

Review Article

Physical activity consultation for people with Type 2 diabetes. Evidence and guidelines

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Accepted 12 February 2007

Abstract

Physical activity is an important, but often underused, therapeutic strategy within diabetes care. To date, little is known about the best way to promote physical activity in diabetes care. Physical activity consultation is an intervention designed to promote physical activity behaviour change. This article provides guidelines on how to conduct a physical activity consultation with people who have Type 2 diabetes, and reviews the evidence surrounding the effectiveness of this intervention in this population. The trans-theoretical model is the underlying theory of behaviour change for the physical activity consultation intervention. The review identifies research which supports the use of this model for understanding physical activity behaviour in people with Type 2 diabetes. The review outlines a number of modifiable variables associated with physical activity behaviour change in this population. How each of these variables is addressed within the guidelines for conducting a physical activity consultation is identified. Finally, limited but consistent research highlights the effectiveness of physical activity consultation for promoting physical activity in people with Type 2 diabetes.

Diabet. Med. 24, 809–816 (2007)

Keywords interventions, physical activity, review, Type 2 diabetes

Introduction

People with Type 2 diabetes who become regularly physically active can potentially gain several improvements in health, including better glycaemic control, fewer diabetes complications and a better quality of life [1]. A more active population of people with Type 2 diabetes could substantially reduce health-care burden and expenditure. Given the current epidemic nature of Type 2 diabetes, and the extensive benefits of physical activity for the management of Type 2 diabetes, physical activity should be a major therapeutic strategy for the diabetes care team. Promotion of physical activity in Type 2 diabetes management is generally inadequate. The majority of people with Type 2 diabetes are inactive and attempts to become more active are often met with failure [2–4].

Two multicentre randomized controlled trials [5,6] have demonstrated the strong protective effects from developing Type 2 diabetes of increased physical activity combined with diet for people at risk of Type 2 diabetes. This has led to a growing interest in the use of physical activity for the preven-

tion and management of Type 2 diabetes. The question of the best way to promote physical activity in this population remains unanswered. The majority of early studies investigating the effects of physical activity on Type 2 diabetes have incorporated structured exercise programmes. These programmes are expensive and time-consuming [7]. Furthermore, they often target a highly motivated, selected group of people and experience high drop-out rates [8]. Physical activity consultation is an intervention designed to promote and maintain physical activity behaviour change. This intervention has recently been adapted for use in diabetes populations and evidence for the effectiveness of this intervention is now accumulating.

The purpose of this article is to provide guidelines on how to conduct a physical activity consultation and to review the evidence surrounding the effectiveness of this intervention within current diabetes care.

Methods

Search strategy

A literature review of articles published from 1960 to 2006 was conducted. Searches were conducted using PubMed, Web

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Table 1 Trans-theoretical model of exercise behaviour change [40]

Stage	Definition	Appropriate strategy
Pre-contemplation	Inactive and do not intend to become active in next 6 months	Information/advice on risks of inactivity, benefits of activity
Contemplation	Inactive, but thinking about becoming active in next 6 months	Decision balance (weigh up pros and cons of becoming active). Discuss and overcome barriers
Preparation	Made some attempts to become more active	Develop realistic activity goals. Establish support
Action	Active, but only began in last 6 months	Reinforce successful attempts. Re-emphasize experienced benefits, overcome experience barriers
Maintenance	Active for longer than 6 months	Relapse prevention. Alternative activities

of Science and MEDLINE. Keywords and phrases were: physical activity, exercise, Type 2 diabetes, interventions, physical activity promotion, behaviour change, trans-theoretical model of behaviour change and stage of behaviour change. Searches were also carried out on key authors (Dr Tudor-Locke, Professor Mutrie, Professor Biddle) and appropriate websites (Diabetes UK, American Diabetes Association, American College of Sports Medicine). As a result of the limited amount of published research in these areas, all papers of an appropriate scientific quality were considered for inclusion in this paper. Research studies were of variable study design; however, all had been subjected to a process of peer review.

Results

Using theory to inform practice

In 1995, the American College of Sports Medicine (ACSM) and Centres for Disease Control and Prevention (CDC) developed new physical activity guidelines which focused on maintaining and improving health. These new guidelines recommend accumulating 30 min of moderate intensity physical activity most days of the week [9]. These guidelines are potentially more accessible to the whole population, including people with Type 2 diabetes. Closely linked to the introduction of these guidelines was the development of lifestyle physical activity interventions as a break away from the traditional structured exercise programme. Lifestyle interventions have been shown to be as effective as structured exercise programmes for improving physical activity and health outcomes in the general population and may be more effective for maintaining long-term adherence [10,11]. These interventions are often based on a theoretical framework.

A number of theoretical models have been proposed and used in an attempt to explain physical activity behaviour. Models include: the health belief model [12] and protection motivation theory [13], which both propose that health behaviour change is related to the potential to protect against disease and improve health, the self-efficacy theory [14], which centres behaviour change round a person's confidence in their ability to successfully perform a behaviour, the theory of reasoned action [15],

and theory of planned behaviour [16], which both examine a person's intention to perform or not perform a behaviour, the chronic disease care model, which summarizes the basic elements for improving care in health systems at the community, organization, practice and patient levels [17], and the trans-theoretical model of behaviour change [18], which suggests people move through stages when changing a behaviour.

A large amount of research supports the use of the trans-theoretical model for physical activity behaviour change in the general population [19]. Research is emerging supporting the use of this model for promoting physical activity in people with Type 2 diabetes [20–23]. The trans-theoretical model suggests individuals move through five stages when changing behaviour. These stages have been labelled pre-contemplation, contemplation, preparation, action and maintenance. A definition of each stage is given in Table 1. Progression from one stage to another does not always occur in series and individuals can at any time progress forward or relapse back one or a number of stages. The model proposes that different intervention strategies (outlined in Table 1) should be used at different stages of behaviour change to help a person progress to a higher stage or to avoid relapse. The model also incorporates three mediators of behaviour change. These are self-efficacy (confidence in ability to change), decisional balance (pros and cons of change) and cognitive and behavioural processes of change (10 identified strategies or techniques people use when changing behaviour).

A meta-analysis [19] of 71 published reports in 2001 summarized findings from applications of the trans-theoretical model to physical activity in the general population by investigating the relationship between the core constructs of the model (stage of change, decision balance, self-efficacy and the processes of change). Figure 1 illustrates the main findings from this study. Results provide strong support for the application of this model to physical activity. The trans-theoretical model appears to be a good model to choose as a theoretical base for understanding and influencing physical activity behaviour in people with Type 2 diabetes. The model includes a number of mediators, such as self-efficacy and perceived benefits and barriers of behaviour change, which are reported as being important variables for physical activity participation in

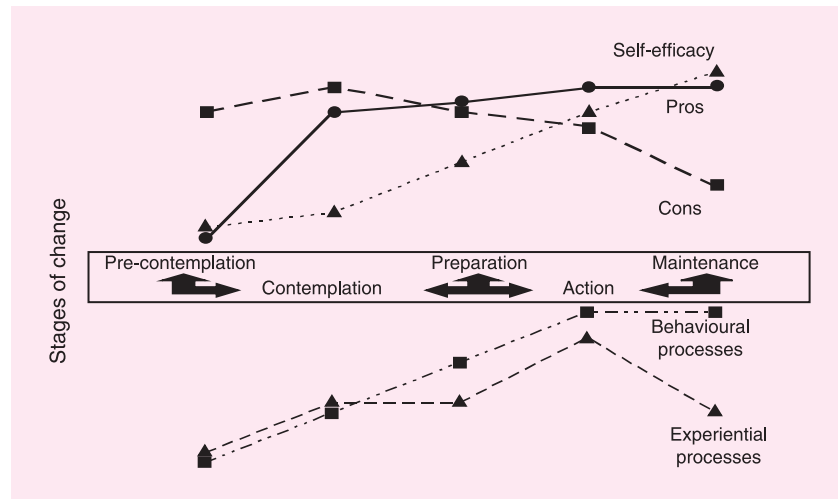


FIGURE 1 Relationship between the core constructs of the trans-theoretical model of behaviour change [19].

people with Type 2 diabetes [24]. Mau *et al.* [21] provided evidence on the validity of the trans-theoretical model for physical activity behaviour change in diabetes populations by reporting stage of change and movement in stage of change to be related to current physical activity behaviour and changes in physical activity behaviour, respectively, in people with or at risk for diabetes. The American College of Sports Medicine position statement on exercise and Type 2 diabetes highlights the use of this trans-theoretical model for promoting physical activity in people with Type 2 diabetes [1].

Modifiable variables associated with physical activity behaviour

Variables associated with physical activity behaviour can provide important information for the design of effective physical activity interventions. Variables identified in the literature as being associated with higher levels of physical activity in people with Type 2 diabetes are: self-efficacy [24], perceived benefits of physical activity participation [2], performance and outcome expectations [25], motivation and physical activity knowledge [3].

Kingery and Glasgow [24] examined the relationship of self-efficacy in predicting diabetes self-care behaviour, including diet, physical activity and glucose testing, in people with Type 2 diabetes. Physical activity behaviour was measured using a 7-day self-monitoring diary and self-efficacy was measured using a 29-item questionnaire. Self-efficacy was significantly correlated ($r = 0.58$) with physical activity. Of the three self-care behaviours (diet, physical activity and glucose testing), participants rated themselves lowest on self-efficacy for physical activity. Padgett [25] also showed that people with Type 2 diabetes report the lowest self-efficacy for physical activity compared with diet, medication and general diabetes management. These findings highlight the importance of incorporating strategies designed to enhance self-efficacy during physical activity interventions for people with Type 2 diabetes. Self-

efficacy is integrated into the trans-theoretical model, and strategies used within physical activity consultation to increase self efficacy include: setting realistic goals and providing role models with examples of how other individuals with diabetes have changed their physical activity behaviour.

Wilson *et al.* [2] reported that people with Type 2 diabetes perceive the greatest belief in the effectiveness of medication therapies of diabetes management, but report the lowest belief in the effectiveness of physical activity. This highlights the need to explain the rationale behind the effectiveness of physical activity in the management of Type 2 diabetes. Perceived benefits of physical activity among people with Type 2 diabetes include improving diabetes control and managing weight [26]. Reported barriers include physical discomfort from exercise, a fear of hypoglycaemia, being too overweight to exercise, and lack of support [2,26]. The identification of perceived barriers to physical activity participation and education on how to overcome them could significantly enhance adherence to physical activity.

Low motivation to participate in physical activity is a major factor associated with poor physical activity participation in healthy individuals [27]. In a study by Hays and Clark [3], people with Type 2 diabetes who reported fewer motivational barriers for physical activity were more likely to report higher levels of physical activity. These findings suggest effective methods for enhancing motivation should be included in the promotion of physical activity in people with Type 2 diabetes. Goal setting and self-monitoring of progress are important sources of self-motivation. Martin *et al.* [28] found that flexible exercise goals set by the individual, in comparison with goals set by an instructor, significantly improved adherence to an exercise programme. Pedometers are increasingly being used as self-monitoring and goal-setting tools to encourage people to increase their level of physical activity. Using a randomized controlled trial, Tudor-Locke *et al.* [29] investigated the effectiveness of a pedometer-based walking programme for people with Type 2 diabetes. Participants who received the pedometer intervention

increased the number of daily steps taken by over 3000 steps during the 16-week intervention. However, average step counts had returned to baseline 8 weeks after the intervention. These results are similar to results from studies with the general population [30] indicating that, although pedometers can elicit immediate increases in walking behaviour, additional strategies are needed to maintain lifestyle change. Physical activity consultation is an intervention which could be used to improve long-term maintenance of physical activity behaviour change.

Physical activity knowledge has been shown to correlate poorly with physical activity behaviour [31]. Guion *et al.* [32] assessed knowledge of physical activity in people with Type 2 diabetes. Results demonstrate only 38% of respondents knew the current physical activity recommendations. Consistent with previous research, a weak relationship was present between knowing physical activity recommendations and actual reported physical activity participation. Similar findings have been reported from other health behaviours, indicating that awareness of desired health practices is not sufficient for bringing about the adoption of health behaviour change. Educating people about the benefit of physical activity, although important, is unlikely to lead to long-term physical activity behaviour change.

Social support for physical activity behaviour change has been consistently correlated with physical activity participation in the general population [33]. People with Type 2 diabetes report the least amount of social support for physical activity, compared with other diabetes self-care behaviour [34]. Ary and colleagues [34] reported that, of 76% of people with Type 2 diabetes advised to adopt a more physically active lifestyle, only 21% received guidance about the most beneficial type and amount to undertake. In comparison, 76% of people with Type 2 diabetes received detailed dietary guidance. A study by Marsden [35] reported that people with Type 1 diabetes indicated that they did not receive adequate education, support or encouragement for physical activity.

To develop effective methods for promoting physical activity in people with Type 2 diabetes, the variables shown to be associated with physical activity behaviour (motivation, self-efficacy, outcome expectations, social support and, to some extent, knowledge) should be considered, and appropriate strategies incorporated.

Physical activity consultation: the process

Physical activity consultation is often based on the trans-theoretical model of behaviour change and generally involves a one-to-one discussion. This intervention could be delivered by any member of the diabetes care team with minimal training in the delivery of cognitive behavioural interventions and physical activity knowledge related to diabetes. A number of health-care professionals will have transferable consultation skills, such as experience of motivational interviewing, which will be valuable to the effective delivery of physical activity consultation. In the UK, the delivery of physical activity con-

sultation has been highlighted as an important service development [36,37], and a number of courses are now being provided allowing health professionals to become skilled in delivery of physical activity consultation in current practice.

The physical activity consultation approach is semi-structured to ensure that the key elements of the trans-theoretical model are covered (see Table 2). Appendix 1 illustrates an example proforma for the full physical activity consultation process. The approach is person centred and adapted according to the needs of the individual. An article published by Rollnick *et al.* [40] described the importance of the style of consultations about behaviour change. Rollnick *et al.* [38] emphasized the use of a guiding style, rather than directing style, where ultimately the patient decides whether or not to change a behaviour and how to go about changing. Health professionals are encouraged to take a back seat in the consultation by avoiding persuasion and instead encourage patients to take responsibility for the behaviour change and explore and develop their own motivations and goals.

The content of a physical activity consultation will be determined largely by a person's motivational status and personal needs, therefore the strategies and format used will vary from person to person. Previous guidelines for conducting physical activity consultations with the general population have been published [39]. For people with diabetes, the format of the consultation will be similar, with focus on variables which have been shown to be strongly related to physical activity behaviour. The advice given with regard to the benefits of physical activity and physical activity recommendations will be more diabetes specific. The American College of Sports Medicine position stand on exercise and Type 2 diabetes gives a good review of physical activity recommendations related to diabetes and diabetes complications [1]. Stage-specific strategies for people in either a contemplation or preparation stage of exercise behaviour change should focus on enhancing motivation, overcoming barriers and developing an appropriate activity plan. Consultations with these individuals can start with an explanation of the different forms of physical activity and a description of different intensity levels. A decision balance table can be completed involving weighing up the perceived pros and cons of becoming more physically active. This often involves an explanation of the effectiveness of physical activity in the management of Type 2 diabetes. The overall aim of the decision balance table is to encourage people to perceive more pros than cons for becoming more physically active. Barriers to physical activity and strategies to overcome these barriers can then be discussed. Physical activity status should be established. This can involve completion of a 7-day physical activity recall, or asking patients to record their physical activity in a diary prior to the consultation visit. The discrepancy between physical activity status and current physical activity recommendations [9] can then be discussed. Potential new activities can then be considered. If appropriate, the patient can be encouraged to start planning where and when these new activities can be carried out.

Table 2 Description of how each component of the transtheoretical model is addressed during a physical activity consultation

Component of trans-theoretical model	Physical activity consultation strategy	Description of strategy
Decisional balance	Decision balance table	Reviewing advantages and disadvantages of becoming more active
Self-efficacy	Discussing suitable activity opportunities	Providing realistic opportunities for success and achievement (mastery experience). Discuss people in a similar situation who have been successful in changing their physical activity behaviour (modelling)
Experiential processes		
Consciousness raising	Decision balance table. Discussing current recommendations	Providing information about the benefits of being more physically active and discuss the current physical activity recommendations
Dramatic relief	Decision balance	Discussing the risks of inactivity
Environmental re-evaluation	Decision balance table	Emphasize the social and environmental benefits of physical activity
Self re-evaluation	Review of current physical activity status and assess values related to physical activity	Review of current physical activity status and assess values related to physical activity
Social liberation	Discussing suitable activity opportunities	Raise awareness of potential opportunities to be active and discuss how acceptable and availability they are to the individual
Behavioural processes		
Counter conditioning	Discussing suitable activity opportunities	Discussion of how to substitute inactive options for more active ones
Helping relationships	Establishing social support	Seeking out friends, family, work colleagues who can support
Reinforcement management	Relapse prevention strategies	Rewarding successful attempts to be active
Self liberation	Goal setting	Making commitments for activity
Stimulus control	Relapse prevention	Identifying situations that may have a negative impact on physical activity behaviour change and developing ways to prevent relapse during these situations

Throughout the process of the physical activity consultation, the person's self-efficacy should be assessed. This is particularly important at the planning stage. How confident is the person in their ability to, for example, walk an additional 10 min every second day. In accordance with Bandura's self efficacy theory [14], a person's self-efficacy can be enhanced by (i) modelling (i.e. discussing examples of similar people, encouraging people to go to watch a class/activity, encouraging people to talk to others who have been in the same situation), (ii) verbal persuasion, (iii) mastery experience (i.e. break the behaviour change down into small bits and encourage people to master each small task before moving on and (iv) emotional arousal (i.e. encouraging the person to be aware of how they feel during and after the activity). The next stage of the consultation often involves the developing of physical activity goals. To enhance motivation, these goals should be time phased into short term (1 month), intermediate term (3 months) and long term (6 months). Patients should be encouraged during the consultation to take responsibility for the development of their physical activity goals, thus ensuring the goals are acceptable to the individual. The goals should be specific and measurable and patients should be encouraged to record these for future reference. If the patient feels that they need support for physical activity then this should be discussed.

For people who are in an action or maintenance stage of exercise behaviour change, the focus of the consultation should

be more on relapse prevention and improving long-term maintenance of a physically active lifestyle. Relapse prevention strategies involve identifying situations that may have a negative impact on behaviour change, such as a busy work schedule or holidays, and developing ways to prevent relapse during these high-risk situations such as time management or cues to get back to an activity plan after holidays.

Physical activity consultation: the evidence

A number of randomized controlled trials provide support for the use of physical activity consultation for promotion and maintenance of physical activity in diabetic populations over periods up to 2 years. Table 3 provides details of the study designs and findings.

Conclusions

This article set out to provide guidelines on how to conduct a physical activity consultation and to review the evidence surrounding the effectiveness of this intervention within current diabetes care. More research is required within all reviewed areas of physical activity behaviour in Type 2 diabetes. The majority of research investigating the validity of models of behaviour change and the determinants of physical activity behaviour have methodological limitations, often using self

Table 3 Physical activity consultation intervention for people with diabetes

Author	Design	Design	Population	Outcomes	Results
Hasler <i>et al.</i> [41]	RCT	Thirty-minute physical activity consultation delivered by researcher vs. standard diabetes and exercise leaflet	Thirty-four people with Type 1 diabetes	Leisure time physical activity. Three-week follow-up	Intervention significantly increased leisure time physical activity. Small decrease recorded in the control group
Kirk <i>et al.</i> [42]	RCT	Thirty-minute physical activity consultation delivered by researcher vs. standard diabetes and exercise leaflet	Twenty-six people with Type 2 diabetes	Physical activity (self report and accelerometer). Five-week follow-up	Intervention group recorded significant increases in both measures of physical activity. Control group recorded a decrease in physical activity
Kirk <i>et al.</i> [22,43,44]	RCT	Thirty-minute physical activity consultation delivered by researcher at baseline and 6 months with support phone calls 1 and 3 months after the consultation vs. standard diabetes and exercise leaflet (also received phone calls unrelated to physical activity)	Seventy people with Type 2 diabetes	Physical activity (self report and accelerometer), stage and process of exercise behaviour change BMI, glycaemic control, lipid profile, blood pressure, fibrinogen. Quality of life, exercise capacity. Six- and 12-month follow-up	Significant improvements in the intervention group in physical activity levels, exercise capacity, stage and processes of exercise behaviour change, glycaemic control, systolic blood pressure, total cholesterol and fibrinogen. Control group recorded significant decreases in physical activity levels and deterioration in glycaemic control and BMI
Chun-Ja <i>et al.</i> [20]	Control group, pre-post design	Sixty- to 90-min physical activity consultation delivered by researcher	Forty-five people with Type 2 diabetes	Stage of exercise behaviour change, physical activity levels, glycaemic control	Intervention group recorded significant improvements in all outcomes. Control group recorded no change
Di Loreto <i>et al.</i> [45]	RCT	Thirty-minute physical activity consultation (not tailored to stage of change) delivered by physicians with support phone calls after 1 month, and 15-min outpatient appointments every 3 months. Control group received standard-care appointments every 3 months	Three hundred and forty people with Type 2 diabetes	Physical activity levels (self report), BMI, glycaemic control. Twenty-four-month follow-up	Intervention group recorded significant improvements in all outcomes. Control group recorded increase in BMI and no change in other outcomes

BMI, body mass index; RCT, randomized controlled trial.

report of physical activity and the use of non-validated questionnaires. Research demonstrating the substantial protective effects of a healthy lifestyle in the development [5,6] and management of Type 2 diabetes highlights the need for more good quality research investigating effective methods of physical activity promotion. Guidelines on how to conduct a physical activity consultation have been provided, including a template (Appendix 1, available online). It is hoped that these can be used by diabetes and other health-care professionals, enabling the widespread implementation of this intervention.

Competing interests

None to declare.

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