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Application of the Transtheoretical model to physical activity in older adults with Type 2 diabetes and/or cardiovascular disease

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ABSTRACT

Objective: Investigate the relationship between physical activity and components of the Transtheoretical model (TTM), in an older clinical population.
Method: 85 people with Type 2 diabetes and/or cardiovascular disease (age 64.8 ± 8.2 yrs) completed TTM questionnaires. Physical activity was assessed using the 7-day recall questionnaire.
Results: Differences across stage of change were found for physical activity, self-efficacy, the pros of more physical active and 5 processes of change. Physical activity, self-efficacy and the pros of more activity were greater in the maintenance than contemplation stage. Stage differences in processes were: consciousness raising (increased contemplation to action), self-liberation (increased contemplation to maintenance), helping relationships (increased preparation to maintenance), counter conditioning (increased contemplation to preparation, action and maintenance) and reinforcement management (increased contemplation and preparation to maintenance). Experiential processes were used more than behavioural processes in the preparation stage.
Conclusions: Findings support the theoretical predictions of the TTM and the use of this model in older clinical populations.

Physical activity can greatly benefit people with cardiovascular disease and/or Type 2 diabetes by improving cardiovascular disease risk factors (Kirk, Mutrie, MacIntyre, & Fisher, 2004; Taylor et al., 2004) and quality of life (Kirk et al., 2001; Newton, Mutrie, & McArthur, 1991). Physical activity interventions for people with cardiovascular disease (Hughes, Mutrie, & MacIntyre, 2007) and Type 2 diabetes (Jackson, Asimakopoulou, & Scammell, 2007; Kim, Hwang, & Yoo, 2004; Kirk et al., 2004) have frequently been based on the Transtheoretical model (TTM). The model proposes that exercise behaviour change is a dynamic process, in which individuals progress or relapse between 5 main stages (Prochaska & Marcus, 1993). The stages are: (1) precontemplation – not physically active or intending to be within the next 6 months; (2) contemplation – not physically active but considering becoming active within the next 6 months; (3) preparation – doing some physical activity but not enough to meet current physical activity guidelines (Haskell et al., 2007); (4) action – regularly physically active but for less than 6 months; (5) maintenance – regularly physically active and for more than 6 months. The behaviour change mediators of the TTM explain why people change their behaviour. Self-efficacy is an individuals confidence in their ability to change. Decisional balance is the weighing up of the pros and cons of the new behaviour. The 10 processes of change, 5 behavioural processes and 5 experiential processes, are the strategies and techniques that individuals employ in order to make a behaviour change (Table 1).

While this model has been well validated in young and middle aged populations (Berry, Naylor, & Wharf-Higgins, 2005; Fahrenwald & Walker, 2003; Kim, 2007), limited research has been conducted on its application to older clinical populations with diabetes or cardiovascular disease, including the application of self-report questionnaires used to assess each construct of the model. The aim of this study was to investigate the relationship between self-reported physical activity and each component of the TTM (stage and processes of change, self-efficacy and decisional balance) in a group of people with diabetes or cardiovascular disease.

Method

Participants and procedure

Eighty five (45M, 40F, mean age 64.8 ± 8.2 yrs) people with Type 2 diabetes ($n = 35$, diabetes duration 10.6 ± 13 yrs) or cardiovascular disease ($n = 28$, duration of CVD 8.2 ± 9.1 yrs) or both ($n = 22$)

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Table 1
The processes of behaviour change and their definitions in relation to physical activity.

Experiential processes	
Consciousness raising	Finding information on the benefits of physical activity and the current recommendations for physical activity
Dramatic relief	Concern for the risks of being physically inactive
Environmental reevaluation	Realising social and environmental benefits that physical activity has
Self-reevaluation	Assessing physical activity status and the values related to physical activity
Social liberation	Awareness, availability and acceptance by the individual of physical activity in the society
Behavioural processes	
Counter conditioning	Substituting inactive options for active options
Helping relationships	Seeking out social support to increase and maintain physical activity
Reinforcement management	Providing rewards for being more active to encourage the uptake and maintenance of physical activity
Self-liberation	Setting goals and making commitments for physical activity
Stimulus control	Controlling factors that have a negative effect on physical activity to prevent relapse and using stimuli to increase physical activity level

were recruited from medical clinics, the surrounding community or specialist exercise programmes and gave informed consent. Exclusion criteria were inability to read and understand English. The Tayside Medical Research committee provided ethical approval.

Participants completed validated questionnaires to assess the constructs of the TTM. Stage of exercise behaviour change was measured using the stage of exercise behaviour change scale (Marcus, Selby, Niaura, & Rossi, 1992). Participants read descriptions of the physical activity recommendations for health and cardiorespiratory fitness (Haskell et al., 2007) then placed themselves in one of the five stages. This study used the algorithm development by Marcus, Selby, et al. (1992) to categorise stage of exercise behaviour change. Despite being criticised for having limitations in staging people in precontemplation and preparations stages it is the most widely used algorithm in the physical activity field and therefore warrants investigation. Self-efficacy was measured with the exercise self-efficacy scale (Marcus, Selby, et al., 1992) which measures an individual's confidence to participate in physical activity during certain circumstances, such as when it is raining. A 5-point Likert scale was used; 1 being not at all confident and 5 being very confident. An additional question was added assessing their confidence in meeting the physical activity guidelines for health (Haskell et al., 2007). Decisional balance was measured using the decisional balance scale (Marcus & Owen, 1992). Participants rated the extent to which they agreed with 6 statements assessing the pros and cons of physical activity. A 5-point Likert scale was used with 1 being not at all important and 5 being very important. The frequency of using the processes of behaviour change was assessed using the processes of change questionnaire (Marcus, Rossi, Selby, Niaura, & Abrams, 1992), consisting of 40 questions, 4 for each process. Each process was scored separately, with a total for each process. Questions were answered using a 5-point Likert scale; 1 being never and 5 being repeatedly for use of the process over the past month. All participants completed the seven day physical activity recall questionnaire (Sallis, Haskell, & Wood, 1985) by interview with a trained research assistant. Physical activity of at least moderate intensity was combined and analysed as total weekly physical activity in minutes.

Data analysis

Data was analysed using SPSS version 15. Since data formed a normal distribution parametric analysis was used. Analyses of variance was conducted to determine differences across stage for each construct. Significance was set at $p < 0.05$.

Results

Table 2 shows participant stage distribution. Differences in measures across stage are shown in Tables 3 and 4 and Fig. 1. Total physical activity increased from contemplation to action and decreased from action to maintenance. The only significant difference identified was from contemplation to maintenance ($p = 0.02$). Self-efficacy and pros on decisional balance increased with increasing stage. The only significant difference recorded on both was from contemplation to maintenance ($p < .005$). The following stage differences were identified in process use: consciousness raising increased from contemplation to action ($p = 0.04$), self-liberation increased from contemplation to maintenance ($p = 0.04$), helping relationships increased from preparation to maintenance ($p = 0.04$), counter conditioning increased from contemplation to preparation, action and maintenance ($p < 0.05$) and reinforcement management increased from contemplation and preparation to maintenance ($p < 0.05$). There was more use of experiential, compared to behavioural processes in the preparation stage ($p = 0.006$), but not contemplation ($p = 0.3$), action ($p = 0.4$) or maintenance ($p = 0.7$) stages.

Discussion

To our knowledge this is the first study examining the relationship between stage of exercise behaviour change and all the TTM components specifically in people with Type 2 diabetes and/or cardiovascular disease. This study supports the theoretical predictions of the TTM when related to physical activity. Other studies provide validity for the TTM to predict exercise behaviour in healthy adults. Fahrenwald and Walker (2003) found that physical activity participation, the uses of the processes of change and self-efficacy increased with increasing stage in women with a mean age of 24.33 ± 5.9 yrs. A study in Korea of 1335 adults found significant correlations between the constructs and stage of exercise behaviour change (Kim, Cardinal, & Lee, 2006). Our results show that as people progress to higher stages of behaviour change they report

Table 2
Number of participants in each stage of exercise behaviour change.

Stage of change	Number of participants ($n = 85$)
Precontemplation	0
Contemplation	12
Preparation	46
Action	2
Maintenance	25