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Intervention

The effects of a brief intervention to promote walking on Theory of Planned Behavior constructs: A cluster randomized controlled trial in general practice

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ABSTRACT

Objective: Perceived behavioral control (PBC) is a consistent predictor of intentions to walk more. A previously successful intervention to promote walking by altering PBC has been adapted for delivery in general practice. This study aimed to evaluate the effect of this intervention on Theory of Planned Behavior (TPB) constructs in this context.
Methods: Cluster randomized controlled trial, with $n = 315$ general practice patients. Practice nurses and Healthcare Assistants delivered a self-regulation intervention or information provision (control). Questionnaires assessed TPB variables at baseline, post-intervention, 6 weeks and 6 months. Walking was measured by pedometer.
Results: The control group reported significantly higher subjective norm at all follow-up time points. There were no significant differences between the two groups in PBC, intention, attitude or walking behavior. TPB variables significantly predicted intentions to walk more, but not objective walking behavior, after accounting for clustering.
Conclusion: The lack of effect of the intervention was probably due to a failure to maintain intervention fidelity, and the unsuitability of the behavior change techniques included in the intervention for the population investigated.
Practice implications: This previously successful intervention was not successful when delivered in this context, calling into question whether practice nurses are best placed to deliver such interventions.
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1. Introduction

Low levels of physical activity are associated with numerous chronic health conditions. The UK government currently recommends that adults aged 19–64 years should aim to be active daily, achieving at least 150 min of moderate intensity activity, or 75 min of vigorous intensity activity, spread across the week to gain protective health benefits [1]. However, only 66% of men and 56% of women aged 19–64 years in England report meeting these new recommendations [2].

Developing effective interventions to increase physical activity is therefore important for population health. Walking is especially promising as a public health intervention because of its acceptability and accessibility, particularly among populations who are the most physically inactive [3]. Furthermore, walking offers considerable health benefits [4]; including reduced body weight, increased fitness [5], and lower cardiovascular and cancer risk [6,7].

Despite this a recent review from the National Institute of Health and Clinical Excellence (NICE) concluded that, although there is considerable randomized controlled trial evidence for the benefits that accrue from walking, there is a shortage of effective interventions that can be offered to patients in general practice [8]. The advantages of the general practice setting are that this is

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where most of the population has regular contact with the healthcare system, and often in circumstances where they are receptive to advice to alter their behavior. The general practice setting therefore provides substantial opportunity for health behavior change [9,10].

For optimum effectiveness, an intervention should have a sound theoretical basis, allowing the appropriate determinants of behavior change to be targeted and effective intervention techniques to be identified [11]. The Theory of Planned Behavior [TPB: 12] has been researched extensively in relation to the prediction of behavior, and the efficacy of the TPB to predict physical activity intentions and behavior has been consistently demonstrated [13,14].

According to the TPB the proximal determinants of behavior are an individual's intention to perform that behavior, and their perceived behavioral control (PBC) i.e. a person's belief that performance of the behavior is within his/her control [12]. Intention is, in turn, hypothesized to be determined by the individual's attitude toward the behavior (evaluation of the outcomes of the behavior), subjective norm (perception of whether significant others believe they should perform the behavior), and PBC. Ajzen [15] has described how PBC is similar, if not identical, to the concept of self-efficacy within Social Cognitive Theory [16]. Self-efficacy is defined as 'the belief in one's capabilities to organize the courses of action required to produce given attainments' [17, page 3]. Self-efficacy is one of the most consistent predictors of both the adoption, and maintenance, of physical activity [18].

However, the efficacy of the TPB is less clear when research focuses on walking, rather than general physical activity. Whilst TPB *variables* have been consistently good predictors of walking intentions, with PBC a consistently strong predictor of intentions to walk more [19–21], two studies have indicated that TPB *variables* do not predict objectively measured walking [22,23].

There are several possible reasons why TPB *variables have* been less predictive of walking behavior. First, studies of walking have employed objective measures of behavior, yet previous research has demonstrated that more variance is accounted for in self-reported than objective behavior [24,25]. Second, Scott et al. [22] employed a military sample in their study, which all substantially exceeded the recommended amount of physical activity for good health. Given this, the results are unlikely to generalize to general public samples that are more sedentary. Third, Hardeman and colleagues [23] used a physiological measure of physical activity i.e. energy expenditure instead of a behavioral measure of walking, which might have influenced the ability of the study to provide a fair test of the association between TPB variables and walking behavior.

Nevertheless a brief intervention to promote walking, based on an "extended" TPB incorporating post-intentional volitional processes, did demonstrate the efficacy of the TPB in explaining objectively measured walking behavior [26,27]. Specifically, changes in PBC mediated the effects of a behavior change intervention on large increases in objectively measured walking behavior in healthy adult volunteers. Both tests of the intervention support the proposition that TPB variables do indeed predict objectively measured walking behavior, in contrast to previous research in this area [22,23].

However, this walking intervention was delivered by a researcher, and was delivered to healthy adult volunteers in both studies. Given the present lack of effective interventions to promote walking available within primary care [8], it was considered important to evaluate whether this intervention can also be delivered successfully within this setting by health professionals. A recent cluster randomized controlled trial of a revised version of the same walking intervention in general practice found no significant differences in objectively measured walking behavior between patients who received the adapted walking intervention and those who received a control intervention [28].

The first aim of this study, therefore, is to examine why the walking intervention, which has been proven to be effective in previous studies [26,27], was unsuccessful in changing objectively measured walking behavior in this population in this setting. It is possible there was no change in the hypothesized mediators of objectively measured walking behavior i.e. TPB [12] variables, resulting in a lack of change in behavior. Alternatively, it is possible that there were changes in the proposed mediators, as expected, but no change in behavior.

Additionally, the present study aims to investigate the role of TPB *variables* in predicting intention and objective walking behavior in a sedentary general practice population.

2. Methods

2.1. Design

Data for this study were derived from a two-arm cluster randomized controlled trial (RCT) of a brief intervention to promote walking within general practice [28,29]. Data on the main outcomes of the trial i.e. walking behavior and economic analysis are reported elsewhere [28]. Practices were randomized to intervention or control, stratified by median practice size over four Primary Care Trusts, and index of deprivation scores [30].

2.2. Participants

Twenty-one general practices in a geographically and socially diverse sub-region of central England were recruited (Fig. 1). Patients were identified from GP practices registers in which the study was based, and a random sample was invited. Patients were eligible for inclusion in the study if they were (a) aged between 16 and 65 years, (b) had one or more chronic conditions for which increasing physical activity would have a positive effect on health status, and (c) were sedentary, in terms of not meeting governmental physical activity guidelines. Further information is provided in the published study protocol [29].

2.3. Procedure

Patients received one of two interventions: (a) self-regulation walking intervention, or (b) information provision plus pedometer intervention. Patients completed a Theory of Planned Behavior questionnaire at baseline ($t1$), immediately after receiving their allocated intervention ($t2$), at six weeks ($t3$), and at six months post-intervention ($t4$). All patients wore a pedometer for 7 days at each measurement point.

Patients in both arms of the study received an information pack containing two leaflets promoting walking, with a specific focus on the benefits of walking [31,32].

2.3.1. Self-regulation Intervention

Patients in the "self-regulation intervention" arm received a theory-based self-regulation intervention delivered by their own practice nurse or HCA. The intervention consisted of two face-to-face sessions of up to 30 min in duration, with a 20 min follow-up session.

To ensure acceptability within general practice the original walking intervention was adapted [26] based on feedback from practice nurses and patients [29]. Intervention content was adapted based on a systematic review with meta-analysis that examined which behavior change techniques (BCTs) were associated with improvements in self-efficacy for lifestyle physical

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