Annals of Internal Medicine ORIGINAL RESEARCH

# Alexander Technique Lessons or Acupuncture Sessions for Persons With Chronic Neck Pain

## A Randomized Trial

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**Background:** Management of chronic neck pain may benefit from additional active self-care–oriented approaches.

**Objective:** To evaluate clinical effectiveness of Alexander Technique lessons or acupuncture versus usual care for persons with chronic, nonspecific neck pain.

**Design:** Three-group randomized, controlled trial. (Current Controlled Trials: ISRCTN15186354)

**Setting:** U.K. primary care.

**Participants:** Persons with neck pain lasting at least 3 months, a score of at least 28% on the Northwick Park Questionnaire (NPQ) for neck pain and associated disability, and no serious underlying pathology.

**Intervention:** 12 acupuncture sessions or 20 one-to-one Alexander lessons (both 600 minutes total) plus usual care versus usual care alone.

**Measurements:** NPQ score (primary outcome) at 0, 3, 6, and 12 months (primary end point) and Chronic Pain Self-Efficacy Scale score, quality of life, and adverse events (secondary outcomes).

**Results:** 517 patients were recruited, and the median duration of neck pain was 6 years. Mean attendance was 10 acupuncture sessions and 14 Alexander lessons. Between-group reductions in NPQ score at 12 months versus usual care were 3.92 percentage points for acupuncture (95% CI, 0.97 to 6.87 percentage points) ($P = 0.009$) and 3.79 percentage points for Alexander lessons (CI, 0.91 to 6.66 percentage points) ($P = 0.010$). The 12-month reductions in NPQ score from baseline were 32% for acupuncture and 31% for Alexander lessons. Participant self-efficacy improved for both interventions versus usual care at 6 months ($P < 0.001$) and was significantly associated ($P < 0.001$) with 12-month NPQ score reductions (acupuncture, 3.34 percentage points [CI, 2.31 to 4.38 percentage points]; Alexander lessons, 3.33 percentage points [CI, 2.22 to 4.44 percentage points]). No reported serious adverse events were considered probably or definitely related to either intervention.

**Limitation:** Practitioners belonged to the 2 main U.K.-based professional associations, which may limit generalizability of the findings.

**Conclusion:** Acupuncture sessions and Alexander Technique lessons both led to significant reductions in neck pain and associated disability compared with usual care at 12 months. Enhanced self-efficacy may partially explain why longer-term benefits were sustained.

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Neck pain is a leading cause of disability globally (1), and management of chronic neck pain is complex (2). Persons with this condition often seek complementary health care (3, 4), such as acupuncture or Alexander Technique lessons, but evidence is lacking on long-term health outcomes.

Acupuncture is based on insertion of needles, with longer-term effects associated with additional components specific to acupuncture theory, such as diagnosis-based lifestyle advice (5–7). A previous trial found significant benefits of acupuncture for low back pain at 24 months after a course of 10 sessions (8). Acupuncture is recommended by such organizations as the U.K. National Institute for Health and Care Excellence as a referral option for chronic back pain (9) and headache (10), and it has been found to be effective for chronic neck pain when administered over 3 months (11).

The Alexander Technique is a taught method of self-care that helps people to enhance their control of reaction and improve their way of going about everyday activities (their "manner of use") (**Appendix 1**, available at www.annals.org). Benefits depend on the reduction of habits associated with poor posture, excessive muscle tension, malcoordination, stress, or pain. The Alexander skills and underlying knowledge are usually taught one-to-one through integrated didactic and hands-on implicit guidance. Health outcomes (12), such as significant long-term reductions in chronic low back pain (13), may be explained by improvements in general coordination, motor control, and balance resulting from facilitation of postural tone regulation and adaptability (14–17).

In this article, we report outcomes over 1 year from a randomized, controlled trial of acupuncture or Alexander Technique lessons versus usual care for persons with chronic, nonspecific neck pain. The study design was appropriate for evaluating the effectiveness of in-

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Summary for Patients . . . . . I-30

**EDITORS' NOTES**

***Context***

Neck pain is a leading cause of disability. Persons with chronic neck pain often use acupuncture or the Alexander Technique and related self-care strategies for management of their condition. Evidence on the long-term effects of these approaches is lacking.

***Contribution***

Patients were randomly assigned to 12 acupuncture sessions or 20 one-to-one Alexander Technique lessons with equivalent overall contact time. The primary study outcome was neck pain, as assessed by the Northwick Park Questionnaire at 0, 3, 6, and 12 months.

***Caution***

The sample was predominantly white.

***Implication***

Acupuncture and Alexander Technique lessons were both associated with a significant reduction in neck pain at 12 months compared with usual care.

terventions that involve active intervention-specific self-care focused toward longer-term change.

## METHODS

### Trial Design

The ATLAS (Alexander Technique Lessons or Acupuncture Sessions) study was a 3-group, parallel-group, open, pragmatic, randomized, controlled trial with 1:1:1 allocation that was designed to assess acupuncture and usual care, Alexander lessons plus usual care, or usual care alone for persons with chronic, nonspecific neck pain. The trial was informed by a pilot study (18) and followed a published protocol (19), which was amended to aid recruitment by changing the initial exclusion criterion of "patients who had received acupuncture in the previous 2 years" to "patients currently receiving acupuncture for neck pain." Written informed consent was obtained from all participants, and ethical approval was obtained from the Leeds West Research Ethics Committee (11/YH/0402). Study funding began on 1 October 2011, the trial was registered at Current Controlled Trials (ISRCTN15186354) on 14 February 2012, and the first patient was recruited on 22 March 2012.

### Trial Participants

Our recruitment strategy targeted primary care patients who consulted their general practitioner (GP) for chronic neck pain. Potential participants were identified via screening of surgery databases using relevant Read codes (18). Patients aged 18 years or older were invited to participate if they had consulted their GP in the past 2 years (11 to 115 weeks previously). Primary care practices sent out invitation letters together with information leaflets, consent forms, and baseline questionnaires. Inclusion criteria were neck pain lasting at least 3 months and a score of at least 28% on the Northwick Park Questionnaire (NPQ) for neck pain and associated disability (20) (10 of 36 points for car drivers and 9 of 32 points for nondrivers) (21). Exclusion criteria are listed in Appendix Table 1 (available at www.annals.org) and included serious underlying pathology.

### Randomization

The York Trials Unit's secure randomization system allocated patients to the intervention groups, with varied block size dynamically generated depending on the number of patients allocated each week. Blocks could include patients from more than 1 practice. The randomization sequence was concealed and was generated with SQL Server, version 11 (Microsoft). Researchers were then informed of allocations, communicated them to participants and their GP practice, and arranged initial appointments with practitioners. Masking was not feasible because of the active self-care components that were specific to the interventions.

### Interventions

Participants randomly assigned to acupuncture were offered up to 12 fifty-minute sessions (600 minutes total) plus usual care. Acupuncturists were members of the British Acupuncture Council, and sessions were typically delivered once per week initially and once every 2 weeks later. Acupuncture practice was based on traditional Chinese medical theory, encompassing acupuncture-specific diagnostic explanations and related lifestyle advice (5–7). Participants randomly assigned to the Alexander Technique group were offered up to 20 one-to-one lessons of 30 minutes' duration (600 minutes total) plus usual care. Alexander teachers were members of the Society of Teachers of the Alexander Technique, and lessons were typically delivered weekly, with the option of being delivered twice per week initially and every 2 weeks later. Alexander teachers used verbal and hands-on guidance in line with usual practice and U.K.-based National Occupational Standards guidelines (22). All intervention sessions were intended to be delivered within 5 months (Appendix 1 and Appendix Table 2, available at www.annals.org, provide further details). Usual care consisted of general and neck pain–specific treatments routinely provided to primary care patients, such as prescribed medications and visits to physical therapists and other health care professionals.

### Outcome Measures

The primary outcome measure was the NPQ score (20), with the primary end point at 12 months. The score is presented as a percentage, with a higher score indicating greater pain and disability. Data on the NPQ were collected at baseline and by postal questionnaire at 3, 6, and 12 months.

Secondary outcome measures included current pain intensity (0 [no pain] to 8 [extreme pain]) collected by text message every other week for the first 6 months and monthly thereafter. The Short Form 12, version 2

(SF-12v2), and patient-reported self-efficacy were completed at baseline and at 6 and 12 months. Self-efficacy was determined by the 5-question pain management subscale of the Chronic Pain Self-Efficacy Scale (scored 0 to 8, with higher scores indicating better self-efficacy) (23). Preferences and expectations were elicited at baseline.

Adverse events were monitored and reported using the standard operating procedures of the York Trials Unit. Participants and practitioners were encouraged to report all events regardless of whether they were related to the intervention. The research team physician (I.W.) categorized adverse events as serious (defined as involving death, hospitalization, persistent disability, or a life-threatening risk) or nonserious.

## Statistical Analysis

### *Sample Size*

Sample size calculations were performed for a simple comparison of 2 groups. Previous pilot data on acupuncture for neck pain showed an SD of 16% for the NPQ primary end point, with a correlation between baseline and 3-month NPQ score of 0.69 (18). Using an arbitrarily defined clinical difference of 5 percentage points (effect size of 0.31) (24), 90% power, and an $\alpha$ of 5%, we determined that 113 participants were required in each group after adjustment for baseline values. Allowance for loss to follow-up was conservative at 30%. For 3 groups of equal size, a total sample of 500 participants was needed. We used an overall reduction in NPQ score of at least 25% from baseline as our definition of a clinically relevant response, based on the literature (25).

### *Primary Outcome Analysis*

All analyses were conducted in Stata, version 13 (StataCorp). The analyses retained all participants in the groups to which they were originally randomly assigned. No statistical comparisons were made between the acupuncture and Alexander groups because the trial was not powered for this. Assumptions were checked for all analyses, and no transformations or adjustments were required.

To conform to the journal's policy, our primary analysis used a repeated-measures mixed model (Stata *mixed* command) that included all randomly assigned participants (a change from our prespecified linear regression model) to more robustly address missing data. Missing data were assumed to be missing at random (MAR). Neck pain duration, age, sex, city, group, time (baseline and 3, 6, and 12 months), and indicators for the group-by-time interaction were included as fixed effects, and GP practice was included as a random effect. The prespecified primary time point was 12 months. Sensitivity analyses to assess departures from the MAR assumption were done by using a pattern mixture model, which included a parameter $\Delta$ to measure the degree of departure (Stata *rctmiss* user-written command) (26). The parameter $\Delta$ was the mean difference in NPQ score (adjusted for covariates) between unobserved and observed outcomes for each group. Two plausible parameter $\Delta$s (5 and 10) were used, and the following 3 scenarios of departures from the MAR assumption were explored: departures in all groups, in the intervention groups only, and in the usual care group only.

In a secondary analysis of the primary outcome measure, we used linear regression to compare NPQ scores between each intervention group and usual care at 12 months, with adjustments for baseline NPQ scores, neck pain duration, age, sex, and city as fixed effects and GP practice as a random effect using robust SEs (Stata *regress* command with *cluster* option). We used an additional secondary analysis to explore the effect of including baseline NPQ score as a baseline covariate (rather than as an outcome) and of excluding participants randomly assigned in error.

### *Adherence-Related Complier Average Causal Effect Analysis*

We performed a complier average causal effect (CACE) analysis to ascertain any relationship between outcome and adherence to the intervention by using an instrumental variable approach (Stata *ivregress* command; see Appendix 2, available at www.annals.org, for details) (27). Adherence was defined as attendance of at least 75% of the sessions.

### *Secondary Outcome Measures Analysis*

For the text message pain scores, means and 95% CIs for each response month were plotted by group. Effect sizes and 95% CIs expressed in units of residual SD were determined from a statistical comparison of pain scores (average area under the curve between 7 and 365 days after randomization) between each intervention group and usual care.

We used linear regression to analyze scores on the physical and mental components of the SF-12v2 at 6 and 12 months and self-efficacy at 6 months, with adjustment for baseline score, neck pain duration, age, sex, and city as fixed effects and GP practice as a random effect using robust SEs. We also used linear regression to explore associations between changes in self-efficacy over 6 months and changes in NPQ outcomes at 6 and 12 months. The outcome modeled was NPQ score; change in self-efficacy, baseline score, age, neck pain duration, sex, and city were included as fixed effects; and GP practice was included as a random effect using robust SEs. The Stata *regress* command with the *cluster* option was used for both of these analyses.

A cost-effectiveness analysis, a longitudinal qualitative substudy, further analysis of the text message pain scores, and more detailed descriptions of the interventions and potential mediators will be reported separately.

## Role of the Funding Source

Arthritis Research UK funded the trial, approved the design, and appointed the independent steering committee to oversee the study but had no role in the

collection, analysis, or interpretation of the data or the submission of the manuscript for publication.

## RESULTS

### Baseline Characteristics and Flow of Participants

Thirty-three general practices participated, and 1144 patients were screened (Figure 1). The most common reason for ineligibility was an NPQ score less than 28%. Between March 2012 and April 2013, a total of 517 patients were recruited (target $n$ = 500). After randomization, 8 participants were found to not meet all inclusion criteria but were included in the analyses (Figure 1). Participants were based at general practices in Leeds ($n$ = 205), Manchester ($n$ = 72), Sheffield ($n$ = 57), and York ($n$ = 183).

Participants were predominantly female (69%) and White British (90%), with a mean age of 53.2 years (SD, 13.8). Median duration of prior neck pain was 72 months (range, 5 to 600 months), and mean baseline NPQ score was 39.8% (SD, 11.1). Overall, baseline characteristics were well-balanced among the 3 groups (Table 1). The median duration of neck pain in the usual care group was higher than in the intervention groups, but this chance imbalance was controlled for analytically as an a priori covariate in the analysis. Baseline preferences and expectations are shown in Appendix Table 3 (available at www.annals.org).

### Interventions, Attendance, and Adherence

Eighteen acupuncturists and 18 Alexander teachers participated. The median number of participants was 7 (range, 2 to 22) per acupuncturist and 8 (range, 1 to 21) per Alexander teacher. Mean attendance was 10 of 12 sessions offered (median, 12 sessions) for acupuncture and 14 of 20 lessons offered (median, 20 lessons) for the Alexander Technique. In total, 72% (125 of 173) of allocated participants attended all 12 acupuncture sessions, and 60% (104 of 172) attended all 20 Alexander lessons; however, 6% and 12%, respectively, attended none (Appendix Figure 1, available at www.annals.org). Twenty percent of acupuncture participants and 9% of Alexander participants paid privately for additional sessions between months 6 and 12 (Appendix Table 4, available at www.annals.org). Appendix 1 and Appendix Table 2 provide details of the interventions. Usual care for neck pain comprised prescribed medication (received by 43% of patients over the first 6 months; Appendix Table 5, available at www.annals.org, provides a breakdown by trial group); visits to GPs (17%), nurses (0.3%), and physical therapists (9%) (Appendix Table 6, available at www.annals.org); outpatient hospital attendance (2%) (Appendix Table 7, available at www.annals.org); and private health care (Appendix Table 4). A total of 442 (85%) participants completed 12 months of follow-up (150 [87%] in the acupuncture group, 146 [85%] in the Alexander group, and 146 [85%] in the usual care group).

### Primary Outcome Measure Analysis

The raw data showed mean 12-month reductions in NPQ scores from baseline of 12.88 percentage points (32% overall reduction) for acupuncture and 12.24 percentage points (31%) for Alexander lessons compared with 9.21 percentage points (23%) for usual care (Figure 2 and Appendix Table 8, available at www.annals.org). In the primary analysis, with adjustment for prespecified covariates, reductions in NPQ score at the 12-month primary end point were larger compared with usual care for both acupuncture (3.92 percentage points [95% CI, 0.97 to 6.87 percentage points] [$P$ = 0.009]) and Alexander lessons (3.79 percentage points [CI, 0.91 to 6.66 percentage points] [$P$ = 0.010]) (Table 2). Significantly larger decreases in pain and associated disability also occurred in the intervention groups at months 3 and 6.

Sensitivity analyses showed that the results were robust to departures from the MAR assumption when the departures were similar in the intervention and usual care groups or occurred in the usual care group only. Results were more sensitive when departures occurred in an intervention group only and when the degree of departure was extreme (parameter $\Delta$ of 10) (Appendix Table 9, available at www.annals.org).

Results were similar in the 2 secondary analyses of the primary outcome measure (Table 3 and Appendix Table 10, available at www.annals.org).

### Adherence-Related CACE Analysis

Estimates of 12-month reductions in NPQ scores for participants who adhered to the intervention (143 of 173 in the acupuncture group and 115 of 172 in the Alexander group) were found to be larger than the primary estimates, showing a greater benefit of acupuncture and Alexander lessons among those who were adherent (details are provided in Appendix 2). Between-group reductions in 12-month NPQ score were 4.49 percentage points for acupuncture (CI, 1.62 to 7.35 percentage points) ($P$ = 0.003) and 4.83 percentage points for Alexander lessons (CI, 0.50 to 9.17 percentage points) ($P$ = 0.030).

### Secondary Outcome Measures

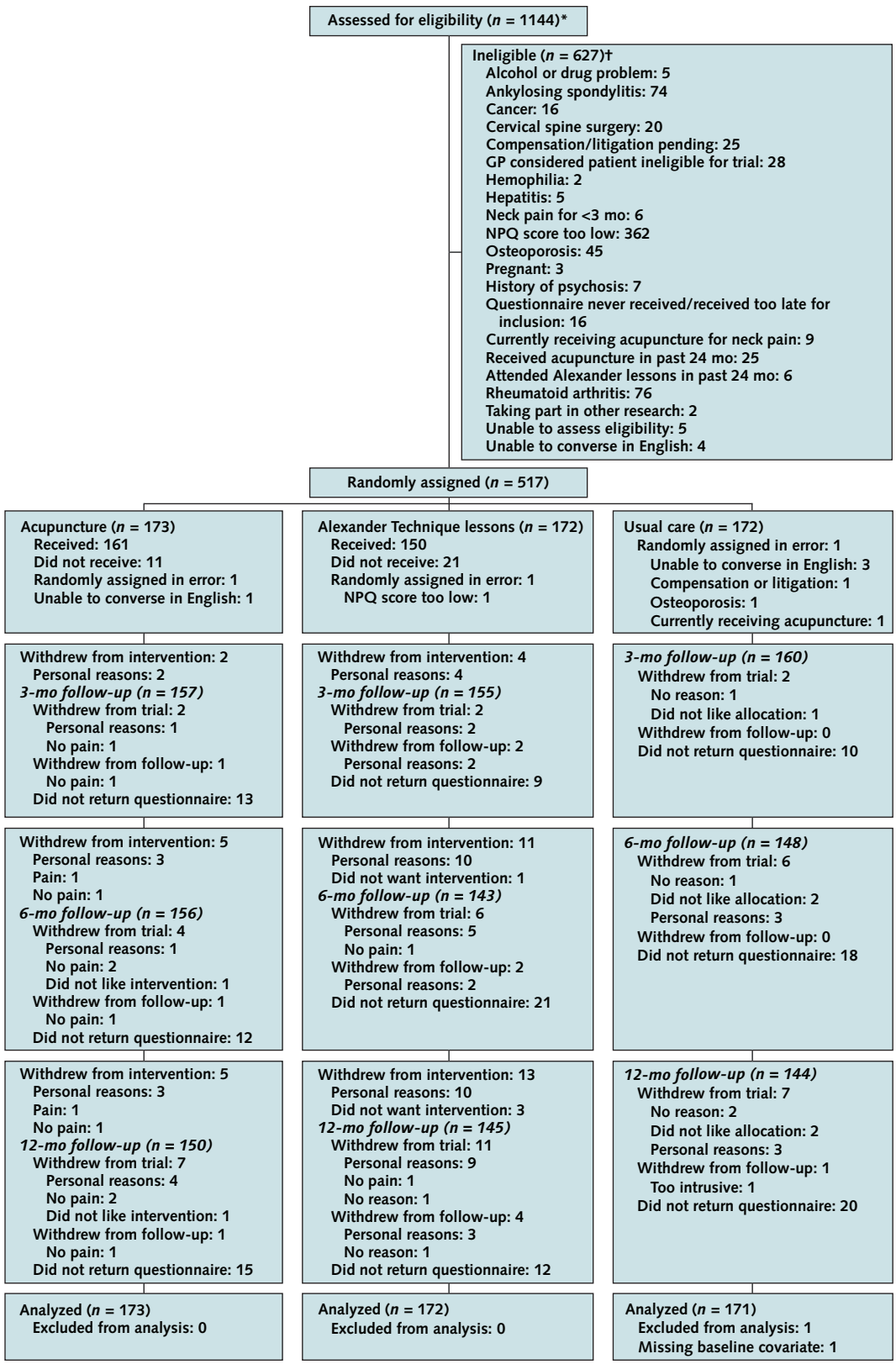
#### *Text Message Pain Scores*

Of the 517 participants, 365 (70.6%) consented to receive and send text messages; 347 returned pain ratings, with a median of 17 text messages per participant. Those who consented were, on average, 10 years younger, more likely to be working full-time, and less likely to be retired (Appendix Table 11, available at www.annals.org). Outcome trajectories are illustrated in Appendix Figure 2 (available at www.annals.org). Standard effects with acupuncture and Alexander lessons versus usual care alone were significant ($P$ < 0.001) and moderate in size (0.60 and 0.46, respectively).

#### *SF-12v2*

We found no significant differences between the interventions and usual care for the physical component score of the SF-12v2 at 6 or 12 months (acupunc-

***Figure 1.*** Study flow diagram.




GP = general practitioner; NPQ = Northwick Park Questionnaire.
* Includes 15 participants who were eligible after rescreening with the change in eligibility criteria (see Methods).
† Some patients met >1 criterion.

*Table 1.* Baseline Characteristics

| Characteristic | Acupuncture (*n* = 173) | Alexander Technique Lessons (*n* = 172) | Usual Care (*n* = 172) |
|---|---|---|---|
| **Mean age (SD), *y*** | 52.0 (13.8) | 53.6 (14.6) | 53.9 (13.0) |
| **Female, *n (%)*** | 119 (68.8) | 120 (69.8) | 118 (68.6) |
| **Ethnicity, *n (%)*** | | | |
| White British | 158 (92.9) | 151 (89.4) | 152 (88.9) |
| Indian | 2 (1.2) | 4 (2.4) | 3 (1.8) |
| Bangladeshi | 1 (0.6) | 0 | 0 |
| Pakistani | 0 | 4 (2.4) | 2 (1.2) |
| Chinese | 1 (0.6) | 1 (0.6) | 1 (0.6) |
| Afro-Caribbean | 1 (0.6) | 1 (0.6) | 0 |
| Other | 7 (4.1) | 8 (4.8) | 13 (7.6) |
| Missing | 3 | 3 | 1 |
| **Mean age at which left full-time education (SD), *y*** | 18.1 (4.7) | 18.2 (6.1) | 18.6 (6.0) |
| Missing, *n* | 14 | 8 | 8 |
| **Current paid employment, *n (%)*** | 105 (61.1) | 100 (59.2) | 106 (62.0) |
| Missing, *n* | 1 | 3 | 1 |
| **Median duration of neck pain (range), *mo*** | 60 (5–600) | 60 (6–540) | 96 (5–600) |
| Missing, *n* | 0 | 0 | 1 |
| **Neck pain worse with stress, *n (%)*** | 115 (66.5) | 108 (63.9) | 117 (69.2) |
| Missing, *n* | 0 | 3 | 3 |
| **Neck pain worse when tired, *n (%)*** | 125 (72.7) | 123 (71.9) | 127 (75.2) |
| Missing, *n* | 1 | 1 | 3 |
| **Reduced hours or stopped working due to neck pain, *n (%)*** | 15 (9.0) | 17 (10.6) | 19 (11.7) |
| Missing, *n* | 6 | 11 | 10 |
| **Outcome measures at baseline** | | | |
| Mean NPQ score (SD) | 39.64 (9.71) | 39.38 (11.91) | 40.46 (11.60) |
| SF-12v2 physical component | | | |
| Mean score (SD) | 39.99 (9.83) | 39.87 (9.75) | 40.98 (9.49) |
| Missing, *n* | 1 | 3 | 3 |
| SF-12v2 mental component | | | |
| Mean score (SD) | 45.07 (11.00) | 45.63 (12.22) | 46.59 (10.87) |
| Missing, *n* | 1 | 3 | 3 |
| Chronic Pain Self-Efficacy Scale | | | |
| Mean score (SD) | 4.11 (1.68) | 4.18 (1.53) | 4.17 (1.54) |
| Missing, *n* | 0 | 1 | 0 |

NPQ = Northwick Park Questionnaire; SF-12v2 = Short Form 12, version 2.

ture, 0.68 [CI, −1.08 to 2.44] [*P* = 0.44]; Alexander lessons, 0.38 [CI, −1.54 to 2.30] [*P* = 0.69]), or for the mental component score at 6 months. However, significantly larger improvements in the mental component score occurred in the intervention groups than in the usual care group at 12 months (acupuncture, 1.76 [CI, 0.15 to 3.37] [*P* = 0.033]; Alexander lessons, 2.12 [CI, 0.42 to 3.82] [*P* = 0.016]).

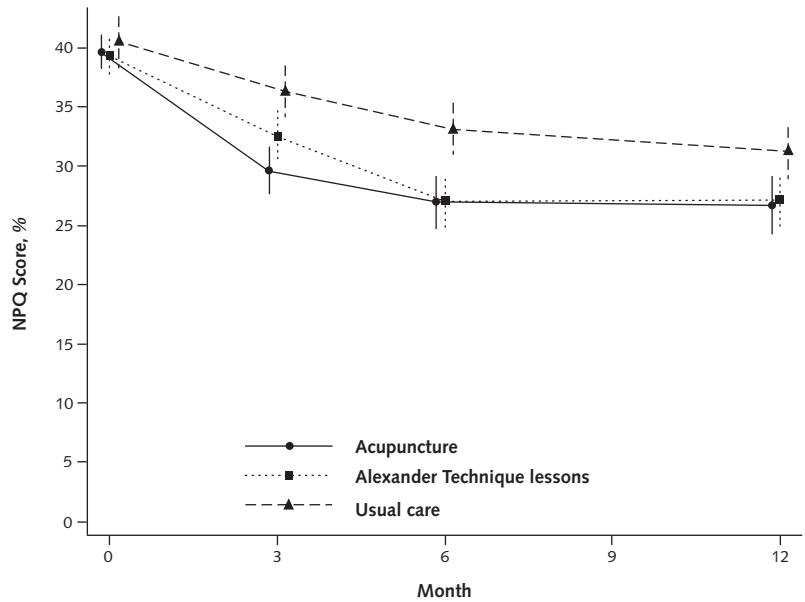
### *Self-Efficacy*

Increases in self-efficacy at 6 months were larger in both the acupuncture group (0.80 [CI, 0.46 to 1.15] [*P* < 0.001]) and the Alexander group (1.09 [CI, 0.63 to 1.55] [*P* < 0.001]) than in the usual care group. These increases were associated with significant reductions in pain and associated disability at 6 and 12 months for both interventions (Table 4). Analyses showed a concurrent lessening of intervention effects, highlighting the possibility that increase in self-efficacy was a mediator variable (Table 4).

## Adverse Events

During the trial, a total of 80 adverse events in 73 participants were reported. Thirty events (37%) were classified as serious, and 50 (63%) were classified as nonserious (Appendix Table 12, available at www.annals.org). No reported serious adverse events were considered probably or definitely related to either intervention. Serious or nonserious adverse events categorized as possibly related to acupuncture were bruising, swelling, or numbness; muscle spasms; pain; and respiratory problems. Pain and incapacity, knee injury, and muscle spasms were considered to be possibly related to Alexander lessons; pain and incapacity and complications after surgery were considered to be possibly related to usual care.

***Figure 2.*** Mean unadjusted NPQ scores and 95% CIs over time, by group.




| Participants, *n* | | | | |
|---|---|---|---|---|
| Acupuncture | 173 | 156 | 156 | 150 |
| Alexander Technique lessons | 172 | 153 | 143 | 145 |
| Usual care | 172 | 155 | 148 | 144 |

NPQ = Northwick Park Questionnaire.

## DISCUSSION

Allocation to acupuncture sessions or Alexander Technique lessons led to reductions in chronic neck pain and associated disability over 12 months compared with usual care. The maintenance of benefit from 6 months (when the interventions ended) to 12 months is notable given that the median duration of neck pain was 6 years. Clinical relevance is suggested by the within-group reductions in NPQ scores from baseline of 32% overall (12.88 percentage points) for acupuncture and 31% (12.24 percentage points) for Alexander lessons, both of which exceed the defined threshold of 25% (25). These results compare favorably with findings for physical therapy and exercise, which have typical reductions of up to 8 or 9 percentage points (28, 29). Of note, the differences in 12-month reduction in NPQ score of 3.92 percentage points for acupuncture and 3.79 percentage points for Alexander lessons (each compared with usual care) were less than the 5 percentage points used in the sample size calculation. Both interventions had a high rate of acceptability, and greater adherence was associated with better pain outcomes. Over time, each intervention resulted in a greater increase in self-efficacy than did usual care, and

***Table 2.*** Primary Analysis: Differences in Adjusted Mean NPQ Scores at 3, 6, and 12 mo*

| Variable | Intervention | Usual Care | Difference (95% CI), *percentage points* | *P* Value |
|---|---|---|---|---|
| **Acupuncture** | | | | |
| Participants, *n* | 173 | 171 | – | – |
| Mean NPQ score (95% CI), % | | | | |
| 3 mo | 37.23 (30.35 to 44.11) | 43.46 (35.40 to 51.52) | −6.22 (−8.75 to −3.70) | <0.001 |
| 6 mo | 35.35 (28.73 to 41.96) | 40.90 (32.94 to 48.87) | −5.56 (−8.33 to −2.78) | <0.001 |
| 12 mo (primary end point) | 37.07 (30.35 to 43.79) | 40.99 (33.01 to 48.96) | −3.92 (−6.87 to −0.97) | 0.009 |
| **Alexander Technique lessons** | | | | |
| Participants, *n* | 172 | 171 | – | – |
| Mean NPQ score (95% CI), % | | | | |
| 3 mo | 38.62 (31.62 to 45.61) | 42.22 (34.07 to 50.37) | −3.60 (−6.08 to −1.13) | 0.004 |
| 6 mo | 32.65 (25.92 to 39.38) | 37.64 (29.58 to 45.69) | −4.98 (−7.72 to −2.25) | <0.001 |
| 12 mo (primary end point) | 33.39 (26.73 to 40.05) | 37.18 (29.16 to 45.19) | −3.79 (−6.66 to −0.91) | 0.010 |

NPQ = Northwick Park Questionnaire.
* The analysis used a linear mixed model that included baseline NPQ score as an outcome measure. Data were assumed to be missing at random. The model was adjusted for group, time (baseline and 3, 6, and 12 mo), indicators for the group-by-time interaction, duration of neck pain, age, sex, and city as fixed effects and general practitioner practice as a random effect.

*Table 3.* Secondary Analysis: Differences in NPQ scores at 12 mo, Adjusted for Covariates*

| Variable | Intervention | Usual Care | Difference (95% CI), *percentage points* | *P* Value |
|---|---|---|---|---|
| **Acupuncture vs. usual care** | | | | |
| Participants, *n* | 150 | 143 | – | – |
| Mean NPQ score (SD), % | 26.76 (15.55) | 31.23 (14.86) | −4.05 (−6.70 to −1.41) | 0.004 |
| **Alexander Technique lessons vs. usual care** | | | | |
| Participants, *n* | 145 | 143 | – | – |
| Mean NPQ score (SD), % | 27.14 (15.87) | 31.23 (14.86) | −3.81 (−7.24 to −0.39) | 0.030 |

NPQ = Northwick Park Questionnaire.
* Linear regression was used for this analysis. Adjustments were made for baseline NPQ score, duration of neck pain, age, sex, and city as fixed effects and general practitioner practice as a random effect using robust SEs.

these improvements were associated with better NPQ outcomes. The SF-12v2 mental component scores at 12 months also improved for each intervention compared with usual care. The interventions seem to have favorable safety profiles, with no serious adverse events considered to be probably or definitely related to them.

Strengths of the ATLAS trial include the broad inclusion criteria, which ensured a representative population of patients with nonspecific chronic neck pain; the pragmatic study design, which allowed intervention delivery typical of routine practice; standardized adverse event monitoring; trial overrecruitment; and low loss to follow-up. The trial also had limitations. First, uneven recruitment among general practices across cities led to most interventions being delivered by about half of the trial practitioners. Second, the acupuncturists and Alexander teachers were members of only 2 large U.K.-based associations (the British Acupuncture Council and the Society of Teachers of the Alexander Technique). Third, some participants had additional private sessions. Finally, the recruited sample was predominantly white and, on average, left full-time education at age 18 years; however, these demographic characteristics reflected the general population locally.

Trials of other interventions for neck pain are not directly comparable to this one because none included all of the following: a usual care control group, a population exclusively comprising patients with chronic neck pain of at least 3 months' duration, NPQ score as an outcome, and a 1-year follow-up (30–33). For example, a Cochrane review of acupuncture trials found that none included a usual care control group (34). A subsequent trial showed that acupuncture was significantly beneficial compared with usual care alone at 3 months (11), but there are no such trials with 12 months of follow-up. For Alexander Technique lessons, ATLAS is, to our knowledge, the first trial assessing long-term outcomes in persons with chronic neck pain. A recent small study ($n$ = 72) showed greater reductions in neck pain after Alexander lessons compared with guided imagery but no significant difference compared with heat pads (35). However, the 5-week follow-up was probably too short for substantial change to occur, and 5 lessons was probably an insufficient number to establish the necessary skills. Indeed, results for the main groups of the ATEAM (Alexander Technique Lessons, Exercise, and Massage) back pain trial showed that 6 Alexander lessons were only 41% as effective as 24 lessons on the primary end point of 12-month Roland Morris disability score (12, 13). These findings informed the number of lessons offered in ATLAS.

Evidence exists for long-term benefit in patients with chronic neck pain when interventions are combined (for example, exercises plus mobilization or ma-

*Table 4.* Effect of Self-Efficacy, as Measured During the Intervention Period, on NPQ Scores at 6 and 12 mo

| Variable | 6 mo | | 12 mo | |
|---|---|---|---|---|
| | Difference From Usual Care (95% CI), *percentage points* | *P* Value | Difference From Usual Care (95% CI), *percentage points* | *P* Value |
| **Acupuncture** | | | | |
| Intervention effects* | −5.56 (−8.33 to −2.78) | <0.001 | −3.92 (−6.87 to −0.97) | 0.009 |
| Self-efficacy† | | | | |
| Intervention | −3.31 (−5.62 to −0.99) | 0.007 | −2.28 (−5.28 to 0.73) | 0.132 |
| Effect of change in self-efficacy | −3.00 (−3.75 to −2.26) | <0.001 | −3.34 (−4.38 to −2.31) | <0.001 |
| **Alexander Technique lessons** | | | | |
| Intervention effects* | −4.98 (−7.72 to −2.25) | <0.001 | −3.79 (−6.66 to −0.91) | 0.010 |
| Self-efficacy† | | | | |
| Intervention | −2.03 (−5.29 to 1.22) | 0.21 | −1.34 (−4.40 to 1.71) | 0.38 |
| Effect of change in self-efficacy | −3.34 (−4.03 to −2.64) | <0.001 | −3.33 (−4.44 to −2.22) | <0.001 |

NPQ = Northwick Park Questionnaire.
* Per primary analysis in Table 2.
† Linear regression models including change in self-efficacy score, baseline NPQ score, duration of neck pain, age, sex, and city as fixed effects and general practitioner practice as a random effect.

nipulation) (2, 36, 37). In this study, we report long-term benefit resulting from single interventions. For acupuncture, longer-term effects are associated in theory with acupuncture-related diagnostic explanations linked to self-care in the form of lifestyle advice (5–7). Alexander lessons offer practical training in self-observation and subtle behavioral change, allowing axial lengthening and modulation of muscle tone that improve functioning (14–17). Because people must continue applying what they learn to gain long-term benefit, both interventions are likely to be more suitable for those motivated to engage in self-care. This view is supported by our evidence showing that self-efficacy in pain management increased after acupuncture or Alexander lessons and was associated with lower pain scores sustained for more than 6 months after the intervention ended. This result is consistent with a previous study that reported increased self-efficacy after Alexander lessons (38), as well as with observations from other research that neck pain interventions that help patients change past illness behaviors and habits are helpful (39) and that improved coping strategies result in better outcomes (40). Other studies in patients with chronic pain have shown that patient empowerment leads to more favorable outcomes (41, 42).

Future studies are warranted to evaluate follow-up beyond 12 months and to determine how many acupuncture sessions or Alexander lessons to offer persons with chronic, nonspecific neck pain. Because acupuncture and Alexander lessons both led to significantly better outcomes than usual care, it would be useful to identify criteria to help patients decide which approach may better suit them. Finally, given the more rapid effect of acupuncture on pain reduction and the stronger emphasis on self-management of the Alexander Technique, evaluating an alternative strategy of providing acupuncture sessions initially followed by Alexander lessons for lifelong self-care skills could be worthwhile.

In conclusion, both acupuncture and Alexander Technique lessons are associated with statistically significant and clinically relevant long-term reductions in neck pain and disability at 12 months compared with usual care alone. Enhanced self-efficacy resulting from these interventions might be important in establishing these benefits and sustaining them over the longer term.

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**Note:** Dr. MacPherson (the manuscript's guarantor) affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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**Reproducible Research Statement:** *Study protocol:* Available in reference 19. *Statistical code and data set:* Relevant anonymized patient-level data are available from Dr. MacPherson (e-mail, hugh.macpherson@york.ac.uk).

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## Appendix 1: Description of the Alexander Technique and Details of the Alexander Lessons Provided to Participants

### Description of the Alexander Technique

The Alexander Technique is a self-care and self-development method for improving the manner in which we go about daily activities (such as sitting, standing, walking, and speaking) and for controlling our own reactions. The primary principles underpinning this approach include the following. First, general coordination and balance, the regulation of postural tone, and pain-free activity ultimately depend on the maintenance of a dynamic coordinated and lengthening central body axis (from the crown of the head to the end of the spine) and on subtlety of head poise. When the necessary conditions are present, clear thought and intention bring about purposeful movement in a fluent and seemingly effortless way (43). Second, these optimal conditions are easily interfered with by maladaptive muscle tension habits, whether the result of physical or emotional trauma or negative reactions to everyday situations. As a consequence, general coordination, mobility, and health may suffer. Third, healthy and pain-free functioning can often be restored by reducing maladaptive habitual reactions and movement patterns, through prioritization of attention to the dynamic coordinated lengthening of the central axis, and through the manner of initiating movement—all in a particular way, as exemplified by the Alexander Technique.

In practice, the technique involves unlearning unwanted habits, developing a more acute sense of spatial awareness and self-awareness, quietening the mind, learning to enliven the eyes and the whole spinal and back musculature, and allowing the head to be freely poised (especially just before and while engaging in activity). Help and guidance from a qualified teacher is essential and usually includes implicit (experiential or practical) and explicit spoken and hands-on instruction, constructive feedback, and encouragement.

During Alexander lessons, people are shown effective ways of refining essential skills, such as intentional inhibition (44), spatial and body awareness, purposeful intention, and attention (avoidance of distraction and "mind wandering"). Lessons feature guided practice in applying the necessary skills during stillness and the preparation for and performance of simple daily activities. Teachers may initially guide a movement or action to enable people to need less and less help and eventually become independent. By learning to adopt the taught strategies and observing that the "right things" then tend to happen of their own accord, people become more confident and engage in activity with more thought and enjoyment and less effort and pain. Improved postural tone, coordination, and health usually follow. People are advised to adopt the daily practice of lying "semi-supine" for 15 to 20 minutes on a firm padded surface with the head supported and to practice the Alexander thoughts and directions recommended by their teacher.

### Details of the Alexander Lessons Provided to Participants

Trial participants were taught the practical procedures and key underlying principles of the Alexander Technique, with the aim of empowering them to adopt this self-care approach in daily life and thus help reduce the frequency and intensity of neck pain. Participants were offered 20 one-to-one Alexander lessons and attended an average of 14 (median, 20; range, 0 to 20); 60% (104 of 172) of participants attended all 20 lessons, and 12% (21 of 172) attended none. Discontinuations in the Alexander group were higher before and during the first few lessons; thereafter, they were

few and were more evenly spread. Lessons typically were delivered weekly, with the option of being delivered twice per week initially and every 2 weeks toward the end of the series. Appointment scheduling involved both the teacher's discretion and the participant's preference. The lessons were delivered over an average period of 22 weeks (median, 23 weeks; range, 1 to 55 weeks), and the average duration of active teaching time was 34 minutes (median, 32 minutes; range, 30 to 50 minutes) per individual lesson.

The Alexander Technique teachers were asked to teach in a way that reflected their usual practice as much as possible, and logbook data showed they were able to do so in 94% of instances (136 of 145 participants). Lesson content and delivery followed the National Occupational Standards (22) and usual good teaching practice. Teaching methods therefore combined spoken advice, practical demonstration, hands-on implicit guidance, and feedback during the participant's performance of common everyday activities. Teaching models (for example, of the skeleton), demonstrations, explanatory diagrams, and handouts were used, when appropriate. Books or DVDs on the Alexander Technique were available or recommended.

After each lesson, teachers completed the designated 1-page record in the logbook, which consisted of a tick-box list of activities taught and engaged in and principles applied. After the final lesson, additional summary questions were answered, mostly by ticking boxes. Analysis of the data revealed that lessons most commonly involved practice in applying the technique to daily activities, such as sitting, moving from sitting to standing and vice versa, and "bending". Emphasis was placed on the participant gaining a practical understanding of the location and role of the major joints and the dynamic relationship of the head, neck, and back, as well as skill in applying the key operational Alexander principles of intentional inhibition and direction. This knowledge and skill enables people to learn what not to do and how to replace unwanted habits with more beneficial strategies. During most of the lessons, time was also occupied with the participant lying in the semi-supine position while engaging with help and advice from the teacher on inhibition and direction and home practice.

Teachers reported that 84% of participants had been keen to learn and apply the technique and that they were not surprised by the outcome for 82% of them. Although 49% of participants were reported to have been adversely affected by "other issues" during the trial and 31% had difficulty in assimilating and remembering Alexander Technique concepts, 78% learned to use the core skills to at least a reasonable degree, and for 20% these skills were assessed as "very good" or "excellent".

The lessons were delivered by 18 teachers who were current professional members of the Society of Teachers of the Alexander Technique, with at least 3 years of teaching experience and evidence of commitment to their own continuing professional development. Selection of teachers was by invitation to those practicing in close proximity to the participating primary care practices. Among selected teachers, 67% were female, and the mean time in practice was 14 years. Almost all participants had the same teacher throughout the intervention. Teachers taught patients from more than 1 GP and, potentially, from more than 1 practice.

## Appendix 2: Supplementary Details of the CACE Analysis

An exploratory analysis was undertaken to investigate the effect of intervention adherence by using the CACE method. We used an instrumental variable approach for this analysis. This approach requires the identification of a variable that is independent of all of the confounders, is associated with the treatment received, and has no direct effect on the outcome itself. For this analysis, we used the treatment assignment as the instrument. We assumed that randomization affected the outcome only through its effect on the treatment actually received and that the same proportion of participants in the control group would not have adhered to the intervention had they been offered it. Estimation was by 2-stage least squares and was implemented in Stata using the *ivregress* command. We also extended the model to include the same covariates as in the primary analysis.

The total number of intervention sessions attended by participants in each group is presented in **Appendix Table 13**. Of the 173 participants randomly assigned to acupuncture, 125 (72.3%) attended all 12 sessions available in the trial, and of the 172 participants randomly assigned to Alexander Technique lessons, 104 (60.5%) attended all 20 lessons. Eleven (6.4%) participants did not attend any acupuncture sessions, and 21 (12.2%) did not attend any Alexander lessons. The average number of acupuncture sessions attended was 10.3 (SD, 3.6) out of a possible 12, and the average number of Alexander lessons attended was 14.2 (SD, 8.2) out of a possible 20. For the purposes of the analysis, adherence was defined in binary form as attendance of at least 75% (9 acupuncture sessions or 15 Alexander lessons). As shown in **Appendix Table 13**, a total of 143 (82.7%) participants adhered to acupuncture and 115 (66.9%) adhered to Alexander lessons, which highlights that adherence was generally good in this trial.

The CACE estimates were larger than the intention-to-treat estimates, showing a larger benefit of acupuncture and Alexander lessons among participants who at-

tended at least 75% of the sessions (Appendix Table 14).

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***Appendix Table 1.*** ATLAS Trial Exclusion Criteria*

| |
|---|
| Serious underlying pathology |
| Prior cervical spine surgery |
| History of psychosis |
| Rheumatoid arthritis |
| Ankylosing spondylitis |
| Osteoporosis |
| Hemophilia |
| Cancer |
| HIV or hepatitis |
| Current or recent alcohol or drug dependency |
| Actively pursuing compensation or with litigation pending |
| Unable to communicate in English |
| Participation in another clinical trial that might interfere with the current study |
| Currently receiving acupuncture for neck pain |
| Attendance at 1-to-1 Alexander Technique lessons in the past 2 y |

ATLAS = Alexander Technique Lessons or Acupuncture Sessions.
* Patients who were pregnant at baseline were excluded because of potential loss to follow-up, but those who subsequently became pregnant remained in the trial.

*Appendix Table 2.* Details of the Acupuncture Treatment Based on the Reporting Guidelines of STRICTA*, an Official Extension to CONSORT

| STRICTA Item | Details of Acupuncture Treatment Within the Trial (*n* = 160) |
|---|---|
| 1. a) Style of acupuncture | Traditional Chinese medicine |
| b) Reasoning for treatment provided | Experience from the pilot study (18) combined with a consensus process involving participating acupuncturists provided a framework for a treatment protocol for a pragmatic trial designed to evaluate acupuncture as provided routinely to patients with chronic neck pain. |
| c) Variation | Individualized treatments were given by 18 acupuncturists who among them provided 1770 treatments to 160 participants. The acupuncturists documented the theoretical frameworks of traditional Chinese medicine that guided the treatment for each patient, as reported separately. |
| 2. a) Number of needles per treatment | On average, 14 needles were inserted per session (range, 5–35). |
| b) Names | In total, 259 different points were used, with 25 696 points used across all sessions. The most commonly used points were GB-20, GB-21, LI-4, LIV-3, BL-10, SP-6, and SI-3, which were used within a course of treatment on 95%, 89%, 65%, 63%, 57%, 54%, and 53% of participants, respectively. |
| c) Depth of insertion | Practitioners provided information on the range of depths used, with mode of the shallowest at 0.5 cm and mode of the deepest at 1.0 cm. |
| d) Response sought | The needle response sought varied; most commonly, *de qi* was sought by 90% of acupuncturists. |
| e) Needle stimulation | The most commonly used method of needle stimulation was the Even method (used by 39% of acupuncturists), followed by a mix of Tonifying, Even, and Reducing methods (28%). |
| f) Retention | Median needle retention time was 20 min (range, 1–60 min). |
| g) Needle type | Needles were stainless steel (100%); length of needle commonly ranged from 15–40 mm, and needle diameter commonly ranged from 0.16–0.25 mm. |
| 3. a) Number of sessions | Participants were offered 12 sessions and completed an average of 10 sessions (median, 12; range, 0–12); 72% (125/173) attended all 12 acupuncture sessions; 6% (11/173) attended none. Discontinuations from acupuncture were low and evenly spread over the course of the 12 sessions. |
| b) Frequency and duration | Average period over which sessions were delivered was 18 wk. Average duration of overall contact time per individual session was 53 min. Appointment scheduling involved both the acupuncturist's discretion and the participant's preference. |
| 4. a) Other components of treatment | Acupuncturists were allowed to use moxibustion, electroacupuncture, ear seeds, cupping, acupressure (brief and no more than 10 min), and heat lamps. Most commonly used were acupressure (used at least once with 68% of patients), cupping (26%), heat lamp (25%), moxa (24%), and electroacupuncture (4%). Acupuncturists were allowed to provide acupuncture theory–based lifestyle advice. In total, 84% of participants received lifestyle advice, most commonly related to exercise (45%), relaxation (37%), diet (34%), and rest (29%). Advice unrelated to acupuncture theory, as well as herbs and magnets, was proscribed. |
| b) Setting and context | Provision or treatments in independent clinics. Acupuncturists encouraged to practice as closely as possible as they normally would. |
| 5. Participating acupuncturists | Practitioners were members of the British Acupuncture Council, with >3 y postqualification experience and commitment to continuing professional development. Selection of acupuncturists was by invitation to those practicing within close proximity to the participating primary care practices. Selected practitioners were 83% female and had been in practice a mean of 15 y. Participants were almost all treated by the same practitioner throughout the intervention period. Practitioners treated patients from >1 GP and potentially from >1 practice. |
| 6. Control or comparator interventions | Participants continued to receive usual care as an adjunct to primary care, NHS hospitals, and private treatment according to need, based on a need to evaluate the effect of acupuncture plus usual care vs. usual care alone. A summary of the usual care received is reported in **Appendix Tables 4** to **7**. |

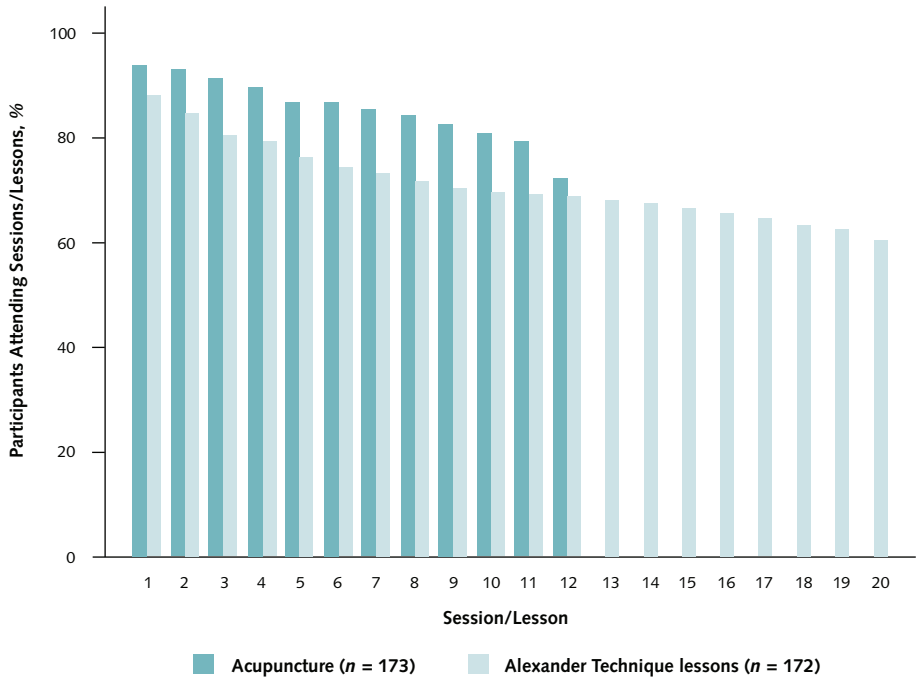
BL = bladder; CONSORT = Consolidated Standards of Reporting Trials; GB = gallbladder; GP = general practitioner; LI = large intestine; LIV = liver; NHS = National Health Service; SI = small intestine; SP = spleen; STRICTA = Standards for Reporting Interventions in Clinical Trials of Acupuncture.
* See reference 45.

*Appendix Table 3.* Expectations and Preferences for Each Intervention at Baseline, by Group*

| Characteristic | Acupuncture (*n* = 173) | | Alexander Technique Lessons (*n* = 172) | | Usual Care (*n* = 172) | | Overall (*n* = 517) | |
|---|---|---|---|---|---|---|---|---|
| | Number | Percentage | Number | Percentage | Number | Percentage | Number | Percentage |
| **Expectations for usual care** | | | | | | | | |
| Very ineffective | 30 | 17.6 | 25 | 14.9 | 24 | 14.2 | 79 | 15.6 |
| Fairly ineffective | 77 | 45.3 | 57 | 33.9 | 59 | 34.9 | 193 | 38.1 |
| Can't decide | 36 | 21.2 | 57 | 33.9 | 45 | 26.6 | 138 | 27.2 |
| Fairly effective | 23 | 13.5 | 27 | 16.1 | 39 | 23.1 | 89 | 17.6 |
| Very effective | 4 | 2.4 | 2 | 1.2 | 2 | 1.2 | 8 | 1.6 |
| **Expectations for acupuncture** | | | | | | | | |
| Very ineffective | 3 | 1.7 | 5 | 3.0 | 4 | 2.4 | 12 | 2.4 |
| Fairly ineffective | 9 | 5.2 | 12 | 7.1 | 9 | 5.3 | 30 | 5.9 |
| Can't decide | 82 | 47.7 | 81 | 47.9 | 68 | 40.2 | 231 | 45.3 |
| Fairly effective | 57 | 33.1 | 53 | 31.4 | 59 | 34.9 | 169 | 33.1 |
| Very effective | 21 | 12.2 | 18 | 10.7 | 29 | 17.2 | 68 | 13.3 |
| **Expectations for Alexander Technique lessons** | | | | | | | | |
| Very ineffective | 2 | 1.2 | 0 | 0.0 | 1 | 0.6 | 3 | 0.6 |
| Fairly ineffective | 6 | 3.5 | 6 | 3.6 | 6 | 3.6 | 18 | 3.5 |
| Can't decide | 89 | 51.7 | 97 | 57.7 | 76 | 45.0 | 262 | 51.5 |
| Fairly effective | 53 | 30.8 | 46 | 27.4 | 56 | 33.1 | 155 | 30.5 |
| Very effective | 22 | 12.8 | 19 | 11.3 | 30 | 17.8 | 71 | 13.9 |
| **Patient intervention preference** | | | | | | | | |
| Acupuncture | 57 | 33.9 | 59 | 35.3 | 69 | 40.6 | 185 | 36.6 |
| Alexander Technique lessons | 72 | 42.9 | 63 | 37.7 | 74 | 43.5 | 209 | 41.4 |
| Usual care | 2 | 1.2 | 2 | 1.2 | 2 | 1.2 | 6 | 1.2 |
| No preference | 37 | 22.0 | 43 | 25.7 | 25 | 14.7 | 105 | 20.8 |
| **Concordance** | | | | | | | | |
| Randomized to preference | 57 | 33.9 | 63 | 37.7 | 2 | 1.2 | 122 | 24.2 |
| Not randomized to preference | 74 | 44.0 | 61 | 36.5 | 143 | 84.1 | 278 | 55.0 |
| No preference | 37 | 22.0 | 43 | 25.7 | 25 | 14.7 | 105 | 20.8 |

* Results are based on those who responded to the question, and the number varies by question.

***Appendix Figure 1.*** Adherence to intervention: attendance at each of the 12 acupuncture sessions or 20 Alexander Technique lessons offered.



***Appendix Table 4.*** Out-of-Pocket Costs, by Group

| Variable | Acupuncture | | | | Alexander Technique Lessons | | | | Usual Care | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Participants | | Cost, £ | | Participants | | Cost, £ | | Participants | | Cost, £ | | Participants | | Cost, £ | |
| | Number | Percentage | Mean | SD | Number | Percentage | Mean | SD | Number | Percentage | Mean | SD | Number | Percentage | Mean | SD |
| **Private acupuncture*** | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 6 | 3.5 | 118.00 | 54.26 | 7 | 4.2 | 139.13 | 93.64 | 6 | 3.5 | 110.17 | 56.32 | 19 | 3.7 | 124.10 | 70.77 |
| Baseline to month 6 | 17 | 11.3 | 73.31 | 48.72 | 3 | 2.3 | 193.33 | 140.12 | 2 | 1.5 | 350.00 | 70.71 | 22 | 5.3 | 116.81 | 108.73 |
| Month 6 to month 12 | 28 | 20.0 | 195.96 | 198.97 | 3 | 2.3 | 92.50 | 17.68 | 2 | 1.6 | 110.00 | 70.71 | 33 | 8.3 | 183.74 | 188.52 |
| **Private Alexander Technique lessons*** | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 0 | 0.0 | – | – | 0 | 0.0 | – | – | 1 | 0.6 | – | – | 1 | 0.2 | – | – |
| Baseline to month 6 | 0 | 0.0 | – | – | 2 | 1.5 | 70.00 | 35.00 | 0 | 0.0 | – | – | 2 | 0.5 | 70.00 | 35.00 |
| Month 6 to month 12 | 1 | 0.8 | – | – | 12 | 9.3 | 117.69 | 106.63 | 0 | 0.0 | – | – | 13 | 3.4 | 117.69 | 106.63 |
| **Other private treatment†** | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 27 | 16.2 | 197.62 | 148.91 | 31 | 18.5 | 195.00 | 148.05 | 33 | 19.5 | 206.69 | 178.18 | 91 | 18.1 | 200.08 | 158.28 |
| Baseline to month 6 | 11 | 7.4 | 137.40 | 76.20 | 8 | 6.1 | 336.25 | 594.79 | 19 | 13.6 | 201.89 | 155.39 | 38 | 9.0 | 213.83 | 298.57 |
| Month 6 to month 12 | 13 | 9.2 | 202.00 | 153.45 | 8 | 5.9 | 233.57 | 216.58 | 18 | 13.4 | 146.67 | 106.70 | 39 | 9.5 | 180.47 | 146.96 |

* Not specified as specifically for neck pain in the question.
† Includes massage, physiotherapy, chiropractor, yoga, reflexology, osteopathy, personal training, hypnosis, Bowen technique, podiatry, tui na, and medication.

***Appendix Table 5.*** Use of Prescribed Medications, by Group*

| Prescribed Medication | Acupuncture | | | Alexander Technique Lessons | | | Usual Care | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Percentage | Change From Baseline, % | Number | Percentage | Change From Baseline, % | Number | Percentage | Change From Baseline, % | Number | Percentage | Change From Baseline, % |
| **Any prescription** | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 132 | 76.7 | – | 129 | 77.3 | – | 122 | 72.6 | – | 383 | 75.5 | – |
| Baseline to month 6 | 101 | 66.9 | −9.8 | 92 | 68.7 | −8.6 | 96 | 67.6 | −5.0 | 289 | 67.7 | −7.8 |
| Month 6 to month 12 | 97 | 69.3 | −7.4 | 91 | 66.9 | −10.4 | 98 | 71.0 | −1.6 | 286 | 69.1 | −6.4 |
| **Neck pain–specific prescription** | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 65 | 52.0 | – | 70 | 56.0 | – | 82 | 70.1 | – | 217 | 59.1 | – |
| Baseline to month 6 | 30 | 30.0 | −22.0 | 42 | 47.7 | −8.3 | 47 | 52.2 | −17.9 | 119 | 42.8 | −16.3 |
| Month 6 to month 12 | 29 | 30.9 | −21.1 | 35 | 40.7 | −15.3 | 51 | 53.7 | −16.4 | 115 | 41.8 | −17.3 |

* Results are based on those who responded to the question, and the number varies at each time point.

***Appendix Table 6.*** Visits to Primary Care Providers and Physical Therapists, by Group

| Variable | Acupuncture | | | | Alexander Technique Lessons | | | | Usual Care | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Participants | | Number of Visits | | Participants | | Number of Visits | | Participants | | Number of Visits | | Participants | | Number of Visits | |
| | Number | Percentage* | Mean | SD | Number | Percentage* | Mean | SD | Number | Percentage* | Mean | SD | Number | Percentage* | Mean | SD |
| **Total visits** | | | | | | | | | | | | | | | | |
| GP | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 153 | 89.5 | 3.18 | 3.34 | 140 | 84.8 | 2.82 | 3.16 | 147 | 86.5 | 2.86 | 2.72 | 440 | 87.0 | 2.96 | 3.08 |
| Baseline to month 6 | 107 | 71.3 | 1.71 | 1.74 | 95 | 71.4 | 2.08 | 2.09 | 106 | 74.6 | 1.94 | 2.11 | 308 | 72.5 | 1.90 | 1.98 |
| Month 6 to month 12 | 96 | 66.7 | 2.19 | 3.24 | 91 | 66.9 | 2.02 | 2.62 | 98 | 71.0 | 2.13 | 2.25 | 285 | 68.2 | 2.12 | 2.73 |
| Practice nurse | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 79 | 47.0 | 0.79 | 1.16 | 70 | 42.9 | 0.89 | 1.61 | 68 | 40.5 | 0.73 | 1.34 | 217 | 43.5 | 0.80 | 1.38 |
| Baseline to month 6 | 57 | 38.3 | 0.60 | 0.92 | 52 | 39.7 | 0.69 | 1.88 | 44 | 31.9 | 0.49 | 0.98 | 153 | 36.6 | 0.59 | 1.31 |
| Month 6 to month 12 | 62 | 44.0 | 0.71 | 1.17 | 53 | 39.3 | 0.70 | 1.20 | 65 | 46.8 | 0.73 | 0.95 | 180 | 43.4 | 0.71 | 1.11 |
| Physical therapist | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 50 | 29.4 | 1.36 | 3.00 | 49 | 29.5 | 1.43 | 2.91 | 47 | 28.0 | 1.30 | 2.62 | 146 | 29.0 | 1.36 | 2.84 |
| Baseline to month 6 | 22 | 15.0 | 0.63 | 2.06 | 21 | 16.2 | 0.86 | 2.31 | 26 | 18.6 | 0.64 | 1.88 | 69 | 16.5 | 0.71 | 2.08 |
| Month 6 to month 12 | 30 | 21.3 | 0.83 | 2.16 | 29 | 21.6 | 1.14 | 2.76 | 26 | 19.1 | 0.70 | 1.81 | 85 | 20.7 | 0.89 | 2.27 |
| **Neck-related visits** | | | | | | | | | | | | | | | | |
| GP | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 69 | 42.6 | 0.75 | 1.23 | 74 | 46.0 | 0.93 | 1.41 | 80 | 49.7 | 0.90 | 1.28 | 223 | 46.1 | 0.86 | 1.31 |
| Baseline to month 6 | 21 | 14.5 | 0.23 | 0.65 | 18 | 14.3 | 0.25 | 0.70 | 29 | 22.0 | 0.30 | 0.65 | 68 | 16.9 | 0.26 | 0.67 |
| Month 6 to month 12 | 22 | 16.2 | 0.25 | 0.63 | 13 | 10.3 | 0.15 | 0.49 | 26 | 20.0 | 0.36 | 0.91 | 61 | 15.6 | 0.26 | 0.70 |
| Practice nurse | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 1 | 0.6 | – | – | 7 | 4.5 | 0.06 | 0.29 | 4 | 2.6 | 0.03 | 0.16 | 12 | 2.6 | 0.03 | 0.21 |
| Baseline to month 6 | 0 | 0 | – | – | 0 | 0 | – | – | 1 | 0.8 | – | – | 1 | 0.3 | – | – |
| Month 6 to month 12 | 1 | 0.7 | – | – | 2 | 1.7 | – | – | 2 | 1.6 | – | – | 5 | 1.3 | – | – |
| Physical therapist | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 39 | 23.8 | 1.06 | 2.67 | 40 | 25.5 | 1.13 | 2.45 | 34 | 22.4 | 0.99 | 2.30 | 113 | 23.9 | 1.06 | 2.48 |
| Baseline to month 6 | 8 | 5.7 | 0.16 | 0.75 | 13 | 10.6 | 0.50 | 1.82 | 15 | 11.5 | 0.42 | 1.51 | 36 | 9.1 | 0.35 | 1.41 |
| Month 6 to month 12 | 14 | 10.6 | 0.33 | 1.43 | 7 | 5.8 | 0.17 | 0.81 | 16 | 12.6 | 0.45 | 1.37 | 37 | 9.7 | 0.32 | 1.25 |

GP = general practitioner.
* Results are based on those who responded to the question, and the number varies at each time point.

***Appendix Table 7.*** Inpatient and Outpatient Visits to NHS Hospitals, by Group

| Variable | Acupuncture | | | | Alexander Technique Lessons | | | | Usual Care | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Participants | | Number of Attendances | | Participants | | Number of Attendances | | Participants | | Number of Attendances | | Participants | | Number of Attendances | |
| | Number | Percentage* | Mean | SD | Number | Percentage* | Mean | SD | Number | Percentage* | Mean | SD | Number | Percentage* | Mean | SD |
| **Total visits** | | | | | | | | | | | | | | | | |
| Attendance at an NHS hospital as an outpatient | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 38/163 | 23.3 | 0.58 | 1.43 | 46/161 | 28.6 | 0.84 | 2.54 | 42/164 | 25.6 | 0.60 | 1.61 | 126/488 | 25.8 | 0.68 | 1.92 |
| Baseline to month 6 | 38/146 | 26.0 | 0.73 | 2.25 | 27/121 | 22.3 | 0.55 | 1.39 | 22/131 | 16.8 | 0.41 | 1.25 | 87/398 | 21.9 | 0.57 | 1.72 |
| Month 6 to month 12 | 32/135 | 23.7 | 1.41 | 6.69 | 36/128 | 28.1 | 0.90 | 2.38 | 37/127 | 29.1 | 0.54 | 1.05 | 105/390 | 26.9 | 0.96 | 4.21 |
| Attendance at an NHS hospital as a day case (planned admission) | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 11/161 | 6.8 | 0.16 | 0.83 | 10/145 | 6.9 | 0.12 | 0.51 | 10/154 | 6.5 | 0.08 | 0.31 | 31/460 | 6.7 | 0.12 | 0.60 |
| Baseline to month 6 | 5/140 | 3.6 | 0.04 | 0.19 | 9/118 | 7.6 | 0.16 | 0.68 | 5/124 | 4.0 | 0.04 | 0.20 | 19/382 | 5.0 | 0.08 | 0.41 |
| Month 6 to month 12 | 14/128 | 10.9 | 0.20 | 0.82 | 5/117 | 4.3 | 0.09 | 0.48 | 9/120 | 7.5 | 0.13 | 0.58 | 28/365 | 7.7 | 0.14 | 0.65 |
| Attendance at an A&E department | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 12/159 | 7.5 | 0.09 | 0.33 | 13/162 | 9.0 | 0.10 | 0.32 | 12/150 | 78.0 | 0.09 | 0.31 | 37/454 | 8.1 | 0.09 | 0.32 |
| Baseline to month 6 | 13/142 | 9.2 | 0.11 | 0.38 | 6/115 | 5.2 | 0.08 | 0.35 | 9/121 | 7.4 | 0.07 | 0.26 | 28/379 | 7.4 | 0.09 | 0.34 |
| Month 6 to month 12 | 11/126 | 8.7 | 0.13 | 0.49 | 7/121 | 5.8 | 0.08 | 0.36 | 4/117 | 3.4 | 0.03 | 0.18 | 22/364 | 6.0 | 0.08 | 0.37 |
| Other admission to an NHS hospital | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 4/155 | 2.6 | 0.03 | 0.16 | 2/143 | 1.4 | 0.01 | 0.12 | 2/148 | 1.4 | 0.02 | 0.18 | 8/446 | 1.8 | 0.02 | 0.16 |
| Baseline to month 6 | 1/135 | 0.7 | 0.01 | – | 2/113 | 1.8 | 0.03 | 0.21 | 3/121 | 2.5 | 0.02 | 0.16 | 6/370 | 1.6 | 0.02 | 0.16 |
| Month 6 to month 12 | 3/126 | 2.4 | 0.03 | 0.22 | 0/118 | 0.0 | – | – | 1/118 | 0.8 | 0.01 | – | 4/362 | 1.1 | 0.01 | 0.14 |
| **Neck pain–only visits** | | | | | | | | | | | | | | | | |
| Attendance at an NHS hospital as an outpatient | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 9/159 | 5.7 | 0.08 | 0.37 | 8/152 | 5.3 | 0.07 | 0.30 | 10/149 | 6.7 | 0.15 | 0.88 | 27/460 | 5.9 | 0.10 | 0.57 |
| Baseline to month 6 | 4/135 | 3.0 | – | – | 3/115 | 2.6 | – | – | 1/123 | 0.8 | – | – | 8/373 | 2.1 | 0.04 | 0.28 |
| Month 6 to month 12 | 7/123 | 5.7 | 0.24 | 1.31 | 5/118 | 4.2 | 0.04 | 0.20 | 6/117 | 5.1 | 0.07 | 0.34 | 18/358 | 5.0 | 0.12 | 0.80 |
| Attendance at an NHS hospital as a day case (planned admission) | | | | | | | | | | | | | | | | |
| Baseline | 3/158 | 1.9 | – | – | 2/138 | 1.4 | – | – | 3/145 | 2.1 | – | – | 8/441 | 1.8 | 0.04 | 0.37 |
| 6 mo | 0/133 | 0 | – | – | 1/114 | 0.9 | – | – | 0/115 | 0 | – | – | 1/362 | 0.3 | – | – |
| 12 mo | 1/121 | 0.8 | – | – | 1/112 | 0.9 | – | – | 0/114 | 0 | – | – | 2/347 | 0.6 | – | – |
| Attendance at an A&E department | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 2/153 | 1.3 | – | – | 4/133 | 3.0 | – | – | 3/141 | 2.1 | – | – | 9/427 | 2.1 | 0.02 | 0.17 |
| Baseline to month 6 | 0/135 | 0 | – | – | 0/108 | 0 | – | – | 0/113 | 0 | – | – | 0/356 | 0 | – | – |
| Month 6 to month 12 | 4/119 | 3.4 | – | – | 2/115 | 1.7 | – | – | 1/111 | 0.9 | – | – | 7/345 | 2.0 | 0.02 | 0.17 |
| Other admission to an NHS hospital | | | | | | | | | | | | | | | | |
| 6-mo period pre-enrollment | 1/150 | 0.7 | – | – | 0/135 | 0 | – | – | 0/139 | 0 | – | – | 1/424 | 0.2 | – | – |
| Baseline to month 6 | 0/129 | 0 | – | – | 0/109 | 0 | – | – | 0/111 | 0 | – | – | 0/349 | 0 | – | – |
| Month 6 to month 12 | 0/121 | 0 | – | – | 0/113 | 0 | – | – | 0/112 | 0 | – | – | 0/346 | 0 | – | – |

A&E = accident and emergency; NHS = National Health Service.
* Results are based on those who responded to the question, and the number varies at each time point.

*Appendix Table 8.* NPQ Descriptive Statistics Over Time, by Group*

| Variable | 0 mo | 3 mo | 6 mo | 12 mo |
|---|---|---|---|---|
| **Acupuncture** | | | | |
| Participants, *n (%)* | 173 (100) | 156 (90.2) | 156 (90.2) | 150 (86.7) |
| Mean NPQ score (SD), % | 39.64 (9.71) | 29.56 (13.34) | 27.00 (14.23) | 26.76 (15.55) |
| Median NPQ score (range), % | 38.89 (27.78–75.00) | 27.78 (0.00–75.00) | 25.00 (0.00–75.00) | 27.78 (0.00–63.89) |
| **Alexander lessons** | | | | |
| Participants, *n (%)* | 172 (100) | 153 (89.0) | 143 (83.1) | 145 (84.3) |
| Mean NPQ score (SD), % | 39.38 (11.91) | 32.50 (13.81) | 27.11 (15.66) | 27.14 (15.87) |
| Median NPQ score (range), % | 36.11 (22.22–91.67) | 30.56 (3.13–77.78) | 25.00 (0.00–78.13) | 25.00 (0.00–69.44) |
| **Usual care** | | | | |
| Participants, *n (%)* | 172 (100) | 155 (90.1) | 148 (86.0) | 144 (83.7) |
| Mean NPQ (SD), % | 40.46 (11.60) | 36.30 (14.30) | 33.07 (14.02) | 31.25 (14.81) |
| Median NPQ score (range), % | 37.50 (27.78–93.75) | 36.11 (5.56–78.13) | 30.90 (0.00–78.13) | 30.56 (0.00–69.44) |

NPQ = Northwick Park Questionnaire.
* Raw data.

*Appendix Table 9.* Sensitivity Analysis Assuming Data Missing Not at Random Under Different Scenarios*

| Degree of Departure From MAR Assumption | Difference (95% CI) | *P* Value |
|---|---|---|
| **Acupuncture** | | |
| Departures in all groups | | |
| Δ = 5 | −4.22 (−7.25 to −1.19) | 0.007 |
| Δ = 10 | −4.39 (−7.49 to −1.29) | 0.006 |
| Departures in intervention groups only | | |
| Δ = 5 | −3.41 (−6.43 to −0.39) | 0.028 |
| Δ = 10 | −2.76 (−5.81 to 0.29) | 0.077 |
| Departures in usual care group only | | |
| Δ = 5 | −4.87 (−7.89 to −1.84) | 0.002 |
| Δ = 10 | −5.68 (−8.74 to −2.62) | <0.001 |
| **Alexander lessons** | | |
| Departures in all groups | | |
| Δ = 5 | −3.83 (−6.82 to −0.83) | 0.013 |
| Δ = 10 | −3.84 (−6.91 to −0.77) | 0.015 |
| Departures in intervention groups only | | |
| Δ = 5 | −3.03 (−6.01 to −0.04) | 0.048 |
| Δ = 10 | −2.24 (−5.26 to 0.79) | 0.148 |
| Departures in usual care group only | | |
| Δ = 5 | −4.61 (−7.60 to −1.63) | 0.003 |
| Δ = 10 | −5.41 (−8.44 to −2.39) | 0.001 |

MAR = missing at random.
* Pattern mixture model with a parameter for the degree of departure from the MAR assumption and adjustments for baseline Northwick Park Questionnaire scores, duration of neck pain, age, sex, and city as fixed effects.

*Appendix Table 10.* Secondary Analysis Using a Linear Mixed Model That Included Baseline NPQ Score as a Covariate and Assumed Data Missing at Random: Differences in Adjusted Mean NPQ Scores at 3, 6, and 12 mo*

| Variable | Mean NPQ Score (95% CI), % | | Difference (95% CI), *percentage points* | *P* Value |
|---|---|---|---|---|
| | **Intervention (*n* = 161)** | **Usual Care (*n* = 156)** | | |
| **Acupuncture** | | | | |
| Overall | 27.65 (25.82 to 29.48) | 32.67 (30.81 to 34.53) | −5.01 (−7.37 to −2.65) | <0.001 |
| 3 mo | 29.36 (27.43 to 31.29) | 35.41 (33.46 to 37.36) | −6.05 (−8.55 to −3.54) | <0.001 |
| 6 mo | 26.85 (24.75 to 28.95) | 32.13 (29.98 to 34.28) | −5.28 (−8.06 to −2.49) | <0.001 |
| 12 mo | 26.74 (24.53 to 28.96) | 30.46 (28.19 to 32.73) | −3.72 (−6.68 to −0.75) | 0.014 |
| | **Intervention (*n* = 154)** | **Usual Care (*n* = 156)** | | |
| **Alexander lessons** | | | | |
| Overall | 28.80 (26.88 to 30.72) | 32.78 (30.92 to 34.63) | −3.98 (−6.37 to −1.58) | 0.001 |
| 3 mo | 32.04 (30.06 to 34.02) | 35.51 (33.60 to 37.42) | −3.47 (−5.96 to −0.99) | 0.006 |
| 6 mo | 27.43 (25.27 to 29.59) | 32.25 (30.16 to 34.35) | −4.82 (−7.58 to −2.06) | 0.001 |
| 12 mo | 26.93 (24.69 to 29.17) | 30.56 (28.37 to 32.76) | −3.63 (−6.53 to −0.74) | 0.014 |

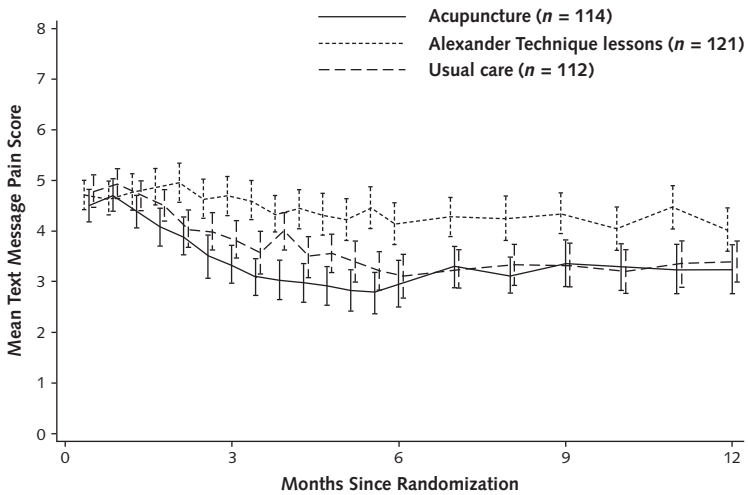
NPQ = Northwick Park Questionnaire.
* Mixed model adjusted for group, time (3, 6, 12 mo), group-by-time interaction, baseline NPQ scores, duration of neck pain, age, sex, and city as a fixed effect and general practitioner practice as a random effect. Excludes those randomly assigned in error.

*Appendix Table 11.* Characteristics of Participants Who Consented or Did Not Consent to Receive and Send Text Messages About Their Pain Scores

| Characteristic | Consented (*n* = 365) | Did Not Consent (*n* = 152) | Group Difference *P* Value* |
|---|---|---|---|
| Mean age (SD), *y* | 50.3 (12.11) | 60.1 (15.09) | <0.001 |
| Sex, *n (%)* | | | |
| Male | 110 (30.1) | 50 (32.9) | 0.54 |
| Female | 255 (69.9) | 102 (67.1) | |
| Employment, *n (%)* | | | |
| Full-time education | 8 (2.2) | 3 (2.0) | 1.000 |
| Working full-time | 160 (43.8) | 31 (20.4) | <0.001 |
| Working part-time | 78 (21.4) | 25 (16.4) | 0.22 |
| Looking after home | 17 (4.7) | 10 (6.6) | 0.36 |
| Unable to work | 26 (7.1) | 10 (6.6) | 0.84 |
| Retired | 58 (15.9) | 70 (46.1) | <0.001 |
| Other | 23 (6.3) | 11 (7.2) | 0.68 |
| Mean NPQ score at baseline (SD), % | 39.3 (10.89) | 41.1 (11.52) | 0.09 |

NPQ = Northwick Park Questionnaire.
* *P* value of *t* test for age and NPQ score, chi-square test for sex and employment status (Fisher exact test if any expected cell counts <5).

***Appendix Figure 2.*** Text message pain scores: mean and 95% CI for each response time point, by intervention group.




| Participants, *n* | | | | | |
|---|---|---|---|---|---|
| Acupuncture | 92 | 91 | 81 | 89 | 86 |
| Alexander Technique lessons | 105 | 96 | 84 | 88 | 94 |
| Usual care | 102 | 96 | 83 | 96 | 98 |

114, 121, and 112 participants in the acupuncture, Alexander Technique, and usual care groups, respectively, sent ≥1 text message.

*Appendix Table 12.* Adverse Events*

| Variable | Acupuncture (*n* = 173) | Alexander Technique Lessons (*n* = 172) | Usual Care (*n* = 172) | Total (*n* = 517) |
|---|---|---|---|---|
| **Withdrawals due to serious AEs** | 3 (1.7) | 3 (1.7) | 0 (0) | 6 (1.2) |
| **Serious AEs** | 9 (5.2) | 13 (7.6) | 8 (4.7) | 30 (5.8) |
| Broken ankle/wrist | 0 (0) | 3 (1.7) | 1 (0.6) | 4 (0.8) |
| Cancer-related | 2 (1.2) | 2 (1.2) | 1 (0.6) | 5 (1.0) |
| Complications after surgery | 1 (0.6) | 0 (0) | 1 (0.6)† | 2 (0.4) |
| Deaths | 1 (0.6) | 1 (0.6) | 0 (0) | 2 (0.4) |
| Hemorrhage | 0 (0) | 1 (0.6) | 0 (0) | 1 (0.2) |
| Hospital admission | 1 (0.6) | 3 (1.7) | 2 (1.2) | 6 (1.2) |
| Pain and incapacity | 0 (0) | 1 (0.6)† | 1 (0.6)† | 2 (0.4) |
| Retinal bleed | 1 (0.6) | 0 (0) | 0 (0) | 1 (0.2) |
| Road traffic accident | 1 (0.6) | 0 (0) | 1 (0.6) | 2 (0.4) |
| Stroke | 0 (0) | 0 (0) | 1 (0.6) | 1 (0.2) |
| Surgery | 2 (1.2) | 2 (1.2) | 0 (0) | 4 (0.8) |
| **Nonserious AEs** | 24 (13.9) | 18 (10.5) | 8 (4.7) | 50 (9.7) |
| Accident | 4 (2.3) | 1 (0.6) | 0 (0) | 5 (1.0) |
| Bruising, swelling, or numbness | 2 (1.2)‡ | 0 (0) | 0 (0) | 2 (0.4) |
| Cancer investigation | 0 (0) | 0 (0) | 1 (0.6) | 1 (0.2) |
| Fall | 2 (1.2) | 5 (2.9) | 1 (0.6) | 8 (1.5) |
| Gynecologic complication | 0 (0) | 1 (0.6) | 0 (0) | 1 (0.2) |
| Hernia | 0 (0) | 1 (0.6) | 0 (0) | 1 (0.2) |
| Infection | 2 (1.2) | 1 (0.6) | 0 (0) | 3 (0.6) |
| Injury at knee | 1 (0.6) | 1 (0.6)† | 0 (0) | 2 (0.4) |
| Knee problem | 0 (0) | 1 (0.6) | 0 (0) | 1 (0.2) |
| Muscle spasms | 1 (0.6)† | 2 (1.2)‡ | 0 (0) | 3 (0.6) |
| Pain | 10 (5.8)§ | 3 (1.7) | 2 (1.2) | 15 (2.9) |
| Pins and needles | 0 (0) | 0 (0) | 2 (1.2) | 2 (0.4) |
| Postsurgery procedure | 0 (0) | 1 (0.6) | 1 (0.6) | 2 (0.4) |
| Respiratory problem | 1 (0.6)† | 0 (0) | 0 (0) | 1 (0.2) |
| Urinary | 0 (0) | 1 (0.6) | 1 (0.6) | 2 (0.4) |
| Visual disturbance | 1 (0.6) | 0 (0) | 0 (0) | 1 (0.2) |

AE = adverse event.
* Values are numbers (percentages).
† Considered possibly related to the intervention.
‡ 1 event out of 2 considered possibly related to the intervention.
§ 7 events out of 10 considered possibly related to the intervention.

*Appendix Table 13.* Intervention Sessions Attended*

| Sessions Attended, *n* | Acupuncture (*n* = 173) | | Alexander Technique Lessons (*n* = 172) | |
|---|---|---|---|---|
| | Number | Percentage | Number | Percentage |
| 0 | 11 | 6.4 | 21 | 12.2 |
| 1 | 1 | 0.6 | 6 | 3.5 |
| 2 | 3 | 1.7 | 7 | 4.1 |
| 3 | 3 | 1.7 | 2 | 1.2 |
| 4 | 5 | 2.9 | 5 | 2.9 |
| 5 | 0 | 0.0 | 4 | 2.3 |
| 6 | 2 | 1.2 | 2 | 1.2 |
| 7 | 2 | 1.2 | 2 | 1.2 |
| 8 | 3 | 1.7 | 2 | 1.2 |
| 9 | 3 | 1.7 | 1 | 0.6 |
| 10 | 3 | 1.7 | 1 | 0.6 |
| 11 | 12 | 6.9 | 1 | 0.6 |
| 12 | 125 | 72.3 | 1 | 0.6 |
| 13 | – | – | 1 | 0.6 |
| 14 | – | – | 1 | 0.6 |
| 15 | – | – | 2 | 1.2 |
| 16 | – | – | 2 | 1.2 |
| 17 | – | – | 2 | 1.2 |
| 18 | – | – | 1 | 0.6 |
| 19 | – | – | 4 | 2.3 |
| 20 | – | – | 104 | 60.5 |
| Mean (SD) | 10.3 (3.6) | | 14.2 (8.2) | |
| Median (IQR) | 12 (11–12) | | 20 (5–20) | |

IQR = interquartile range.
* Some of this information is presented diagrammatically in Appendix Figure 1.

*Appendix Table 14.* CACE Results

| Comparison | Difference in NPQ Scores at 12 mo (95% CI), *percentage points* | *P* Value |
|---|---|---|
| **Acupuncture vs. usual care** | | |
| Primary analysis: mixed model | −3.92 (–6.87 to –0.97) | 0.009 |
| CACE: binary | −4.49 (–7.35 to –1.62) | 0.003 |
| **Alexander lessons vs. usual care** | | |
| Primary analysis: mixed model | −3.79 (–6.66 to –0.91) | 0.010 |
| CACE: binary | −4.83 (–9.17 to –0.50) | 0.030 |

CACE = complier average causal effect; NPQ = Northwick Park Questionnaire.

## Correction: Alexander Technique Lessons or Acupuncture Sessions for Persons With Chronic Neck Pain

The disclosures section of a recent article (1) was incorrect. It states that Drs. MacPherson and Lansdown report that they are members of the British Acupuncture Society; however, the correct name of the organization is the British Acupuncture Council.

This has been corrected in the online version.

### Reference

1. MacPherson H, Tilbrook H, Richmond S, Woodman J, Ballard K, et al. Alexander technique lessons or acupuncture sessions for persons with chronic neck pain. A randomized trial. nn Intern Med. 2015;163:653-62. [PMID: 26524571] doi:10.7326/M15-0667