Journal of Science and Medicine in Sport (2006) 9, 371—377

ELSEVIER

Journal of Science and Medicine in Sport

www.elsevier.com/locate/jsams

ORIGINAL PAPER

Promoting physical activity with people in different places—A Dutch perspective

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Received 9 February 2006; received in revised form 15 June 2006; accepted 16 June 2006

KEYWORDS
Exercise;
Primary prevention;
Secondary prevention;
Physical activity interventions;
Effectiveness

Summary This paper describes five recent Dutch studies of the effectiveness of physical activity interventions carried out in diverse settings: general practice (GP), aged care facilities, and workplaces. The stage-based physical activity counselling carried out in the GP setting demonstrated a beneficial effect on the determinants of physical activity, but did not show any additional effect on physical activity behaviour, compared with standard physical activity advice. In contrast, the stage-based intervention through the workplace was effective in increasing physical activity, due mostly to an increase in vigorous-intensity activities. In the aged care setting, functional-skills training alone or in combination with resistance training showed functional improvement only in participants with high participation rates. Functional-skills training appeared to be more feasible than resistance training in this population of frail elderly. The two studies which aimed to promote earlier return-to-work among workers with sick leave due to non-specific low back pain also showed promising results. As a result, it was recommended that occupational physicians (OP) should refer workers with low back pain in the subacute phase of their sick leave to a low intensity intervention consisting of short meetings and exercises aimed at changing behaviour, and that the OPs contact other health care providers (GPs and physiotherapists) about the treatment strategy. Together, the results of these five Dutch studies suggest that it is feasible to successfully promote physical activity to groups of people in diverse places, with benefits in terms of both prevention and management of chronic disease and injury.

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doi:10.1016/j.jsams.2006.06.014

Introduction

The high prevalence of physical inactivity in Western society and the associated health risks indicate the need to promote physical activity. In the past few decades, a wide range of physical activity promotion interventions has been developed and evaluated, varying in intensity, frequency, mode of delivery, and theoretical foundations. For example, physical activity promotion has been provided through diverse settings, such as workplaces, health care, and schools, each of which has particular relevance to different populations. Moreover, interventions have been developed based on different behavioural models, such as the Theory of Planned Behaviour (TPB),[1] the Social Cognitive Theory (SCT),[2] or the Transtheoretical Model (TTM)[3] and more recently the Ecological Model, which takes into account the influence of the social, political, and physical environment on individual behaviour.

The first part of this paper focuses on primary prevention, that is, promoting physical activity in order to prevent health problems or improve physical function, using examples from projects conducted in three settings (primary health care, aged care, and workplaces). The second part of the paper focuses on secondary prevention, using two examples of return-to-work interventions aimed at the promotion of physical activity, through the Dutch Occupational and Health and Safety (OHS) setting, to workers on sick leave due to low back pain.

Primary prevention interventions

Physical activity promotion in general practice (GP)

In the early nineties, the PACE intervention (PACE: Physician-based Assessment and Counselling for Exercise) was developed in the United States,[4] based on the TTM[3] and the SCT.[2] It was developed as a minimal intervention strategy aimed at enhancing moderate-intensity physical activity through advice from primary care physicians. A controlled trial in the United States showed that the PACE intervention was feasible and effective in producing a short-term effect on walking activity.[4,5]

Following this successful evaluation in the US, the PACE programme was adapted for implementation and evaluation in the Dutch primary care setting, using a randomised controlled trial (RCT). Randomisation to the intervention and control condition was performed at the level of the GP ($n = 29$). Patients ($n = 771$) were aged between 18 and 70 years, at high risk for developing CVD: i.e., diagnosed with hypertension, hypercholesterolaemia, and/or diabetes mellitus type 2, and not in the maintenance stage for regular physical activity. The Dutch version of the PACE intervention consisted of two 10 min consultations with the GP in which stage-based physical activity advice was provided, followed by two stage-based booster telephone calls with a PACE physical activity counsellor. The control GPs gave their patients short standardised physical activity advice.

Process evaluation showed that the implementation of the PACE programme in Dutch general practice was both feasible and acceptable, and that, after a few adaptations, the program would be suitable for wider implementation.[6] The intervention resulted in positive changes in some of the psychosocial determinants of physical activity (i.e., perceived barriers, self-efficacy, and processes of change) at both short-term (8 weeks) and medium-term (6 months).[7] However, despite these positive results, no positive intervention effect was found on changes in stage of change, level of physical activity, or body composition.[8] However, it did appear that there was a non-significant increase in physical activity of 62 min/week in the entire study group, 1 year after baseline. A similar trend was shown for weight, as a decrease of 0.5 kg in body weight was observed among the entire study group.[8]

The ineffectiveness of this Dutch primary care PACE intervention is in contrast with results of the first US study,[4] but in line with results from previous studies on the effectiveness of physical activity interventions in primary care,[9,10] as well as with another US study which showed an increase in time spent in physical activity in both study groups.[11] As was the case with our study,[6–8] it appeared in the US study that both the intervention and the control providers increased their physical activity counselling level during the study year. This may have contributed to the increase in physical activity levels observed in the control group. Furthermore, the evaluation of the Dutch PACE trial used a Solomon four-group design, aimed at studying the effect of measurements on both determinants and levels of physical activity. Using this design, it was shown that the measurements conducted as part of the evaluation induced changes in some of the determinants of physical activity and in physical activity behaviour, and that this effect did not differ between the control and intervention group. Based on these results, the authors suggested that measuring determinants and levels of physical activity per se may influence awareness of physical

activity and this may be an important starting point for changing behaviour.

Overall, the conclusion was that the current version of the Dutch PACE programme was not effective in producing *additional* effects on levels of physical activity and body composition compared with standardised physical activity advice from the GP. However, the positive changes observed in the entire study population are relevant for public health, as they oppose current trends in physical activity and weight. These positive changes can be attributed to several factors, including the advice given by the GP (either PACE or standard), the changes in GPs' physical activity counselling levels and the effect of study-related measurements. Because of the positive process evaluation of the PACE programme, it is currently being considered for implementation in Dutch general practice, complemented with some measures of physical activity and body composition. Furthermore, a recommendation for future studies is to recognise the potential effect of measurements on individual behaviour change.

Physical activity promotion in long-term care facilities

Existing scientific evidence supports a role for regular participation in physical activity and exercise in healthy ageing. In particular the so-called 'frail' elderly may benefit from exercise because of their low level of functioning due to impairments and disability. It is however less clear what type of programme is most beneficial for the frail elderly in everyday life. In efficacy trials, it has been shown that moderate to high intensity resistance training improves muscle strength in this group.[12] The effects of such training on performance measures like walking speed, chair rise performance, or stair climbing performance are however less clear.[13] The purpose of the study described here was to compare the effectiveness of different exercise protocols on physical fitness, functional performance and self-rated disabilities of elderly people, living in long-term care facilities.[14] Emphasis was placed on the feasibility of the interventions in real life situations.

Two hundred and twenty four residents (mean age: 81 ± 5.4 years; 15% males) of six different long-term care facilities were randomly assigned to one of four groups: (1) moderate-intensity resistance training (twice weekly), (2) moderate-intensity all-round functional-skills training (twice weekly), (3) combined resistance (once weekly) and functional-skills training (once weekly), or (4) a social control programme. The programmes were organised in residential care homes and supervised by the physical therapists usually working in these homes, assisted by trained volunteers. The resistance training consisted of five exercises, namely leg press, lattisimus pull-down, biceps curl and triceps press on TechnoGym equipment, and heel raises with dumbbells (1—5 kg each), ankle and/or wrist weights (1 and 2 kg per pair). The functional-skills training programme was designed to improve muscle strength, speed, endurance, coordination, and flexibility thereby improving functional performance of common daily activities. Fitness and performance measures and self-reported disability were measured at baseline and after the intervention (24 weeks).

The results of this study showed that twice weekly functional-skills training, or a combination of resistance and functional-skills training, improved several fitness and performance measures (i.e., reaction time, eye—hand coordination, flexibility of the hip and spine, chair rise, and putting on and off a coat).[14] However, compliance to twice-weekly moderate-intensity exercise appeared difficult for this frail population, and improvement was only found among those who attended at least 75% of all exercise classes.

Although efficacy studies show that resistance training can be of benefit for older people's physical functioning, this study, which was carried out in close to real life circumstances, failed to find a beneficial effect of such a programme. However, implementation of physical activity or exercise programmes among the elderly involves certain difficulties. First, motivating frail elderly to initiate an exercise programme is a real challenge. Moreover, if they do participate, it is a challenge to achieve adherence to the programme, with most study participants finding it difficult to exercise twice weekly. Promoting adherence to the programme is however important, as positive effects were only found among participants who attended at least 75% of the functional-skills training or combined exercise classes. A third problem in implementing exercise programmes for the elderly is related to compliance to the prescribed exercise intensity. Both our participants and the supervising physical therapists were reluctant to increase the resistance in the strength-training programme, both the participants and the physical therapists were cautious, tending to increase intensity at a slower pace than prescribed by the study protocol.

As the functional-skills training alone or in combination with resistance training showed functional improvement, functional-skills training seems to be more feasible in this specific population, as it uses small, easily transportable, and inexpensive

equipment. However, although expensive resistance equipment is needed for the strength-training programme, this programme was very popular among the study population. There is now a need for more studies that examine the effects of exercise training protocols under real life circumstances, with a focus on appropriate, feasible ways to increase exercise frequency and intensity among older adults.

Physical activity promotion in the workplace

In 2000/2001, 299 Dutch civil servants working in three municipal services of the same Dutch town participated in a randomised controlled study that investigated the (cost-)effectiveness of a workplace physical activity intervention. Randomisation took place at the workplace unit level ($n = 70$), resulting in 131 civil servants being allocated to an intervention group and 168 to a control group. The 9-month intervention was based on the PACE strategies. In order to meet the needs of the municipal services and the provider of the intervention, which was a commercial company offering individual lifestyle counselling to companies, the PACE intervention was adjusted slightly. The intervention was based on the SCT[2] and the TTM,[3] using stage of change assessment forms and PACE counselling forms. It consisted of seven individual, face-to-face consultations, each of 20 min in duration. Counselling focussed primarily on the enhancement of individual physical activity and secondarily on the promotion of healthy eating.

Behavioural, health, and work-related outcomes were evaluated. Despite the absence of an effect on the proportion of those meeting the moderate-intensity public health physical activity recommendation,[15,16] results showed a statistically significant effect on total physical activity and sporting activities in favour of the intervention group.[17] Furthermore, the intervention showed an effect on cardiorespiratory fitness, expressed as submaximal heart rate. Based on the cost-effectiveness analysis, it appeared that the positive effects on total physical activity and submaximal heart rate could be gained at the price of €5.2 (AUD$ 8.9) per extra kilocalorie per day, and €234.9 (AUD$ 402.7) per beat per minute decrease in submaximal heart rate.[18] As the employer was more interested in the balance between costs and work-related benefits, a cost-benefit analysis was also conducted. The intervention costs were compared with the monetary benefits due to sick-leave reduction. During the 9-month intervention period, the municipal service lost an average of €304.7 (AUD$ 522.3) due to sick-leave compensation costs for each participating worker.[18] However, during the same 9-month period in the year after the intervention, the mean benefit due to sick-leave reduction was €635.2 (AUD$ 1088.9) per worker.

The results of this intervention only partially confirm those of previous studies. For example, Calfas et al.[4] concluded that counselling was effective for moderate-intensity physical activity, whereas Van Sluijs et al.[8] could not detect any additional effect of the PACE intervention, compared to standard physical activity advice. The PACE intervention through the workplace, did not find an effect on the proportion of participants meeting the moderate-intensity physical activity recommendations, but, based on the effects found for energy expenditure, sporting activities.

Differences between this study and the previous ones might be due to the study population and, as a consequence, the content of the counselling. In both the studies of Calfas et al.[4] and Van Sluijs et al.,[8] the counselling was targeted to promote moderate-intensity physical activity among either inactive patients or patients not in the maintenance stage. Even though the goal of counselling in the workplace-based study was to promote both moderate-intensity and vigorous-intensity physical activity, it appeared that the majority of the study population wanted to improve their cardiorespiratory fitness. Consequently, the counsellor focussed on vigorous physical activities.

When comparing the present findings with those of previous workplace intervention studies, some discrepancies can be noted. For example, the meta-analysis by Dishman et al.[19] found a small, non-significant effect on physical activity or fitness. This was supported by a recent review by Marshall,[20] who concluded that there was little evidence of the long-term effectiveness of workplace physical activity programmes on physical activity. In contrast, the systematic, qualitative review by Proper et al.[21] concluded that there was strong evidence for a positive effect on physical activity and inconclusive evidence for a positive effect on cardiorespiratory fitness. Discrepancies in conclusions between these reviews can probably be ascribed to the methods used, and the inclusion of different studies. Another important finding by Proper et al.[21] was that there is a lack of good quality studies evaluating the effectiveness of workplace physical activity programmes. There is a strong need for more randomised controlled trials evaluating both health-related outcomes and work-related outcomes (e.g. sick leave) as well as cost-benefit analyses.

Secondary prevention interventions

In the Netherlands sick-listed workers with low back pain receive social medical guidance from an occupational physician, who is contracted by the workers' company. In 2002, the so-called 'Gatekeeper Act' was introduced, which stipulates that the employer, together with the worker, has to put adequate effort into the rehabilitation process during the first year of sick leave, to actively promote return-to-work. If the employer fails to put effort into the rehabilitation process, s/he has to pay wages for an additional number of years. This act further made the worker partly responsible for his own employment status and the worker can now loose vocational rights in case of negligence in the rehabilitation process. Therefore, both the employer and the employee have an interest in effective strategies to speed up recovery from illness and to return-to-work. However, until recently, little evidence was available on the effectiveness of commonly applied interventions in the Dutch OHS setting.

Two recently conducted large Dutch RCTs are described here. Both studied the effectiveness of different physical activity interventions on return-to-work among workers who were on sick leave due to non-specific low back pain.

Graded activity

The first RCT examined the effectiveness of a graded activity intervention (GA) for low back pain, based on the study of Lindstrom et al.[22] The study included 134 Dutch airline company workers, who were randomly assigned to either GA ($n = 67$) or usual care (UC) ($n = 67$). The GA intervention consisted of physical exercises, applied according to operant conditioning behavioural principles. The main purpose of the intervention to be communicated by the caregiver was: ''pain does hurt, but that does not necessarily mean that it harms''. The GA intervention had a maximal duration of 3 months and was provided by a skilled physiotherapist twice a week, with usual guidance by the occupational physician. Those in the UC group were advised according to Dutch guidelines for patients with low back pain (i.e., the occupational physician discussed the generally good prognosis and the intended date of return-to-work; the worker was advised to continue physical activities; and after 6 weeks, an exercise programme or physical therapy was recommended).

After 6 months, results indicated that those in the GA group returned to work faster, with a median sick leave of 54 days compared with 67 days among those in the UC group.[23] Cox regression analysis showed that participants in the GA programme were significantly more likely to return-to-work than those in the UC group [hazard ratio (HR): 1.9, 95% CI: 1.2—3.2]. This effect was sustained over the entire study period (12 months) (HR: 1.9, 95% CI: 1.2—3.1) with a median sick-leave days of 67 among those in the GA group versus 102 among those in the UC group.[24]

Back schools

The second intervention studied the effectiveness of two 'back schools' (low intensity and high intensity) among 299 workers sick-listed for a period of 3—6 weeks due to non-specific low back pain. Workers were randomly assigned to one of three groups: (1) low intensity back school, (2) high intensity back school, or (3) UC. The low intensity back school was based on the Swedish model[25] and consisted of four group sessions once a week, supervised by a physiotherapist. The sessions included education and strength exercises for abdominal, back, and leg muscles. The high intensity back school programme was based on the principles of the GA programme (see earlier), including cognitive behavioural therapy using a time-contingent (instead of pain-contingent) increase in the level of physical activity. Additionally, strength exercises for abdominal, back, and leg muscles were performed. After 6 months, the median number of sick-leave days was 68, 85, and 75 in the low intensity back school, high intensity back school, and UC, respectively. Compared with the UC group, the low intensity back school expedited return-to-work during the initial 6 months of sick leave with a HR of 1.4 (95% CI: 1.0—1.9).[26]

Where to from here?

These two studies examined the effectiveness of interventions in workers in their subacute phase of sick leave due to non-specific low back pain. The interventions were aimed at physical activity stimulation and incorporated principles of cognitive behavioural therapy, trying to modify workers' irrational beliefs about their back pain. The low intensity back school intervention was low intensity and low cost, whereas the high intensity back school and GA programme were high intensity and high cost. The more intensive interventions treated and supervised the workers for a longer period, but did not significantly facilitate return-to-work compared with the less intensive and cheaper intervention. Although the low intensity intervention seems

promising, the crucial questions are 'where to from here?' and 'what intervention is most effective?' On the basis of the results from these two Dutch trials, it is recommended that: (1) occupational physicians should refer workers with low back pain in the subacute phase of sick leave, which is at 3—6 weeks of continued sick leave; (2) occupational physicians should refer workers to an intervention that follows a graded activity protocol and actively incorporates the work situation of the worker; (3) occupational physicians should contact GPs and physiotherapists about their treatment strategy to prevent conflicting advice and guidance.

Conclusions

The studies described in this paper are examples of the 'state of the art' in physical activity interventions involving different people in different places. Although the primary prevention studies yielded contrasting results in terms of efficacy, all three resulted in important lessons on which we can build future intervention efforts. In contrast, the results of the workplace studies point to the demonstrable value of physical activity intervention as a strategy for encouraging earlier return to work for people with non-specific low back pain.

Practical implications

- It is feasible to successfully promote physical activity to groups of people in diverse places: at general practice (GP), aged care facilities, and workplaces.
- There is a need for more good quality effectiveness studies that examine the effects of physical activity promoting programmes under real life circumstances.
- Physical activity intervention is an effective strategy for encouraging earlier return to work for people with non-specific low back pain.

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