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Readiness to use physical activity as a smoking cessation aid: A multiple behaviour change application of the Transtheoretical Model among quitters attending Stop Smoking Clinics

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## Abstract

**Objective:** Physical activity (PA) reduces cigarette cravings during smoking abstinence.

However, little is known about quitters' use of PA. This study aimed to: (1) determine the extent of quitters' past and current use of PA as a cessation aid, while attempting to quit; (2) examine the relationship between use of PA and quitter characteristics and cognitions, within the Transtheoretical Model framework. **Methods:** Self-report surveys were completed by 181 smokers attending Stop Smoking Services in England and Scotland. **Results:** Twenty-two percent of quitters reported currently using PA to control their smoking, and 35% had used it during a previous quit attempt. Those in a more advanced stage of readiness for using PA as a cessation aid, held more positive beliefs regarding self-efficacy and outcome efficacy.

**Conclusion:** Quitters were more likely to use PA to help them quit when they had greater belief in their own ability to use PA and in the efficacy of PA to help them to quit, and were also meeting weekly PA targets for health. **Practice implications:** Strategies by stop smoking advisors that aim to enhance client self-efficacy and outcome efficacy beliefs regarding PA as a cessation aid may help to increase the use of this behavioural strategy, since it seems that most quitters do not use PA.

Key words: exercise, beliefs, self-efficacy, outcome efficacy, outcome expectancy, stage of change, motivation

## 1. Introduction

Physical activity (PA) can reduce cigarette cravings and withdrawal symptoms and may be a useful aid to smoking cessation aid [1,2]. However, little is known about the extent to which smokers attempting to quit (i.e. ‘quitters’) use PA as an aid; nor have associated cognitions about PA been investigated. The Transtheoretical Model (TM) [3] has been widely used as a framework for explaining both smoking and PA behaviours [4,5]. However, using this model, no study has investigated the readiness of smokers who are attempting to quit to increase PA specifically as a cessation aid. It might be expected that those in the pre-contemplation, contemplation and preparation stages (to use PA as an aid) would have weaker self-efficacy and outcome efficacy. The present study assessed the extent to which smokers use PA as an aid to quitting and investigated the relationship between quitter characteristics and cognitions within the TM.

## 2. Methods

### 2.1 Participants, Design and Procedure

The study received national research ethics approval. National Health Service (NHS) Smoking Cessation Services (SCS) throughout England and Scotland were used to recruit 181 quitters. Respondents completed a single anonymous survey, which was distributed and collected by the SCS.

### 2.2 Measures

#### 2.2.1 Physical activity as a cessation aid.

The question for assessing readiness for using PA as a cessation aid was adapted from the contemplation ladder [6]: “Please circle the letter next to the statement which is closest to your current use of exercise (that is, spending at least 10 minutes continuously engaging in moderate intensity activities, e.g., a brisk walk) as a strategy to help you quit smoking:

I do not exercise as a way of controlling my cigarette smoking and I don’t intend to start  
(A);

I do not exercise as a way of controlling my cigarette smoking but I'm thinking about starting (B);

I exercise once in-a-while as a way of controlling my cigarette smoking, but not regularly (C);

I exercise regularly as a way of controlling my cigarette smoking, but started only in the past six months (D);

I exercise regularly as a way of controlling my cigarette smoking and have been doing so for longer than 6 months (E).”

### 2.2.2 Beliefs about the use of physical activity in smoking cessation.

Scales were adapted to assess self-efficacy and outcome efficacy (expectancy) for PA in the smoking cessation context. Outcome efficacy was measured both in terms of the perceived acute effect of PA on eight items concerned with withdrawal symptoms (e.g. desire for a cigarette, irritability) [7,8], and perceived chronic effect of PA on 11 items associated with *regular* PA (e.g. weight management, muscle tone) and quitting smoking (e.g. ability to cope with stress, success at quitting). The latter measures were based on those used by Faulkner and colleagues [9]. Both *acute* and *chronic outcome efficacy* were measured using a 7-point scale (-3 ‘perceived large negative effect’ to +3 ‘perceived large positive effect’). Items were subjected to confirmatory factor analysis (details available from corresponding author). The *acute* and *chronic measures had* excellent internal consistency ( $\alpha=0.94$  and  $0.95$ , respectively).

*Barrier self-efficacy*, in terms of a quitter’s confidence in their ability to do PA (e.g. brisk walk) in 14 situations where they might usually smoke (e.g. after eating, when bored), was assessed (1=not at all confident to 7=definitely confident), with excellent internal consistency ( $\alpha=0.93$ ). More *general PA self-efficacy* (not as a cessation aid) was measured using a 3-item 1-7 scale (definitely not – definitely confident)( $\alpha=0.87$ ). A single-item (1-7 scale) assessed the importance of becoming more active. Items for each scale were subjected to confirmatory

factor analysis (details available from corresponding author). The importance of doing more PA was assessed with a 7-point scale from ‘not at all important’ to ‘very important.’

### 2.2.3 Demographics and background characteristics.

The demographic variables of age, gender and ethnicity occupation, self-reported height and weight, self-rated health, smoking history, and use of PA and amount of weight gained during the last cessation attempt were assessed. Current PA levels (for moderate and vigorous activity) were self-reported using the 7-day physical activity recall (7-PAR) [10].

### 2.3 Data analysis

Data was analysed using SPSS (v.13). The association between background and TM variables, and stage of readiness (with Action and Maintenance stages combined due to few participants in each) was examined using ANOVA with Bonferroni-corrected post-hoc tests. Logistic regression was then used to examine the relative effects of predictors on ‘actively’ versus ‘not actively’ (pre-contemplation, contemplation and preparation stages) currently using PA to aid cessation. The first model included only background variables, the second only self-efficacy (SE) and outcome efficacy (OE) variables, and the third included SE and OE variables while controlling for selected background variables.

## 3. Results

### 3.1 Sample characteristics

Of the 83% (151) reporting that they had previously attempted to quit, 35% (53) reported having used PA to help them, with 22% using it during the current quit attempt (see Table 1). Those having made a previous quit attempt reported gaining an average of 7.0kg (SD=7.8) during their last attempt. Mean scores for self-efficacy and outcome efficacy indicate that quitters were only slightly confident in their own ability to be physically active to aid cessation and more generally, and, in general, they perceived PA as neither beneficial nor detrimental as a cessation aid. The range of scores, variance and indices for skewness and

kurtosis for the respective measures indicated that the scales have acceptable psychometric properties.

Insert table 1 here

### 3.2 Differences by stage of change

ANOVAs revealed that self-rated health and all TM cognitive variables differed significantly according to stage of readiness (see Table 2). Multivariate logistic regression showed that being in the active stage of readiness for using PA as an aid to smoking cessation was independently associated only with level of PA and higher general PA self-efficacy (see Table 3).

Insert Tables 2 and 3 here

## 4. Discussion and conclusion

### 4.1 Discussion

This study is the first to investigate quitters' use of, and beliefs concerning, PA as an aid to smoking cessation. About one third of quitters reported using PA as an aid, thereby supporting previous findings that 'simultaneous' behaviour change is acceptable and effective [11]. The present study demonstrates the applicability of the TM to this context; revealing that those using PA to self-regulate their smoking held more favourable beliefs concerning PA as a smoking cessation aid (general health and acute outcome efficacy or expectancy)(as supported by others [12]) and their ability to use PA (self-efficacy). The TM has been shown to be useful for explaining PA (e.g. [13]) and smoking cessation (e.g. [14]), but this is the first study to examine the TM for using one behaviour to change another. Future research should focus on enhancing specific cognitions as potential mediators of actual increases in PA to aid smoking cessation. The present research suggests that the focus should be on increasing confidence regarding PA, and particularly among those who are less active. This study is limited in that data is from a cross-sectional self-report survey. Prospective studies,



incorporating objective measures of PA (e.g. accelerometers), are needed to further explore cognitions when quitters use PA as an aid to smoking cessation.

#### 4.2 Practical implications

Our findings suggest that when promoting PA as a smoking cessation aid, attempts should be made to not only increase quitters' overall PA levels, but also their use of PA to help control urges to smoke and their positive beliefs surrounding the potential for PA to help them to quit. Specifically, PA promotion strategies that aim to increase quitters' self-efficacy and outcome efficacy beliefs regarding PA as a cessation aid may be more likely to be successful.

#### 4.3 Conclusion

Despite smoking cessation practitioners often being advised to avoid promoting PA within their clinics [15], many quitters attending such clinics reported that they made use of PA as a means of controlling their smoking behaviour and have used it as a cessation aid in the past. Quitters were more likely to use PA to help them quit when they had greater belief in their own ability to both be physically active in general and also to use PA in situations where they would normally smoke and had greater belief in the efficacy of PA to help them to quit.

Note:

Surveys are available from the corresponding author.

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Health Department; Welsh Assembly Government.



**SCHOOL OF SPORT AND HEALTH SCIENCES**

**15<sup>th</sup> June, 2009**

**Patient Education & Counselling**

Dear Editor,

Pleased find enclosed our revised manuscript to be considered for Patient Education & Counselling, and apologies for the delay in resubmitting.

We appreciate the positive feedback received on the first version and have responded in two main ways:

1. We have shortened the manuscript to meet the criteria for a short communication;
2. We have conducted additional multivariate analyses (binary logistic multiple regression) (see new Table 3).

In addition, we have slightly revised the title to better reflect the contribution the paper makes.

All the authors have been personally and actively involved in the revisions. We look forward to receiving further feedback and hope that the manuscript will be suitable for publication.

Best wishes,

Prof Adrian Taylor

(Professor of Exercise & Health Psychology)

Table 1: Sample characteristics for smokers (N=181).

	Mean (SD)	Percentage (n)
Age (years)	43.6 (13.4)	
Gender		
Male		35% (62)
Female		65% (115)
Ethnicity		
White		93% (164)
Black		5% (8)
Other		3% (5)
Occupation		
Professional		15% (24)
Clerical & management		30% (47)
Technical/craft occupation		5% (7)
Semi-routine		13% (20)
Routine manual/service		9% (14)
Out of work (unemployed/retired)		26% (40)
Student		2% (3)
Voluntary worker		1% (1)
Body Mass Index	26.2 (5.8)	
Self-rated health (1=poor - 5=excellent)	2.7 (0.9)	
Cigarettes per day (before this quit attempt)	21.2 (12.6)	
Times quit in last year	1.8 (3.0)	
Previously attempted to quit (% yes)		84% (151)
Gained weight after last quit attempt (% yes)		58% (88) <sup>a</sup>
Weight gained after last quit attempt (kg)	7.0 (7.8)	
Used PA as aid in last quit attempt (% yes)		35% (53) <sup>a</sup>
Quitting self-efficacy (this attempt)(1-7)	5.4 (1.6)	
Weekly vigorous PA (mins) <sup>b</sup>	40.5 (92.5)	
Weekly moderate PA (mins) <sup>b</sup>	157.7 (254.7)	
Perceived importance of increasing PA (1-7)	4.9 (2.0)	
Stage of change for using PA as an aid	2.3 (1.2)	
Precontemplation		29% (49)
Contemplation		38% (64)
Preparation		11% (18)
Action		15% (25)
Maintenance		7% (12)
Self-efficacy (1-7)	4.0 (1.5)	
Barrier PA self-efficacy (1-7)	4.6 (1.7)	
Acute outcome efficacy (-3 to +3)	1.3 (1.1)	
Chronic outcome efficacy (-3 to +3)	0.9 (1.3)	

<sup>a</sup> Percent of n=151 who had made a previous quit attempt.

<sup>b</sup> Derived using 7-day recall of physical activity [14]

Table 2 Mean (SDs) item score for variables by stage of readiness to use of PA as a cessation aid

	PC	C	P	A + M	F (3,160) <sup>a</sup>	Group differences (Bonferroni corrected)
n & %	49 (29%)	64 (38%)	18 (11%)	37 (22%)		
Barrier self-efficacy (1-7)(14 items)						
Average scores	3.3 (1.6)	3.9 (1.1)	4.1 (1.3)	5.0 (1.3)	10.87***	PC**, C*** < A & M
t-scores	45.4 (1.7)	50.1 (1.0)	50.2 (2.0)	56.6 (1.5)		
PA self-efficacy (1-7)(3 items)						
Average scores	3.8 (1.9)	4.6 (1.3)	4.9 (1.5)	5.8 (1.3)	12.16***	PC < C***, P*, A+M***; C** < A+M
t-scores	44.8 (1.7)	49.6 (1.0)	51.8 (2.1)	56.8 (1.3)		
Chronic outcome efficacy (-3 to +3)						
Average scores	0.9 (1.1)	1.6 (0.7)	1.2 (1.3)	1.7 (1.2)	6.62***	PC**, C*** < A & M
t-scores	45.5 (1.4)	52.1 (0.8)	48.5 (3.0)	53.6 (1.8)		
Acute outcome efficacy (-3 to +3)						
Average scores	0.5 (1.2)	1.0 (1.1)	0.5 (1.7)	1.6 (1.3)	5.75**	PC**, P* < A+M
t-scores	46.4 (1.4)	50.5 (1.1)	47.0 (3.1)	55.0 (1.7)		
Client PA importance (1-7)	3.9 (2.4)	4.9 (1.8)	5.3 (1.4)	6.0 (1.5)	9.09***	PC < C*, P*, A+M***; C* < A+M
Self-rated health (1-5)	2.5 (0.8)	2.6 (0.9)	2.6 (0.7)	3.0 (0.8)	3.16*	PC < A+M*
Mins of vig intensity PA in past week	28.9 (87.0)	34.0 (99.6)	25.6 (55.1)	74.3 (103.6)	2.07	
Mins of mod intensity PA in past week	159.3 (308.2)	161.7 (252.9)	110.3 (206.3)	186.0 (226.2)	0.31	

## Notes:

a Degrees of freedom ranged from 3,158 to 3,163 depending on participants in analysis.

PC, Pre-contemplation; C, Contemplation; P, Preparation; A & M, Action & Maintenance.

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Table 3 Crude and adjusted<sup>a</sup> odds ratio (OR) and 95% confidence intervals (CI) for binary logistic regression analyses

	Crude OR	95% CI		
<i>Model 1</i>				
Age	1.01	0.98-1.05		
Gender	0.45	0.16-1.23		
BMI	0.93	0.82-1.05		
Self-rated health (low v high)	0.63	0.23-1.71		
Meets weekly PA target <sup>a</sup> or not	0.25 **	0.10-0.62		
Cigarettes smoked prior to quit	1.02	0.97-1.07		
			<i>Model 3</i>	
<i>Model 2</i>			Adjusted OR <sup>b</sup>	Adjusted 95% CI
PA Self-efficacy	1.04 *	1.01-1.07	1.05 *	1.00-1.11
Barrier PA self-efficacy	1.14 *	1.00-1.29	1.03	0.87-1.23
Chronic outcome efficacy	0.99	0.93-1.04	0.96	0.89-1.04
Acute outcome efficacy	1.04	0.98-1.11	1.07	0.99-1.17

Notes:

<sup>a</sup> Achieving national target of 30 minutes of moderate intensity physical activity on at least 5 days a week

<sup>b</sup> Adjusted for age, gender, BMI, self-rated health, meeting PA weekly targets, cigarettes smoked prior to quitting

\* P<.05, \*\* P<.01