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Assessing the effects of a health promotion programme for elderly people

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Summary

Physical exercise is an increasingly popular health promotion activity for elderly people, although evidence of its effectiveness is limited. We aimed to evaluate the impact of the exercise component of the Look After Yourself (LAY) package promoted by the Health Education Authority in two groups of elderly people attending the 10 weekly sessions which make up the LAY course. Classes 1 and 2 comprised 13 and 18 subjects, aged from 65 to 89 years, and from 58 to 87 years respectively. Class 1 subjects were white with the exception of one Jamaican man, and Class 2 subjects were all Afro-Caribbean. Subjects had measurements of shoulder joint flexibility, grip strength, blood pressure, weight and a self-perceived health questionnaire, the Nottingham Health Profile (NHP) completed at baseline, 10 weeks and at six months. Class 1 showed reductions in grip strength and a deterioration in pain and mobility dimensions of the NHP, whereas Class 2 showed large improvements in shoulder joint flexibility and a small and non-significant trend towards improved self-perceived health. Class 2 subjects felt that they had benefited, and just over half had continued with an exercise programme. These findings suggest that the effect of mild exercise on objective indicators and self-perceived health may depend on the context in which it is done, the type of exercise promoted, and that continued exercise is aided by the provision of further group classes. There is a need for evaluation of the impact of different types of exercise programmes, covering a wider range of indicators of fitness, in larger groups of elderly people.

Introduction

Physical exercise is an important part of health promotion programmes aimed at older people because of increasing evidence of its effectiveness in improving physical capacity,[1] well-being and depression,[2] bone density,[3,4] and reducing arteriovascular risk factors.[5] However, evidence from small-scale studies of elderly volunteers suggests that exercise has to be intensive and frequent for any benefits in physical capacity to occur.[6] Reductions in coronary heart disease and stroke are also only likely to be achieved by means of vigorous exercise.[7]

The Look After Yourself (LAY) programme was developed by the Health Education Authority as part of a life-style modification package to prevent coronary artery disease, aimed initially at people under 65 years. LAY is one of a range of projects supported by Look After Your Heart (LAYH), which include Look After Your Employee, Look After Your Customer, and Look After Your Community. More recently, LAY has been promoted for older people, with several health authorities and commercial industries training staff to carry out the LAY course for older people. The course comprises 10 weekly sessions covering exercise, relaxation and health topics such as diet, and is run by a trainer.

Surprisingly, no work has been done on the impact of the LAY course on outcomes of health and fitness. In part, this is because of the obvious difficulties of relating changes in health behaviour and disease to use of the LAY course, and in part because the main effort in the first years were to establish the programme in the public and political mind. Evaluation and monitoring of efficiency and effectiveness of projects are now major objectives of LAYH, but it is likely that outcomes will be considered at a population rather than individual level.[8]

We felt that it was feasible to study the effects of the exercise component of the programme. Therefore, we aimed to use objective indicators of physical capacity (i.e. muscle strength and flexibility) and subjective indicators of health and well-being (i.e. the Nottingham Health Profile; NHP) to measure the effects of LAY.

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Methods

The LAY programme

The aims of LAY are to achieve and support changes in life-style that promote health through avoidance of behaviours associated with ischaemic heart disease. It is intended that participants should be able to maintain life-style changes on their own after the course. The LAY programme is closely related to the Look After Your Heart (LAYH) programme and is managed by LAYH.

The LAY sessions usually last two hours, equally split between exercise, relaxation and health topics. The types of activity in the exercise section are suitable for keep-fit classes and are designed to be done without equipment or special facilities. The exercises are split into three categories: suppleness (arm circling backwards, side bends, trunk–knee–hip bends, head–arms–trunk rotating, alternate ankle reaching), strength (upper body – wall–table–chair–floor press-ups, abdomen – graded trunk curls, legs – graded squat jumps), and stamina (running on the spot, stepping, regular jogging – for 15 mins at a time). The exercises start with a gentle warm-up, followed by progressive increase in intensity, and a slowing-down at the end. Each subject is expected to carry out exercises at a work rate that suits them, and competition is discouraged. The course can be as short as six weeks, but ideally runs for 10 consecutive weeks.

LAY offers training and produces material for 10-week courses which may be held in health centres, day centres or in the work place. City and Hackney Health Authority employs a health promotion officer for the elderly who is trained to run LAY courses and co-ordinate the work of other LAY tutors in the district.

The LAY groups

Two groups of people were studied. The first class (Class 1) was held at a day centre, and the second (Class 2) was held about six months later at an Afro-Caribbean day centre. Class 1 participants were recruited from regular day centre attenders and by local publicity, although all participants were regular attenders, and were white with the exception of one Jamaican man. All Class 2 subjects were regular day centre attenders and were all Afro-Caribbean. Day centre users were under no obligation to attend all (or any) of the classes, and no barriers (e.g. ill health or payment) to joining were raised.

Class 2 differed from Class 1 in that a regular exercise class was maintained after the end of the LAYH programme, giving greater opportunity for continuing with exercise. The need to continue exercise was given greater emphasis, and hand exercises were incorporated into Class 2.

The measurements

At the first meeting a 'health and fitness' check was conducted to measure blood pressure, weight, hand grip strength and shoulder joint flexibility. The measurements and equipment had all been previously validated and used in a large population survey of health and fitness in old age,[9] and were chosen because they were variables that might be influenced by an exercise intervention. In addition, a self-completion questionnaire, the Nottingham Health Profile,[10] was used to gather information on health and well-being. These measurements were repeated at 10 weeks and 6 months. A semi-structured questionnaire was also used at six months for Class 2 to gain feedback about the course and activities. This questionnaire was not used for Class 1 as it was developed specially for Class 2.

Sample size estimates were made, and for most variables measured, a study of 10–20 subjects would have only limited power to detect important differences (see Table 1). For example, a difference as big as 20–30 mmHg in systolic blood pressure might easily be missed with such a small sample. However, with more precise measurements (e.g. grip strength and joint flexibility) smaller, and physiologically relevant, differences would be detectable with the sample sizes available to us. Differences detectable in NHP scores corresponded to a change of response to two or three questions within a given dimension, and would be considered clinically important. However, sample size estimates were not a major consideration in planning the work, as it was considered a necessary first step to collect some information on the approximate size of outcomes of exercise interventions with elderly people to guide further studies.

TABLE 1 Sample size estimates for the variables measured; all estimates are based on alpha = 5 per cent and beta = 10 per cent (i.e. power 90 per cent), and standard deviations given are of the difference between initial and 10-week observations

Variable	S.D. of difference	Maximum difference detectable	
		$n=10$	$n=20$
Systolic blood pressure (mmHg)	22	31	22
Grip strength (kg)	5	7	5
Shoulder joint flexibility (deg.)	12	17	12
Weight (kg)	7	10	7
NHP dimensions	25	35	25

TABLE 2 Differences in physiological measurements at baseline, 10 weeks and six months (figures are means with standard errors of the mean in parentheses)

	Baseline	10 weeks	6 months
Class 1	(*n*=11)	(*n*=11)	(*n*=7)
Systolic pressure	155 (6)	165 (4)	172 (13)
Diastolic pressure	92 (6)	83 (4)	99 (11)
Grip strength (right hand) (kg)	28 (3)	22 (3)*	23 (3)
Shoulder joint (deg.)	131 (2)	131 (4)	124 (4)
Weight (kg)	72 (3)	75 (3)	72 (4)
Class 2	(*n*=17)	(*n*=17)	(*n*=13)
Systolic pressure	147 (8)	139 (6)	147 (6)
Diastolic pressure	77 (4)	73 (3)	77 (4)
Grip strength (right hand) (kg)	21 (2)	22 (2)	18 (1)
Shoulder joint (deg.)	121 (3)	152 (3)**	143 (5)**
Weight (kg)	77 (3)	77 (3)	75 (4)

Paired *t*-tests (baseline versus 10 weeks or six months).
*$p<0.05$; **$p<0.001$.

Analysis was done using SPSS-PC+ (Version 3·01), and non-parametric tests (Wilcoxon's signed ranks test) of significance were used for nominal and ordinal data and parametric tests (paired *t*-test) used for comparisons of continuous variables.

Results

Classes 1 and 2 comprised 13 and 18 participants and did not differ significantly in age distribution; 74 years (range 65–89) and 72 years (range 58–87) respectively. In both groups only two participants were men. Compliance with the classes was reasonable, with both groups achieving an average of more than 75 per cent attendance. The attendance of individuals ranged from six to eight out of the 10 classes.

Physiological measurements at baseline, 10 weeks and six months are shown in Table 2. Six-month measurements were completed on just over half the participants because of non-attendance. In Class 1, but not Class 2, a significant reduction in hand grip strength occurred. A substantial increase in shoulder joint flexibility was observed in Class 2. Insignificant changes in systolic blood pressure and weight occurred in both classes.

The NHP scores did change during the programme and are shown in Table 3 and Figs. 1 and 2. The trends differed in the two groups. Class 1 showed deteriorations in their scores on all dimensions of the NHP (except social isolation), which were statistically significant for pain and mobility. Class 2 showed small improvements (with the exception of sleep), although these were not statistically significant. Most of the changes in NHP scores were short-lived, with a return to baseline values by six months. No significant changes in Part 2 NHP scores (effects on life-style: hobbies, sex life, work, social activities, holidays, home life) were found in either class.

TABLE 3 Differences in NHP scores at baseline, 10 weeks and six months (figures are medians with 25th and 75th centiles in parentheses)

	Baseline	10 weeks	6 months
Class 1	(*n*=13)	(*n*=11)	(*n*=13)
Energy	24 (0–82)	61 (0–76)	24 (0–68)
Pain	13 (0–19)	40 (0–60)*	30 (0–60)**
Emotion	19 (0–59)	51 (0–74)	10 (0–78)
Sleep	38 (13–78)	73 (16–78)	22 (0–55)
Isolation	22 (0–42)	22 (19–42)	22 (0–29)
Mobility	12 (0–27)	21 (0–45)	23 (0–32)*
Class 2	(*n*=18)	(*n*=18)	(*n*=13)
Energy	39 (0–100)	30 (0–82)	37 (24–100)
Pain	33 (24–100)	21 (0–50)	29 (3–50)
Emotion	21 (0–42)	12 (0–36)	11 (0–70)
Sleep	13 (9–29)	13 (0–38)	22 (0–47)
Isolation	10 (0–60)	10 (0–59)	0 (0–32)
Mobility	28 (21–39)	22 (8–38)	22 (11–39)

Wilcoxon's signed ranks test (baseline versus 10 weeks or six months).
*$p<0.05$; **$p<0.02$.

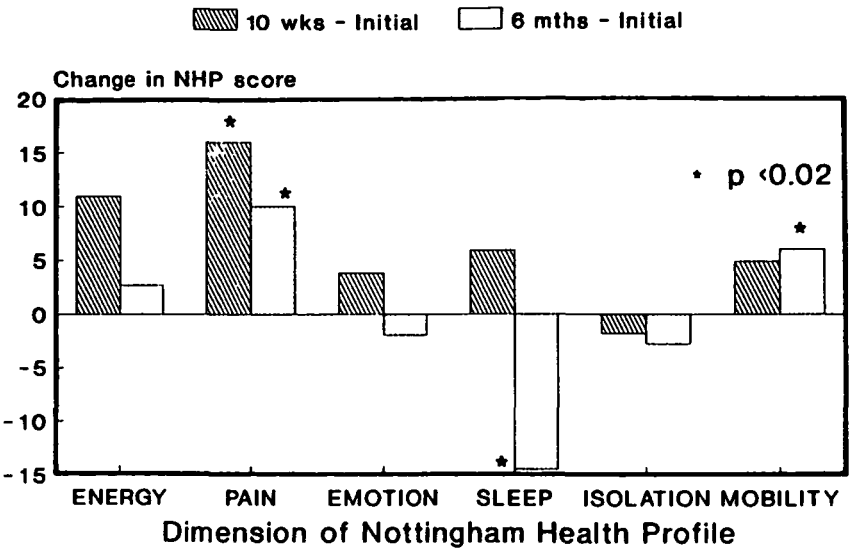

FIGURE 1 Changes in NHP scores from baseline to 10 weeks for Class 1.

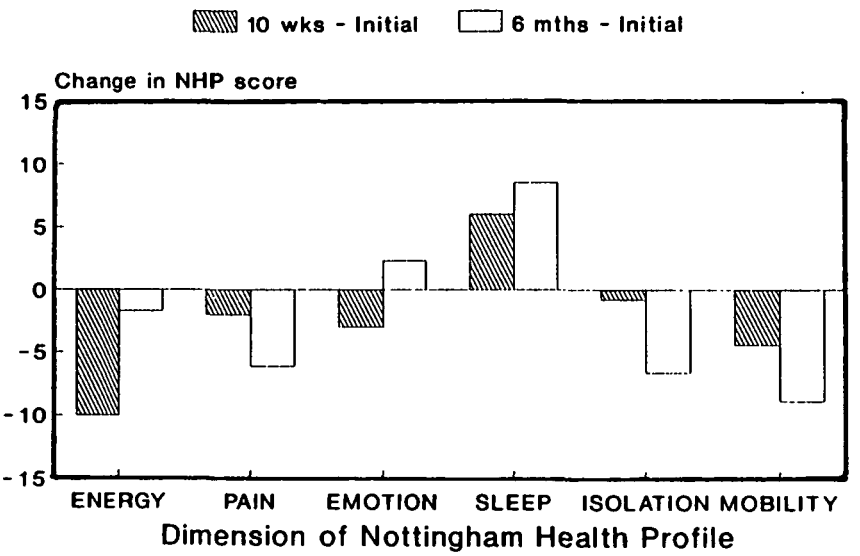

FIGURE 2 Changes in NHP scores from baseline to 10 weeks for Class 2.

The semi-structured questionnaire was completed by 14 participants of Class 2. Only three people felt unwell during the exercise sessions and all but one felt that the exercises had made a difference to their mental or physical health. Just over half (57 per cent) had continued with the LAY exercises at least once a week (by attendance at the day centre class), and 13 participants had increased their daily activity (most typically walking). When asked whether the LAY course had produced any life-style changes, 10 subjects spontaneously mentioned dietary changes, but only three reported an increase in exercise.

Discussion

We used a 'before and after' study design, relying on each subject to act as their own control, rather than a randomized controlled trial design. Our design has

weaknesses that must be considered before interpretation of our findings. The most important weakness is that exercise (or other activities) other than that offered by the LAY programme may have had an influence over the 10 weeks. Although we are certain that no major exercise promotion occurred, it is possible that other more subtle influences may have had some effect on the 10-week and six-month results.

However, randomized controlled trials of health promotion interventions are difficult to conduct. In particular, it is easy for the control group to become 'contaminated' by the intervention. This would have been extremely likely in the context of day centre attenders who might meet on other occasions and discuss the content of the intervention. Losses also tend to be high in such control groups as subjects are dissatisfied with their allocation to a control group, and simply join an alternative non-randomized exercise group.

The sample sizes were determined by the size of groups that were available for study and could be run in a day centre. The study did not have adequate power to detect important changes in some of the variables measured. For example, the study did not have enough power to detect small changes (e.g. a few millimetres fall in blood pressure) that might be important when considered over large populations (see Table 1). However, for other variables (e.g. shoulder joint flexibility, grip strength and NHP scores) even the small numbers of subjects studied were sufficient to give adequate power.

Some of the measures of physical capacity considered here might not be expected to change with the type of exercise used. However, grip strength may be improved by exercises of the upper limbs and trunk, as it is strongly related to upper arm functional abilities,[11] and is correlated with the strength of other upper limb muscle groups.[12] Shoulder joint flexibility should be improved by some of the exercises used. The measurements used represent those that can be done easily in a non-clinical setting. The recommended method of pulse counting to monitor cardio-respiratory fitness proved impossible for participants to manage reliably. No attempt was made to measure stamina, which might have increased. A test of stamina would have been of great value (e.g. a treadmill test), but such equipment is not portable, and testing stamina is time-consuming and not greatly enjoyed by elderly subjects. Equipment is now available for measuring power output across the hip joint,[13] which would provide a more relevant measurement than grip strength. Thus our choice of outcomes was determined by feasibility as well as a critical appraisal of those indicators that might show changes produced by exercise.

Despite these problems of study design, we have demonstrated that it is possible to use objective and subjective measurements as part of a health promotion course. This has led to a more questioning approach, and changes to aspects of the course aimed at producing greater benefits to attenders. Subjects also found the health and fitness checks enjoyable and were interested in changes in their measurements.

Turning to our findings, the LAY programme appeared to have little effect on measures of physical capacity, and to have a short-term detrimental effect on self-perceived health in Class 1. The results in Class 2 were much more encouraging, as shoulder joint flexibility improved and blood pressure tended to fall in the short term. Self-perceived health also showed a trend toward improvement in Class 2.

Class 1 participants commented on how much they had enjoyed the group, and how upset they were when it finished. It is possible that the deterioration of their NHP scores occurred because of the ending of the group, as scores came back to baseline levels by six months. However, it is possible that some of the activities did lead to pain (e.g. in stiff joints) which led in turn to reduced mobility. This was reported by three participants of Class 2.

The disappointing findings in Class 1 led to some changes in approach with Class 2, in particular an emphasis on maintenance of activity by setting up an exercise group, and hand exercises. This may have led to maintenance of self-perceived health in Class 2 and the improvement in grip strength.

Beneficial effects of exercise on arteriovascular risk factors have been reported, but in this study no significant reductions in blood pressure or weight were observed. This may be due to chance because the sample sizes in both groups were small. However, it is possible that the intensity and frequency of exercise were too low to make any difference.

The NHP is a general indicator of quality of life and well-being (despite its reliance on symptoms rather than positive aspects of health). We used it because of our previous experience, and because it is extremely well validated with older people, and even mild exercise is thought to lead to benefits in well-being. The NHP scores are sensitive to change in health service interventions (e.g. hip replacement) and vary with the natural history of disease (e.g. stroke), but the use of 'quality of life' measures in evaluating the impact of exercise is not common, and it may be that disease and socio-economic status are much more powerful determinants of how people feel than a weekly health promotion class. The average scores of both the classes were relatively high compared with published age and sex norms.[10] Emotion, sleep and isolation scores were about twice

expected levels for Class 1, and energy, pain, emotion, isolation and mobility were between two and three times higher than expected for Class 2. These differences from large normative samples probably reflect the adverse social and economic environment of elderly people living in inner cities.

It is possible that changes in NHP reflect non-exercise aspects, such as relaxation and discussion topics, of the LAY package. However, the NHP did show variation in these groups, and further work with this indicator as an outcome of the impact of health promotion classes is justified.

The Class 2 semi-structured questionnaire demonstrated that the majority of participants had enjoyed the programme and felt that they had got a lot out of it. Although a questionnaire was not used with Class 1 (it had not been developed at this stage of the study), informal discussions with this group demonstrated the same general feelings of enjoyment and benefit. It is worth augmenting measurements like the NHP with questionnaires more directly related to exercise behaviour in future studies of outcome.

An obvious and major difference between the classes was ethnicity: Class 2 were all Caribbean people. It may be that their response to the LAY class, and their self-perceived health ratings differed systematically from those of participants in Class 1. There is little information on ethnic differences in responses to such measurements, but a study amongst Gujarati elders demonstrated much more positive responses to a life satisfaction index than among the indigenous white population.[14]

This study did not intend, and cannot hope to provide a conclusive answer to the question of the impact of exercise among elderly people. The importance of evaluating the community effectiveness (as opposed to the laboratory effectiveness) of exercise as promoted in public health approaches should be self-evident. However, it is all too easy to promote exercise because it may be thought of as harmless and is almost always beneficial.[15] The questions of how much exercise is necessary, for how long, of what type, and at what cost remain unanswered.[16] Exercise classes are not cheap to run, and if the benefits are illusory then resources will be wasted.

The type and amount of exercise generally recommended is derived from information about the relationship between exercise and cardiovascular events in middle-aged men.[7,17] The application of such recommendations (e.g. vigorous exercise for at least 20 minutes at least three times a week) to elderly people is questionable. As it is likely that risks of exercise will increase with increasing frequency and intensity, it is necessary to define the effects of different amounts and types of exercise for elderly people. The present LAY regime is certainly of relatively low intensity and frequency and may, therefore, be insufficient to produce a training effect. It is clear that, with encouragement, elderly people attending a class are willing to increase their levels of activity and to do exercises provided group activity is maintained.

This study shows that the effects of mild to moderate exercise need further systematic research in larger, controlled studies. The possibility exists that in some circumstances such programmes may lead to adverse effects. Further studies are under way to examine the impact of the LAY approach in larger groups, and of the possibilities of promoting brisk walking among elderly people.

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