European Journal of Public Health, Vol. 21, No. 1, 56–62

doi:10.1093/eurpub/ckq003 Advance Access published on 5 April 2010

Exercise on prescription: changes in physical activity and health-related quality of life in five Danish programmes

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Received 12 August 2009, accepted 11 January 2010

Background: Exercise prescribed by the general practitioner may be an important health-improving intervention for inactive individuals with lifestyle diseases. The objective was to analyse changes in physical activity and health-related quality of life among participants in five similar 'Exercise on Prescription' (EoP) programmes. **Methods:** The analysis was based on self-reported information in a follow-up design without a control group. The intervention comprised group training twice weekly in the first 2 months and once weekly in the following 2 months (24 sessions in all) combined with four to five sessions of motivational counselling. Self-report questionnaires were administered at the first contact and again after 4, 10 and 16 months. Outcome measures were changes in self-reported activity levels converted to metabolic equivalents and health-related quality of life measured by standard instruments (SF-12v2 and EQ-5D). **Results:** 449 individuals (59% women, mean age 57 years) agreed to participate in the study. Dropout was considerable [123 (27%); 231 (52%) 297 (66%) after 4, 10 and16 months]. Participants increased their physical activity level and health-related quality of life from baseline to 4 months and maintained improvement throughout the observation period. One in three to six participants increased their physical activity level and one in 4–10 achieved improvements in health-related quality of life. **Conclusion:** Exercise on prescription can contribute to improvements in physical activity level and health-related quality of life in physically inactive patients with or at increased risk of developing lifestyle diseases. An acceptable number of participants achieved and maintained improvements in physical activity level and health-related quality of life.

Keywords: exercise on prescription, EQ-5D, health-related quality of life, metabolic equivalents, SF-12v2

Introduction

Strong evidence suggests that increased physical activity can reduce the risk of developing certain lifestyle diseases (e.g. cardiovascular diseases, hypertension and type 2 diabetes) and reduce the adverse effects of such diseases.[1–3] This suggests that physical activity may play an important role in the prevention and treatment of these diseases. Both international and national guidelines recommend that all adults should be physically active for at least 30 min per day—preferably 7 days a week.[4,5] Despite such recommendations a considerable proportion of the Danish population is less physically active than this level and may therefore be at increased risk of poor health.[6,7]

Given the evidence for positive short-term health effects from prescription exercise,[8] several Danish regional health authorities have given general practitioners (GPs) the opportunity to refer physically inactive patients to an 'Exercise on Prescription' (EoP) programme. These Danish programmes were developed around 2002 with inspiration from the Swedish versions of EoP.[9,10] The Danish programmes are similar as regards design and content. However, until now, they have not been evaluated in terms of their ability to increase and maintain participants' levels of physical activity and improve health-related quality of life. Without systematic analyses of achieved effects, it is difficult to determine the extent to which participants achieve desirable health improvements.

One of the most challenging issues for EoP is the programmes' ability to maintain participants' engagement in a physically active lifestyle during and after completion of the intervention.[8] Nevertheless, only limited knowledge exists concerning the extent to which participants who complete an EoP programme continue to be physically active after the supervised training programme has come to an end.

Four Danish counties and one municipality participated in an evaluation of EoP that was conducted by the Centre for Applied and Clinical Exercise Sciences (ACES), University of Southern Denmark. Interviews with GPs who were involved in the programmes indicated that some groups of participants obtained a greater effect from the treatment than others.[11] Therefore, it is relevant to examine whether adherence to EoP and achieved results reached by the participants are related to certain demographic or health-related characteristics.

The objective of this study was to analyse changes in physical activity and health-related quality of life among participants in five similar EoP programmes and to assess whether participants with certain characteristics obtained better effects.

Material and methods

The EoP intervention

The content of the EoP programmes was similar in the counties of Northern Jutland, Funen, Ribe and Vejle and the municipality of Frederiksberg. The programmes were designed as an intervention to which GPs could refer their physically inactive patients in treatment for or with increased risk of developing cardiovascular disease, hypertension or type-2 diabetes. In discussions with their patients, the GPs should ascertain whether patients were motivated to change their habits in relation to physical activity and were willing to pay an intervention enrolment fee (67–100 Euros). The GPs issued a written prescription to eligible patients, who then contacted an EoP clinic and made an appointment for the first health-profile assessment and motivational counselling session.

The EoP intervention lasted 4 months and comprised group training led by a trained instructor (usually a physiotherapist) and a series of motivational counselling sessions and health-profile assessments (four to five times within a 10-month period). The group training comprised 1 h of training twice weekly for the first 2 months and then once weekly for 2 months (24 training sessions in total). The specific content of the training sessions was adapted by the instructor to the individual participant. The motivational counselling sessions were aimed at motivating participants to change their physical activity habits. During the counselling sessions, a range of physical measurements was made and the participants completed health questionnaires. During the first contact at the training centre, participants were invited to take part in the evaluation of the EoP programme; those willing to do so gave consent for independent evaluators to access health and personal information.

Data collection

The data collection was conducted using a follow-up design without controls. During the recruitment phase (January 2005 to August 2007), 449 persons agreed to participate in the evaluation of EoP. At the first contact in the training centre, participants received a baseline questionnaire (T0). After 4 months (at the end of the group training), 10 and 16 months (T4, T10 and T16), similar questionnaires were posted to the participants together with a prepaid return envelope. Respondents who failed to return a questionnaire were contacted once by telephone and encouraged to return the questionnaire. A subsample of the data ($n = 28$) was from a randomized controlled trial of EoP previously published.[12]

Questionnaire

Level of physical activity was determined using several short, previously validated items. The questions focused on physical activity in relation to employment/work, walking, cycling, housework, sedentary activities, exercise and sleep.[13] Health-related quality of life was assessed using the Danish versions of SF-12 version 2[14] and EQ-5D.[15] Self-report information about gender, age and body mass index (BMI) was also collected.

Analysis and statistical methods

Outcome measures were changes in self-reported activity levels converted to metabolic equivalents and health-related quality of life measured by standard instruments (SF-12v2 and EQ-5D). Daily physical activity was transformed to energy consumption [metabolic equivalent task (MET) × hours/day].[13] A change of 1 MET per day, equivalent to walking an extra 10–15 min, was considered a minimal important difference.[16] An increase of 2 MET would fulfil the international recommendations for physical activity level.

Responses to SF-12v2 were transformed to physical and mental dimension scores using software provided by the instrument developers, which uses a standardized algorithm.[14,17] Both scales range from 0 to 100, where 100 represents the best physical/mental health state. A change of 5 points on each scale was considered a minimal important difference.[18] Comparison to the general population could not be made, as Danish SF-12v2 population norms are not available.

Responses to EQ-5D were transformed to 0–1 index scores (where 1 represents the best health state) using the recommended Danish algorithm, which is based on the time-trade-off method.[19,20] A change of 0.05 points was considered a minimal important difference.[21,22] The observed health status of the sample was compared with the Danish population norms.[23]

There were few missing items in the returned questionnaires. Missing items in descriptive variables (BMI: 8 missing; present health status, i.e. the first question in SF-12v2: 10 missing; current health status in the later months, i.e. question 2 in SF-12v2: 8 missing) were replaced by a value calculated based on a multiple regression model including gender, age and county/municipality (and BMI) as explanatory variables.

There were many missing observations due to non-return of questionnaires. Investigation of register-based mortality data indicated that missing returns might be due to participant death in only five cases. Other reasons for non-return were not established, but may have been related to non-adherence to the exercise programme.

Several approaches were pursued to overcome the problems of missing data on physical activity and health-related quality of life for participants who had returned the baseline questionnaire but did not return one or more follow-up questionnaires. In the first approach (baseline observations carried forward), missing data at T4, T10 and T16 were replaced by the baseline value (T0). In the second approach (mean imputation), missing values at T4, T10 and T16 were replaced by estimated mean values for individuals who returned the questionnaire. In the third approach (last observation carried forward), missing data were replaced by the last valid observation. The fourth approach (complete observations) restricted the analyses to individuals who had returned all four questionnaires.

Descriptive analyses were performed based on the returned questionnaires. Differences in parametric variables between the five programmes were tested with analysis of variance (ANOVA). Chi-square tests were applied for categorical variables. Difference in EQ-5D index score for the sample and the general population was estimated based on population norms from 15 700 representative Danes according to gender and 5-year age groups.[23] The difference between the observed score index and the population-based score index was assessed using a paired t-test assuming similar variance.

Logistic regression models were fitted to investigate whether respondents who returned all questionnaires were different in terms of gender, age group, BMI and programme from those who returned fewer questionnaires. Logistic regression models were also fitted with various interactions between groups of these variables. As no significant difference was found between the two groups in either the simple models or the models including interaction variables, the estimation results are not reported here.

Differences in average outcomes (MET, SF-12v2 scores and EQ-5D index score) between the five programmes were tested using ANOVA. As only few statistical significant differences were found, the detailed results are not reported here.

The effect of the intervention programme in terms of changes in MET, SF-12v2 scores and EQ-5D index score was assessed as the mean differences (and standard deviation) from the baseline value (T0) and values at T4, T10 and T16. The significance of the estimated difference was tested using paired *t*-tests. Finally, the number needed to treat to achieve one person with a minimal important difference was calculated after 4, 10 and 16 months.

Results

Baseline characteristics for the 449 participants are shown in table 1. There was no significant difference between the five programmes with respect to gender, change in health status over the last 12 months or current health scores (SF-12v2 and EQ-5D index scores). Mean age was significantly lower in the samples from Funen and Vejle/Ribe counties, while mean BMI and baseline MET were significantly lower in the Frederiksberg sample. No significant difference was found between those individuals who returned all questionnaires and those who did not, with the exception that the Vejle/Ribe programme had a significantly lower dropout rate than the other programmes.

Table 2 presents raw data for the four effects variables at different observation times. Of the 449 participants 326 (73%), 218 (48%) and 152 (34%) returned the follow-up questionnaires after 4, 10 and 16 months, respectively. The mean values were broadly similar to the non-parametric medians suggesting reasonably symmetric distributions, as was confirmed by graphic inspection and analysis of kurtosis. The only exception was the distribution of SF-12v2 mental dimension scores, which showed a tendency to right skewness.

Table 3 shows the changes from baseline values for MET, SF-12v2 and EQ-5D index scores using different strategies for imputation of missing observations. Using data based on baseline carried forward, the average MET increased by 0.6 during the training intervention ($P < 0.01$). The average MET increase after 10 and 16 months was 0.5 and 0.3, respectively. The other imputation methods indicated that the average MET increased slightly more after 10 and 16 months. This improvement is equal to an average increase of 0.6–1.6% of the baseline MET. The long-term effect of exercise was more apparent when missing data were replaced by means of the observed values. Among the individuals who participated in the full study (returned all questionnaires), an average increase of 1.0 MET ($P < 0.01$) was observed after completion of the programme, while a lower, but still significant, increase was observed in the longer term.

Few statistically significant changes could be observed in the two SF-12v2 subscales. In contrast, significant improvements could be observed in the EQ-5D index score for all observation times and with all imputation methods.

The number needed to treat to achieve one person with a minimal important difference is calculated in table 4. The different imputation methods to take account of missing data provided different results. When missing data were replaced by baseline score, three to six participants could be expected to achieve an improvement in physical activity of 1 MET. One in four to nine participants could be expected to achieve a minimal important difference in the two SF-12v2 subscale scores, while one in 4–10 participants could be expected to achieve a minimal important difference in the EQ-5D index score.

Logistic regression modelling of the likelihood to achieve a minimal important difference in one of the four outcome variables using gender, age group, BMI and programme as explanatory variables did not result in statistically significant parameters.

Discussion

In this study, the observational effect data from similar EoP programmes undertaken in four Danish counties and one municipality were pooled. The recruitment method and characteristics of participants were broadly similar in the programmes, as were the content and organization of the intervention. The observation period was relatively long and included follow-up questionnaires to be completed 16 months after programme enrolment.

The results of the analysis suggest that one in three participants who agreed to participate in the study achieved an important improvement in self-reported physical activity (>1 MET) after 4 months. This improvement was maintained after 10 and 16 months. For participants who responded to all follow-up questionnaires, nearly every second participant achieved an important improvement in

Table 1 Baseline characteristics of participants

		Training programme				
	All $n = 449$	**NJ** $n = 210$	**FRB** $n = 76$	**FU** $n = 135$	**V/R** $n = 28$	**ANOVA-*P***
Women	58.8%	54.3%	59.2%	65.9%	57.1%	0.20
Age, mean years (SD)	57.2 (11.4)	59.7	58.1	53.3	55.0	<0.01
BMI, mean (SD)	31.8 (5.8)	32.0	30.0	32.2	32.2	0.04
MET level of activity, mean (SD)	40.2 (4.8)	40.9	38.3	40.1	40.5	<0.01
Health status compared to one year ago						
Better	16.3%	15.3%	11.8%	16.3%	37.0%	χ^2 $P = 0.08$
The same	61.0%	62.6%	63.2%	62.2%	37.0%	
Worse	22.7%	22.2%	25.0%	21.5%	26.0%	
SF-12v2, mean score (SD)						
Physical dimension	54.5 (17.0)	55.5	55.4	53.2	50.3	0.33
Mental dimension	58.6 (16.1)	58.5	60.2	58.0	57.5	0.79
EQ-5D, mean index score (SD)	0.784 (0.186)	0.765	0.804	0.798	0.797	0.26

NJ: North Jutland; FRB: Frederiksberg; FU: Funen; V/R: Vejle/Ribe.

physical activity. Making the conservative assumption that 'only' these participants (i.e. 75 of 449) achieved an important improvement in physical activity, suggests that increased physical activity could be obtained for one in six participants enrolled. A realistic assessment of the number needed to treat would thus range between three and six participants in order to achieve one participant with an important change in physical activity.

Participants also appeared to achieve good outcomes in terms of health-related quality of life. Results for the SF-12v2 and EQ-5D instruments suggest that one in 4–10 participants achieved an important improvement in quality of life after enrolment in the programme. However, only the changes in the EQ-5D index scores reached statistical significance.

Table 2 Mean values and distributions of observed effects variables

	n		Mean	SD	Percentiles		
					25	50	75
Level of activity (MET)							
T0	449		40.2	4.8	36.8	39.7	43.6
T4	326	73%	40.8	4.7	37.7	40.4	44.3
T10	218	49%	41.0	4.5	38.1	40.4	44.2
T16	152	34%	41.0	4.8	38.3	40.6	44.0
SF-12v2 Physical dimension							
T0	427		54.5	17.5	44.0	55.0	74.0
T4	307	72%	55.1	17.1	44.0	55.0	74.0
T10	206	48%	56.5	16.3	44.0	57.0	74.0
T16	139	33%	57.0	16.7	47.0	57.0	74.0
SF-12v2 Mental dimension							
T0	427		58.6	16.5	47.0	62.0	74.0
T4	307	72%	61.8	15.6	47.0	62.0	75.0
T10	206	48%	60.9	17.1	47.0	57.0	75.0
T16	139	33%	61.0	15.5	47.0	57.0	75.0
EQ-5D index score							
T0	440		0.784	0.188	0.723	0.781	0.943
T4	307	70%	0.839	0.150	0.756	0.824	1.000
T10	209	48%	0.832	0.166	0.756	0.824	1.000
T16	143	33%	0.840	0.169	0.756	0.824	1.000

These exercise programmes can be considered to have been successful as the achieved effects are relatively high in comparison with international studies,[8,9,24,25], in which over 10 people needed to be treated to achieve an important difference in either physical activity or health-related quality of life. However, a direct comparison may not be appropriate as these studies were undertaken as randomized controlled trials and would be expected to provide a more conservative estimate of the number needed to treat than would an uncontrolled follow-up study.

There was a high rate of non-response to the follow-up questionnaires in the current study [123 (27%) after 4 months, 231 (52%) after 10 months and 297 (66%) after 16 months]. Non-response could be related to lack of adherence with the prescribed intervention, although some of those not returning the follow-up questionnaires were participants who had been adherent during the 4-month training programme. Non-response could also have been due to fatigue in responding to the questionnaires or lack of time and interest in attending the 16-month follow-up assessment. Therefore, it may be a conservative assumption that non-responders do not adhere to the recommendations regarding regular physical activity, although this assumption was applied in this analysis. The statistical modelling did not identify a clear pattern of difference between the participants who returned all questionnaires and those who did not. It appeared that the older participants (aged 65+ years) were more likely to return all questionnaires than younger participants. They also tended to report better health condition and greater improvements in EQ-5D index scores.

Missing follow-up responses posed methodological challenges for the subsequent analysis. In this study, we employed various strategies to handle missing follow-up data, based on different assumptions as to the likely outcome for non-responders. The baseline carried-forward approach is the most conservative strategy and assumes that no effects (and no deterioration) have been achieved during the period with no observations. Last observation carried forward is less conservative and assumes that the achieved improvements are retained during the period with missing observations. The mean imputation strategy is even more optimistic and assumes that non-respondents will experience the same

Table 3 Changes from baseline in physical activity (MET) and health-related quality of life (SF-12v2 physical and mental dimension scores and EQ-5D index score) using different strategies for imputation of missing observations ($n = 449$)

	Baseline carried forward Mean (SD)	Mean inputation Mean (SD)	Last obs. carried forward Mean (SD)	Complete observations Mean (SD)
Level of activity (MET)				$n = 152$
T4	0.64 (3.10)[b]	0.66 (4.13)[b]	0.64 (3.13)[b]	1.04 (3.33)[b]
T10	0.48 (2.80)[b]	0.83 (4.53)[b]	0.72 (3.44)[b]	0.95 (4.05)[b]
T16	0.27 (2.53)[a]	0.80 (4.68)[b]	0.66 (3.54)[b]	0.80 (4.30)[a]
SF-12v2 Physical dimension				$n = 139$
T4	−0.54 (17.77)	0.66 (20.44)	−0.54 (17.80)	1.93 (21.18)
T10	0.91 (16.00)	2.06 (30.60)[a]	−0.08 (19.60)	2.61 (23.76)
T16	0.80 (12.00)	2.56 (18.67)[b]	0.17 (18.94)	2.58 (21.50)
SF-12v2 Mental dimension				$n = 139$
T4	2.21 (17.79)[b]	3.23 (19.93)[b]	2.21 (17.79)[b]	2.14 (20.64)
T10	0.50 (14.47)	2.33 (19.20)[a]	1.67 (18.60)	2.17 (20.80)
T16	0.14 (11.01)	2.44 (17.69)[b]	1.10 (18.25)	0.44 (19.84)
EQ-5D index score				$n = 143$
T4	0.027 (0.116)[b]	0.055 (0.169)[b]	0.027 (0.116)[b]	0.038 (0.141)[b]
T10	0.011 (0.860)[b]	0.048 (0.171)[b]	0.020 (0.109)[b]	0.033 (0.120)[b]
T16	0.011 (0.090)[a]	0.056 (0.181)[b]	0.020 (0.123)[b]	0.033 (0.157)[a]

a: Significantly different from T0 ($P < 0.05$).
b: Significantly different from T0 ($P < 0.01$).

Table 4 Number needed to treat to achieve one person with a minimal important difference in effect measure

	Baseline observation carried forward *n* = 449	Mean imputation *n* = 449	Last observation carried forward *n* = 449	Complete observations
Change in activity level (>1 MET)				*n* = 152
T4	3.0	2.2	3.0	2.1
T10	4.1	2.0	2.7	2.1
T16	5.8	1.9	2.7	1.9
Change in SF-12v2 Physical dimension (>5 index score)				*n* = 139
T4	4.3	2.6	4.3	2.9
T10	5.5	2.4	3.7	2.5
T16	8.3	2.3	3.7	2.6
Change in SF-12v2 Mental dimension (>5 index score)				*n* = 139
T4	3.7	2.6	3.7	2.6
T10	5.4	2.5	3.6	2.3
T16	8.6	2.6	3.8	2.7
Change in EQ-5D index score (>0.05 index score)				*n* = 143
T4	4.4	2.4	4.4	3.0
T10	7.6	2.4	4.7	3.2
T16	10.0	2.1	4.6	3.2

improvements as respondents. Which of these assumptions is the most realistic is difficult to assess. It is likely, however, that mean imputation provides overly optimistic assessments. The complete case strategy is the most optimistic analytical strategy and may be used as an indication of the maximum achievable improvement.

The study was designed as a cohort study rather than a controlled study. This may also lead to an overly optimistic assessment of the effects of the intervention. An observation bias (Hawthorne effect) may have led respondents in the current study to give overly positive responses to the follow-up questionnaires because of the general support experienced from the programme, familiarity with the questionnaires and greater awareness of the relationship between health and physical activity. There may also have been considerable selection bias amongst the participants who chose to enrol in the study. At the time of referral, the GPs needed to be fairly sure that the patient would actually undertake the prescribed exercise and would pay the participation fee. To be included in the study, the referred patients also had to be able and willing to comply with the described data collection scheme and to attend follow-up counselling sessions. The participant sample is thus unlikely to be representative of all individuals referred to EoP—or of those who could potentially benefit from more physical activity. Nevertheless, the size of the pooled study sample is sufficient to allow assessments of the likely benefits from the programme for the group of referred patients who were willing to participate in the evaluation.

No significant difference was found between those individuals who returned all questionnaires and those who did not, with the exception that the Vejle/Ribe programme had a significantly lower dropout rate than the other programmes. This could be expected as these participants took part in a randomized trial and were followed more closely, e.g. through telephone contact.

The evaluation of the programme in Vejle/Ribe was designed as a randomized controlled trial.[12] Only participants in the intervention group ($n = 28$)—who received group training similar to the other programmes—were included in the current study. We found that these participants had a significantly lower dropout rate than participants from other programmes and were more likely to achieve increased level of physical activity, due to closer follow-up. However, we chose to include them in the study to maintain statistical power in the long-term assessments, as these participants were similar at baseline to participants from other regions. In clinically controlled trials, it is typically less difficult to obtain a temporary increase in level of physical activity.[26] It is, however, difficult to maintain the participants in an active lifestyle.[27] There appears to be no well-defined limit for how much patients are willing to change their lifestyle to reduce their risk factors.[28]

Measurement of self-report physical activity is challenging. In the this study, participants were asked to provide estimates of time engaged in various activities. Validated instruments were used for obtaining information about physical activities and international standards were applied for the conversion of energy consumption. Based on these data, an assessment was performed related to the individual average energy consumption as a proxy for physical activity. It is noted, however, that the sample baseline average of 40 MET per day is relatively high—and also about 15% higher than the level reported in a previous study.[24] The assumption that a change of 1 MET is an important improvement in physical activity can also be debated. It is obvious that if this criterion were set at a higher level, fewer participants would have achieved the desirable outcome. An evaluation of 10 physical activity questionnaires concluded that future questionnaires should include sleep, light-, moderate- and heavy-intensity leisure activities, household chores and occupational activities.[29] Finally, respondents tended to over-report physical activity and underestimate sedentary behaviour. The questionnaire used for this study did include items related to sleep, light-, moderate- and heavy-intensity leisure activities, household chores and occupational activities. Furthermore, the questionnaire adjusted for under-reporting of light-to-moderate activities.[13]

A relatively strict criterion was used for determining important changes in the two measures of health-related quality of life. A score change of 5 and 0.05 was employed to indicate minimal important improvements on SF-12v2 and EQ-5D, respectively. Lower thresholds (e.g. 3 and 0.03)[21] would result in more participants achieving a successful improvement in health-related quality of life from the intervention. It is interesting to note that the two instruments gave different assessments of the quality-of-life improvement. The SF-12v2 instrument showed insignificant tendencies towards improvements, whereas the EQ-5D instrument showed statistically significant improvements in health-related quality of life.

The moderately positive results from this study and from a number of EoP studies from other countries suggest that EoP is a potentially useful intervention when targeting groups of sedentary patients with lifestyle diseases or increased risk of developing lifestyle diseases. However, further development and implementation of effective and sustainable EoP interventions are necessary in primary healthcare to improve the health benefit from these interventions.

Refinement of the screening process to include individuals with an appropriate combination of risk profile and fundamental physical and mental capabilities would seem to be a relevant development of the programmes. Health professionals should focus on providing exercise options that appeal to the participants and are appropriate for their age, social situation, medical circumstances and general interests. It would also be useful to find ways of increasing GP support for the programme, as well as strengthening their links to EoP providers.

In comparison with EoP interventions from other countries, the Danish model involves a high degree of contact with a healthcare professional (typically a physiotherapist), for example, see Refs 24, 30 and 31. However, a recent study involving interventions of 10-week supervised exercise classes and a 10-week instructor-led walking programme found that supervised exercise classes or walks might not be more effective than the provision of information about their availability.[32]

The current results show that EoP does have potential, as an acceptable number of patients increased their physical activity level and health-related quality of life and maintained these changes for at least 10 months after termination of the supervised training. This is in contrast to the only randomized trial of Danish EoP that found no difference between EoP and an intervention that comprised five motivational sessions and health-profile assessments[12]—the study had a number of problems; however, the main one being a low number of participants.

EoP involves a high degree of contact with healthcare professionals and is thus quite expensive, and certainly more expensive than other types of interventions targeting the same group of patients. Prescribing walking for sedentary individuals has proven effective at low cost.[33] A Cochrane review concluded that there is some support for self-directed physical activity combined with professional guidance and on-going professional support.[34]

EoP can contribute to improvements in physical activity level and health-related quality of life in a group of physically inactive patients with lifestyle diseases or at increased risk of developing lifestyle diseases. An acceptable number of participants achieved and maintained improvements in physical activity level and health-related quality of life.

Acknowledgements

The financial support of the National Board of Health is gratefully acknowledged. The authors thank the individuals who participated in the study and the staff who organised the administration of questionnaires and collected clinical data. Thanks are also due to Charlotte Bruun Pedersen and Claire Gudex for their assistance with language editing of the manuscript. Part of the work was done while the authors were employed at the Centre for Applied and Clinical Exercise Sciences, University of Southern Denmark.

Funding

The work was partly supported by an unrestricted grant from the National Board of Health.

Conflicts of interest: None declared.

> ### Key points
>
> - This pooled cohort study used self-reported data on average energy consumption and health-related quality of life and employed a 16-month observation period.
> - The intervention consisted of 24 training sessions and five counselling sessions over a 4-month period.
> - There was considerable non-response to the follow-up questionnaires.
> - One in three to six participants achieved an important improvement in physical activity.
> - One in 3–10 participants achieved an important improvement in health-related quality of life.

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