

Randomized controlled trial of the Alexander Technique for idiopathic Parkinson's disease

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Received 20th April 2002; returned for revisions 18th June 2002; revised manuscript accepted 3rd July 2002.

Objective: To determine whether the Alexander Technique, alongside normal treatment, is of benefit to people disabled by idiopathic Parkinson's disease.

Design: A randomized controlled trial with three groups, one receiving lessons in the Alexander Technique, another receiving massage and one with no additional treatment. Measures were taken pre- and post-intervention, and at follow-up, six months later.

Setting: The Polyclinic at the University of Westminster, Central London.

Subjects: Ninety-three subjects with clinically confirmed idiopathic Parkinson's disease.

Interventions: The Alexander Technique group received 24 lessons in the Alexander Technique and the massage group received 24 sessions of massage.

Main outcome measures: The main outcome measures were the Self-assessment Parkinson's Disease Disability Scale (SPDDS) at best and at worst times of day. Secondary measures included the Beck Depression Inventory and an Attitudes to Self Scale.

Results: The Alexander Technique group improved compared with the no additional treatment group, pre-intervention to post-intervention, both on the SPDDS at best, $p = 0.04$ (confidence interval (CI) -6.4 to 0.0) and on the SPDDS at worst, $p = 0.01$ (CI -11.5 to -1.8). The comparative improvement was maintained at six-month follow-up: on the SPDDS at best, $p = 0.04$ (CI -7.7 to 0.0) and on the SPDDS at worst, $p = 0.01$ (CI -11.8 to -0.9). The Alexander Technique group were comparatively less depressed post-intervention, $p = 0.03$ (CI -3.8 to 0.0) on the Beck Depression Inventory, and at six-month follow-up had improved on the Attitudes to Self Scale, $p = 0.04$ (CI -13.9 to 0.0).

Conclusions: There is evidence that lessons in the Alexander Technique are likely to lead to sustained benefit for people with Parkinson's disease.

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Introduction

In 1997 a pilot study¹ of a relatively unknown method of neuromuscular re-education called the Alexander Technique indicated that in conjunction with drug therapy it could benefit people with Parkinson's disease, and that the possibility merited further research: hence this trial with a larger sample and two control groups. Postural abnormalities and imbalance are relatively unresponsive to pharmacological therapy,² but they may prove to be responsive to the Alexander Technique.

The mainstay of pharmacological therapy for idiopathic Parkinson's disease is levodopa,³ but as the disease progresses and levodopa dosage needs to be increased, adverse side-effects may occur.⁴ Furthermore speech and postural disturbances appear to escape from adequate control more readily than bradykinesia.⁵ An evidence-based, self-help method that patients could learn and use to combat postural abnormalities and improve performance of everyday activities would be a welcome addition to the therapeutic portfolio.

The Alexander Technique⁶ concerns the practical relationships between thought and the resultant muscle activity involved in postural support and in movement and has particular relevance for the initiation of movement. It is taught in individual private lessons. Using skilled hand contact a teacher observes and assesses changes in muscle activity, balance and co-ordination resulting from mental activity and provides immediate feedback. In this way through practising mental procedures with help and advice from the teacher, pupils learn to recognize and adopt better thinking strategies for overall control of balance and movement. The Alexander Technique is widely used to reduce or prevent chronic back pain and other problems such as poor muscular respiratory function,⁷ both of which frequently occur in Parkinson's disease.

The main hypothesis in this study is that the Alexander Technique may complement pharmacological therapy in relieving motor and postural disability in Parkinson's disease. The secondary hypothesis is that improvement will be due to the Alexander Technique-specific content of lessons, over and above any beneficial effects

from personal attention and hand contact during lessons.

Methods

Volunteers were recruited through advertisements in the national and London press, at Parkinson's disease clinics in several London hospitals and through the Parkinson's Disease Society, to participate in a trial to look at the effects of the Alexander Technique and therapeutic massage. They were recruited in three successive cohorts during 1998–1999. The inclusion and exclusion criteria for eligibility were as follows:

Inclusion

- Diagnosed with idiopathic Parkinson's disease by a consultant neurologist
- Committed to keeping Parkinson's disease medication unchanged from before the pre-intervention test to after the post-intervention test
- Able to climb 20 stairs
- Able to lie on the floor and get up alone (with help from furniture)
- Reasonable short-term memory.

Exclusion

- Taking medication for another serious neurological illness
- Been hospitalized for depression in last 10 years
- Receiving a non-pharmacological therapy in the last six months
- Individual Alexander Technique lessons in last 10 years.

Ethics Committee approvals were obtained and all participants signed consent forms.

To calculate the target sample size, test size and power were set at 5% and 85% respectively.⁸ An estimate of the required standard deviation obtained from the preliminary study¹ and a nomogram,⁹ were used for sample size determination. The target size was calculated to detect a difference of three points on the Self-assessment Parkinson's Disease Disability scale¹⁰ (SPDDS) at best times of day. The target sample size was 30 per group and 90 in total.

Procedure

Two to three days after the pre-intervention tests were completed, the randomizing statistician was given access by the research manager to information on each participant to enable random ascription into one of three equal-sized groups: one group to receive a course of lessons in the Alexander Technique (the Alexander Technique group), one to receive no additional interventions (the no additional intervention group) and one (the massage group) to control for the individual attention and non-Alexander Technique-specific aspects of hand contact involved in the Alexander Technique teaching method. All groups continued their medication for Parkinson's disease.

The three groups were balanced using a computer program, MINIM,¹¹ for four categories: age with three subcategories, gender, duration of diagnosed illness with four subcategories and severity of illness based on the pre-intervention SPDDS at best scores for which there were two subcategories: scores of 25–28 and scores of 29+. The SPDDS is designed to measure progressive deterioration for 25 everyday activities, on a scale with a range of 25 (all 25 activities can be performed alone and without difficulty) to 125 (all 25 activities are unable to be done at all). Some participants were likely to be at or very close to a total score, pre-intervention, of 25 and consequently, for these patients, improvements post-intervention would not be reflected in an improved total score. To avoid distortion when comparing mean change, the groups needed to be

balanced for numbers at or close to the ceiling score of 25.

The balance among the three groups as a result of the randomizing method and other descriptive characteristics of the participants who completed pre- and post-intervention tests can be seen in Table 1. All participants received the same written and scripted requests to refrain as far as possible from Parkinson's disease medication change until after the post-intervention tests and all signed their agreement. The signed commitment on the application form contained a footnote: participants were referred to their information sheet and to their doctor, who also had a separate information sheet, if they had any doubts. The information sheets said that, if the patient and doctor wished to change medication, the patient's well-being took precedence over the research commitment.

Planned interventions

The Alexander Technique group received two Alexander Technique lessons per week for 12 weeks. Each lesson lasted 40 minutes. Both the Alexander Technique teachers were members of the Society of Teachers of the Alexander Technique. Interventions started 3–10 days after randomization and were completed within three months. Five weeks after completion the participants in the Alexander Technique group received a short audio-tape¹² to lead them through a 20-minute lying down exercise.

The massage group received two massage sessions per week for 12 weeks. This is not a com-

Table 1 Characteristics at randomization of participants who completed the post-intervention tests

	Alexander Technique (<i>n</i> = 29)	Massage (<i>n</i> = 29)	No additional intervention (<i>n</i> = 30)
Age in years	64.1 ± 9.1	66.1 ± 10.3	64.8 ± 10.8
Duration of illness in years	4.8 ± 4.3	4.7 ± 3.7	4.9 ± 3.5
Severity of illness:			
SPDDS at best	33.3 ± 8.7	33.9 ± 11.2	32.0 ± 7.8
SPDDS at worst	47.3 ± 14.7	49.0 ± 18.5	46.4 ± 13.8
Attitudes to Self	34.9 ± 14.3	32.0 ± 16.5	31.6 ± 18.5
Depression (BDI)	9.9 ± 5.8	11.9 ± 6.4	8.7 ± 6.1
Gender: women, men	10:19	8:21	9:21

All values are means ± SD.

SPDDS, Self-assessment Parkinson's Disease Disability Scale; BDI, Beck Depression Inventory.

parative study of massage and the Alexander Technique: the massage group was to control only for touch and personal attention in Alexander Technique lessons. Hence the manual contact on skin was limited to reflect more closely manual contact in Alexander Technique lessons. Massage on the skin was restricted to the neck and head, up to the elbow on the arms and up to the knee on the legs. The back was massaged through light clothing. Massage oil was unscented. There was no music. The practitioners were trained in therapeutic massage: to work with ill or injured patients for whom the full range of massage strokes must be restricted or adapted. They qualified from the Clare Maxwell-Hudson and Linda Scott Schools of Therapeutic Massage respectively. The massage was Swedish based, consisting mainly of effleurage, gentle kneading and pressure point work.

To minimize the likelihood that difference in the quality of surroundings could be a confounding factor, the Alexander Technique lessons and the massage interventions were given in rooms with identical furnishings, on the same days of the week, with the same reception staff. To minimize the possibility that difference in 'clinical authority' could be a confounding factor, all therapists were women, all were addressed by their first names, and none wore white coats.

Main outcome measures: SPDDS questionnaires

The Self-assessment Parkinson's Disease Disability Scale¹¹ (SPDDS) is a self-report questionnaire containing a list of actions, such as walking indoors and outdoors, getting dressed and undressed, turning over in bed and writing a letter. It has been thoroughly tested for internal consistency and validity. Comparison of patient-determined ratings with ratings by their carers and ratings of one-off performance of certain activities in the SPDDS by independent observers showed the patients' judgements of their disability to be valid.^{13,14}

Participants were asked to rate how easy or difficult it was to perform 25 separate actions at their best (SPDDS at best) and at their worst times (SPDDS at worst) in the last week, on a 5-point scale (range of total scores 25–125); 1: 'able to do alone and without difficulty'; 2: 'able to do

alone with a little effort'; 3: 'able to do alone with a lot of effort or a little help'; 4: 'able to do but only with a lot of help'; 5: 'unable to do at all'. The SPDDS at best and SPDDS at worst questionnaires were identified to participants as 'everyday actions'. Questionnaires were administered on three occasions: pre-intervention, post-intervention and at the six-month follow-up. They were mailed out and collected in by the research manager.

Secondary outcome measures

There were four secondary outcome measures. The Beck depression inventory (BDI),¹⁵ identified to participants as 'feelings in the last week', asked subjects to indicate how they felt about 21 items by selecting one of the four statements which best described their feelings. The most positive score per item was 0, the most negative was 3 (range of total scores 0–63).

The Attitudes to Self Scale was identified to participants as, 'feelings and attitudes to our bodies/selves'. It consists of 15 semantic paired opposites, e.g. tense/relaxed, self-confident/insecure. The most positive score was 0 and the most negative was 6 (range of total scores 0–90). It is an adapted version of the body concept questionnaire for torticollis, which has 22 paired opposites and has been shown to be internally consistent with high test-retest scores over one month.¹⁶

The BDI and the Attitudes to Self Scale were administered in an identical way to the SPDDS.

The questionnaire on changes arising from the interventions was completed by the Alexander Technique and massage groups post-intervention. It provides data on disability from a different angle from the SPDDS: whilst the SPDDS is a common list of pre-identified activities, the questionnaire on changes arising from the interventions produced a list defined by each participant (and their friends and family).

The Alexander Technique use questionnaire was completed by the Alexander Technique group only. It is a single sheet with seven questions about use of the Alexander Technique at six-month follow-up.

Statistical analyses

The pre-intervention questionnaires were issued 3–10 days before interventions started. The post-

intervention questionnaires were issued two to three days after the last intervention. The data were entered onto disk by the Applied Statistics Unit at Kent University using the SPSS data entry module. The first entry printout was checked, item by item, by a second person. A third person in the Unit checked discrepancies and corrected SPSS data sets.

This trial was designed to validate the results of the preliminary study in which all mean changes had been positive. Improvements from Alexander Technique lessons had been statistically significant at $p \leq 0.05$ on SPDDS at best, SPDDS at worst, the BDI, and a body concept questionnaire (for torticollis), similar to the Attitudes to Self Scale in this trial; hence the assumption of deviation from the null hypothesis in a specified direction and the use of one-tailed tests for the comparative analyses of the Alexander Technique and no additional intervention groups.^{17,18} For consistency of interpretation, one-tailed tests were also used for Alexander Technique compared with massage and massage compared with no additional intervention. Confidence interval limits were set at 95%, but in keeping with the arguments for one-tailed tests they were allowed to be noncentral in cases where the results were significant, all but one occurring in comparisons between the Alexander Technique group and the no additional intervention group.

Statistical significance in this trial was set at $p \leq 0.05$. The data were analysed using SPSS version 8. Specific techniques used included: reliability analysis, normal plots and tests for normality of differences, *t*-tests and analysis of variance, multiple regression, logistic regression, log-linear modelling and contingency table analysis.

Qualitative data from the questionnaire on changes arising from interventions were analysed by an independent researcher with a postgraduate degree in complementary therapies and training in qualitative methods, but no personal identification with massage or the Alexander Technique. The handwritten responses to the open-ended question were typed onto proformas from which she carried out an interim classification of comments which she coded,¹⁹ and then a final classification²⁰ in which additional categories

were added to reduce the interpretative element in grouping together similar but not identical responses. Patient identity was by numerical code instead of patient name to preserve confidentiality. The intervention itself, however, was usually clear from the responses. She then coded the individual responses.

Allocation concealment, masking of the research staff, masking of participants and separation of research functions

The randomization was performed by an independent statistician and group identity of participants was concealed from the research staff who performed the data collection and analysis. Allocation between the Alexander Technique and the no additional intervention groups was not concealed from the patients: it was felt unethical to ask patients to attend for 24 mock Alexander Technique lessons. However, to minimize bias due to participants trying to 'please' the research team, the trial was consistently presented as equally about both interventions. This included the wording in a special letterhead produced for use in all trial correspondence with participants and research personnel, internal and external, on all documentation such as the GP and participant information sheets and the consent form, and, on all advertising for volunteers and publicity in the press, including one article in *The Times*, London,²¹ from which nearly one-third of the sample were recruited.

The Alexander Technique teachers and the masseuses knew the names of the people in their intervention group, but had no part in their recruitment or randomization, or in the organization of data collection or its analyses. Transference of data from questionnaires to disk was performed by the Applied Statistics Research Unit at Kent University, working from questionnaires identified by unique codes, under instruction from an independent statistician who had no earlier involvement in the trial.

Research protocol variation

In the massage group, the first two cohorts (see 'Sample' above) comprising 19 participants, in addition to the range of massage in the protocol, were given advice on posture, relaxation techniques and encouragement to perform some sim-

ple repetitive physical exercises (wrist, neck, face) to improve mobility.

Detailed data on dosage and drug changes were collected at each test: name of drug, tablets in milligrams, and number of tablets or total milligrams per 24 hours, as part of the basic research design, to check whether change was occurring. An unexpected number of participants in the first cohort reported medication change, post-intervention. In order to understand what these figures meant additional information was required. Hence a medication change questionnaire was introduced (retrospectively for the first cohort), at each test. It included questions on reasons for the change, whether symptoms had worsened and whether the participants had visited their Parkinson's disease consultant or GP about Parkinson's disease.

Results

Attendance rates for the interventions were good: 99% (23.8 lessons) for the Alexander Technique and 97% (23.3 sessions) for massage. High attendance in both groups seems to have been partly due to a desire to support the trial for the benefit of the whole Parkinson's disease population.

Compliance was also high. Since the therapeutic massage practitioners were trained to massage people who are injured or ill, reduced participant compliance due to feelings of depression or pain was not an issue. Compliance in the Alexander Technique lessons, in the sense of commitment to learning, varied, as always. And there were a few participants in the Alexander Technique group who were restricted by joint pain from completing some basic learning procedures.

The randomization procedure produced a finely tuned balance for severity of disease within the subgroup of scores 25–28 on the SPDDS at best, pre-intervention: the numbers at the ceiling (25) and close to the ceiling (26 and 27) were each similar across all groups, further reducing the possibility of distortion in comparisons of change in group means.

Main hypothesis: main outcome measure

Pre-intervention to post-intervention, the Alexander Technique group improved compared with the no additional interventions group (see Table 4) on both the SPDDS at best, $p = 0.04$ (CI -6.4 to 0.0) and on the SPDDS at worst, $p = 0.01$ (CI -11.5 to -1.8). The comparative improvements were maintained at the end of the six-month follow-up: on SPDDS at best $p = 0.04$ (CI -7.7 to 0.0) and on SPDDS at worst $p = 0.01$ (CI -1.8 to -0.9). The mean scores of both groups (see Table 2) had declined at the six-month follow-up, but while the mean scores of the Alexander Technique group remained more positive than at the start, the mean scores of the no additional intervention group registered deterioration since pre-intervention. The sample size criterion of a mean change of three points in the Alexander Technique group on the SPDDS at best was not achieved; on the SPDDS at worst it was exceeded.

Main hypothesis: other outcome measures

Post-intervention, in response to the open-ended question about changes arising from the interventions, (see Table 6) the Alexander Technique group made 59 mentions of improvement in particular actions – for example, 14 participants (48%) mentioned walking and 11 (38%) mentioned speech – and 89 mentions of other physical benefits such as improved posture or balance mentioned by 17 participants (59%), greater energy or less tired by nine (31%), reduced tremor by eight (28%) and reduced rigidity or reduced muscle tension also by eight participants. Improvements to the emotional impact of progressive disability included reduced stress and panic or greater composure mentioned by 10 participants (35%) and improved self-confidence mentioned by eight participants (28%).

Post-intervention, the Alexander Technique group compared with the no additional intervention group (see Table 4) felt significantly better: on the BDI ($p = 0.03$), and at the six-month follow-up on the Attitudes to Self Scale ($p = 0.04$). The results were positive, but not statistically significant for the Attitudes to Self Scale post-intervention ($p = 0.07$) and the BDI at the six-month follow-up ($p = 0.17$). Post-intervention, the Alexander Technique group had a mean

Table 2 Mean scores^a for SPDDS at best, SPDDS at worst, Attitudes to Self Scale and BDI for the three groups, at pre-intervention, post-intervention and 6-month follow-up

	Pre-intervention		Post-intervention		Follow-up	
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)
SPDDS at best						
Alexander Technique	29	33.3 (8.7)	29	31.0 (7.9)	28	32.0 (10.5)
Massage	29	33.9 (11.2)	29	32.8 (9.1)	28	35.1 (10.8)
No additional intervention	30	32.0 (7.8)	30	32.5 (9.4)	27	33.7 (9.5)
SPDDS at worst						
Alexander Technique	29	47.3 (14.8)	29	42.4 (12.3)	28	44.7 (16.0)
Massage	29	49.0 (18.5)	29	47.9 (16.2)	28	54.0 (19.3)
No additional intervention	30	46.4 (13.8)	30	48.1 (17.2)	26	47.5 (14.3)
Attitudes to Self						
Alexander Technique	29	34.9 (14.3)	29	29.8 (15.2)	28	32.2 (14.8)
Massage	29	32.0 (16.5)	29	31.9 (16.1)	29	35.7 (16.8)
No additional intervention	30	31.6 (18.5)	30	30.1 (15.8)	27	34.1 (15.2)
Depression (BDI)						
Alexander Technique	29	9.9 (5.8)	29	8.0 (5.1)	28	9.2 (7.1)
Massage	29	11.9 (6.4)	29	10.2 (5.6)	28	10.1 (5.7)
No additional intervention	29	8.7 (6.1)	30	8.9 (6.7)	27	9.0 (5.9)

^aLower scores represent more positive response.

SPDDS, Self-assessment Parkinson's Disease Disability Scale; BDI, Beck Depression Inventory.

Table 3 Mean changes in score^a for SPDDS at best, SPDDS at worst, Attitudes to Self Scale and BDI for the three groups, pre- to post-intervention and pre-intervention to six-month follow-up

	Pre- to post-intervention		Pre-intervention to follow-up	
	<i>n</i>	Mean change (SD)	<i>n</i>	Mean change (SD)
SPDDS at best				
Alexander Technique	29	-2.3 (5.68)	28	-1.3 (6.39)
Massage	29	-1.1 (7.78)	28	1.0 (7.89)
No additional intervention	30	0.4 (6.13)	27	2.2 (7.58)
SPDDS at worst				
Alexander Technique	29	-5.0 (10.43)	28	-3.2 (7.84)
Massage	29	-1.1 (9.70)	28	7.0 (12.65)
No additional intervention	30	1.7 (8.18)	26	3.1 (11.93)
Attitudes to Self				
Alexander Technique	29	-5.1 (9.77)	28	-2.6 (12.52)
Massage	29	-0.1 (14.46)	29	3.7 (13.98)
No additional intervention	30	-1.6 (8.21)	27	2.9 (11.04)
BDI				
Alexander Technique	29	-1.9 (2.96)	28	-0.9 (3.37)
Massage	29	-1.7 (4.49)	28	-1.3 (4.22)
No additional intervention	29	-0.2 (4.12)	26	-0.1 (3.09)

^aNegative scores represent improvement.

SPDDS, Self-assessment Parkinson's Disease Disability Scale; BDI, Beck Depression Inventory.

improvement (see Table 3) of -5.1 points on the Attitudes to Self Scale compared with only -1.6 for the no additional intervention group. At the six-month follow-up the mean improvement for the Alexander Technique group was -2.6 points compared with a deterioration of +2.9 for the no additional interventions group, a statistically significant difference ($p = 0.04$). On the BDI the changes (see Table 3), pre- to post-intervention,

were -1.9 for the Alexander Technique group and -0.2 for the no additional intervention group; pre-intervention to the six-month follow-up they were +0.9 and -0.1 respectively.

One person in the Alexander Technique group changed their Parkinson's disease medication (see Table 5) between the pre-intervention and post-intervention tests, and seven people in the no additional intervention group. During the six-

Table 4 Comparison of mean changes on SPDDS at best, SPDDS at worst, Attitudes to Self Scale and BDI for the three groups, pre- to post-intervention and pre-intervention to six-month follow-up

	Pre- to post-intervention			Pre-intervention to follow-up				
	Difference in mean ^a	95% confidence interval ^b	p -value ^c	Difference in mean ^a	95% confidence interval ^b	p -value ^c		
Alexander Technique compared with no additional intervention								
SPDDS at best	-2.7	-6.4	0.0	0.0402	-3.5	-7.7	0.0	0.0359
SPDDS at worst	-6.6	-11.5	-1.8	0.0043	-6.3	-11.8	-0.9	0.0121
Attitudes to Self	-3.5	-8.2	1.2	0.0706	-5.5	-13.9	0.0	0.0443
BDI	-1.8	-3.8	0.0	0.0335	-0.9	-2.6	0.9	0.1687
Alexander Technique compared with massage								
SPDDS at best	-1.2	-4.8	2.4	0.2575	-2.3	-6.1	1.6	0.1194
SPDDS at worst	-3.9	-9.2	1.4	0.0731	-10.2	-15.9	-4.6	0.0003
Attitudes to Self	-5.0	-11.5	1.5	0.0642	-6.3	-14.6	0.0	0.0387
BDI	-0.3	-2.3	1.7	0.3917	0.4	-1.7	2.4	0.6492
Massage compared with no additional intervention								
SPDDS at best	-1.6	-5.2	2.1	0.1959	-1.2	-5.4	3.0	0.2864
SPDDS at worst	-2.7	-7.4	1.9	0.1229	3.9	-2.8	10.6	0.8741
Attitudes to Self	1.5	-4.6	7.6	0.6875	0.8	-6.0	7.6	0.5931
BDI	-1.5	-3.7	0.8	0.0976	-1.2	-3.3	0.8	0.1118

^aNegative values indicate greater comparative improvement.

^bConfidence intervals may be non-central, in keeping with one-tailed tests.

^c p -values correspond to one-sided alternatives (see text).

SPDDS, Self-assessment Parkinson's Disease Disability Scale; BDI, Beck Depression Inventory.

Table 5 Numbers of participants changing medication between pre-intervention (t_1) and post-intervention (t_2) and pre-intervention and follow-up (t_3), number without medication change (t_1 - t_3) and number with worsening symptoms (t_2 - t_3) by group

Group	n	Participants changing medication ^a		Participants without medication change	Participants with worsening symptoms
		t_1 - t_2	t_2 - t_3	t_1 - t_3	t_2 - t_3
Alexander Technique	28	1	4	24	7
Massage	27	4	12	14	7
No additional intervention	27	7	12	12	6

^aIn some cases the same participant changed their medication t_1 - t_2 and t_2 - t_3 .

Table 6 Changes mentioned by five or more participants in response to the questionnaire on changes arising from the interventions, post-intervention: the Alexander Technique group and the massage group

Changes	Number of mentions	
	Alexander Technique (n = 29)	Massage (n = 29)
More people in the Alexander Technique group		
Posture or balance improved	17	2
Coping ability increased or new coping strategy	15	4
Walking improved	14	1
More positive or hopeful or better able to accept condition	12	4
Speech improved	11	1
Stress reduced or panic reduced or more composed	10	2
Energy increased or tiredness reduced or more alert	9	2
Tremor ameliorated	8	2
Rigidity reduced or muscle tension reduced	8	1
Sitting improved	8	1
Awareness of body improved	8	0
More self-confidence	8	0
Facial expression improved	6	0
General mobility improved	6	2
Better in crowds or at social events or going out	5	0
Similar number of people in the Alexander Technique group and the massage group		
Less pain	7	6
Therapists' counselling or caring was beneficial	5	5
More people in the massage group		
Relaxation beneficial	7	12
Sense of well-being or therapy generally beneficial	4	10
Less stiffness or less cramping or more supple	1	6
Therapy enjoyable in itself	1	5

month follow-up the figures were four and 12 people respectively. Twenty-four people in the Alexander Technique group did not change their medication during the whole nine months compared with 12 in each of the other two groups. This did not appear to be due to 'loyalty' since a smaller percentage of the no-change subjects in the Alexander Technique group had worsening symptoms (29%) during the six-month follow-up than in the other two groups (50%).

Secondary hypothesis

Comparative change in the massage group and the no additional intervention group, as measured on the SPDDS at best and SPDDS at worst, showed no statistical significance in the differences, either immediately post-intervention or at the six-month follow-up. Nor were there any significantly positive comparative

changes for the BDI or Attitudes to Self Scale (see Table 4).

On the BDI however, the mean changes of the massage group (see Table 3) were not only positive pre- to post-intervention (-1.7) and post-intervention to the six-month follow-up (-1.3), but close to the changes in the Alexander Technique group, (-1.9 and -0.9 respectively). The mean scores of the no additional intervention group, on the other hand, barely changed pre- to post-intervention (-0.2) and pre-intervention to the six-month follow-up (-0.1).

But on the Attitudes to Self Scale the massage group results contrasted with those of the Alexander Technique group. They showed (see Table 3) little change post-intervention (-0.1) and worsening at six-month follow-up (+3.7) and were relatively close to the no additional intervention group mean changes of -1.6 and +2.9. In

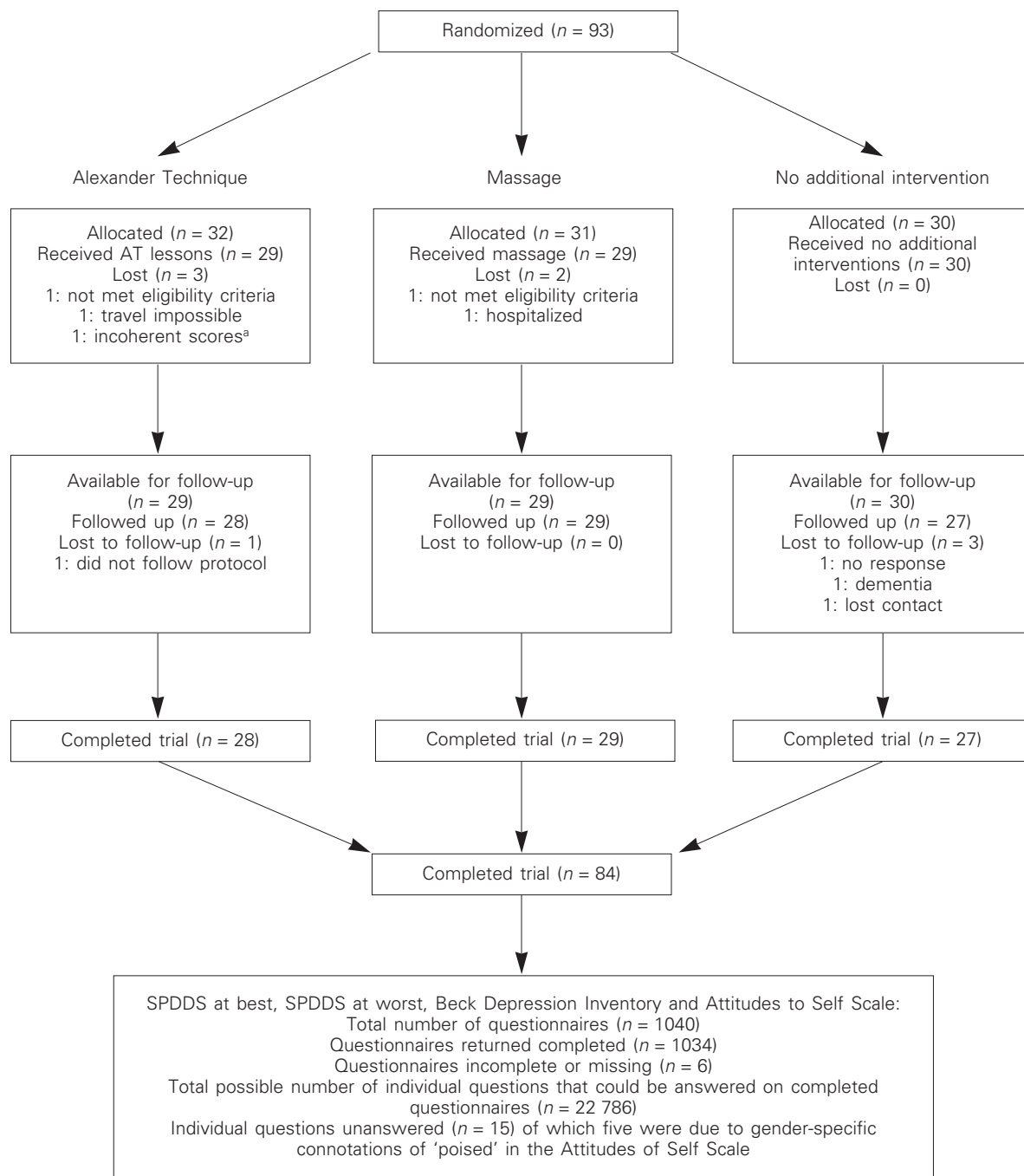


Figure 1 Recruitment of participants and progress through the trial. ^aThe data were screened for anomalies and a change of 42 points was found between pre- and post-intervention on SPDDs. Its p -value on the Bonferroni co-variate-adjusted outlier test was 0.0004. This was considered incoherent and the participant excluded from the study. All remaining data ($n = 28$) were approximately normally distributed.

contrast the Alexander Technique group mean scores showed improvement over both periods (-5.1 and -2.6).

The items with the highest number of mentions by the massage group, in response to the questionnaire on changes arising from the interventions (see Table 6) were relaxation with 12 mentions (41%) and a sense of well-being or general benefit with 10 mentions (35%). The massage group made only eight mentions of improvement from massage in specific physical actions compared with 59 mentions in the Alexander Technique group. The massage group made 17 mentions of more general physical improvements compared with 89 such mentions from the Alexander Technique group.

Nineteen out of 28 in the Alexander Technique group replied 'a great deal of help' or 'quite a lot of help' to the question in the Alexander Technique use questionnaire, at the six-month follow-up, 'How much, if at all, does the Alexander Technique still help in the management of disability?' Nine replied 'not much help.' No-one replied 'no use at all'.

Pre- to post-intervention, medication change (see Table 5) in the massage group was lower than in the no additional intervention group (four participants compared with seven) but higher than in the Alexander Technique group (four participants compared with one). During the six-month follow-up, there were 12 people each in the massage and no additional intervention groups who changed their Parkinson's disease medication and four in the Alexander Technique group. The rate of medication change in the Alexander Technique group was statistically significantly lower than in the other two groups, at $p = 0.001$, (chi-squared 10.936, d.f. = 1). Fewer participants in the Alexander Technique group changed their medication and yet were not experiencing worsening symptoms, at $p = 0.047$, (chi-squared 3.939, d.f. = 1).

Discussion

Although the sample is not large and the changes in the Alexander Technique group on the SPDDs are not large either (although statistically significant), the reliability of the results is

Clinical messages

- A relatively small number of lessons in the Alexander Technique leads to sustained benefits in patients with idiopathic Parkinson's disease.
- The sustained benefits are mainly due to acquiring the ability to apply Alexander Technique skills in daily life.
- Touch and attention alone do not lead to sustained benefits.

strengthened by the consistently positive direction of results across a range of outcome measures and by certain research features.

The four categories and 13 subcategories used to balance the groups at randomization appear to have been well chosen. For instance, in the subcategory of severity of illness, SPDDs at best scores 25–28, the distribution of scores 25, 26, 27 and 28 were also balanced among the Alexander Technique, massage and no additional intervention groups. This may have been assisted by the other three categories of age, gender and duration comprising nine subcategories.

Patient eligibility was double-checked at pre-intervention interview by different research staff, making it unlikely that other neurological medication or other physical therapies, or depression would be confounding factors. The Alexander Technique and massage interventions were made as similar as possible with respect to length, frequency, place, therapists and data collection on the impact. Lack of drop-out by those who were less enthusiastic about the intervention to which they had been allocated or found the Alexander Technique difficult, and almost 100% return of questionnaires, helps to ensure that the data are reliable and not biased towards those who responded well to the interventions.

Impact was measured in two different ways: open-ended questions and published rating scales. The content of the four self-report rating scales were almost without overlap – even the BDI and the Attitudes to Self Scale – and so each added distinct information about the impact of the interventions.

Finally, some participants had painful joint

problems such that they could not sit or stand for more than several minutes before their concentration was broken by the discomfort. This made it more difficult for them to learn the Alexander Technique. On the other hand, it made the sample more inclusive, i.e. more representative of the total Parkinson's disease population.

Clinical importance of change measured by SPDDS

Clinical importance of the main outcome measures is not guaranteed by statistical significance with the threshold at $p \leq 0.05$.²² In the absence of formal discussion of the responsiveness of the SPDDS, it was the secondary outcome measures collectively which provided evidence that the point changes of the Alexander Technique group, on the SPDDS at best and on the SPDDS at worst, represented clinically important improvement.

Unexpected evidence of the clinical importance of the benefits was the apparent impact on the incidence of medication change. First, the incidence of changes made by participants in order to improve symptoms or reduce adverse side-effects was strikingly lower in the Alexander Technique group compared with both the two other groups. Second, the differential deferment of change did not seem to be due to a 'loyalty' factor since the rate of worsening symptoms among those who did not change their medication was much lower rather than much higher in the Alexander Technique group.

The explicit and wide range of responses from the Alexander Technique group to the questionnaire on changes arising from the interventions provided confirmation of the main benefits being improvement in some of the items on the SPDDS list, such as walking. But it also provided evidence of improvement in other important activity such as facial expression and speech and a reduction in general physical symptoms such as tiredness, rigidity, tremor and poor posture.

There was also evidence from the questionnaire on changes arising from the interventions, the Attitudes to Self Scale and the BDI that the learning and application of Alexander Technique skills reduced some of the emotional symptoms of Parkinson's disease such as apathy, feelings of

helplessness, loss of confidence and depression, which may all affect a person's ability to manage disability.

To what extent were the benefits due to learnt Alexander Technique skills rather than the therapeutic contact between therapist and patient during lessons?

Personal attention and hand contact may have had a therapeutic effect on depression, as shown by the BDI results, in both the Alexander Technique and massage groups. The apparent tailing off of this improvement over the six-month follow-up period when there were no Alexander Technique lessons or massage sessions supports this possibility. But the Alexander Technique group improved so much more than the massage group on the SPDDS at best, the SPDDS at worst, the Attitudes to Self Scale and the questionnaire on changes arising from the interventions, that the beneficial effect of the Alexander Technique on the management of disability must be due to other features of the Alexander Technique intervention than personal attention and hand contact.

The continued comparative improvement of the Alexander Technique group at six-month follow-up (on the SPDDS at best, the SPDDS at worst, the BDI and the Attitudes to Self Scale) also suggests the benefit could be partly due to the continued application of learnt skills. The comparatively high number of mentions of improved self-confidence in the questionnaire on changes arising from the interventions (eight compared with none in the massage group) and reduced panic and stress (10 compared with two in the massage group) are also consistent with the emotional impact of successfully acquiring new coping skills.

Most people acquire the habit of focusing on the direct control of muscular effort in order to stand, sit and move. The Alexander Technique provides a different mental approach, which appears to facilitate the activity of brainstem mechanisms that control the automatic adjustment of postural support. It leads to less effort in moving, probably due to improved balance and reduced overall tension. Hence its effectiveness for Parkinson's disease, in which symptoms combine to make movement more of an effort. There

is no research-based evidence at present to explain the mechanism of how the Alexander Technique works.

Comments and shortcomings

A progressive disease, managed by frequent adaptations of drug regime, can make measurement of an additional intervention hard to organize logistically. In this trial the interventions were squeezed into three months as this was considered the ethical length of time to ask participants to refrain from medication change. This meant, however, that some participants became very tired from the travelling; it also prevented Alexander Technique teachers from pacing the frequency of lessons to suit the individual (commonly, closer to once a week than twice).

The protocol variation experienced by 19 participants in the massage group does not affect the role of the massage group as a control for touch and personal attention in Alexander Technique lessons; nor does it affect the comparisons between the Alexander Technique group and the no additional intervention group on SPDDS at best, SPDDS at worst, the Attitudes to Self Scale and the BDI. Hence it does not weaken the main findings. It is with respect to the secondary hypothesis, in one of the secondary outcome measures (changes arising from the interventions), that, as a consequence, the results probably understate difference between Alexander Technique and massage.

We conclude that the positive results for the Alexander Technique group across several measures, including the most accurate type of measure of disability (self-rated) for Parkinson's disease (the SPDDS) show that it is likely to benefit most moderately mobile, nondemented people with Parkinson's disease who are interested in a technique for self-help. There was also evidence that the benefit was due to Alexander Technique-specific factors such as the application of learnt skills.

The possibility that the Alexander Technique could slow the rate of dose increase in levodopa-replacement drugs, or help the patient delay uptake, is worth further research, as are the indications that the Alexander Technique can help with facial expression, speech, and the management of tremor.

The findings justify further research with a sample large enough to produce results that could inform multidisciplinary approaches to treatment programmes. Using the same research protocol would allow the cost-effective possibility of aggregating the results from this study with results from further cohorts, in different locations.

Acknowledgements

We gratefully acknowledge funding support for this trial from the Foundation for Integrated Medicine, the Parkinson's Disease Society, Remedi (for the relief of disability) and the University of Westminster. We thank Peter Bain, Richard Brown, Peter Davies, Margaret Eames, Leslie Henderson, Andrew Lees, Kirsten Turner, Derick Wade, and the Research Committee of FIM, for advice on aspects of the design; Margaret Eames for supervising and Sheena Somerville for performing the randomization; Hal Andrews and Caroline Miller for Polyclinic organization; Christine Frank for qualitative data analysis; Sarah Heritage for carrying out the statistical analyses under supervision of CC; Julia Stallibrass, Kathleen Ballard and Katherine Deane for help with writing this paper; the team of volunteers who worked as research assistants and Polyclinic receptionists for PS, and, most important of all, the people with Parkinson's disease who participated.

Contributions of authors

CS designed the protocol, obtained the funding, was principal investigator, and wrote the paper. PS organized all aspects of recruitment, questionnaires and clinical tests and research management. CC advised on statistical method and was responsible for all the analysis and interpretation of statistical results in the paper.

Competing interests

CS was the principal Alexander teacher but otherwise had no contact with participants. The research manager and her assistants, two independent statisticians and the Applied Statistics Unit at Kent University were responsible for recruitment, randomization, collection of the data, its input onto disk and its analysis. Massage and Alexander Technique interventions were

conducted to the same timetable, in the same clinic.

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