

CAA NATIONAL RESEARCH SYMPOSIUM 2015: PRIZE PAPERS

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WINNER 'RESEARCH EXCELLENCE AWARD' PRIZE

Presenting author: Katie de Luca
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Abstract Title: Three subgroups of pain phenotypes in 227 older, community dwelling women with arthritis: a cross-sectional study

Author contribution: Katie de Luca, Lynne Parkinson, Aron Downie, Julie Byles

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Conflict of interest: No competing interests

Authors & Affiliations:

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Objectives: The multi-dimensional nature of pain includes sensory, affective and cognitive characteristics of pain. No study has looked at sub-grouping women with arthritis, based on the dimensions of the pain experience. The aim is to identify distinct groups of women with arthritis, based on the multi-dimensional nature of their pain.

Methods: A cross-sectional study of 700 women from the Australian Longitudinal Study on Women's Health. Women were sent a postal survey asking about their health, pain and arthritis. Pain dimensions included intensity, severity and duration, sensory and affective quality, type of pain and pain catastrophizing. Statistical analyses included latent class cluster analysis and comparison between clusters using multi-variate multinomial logistic regression.

Results: 579 (82.7%) women returned surveys and 227 had arthritis. A three-class cluster model was most parsimonious. Cluster 1 had 95 women (40%) with mild uni-dimensional pain profile, Cluster 2 had 83 women (38%) with moderate multi-dimensional pain profile and Cluster 3 had 49 women (22%) with severe multi-dimensional pain profile. Compared to women in cluster one, women in cluster two have significantly worse QoL and fatigue. Compared to women in cluster one, women in cluster three have significantly worse QoL, depression, unemployment, being overweight/obese and fatigue.

Discussion and Conclusions: Three clusters of women based upon dimensions of pain were identified. 40% had mild pain; 38% had moderate pain and poor sensory/affective qualities of pain; and 22% had severe pain with sensory and affective abnormalities, neuropathic pain and pain catastrophizing. Women in clusters two and three were at significantly higher risk of poorer quality of life and health compared to women in

cluster one. Women with arthritis have different experiences of pain, noticeably nearly ¼ present with severe pain, sensory abnormalities, neuropathic pain and pain catastrophizing. This is characteristic of chronic, non-nociceptive pain of a central origin.

WINNER OF CONFERENCE DELEGATES PRIZE

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Abstract Title: Chiropractic adjustments alter sensorimotor integration in the pre-frontal cortex: A brain source localisation study

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Conflicts of Interest: No conflicts of interest have been identified.

Objectives: There is a growing body of evidence that reports that adjusting vertebral subluxations improves sensorimotor integration.¹ Indirect evidence suggests that these improvements in sensorimotor integration may be due to neuroplastic brain changes in

Prize Papers

structures such as the primary sensory cortex, primary motor cortex, prefrontal cortex, basal ganglia and cerebellum.²⁻⁴ However, the poor spatial resolution associated with the techniques that were used in these previous studies mean it is unclear exactly where these brain changes occur.²⁻⁴ This study sought to verify the findings of these previous experiments and to investigate which underlying brain sources may be responsible for such changes.

Methods: Nineteen SCP volunteers attended two sessions in random order (spinal adjustment and passive movement control). Somatosensory evoked potentials (SEPs) from 62-channel EEG electrodes were recorded following median nerve stimulation (1000 stimuli at 2.3 Hz) pre and post either intervention. Peak-to-peak amplitude analysis was completed for the N30 SEP component. Dipolar models of underlying brain sources were built by using the brain electrical source analysis. Differences in N30 amplitudes, dipole locations and dipole strengths were assessed by two-way repeated measures ANOVA.

Results: Spinal adjustments decreased the N30 amplitude by $16.9 \pm 31.3\%$ ($P=0.02$), while no differences were seen following the control intervention ($P=0.4$). Brain source modeling revealed a 4-source model: primary somatosensory cortex, pre-frontal cortex, cingulate, and bilateral secondary somatosensory cortex. No changes in source location occurred following spinal manipulation, but the pre-frontal source showed reduced activity by $20.2 \pm 12.2\%$ ($P=0.03$) following spinal manipulation.

Discussion/Conclusion: A single session of spinal adjustments of vertebral subluxations in subclinical pain patients alters somatosensory processing at the cortical level, particularly within the prefrontal cortex. The mechanisms behind many of the clinical changes that are associated with chiropractic care may be due to alterations in sensorimotor integration in the prefrontal cortex.

1. Haavik H, Murphy B. The role of spinal manipulation in addressing disordered sensorimotor integration and altered motor control. *J Electromyogr Kinesiol* 2012;22(5):768-76.
2. Haavik Taylor H, Murphy B. Cervical spine manipulation alters sensorimotor integration: A somatosensory evoked potential study. *Clin Neurophysiol* 2007;118(2):391-402.
3. Haavik Taylor H, Murphy B. Altered sensorimotor integration with cervical spine manipulation. *J Manipulative Physiol Ther* 2008;31(2):115-26.
4. Haavik Taylor H, Murphy B. The effects of spinal manipulation on central integration of dual somatosensory input observed after motor training: a crossover study. *J Manipulative Physiol Ther* 2010;33(4):261-72.

PODIUM FINALIST

Presenting Author: Julie C Kendall
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Abstract title: Neck pain, concerns of falling and physical performance in community dwelling Danish citizens over 75 years of age: A cross-sectional study

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Conflict of interest: No conflicts of interest

Background: One in three older people will experience a fall⁵ and with an aging population the costs and burden associated with falls is expected to increase. Bodily pain in older people has been shown to be associated with psychological concerns of falling and decreased physical performance⁶, two known risk factors for falling^{7,8}. Importantly, neck pain is associated with disturbance of sensorimotor control of balance⁹; despite this known association, neck pain specifically has not been previously investigated as a risk factor for falling in older people. This study aimed to investigate the association between self-reported neck pain and concerns of falling and physical performance when controlling for other risk factors in community dwelling people aged 75 years and above.

Methods: Cross-sectional study of 423 Danish citizens aged 75 years and older who were participants recruited to the Healthy Aging Network of Competence (HANC) study. Measures included Self-reported neck pain, physical performance (Short Physical Performance Battery), self-reported psychological concerns related to falling (Falls Efficacy Scale International), depression (Major Depression Inventory), cognitive function (Mini Mental State Examination), and self-reported low back pain.

Results: Pain that is activity limiting is significantly associated with concerns of falling (OR 3.29, 95%CI 1.54-7.032) and decreased physical performance (OR 2.26, 95%CI 1.09-4.7). These relationships are however confounded by cognitive function, depression, age, and self-reported history of falls.

Conclusion: Neck pain that limits activities, or is of high intensity in community dwelling older people is associated with increased concerns of falling and decreased physical performance, two known risk factors for falling in older people. These relationships are complex and influenced by other cognitive and physical factors.

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Prize Papers

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3. Haavik Taylor H, Murphy B. Altered sensorimotor integration with cervical spine manipulation. *J Manipulative Physiol Ther* 2008;**31**(2):115-26.
4. Haavik Taylor H, Murphy B. The effects of spinal manipulation on central integration of dual somatosensory input observed after motor training: a crossover study. *J Manipulative Physiol Ther* 2010;**33**(4):261-72.
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9. Treleaven J. Sensorimotor disturbances in neck disorders affecting postural stability, head and eye movement control. *Man Ther* 2008;**13**(1):2-11.

PODIUM FINALIST

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Abstract title: Advice to stay active or structured exercise in the management of sciatica: a systematic review and meta-analysis.

Authors: Matt Fernandez¹, Jan Hartvigsen^{2,3}, Manuela L. Ferreira^{4,5}, Kathryn M. Refshauge¹, Aryane F. Machado¹, Ítalo R. Lemes¹, Chris G. Maher⁴ and Paulo H. Ferreira¹.

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- e) Matt Fernandez is a PhD student supported by the Chiropractic and Osteopathic College of Australasia (COCA). Chris Maher is supported by a research fellowship funded by the Australian Research Council
- f) No conflict of interest
- h) This abstract has been presented at another meeting (COCA conference October 2014, CAANSW 2015 as a poster), and has been accepted in SPINE (journal).
- g) Level I systematic review and meta-analysis

Objective: Conservative management of sciatica usually includes interventions to promote physical activity in the form of advice to stay active or exercise, but there has been no systematic review directly comparing these two approaches.

Methods: Data Sources included MEDLINE, CINAHL, Embase and PEDro databases. Studies included randomized controlled trials comparing advice with exercise. Two independent reviewers extracted data and assessed methodological quality using the PEDro scale. Pain and disability data were extracted for all time points and converted to a common 0 to 100 scale. Data were pooled with a random effects model for short; intermediate and long-term follow ups. The GRADE approach was used to summarize the strength of evidence.

Results: Five trials were included in the meta-analysis, which showed a significant, although small effect favoring exercise over advice for reducing leg pain intensity in the short term (weighted mean difference: 11.43 [95%CI, 0.71, 22.16]), but no difference for disability (weighted mean difference: 1.45 [95%CI, -2.86, 5.76]). Furthermore, there was no difference at intermediate and long-term follow ups between advice and exercise for patient relevant outcomes.

Conclusion: There is low quality evidence (GRADE) that exercise provides small, superior effects compared with advice to stay active on leg pain in the short term for patients suffering with sciatica. However there is moderate quality evidence showing no difference between advice to stay active and exercise on leg pain and disability status in people with sciatica in the long term. Advice to stay active is likely to be a more cost-effective option to manage long-term disability in patients with sciatica when compared to structured supervised exercise.

PODIUM FINALIST

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ABSTRACT TITLE: The effect of a single application of manual or instrument applied cervical manipulation for mechanical neck pain: a randomised controlled trial.

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Objectives: While there is evidence that cervical manipulation (CM) improves mechanical neck pain (MNP) differences in effect between techniques remains unclear. Results from high (manually applied manipulation: MAM) and low force techniques (instrument applied manipulation: IAM) are often grouped together despite IAM being considered lower risk than MAM. If the two are equally effective then the lower risk technique should be used preferentially. The aim of this study was to determine whether there was any difference in effect on MNP following MAM and IAM.

Methods: 65 volunteers with MNP were randomly allocated to three groups: (i) Stretching (Control); (ii) Stretching plus MAM; and (iii) Stretching plus IAM. Intervention consisted of a single CM (MAM: manually applied high velocity low amplitude CM; IAM: CM applied using an Activator® adjusting instrument). Objective measures including pressure pain threshold (PPT), cervical range of motion (cROM), hand grip strength (GS) and blood pressure at the wrist (WBP) and a subjective measure of pain using the visual analogue scale (VAS) were measured immediately pre and post intervention. A follow-up VAS was obtained via phone text message 7 days post intervention.

Results: Cervical rotation and lateral flexion increased following MAM compared to IAM [rotation – ipsilateral: 10.35° (p=0.002); contralateral: 6.32° (p=0.015); lateral flexion – contralateral: 6.40° (p=0.001)]. Contralateral GS increased 4.43kg/cm² (p=0.013) following IAM compared to MAM. No moderate or severe adverse events were reported in this trial.

Discussion: The application of a single manipulative thrust produced immediate effects on MNP. The effect of MAM was different to IAM with an increase in cROM following MAM and an increase in GS on the contralateral side following IAM. It is likely that the biomechanical characteristics of each technique are responsible for the variation in effect in cases of MNP.

PODIUM FINALIST

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Abstract Title: Manual care of residents with spinal pain within a therapeutic community.

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ABSTRACT

Purpose: Examine the outcomes of interventions, which included the option of a package of manual & manipulative therapy (MMT), provided to self-presenting residents

experiencing non-malignant non-specific spinal pain in a substance misuse therapeutic community (TC).

Design/Methodology: Clinical outcomes-based audit to explore the potential benefits of the interventions offered to residents experiencing non-malignant non-specific spinal pain in a substance misuse TC. Residents seeking care for their spinal pain underwent an assessment by either the TC's general practitioner or by a chiropractic student under supervision. Eligible participants could choose one of the four interventions available at the TC: (a) usual care *without* any additional treatment (Group 1), (b) usual care *with* simple analgesics (Group 2), (c) usual care plus a package of MMT *without* simple analgesics (Group 3), or (d) usual care plus a package of MMT *with* simple analgesics (Group 4). Outcome measures were the RAND 36-item Short Form (RAND-36) health-related quality-of-life survey and the Patient Satisfaction Questionnaire. Data were collected at baseline and after 6 weeks for each participant, with those participants choosing the package of MMT receiving up to 6 treatments over the study period. Two cycles of 6-weeks of data collection was used in this audit. Data were analyzed for statistically significant (repeated measures ANOVA with Bonferroni correction) and clinically meaningful changes in scores (minimally clinically important differences).

Results: Of 71 self-presenting residents seeking care, 68 were eligible to participate. Of these, 32 chose usual care *with* simple analgesics (Group 2) and 36 chose usual care plus the package of MMT but *without* simple analgesics (Group 3). None chose usual care without additional treatment or usual care plus the package of MMT with analgesics, thus offering only the data from two groups for analysis. Group allocation was non-random and based on patient choice. Between-group analysis of the cumulative and component RAND-36 data indicated a significant difference between the two groups ($P=0.034$), particularly in the physical outcomes ($P=0.012$), indicating that Group 3 had improved scores over Group 2. Group 3 showed a significant change in RAND-36 scores ($P<0.01$) when compared with Group 2 ($P=0.23$) over the 6-week treatment period. The Patient Satisfaction Questionnaire scores of the two groups showed a statistically significant difference ($P=0.0093$), suggesting that Group 3 had greater patient satisfaction with care. The outcomes suggest that the package of MMT in Group 3, delivered by a chiropractor, may have added to therapeutic effect that extended beyond physical outcomes but also influenced psychological outcomes. It appears that utilizing of both active and passive interventions offers the best possible outcomes.

Conclusions/Implications: The results of this clinical outcome-based audit suggest that the addition of a package of MMT to usual care may be of benefit over usual care with simple analgesics. The results intimate that the benefits of the package of MMT may extend across both the physical and psychological components of the pain experience, although a confirmatory study is recommended to substantiate these insights.

Originality: As far as the authors are aware, this trial is the first of this type in a TC, with the insights and experience gained supporting a definitive trial.

Key Indexing Terms: Analgesics; Back Pain; Chiropractor; Spinal Manipulation; Spinal Pain; Substance Abuse; Therapeutic Community