonstrated that smartphone and wearable-supported interventions produced statistically significant increases in daily step counts and moderate-to-vigorous physical activity (Brickwood et al., 2019). More recent analyses have confirmed that app-based behavioural interventions remain impactful when coupled with personalised reminders and feedback loops (Hydari et al., 2023). Increased activity of this nature is strongly associated with weight maintenance and reduced obesity risk, aligning with NICE recommendations emphasising the role of regular movement in long-term weight control (NICE, 2020).

Limitations and Challenges

Several limitations constrain the effectiveness of these technologies. Sustained engagement remains a major barrier; many users discontinue app use within weeks, limiting long-term behavioural impact (Simpson & Semple, 2021). Access to digital tools is also uneven, with digital exclusion disproportionately affecting individuals in lower-income and older populations (NHS England, 2022). Furthermore, while increases in physical activity are observable, evidence linking app use directly to sustained weight reduction remains limited, reflecting the multifactorial nature of obesity.

BLOG 2 (Designed Digital Technology)

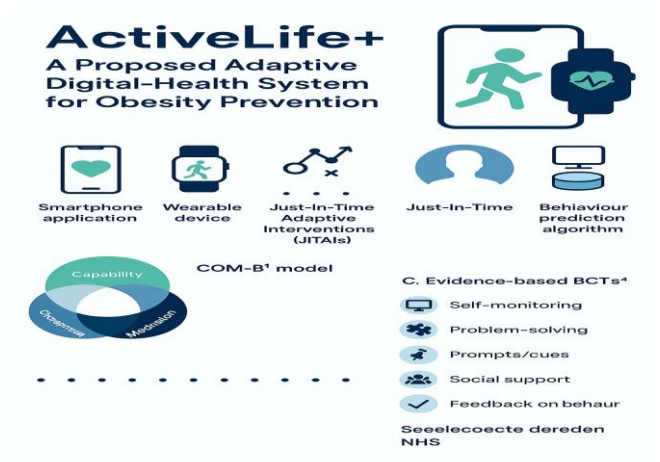
ActiveLife+: A Proposed Adaptive Digital-Health System for Obesity Prevention



Despite the proliferation of physical-activity applications, long-term obesity prevalence remains high, indicating that current digital interventions are insufficient to address the complexity of weight-related behaviours. Obesity results from interrelated behavioural, social and physiological processes, many of which require timely and personalised support. To address these limitations, this blog introduces ActiveLife+, an evidence-informed conceptual digital health system designed to provide adaptive, context-aware support for physical-activity promotion and obesity prevention.

Description of ActiveLife+ Technology

ActiveLife+ consists of a smartphone application integrated with a low-cost wearable device capable of monitoring step count, heart-rate variability (HRV), sleep patterns and prolonged sedentary behaviour. Central to its functionality is a behaviour-prediction algorithm that synthesises physiological and contextual data to identify high-risk sedentary periods. In response, the system deploys Just-In-Time Adaptive Interventions (JITAs)—including short movement prompts, guided breathing exercises or supportive motivational messages—tailored to the user’s historical patterns, emotional state and daily



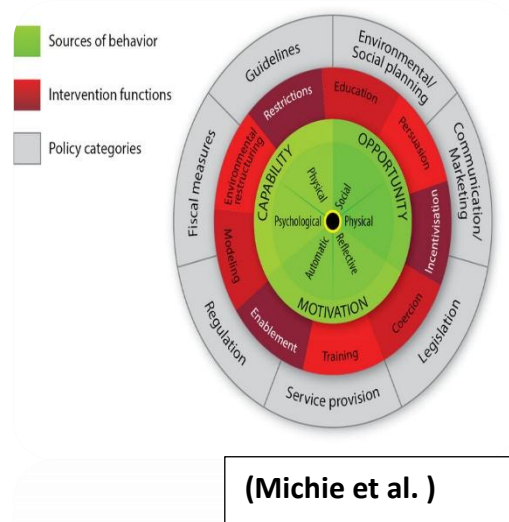
routine. This real-time responsiveness aims to disrupt sedentary habits before they become entrenched.

Theoretical Framework (COM-B and Behaviour Change Techniques)

The theoretical underpinning of ActiveLife+ draws on the **COM-B model**, which conceptualises behaviour as a function of Capability, Opportunity and Motivation (Michie, van Stralen & West, 2011). Within this framework:

- **Capability** is strengthened through micro-lessons and coping strategies.
- **Opportunity** is enhanced via timely movement cues.
- **Motivation** is increased through personalised visual feedback and progress tracking.

The system explicitly incorporates evidence-based BCTs such as self-monitoring, problem-solving, prompts/cues, social support and feedback on behaviour.



Potential Public-Health Advantages

ActiveLife+ offers several potential advantages:

- **Predictive and personalised support** may increase adherence compared with generic reminders.
- **Wearable-derived physiological data** provide granular behaviour insights.
- **Integration with NHS weight-management pathways** could enhance scalability and access.

These elements position ActiveLife+ as a potentially impactful tool for supporting long-term physical-activity habits.

Limitations and Risks

Despite its potential, significant challenges exist. Access to digital wearables may reinforce socioeconomic inequalities (NICE, 2022). Physiological signals are influenced by diverse factors, risking inaccurate prompts. Data privacy concerns are substantial, given the continuous collection of sensitive biometric data. Additionally, empirical validation through

feasibility studies, micro-randomised trials and qualitative research is required to ensure safety, acceptability and effectiveness (Shen, Gao & Shi, 2025).

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