International Journal of Osteopathic Medicine 32 (2019) 2–6

Contents lists available at ScienceDirect

International Journal of Osteopathic Medicine

journal homepage: www.elsevier.com/locate/ijosm

Do empathic osteopaths achieve better clinical results? An observational feasibility study

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ARTICLE INFO

Keywords:
Empathy
Jefferson Scale of Physician Empathy-Health Professional
Musculoskeletal pain
Osteopathic manipulative treatment
Feasibility study

ABSTRACT

Background: Empathy plays a role in medical care. Studies have showed that higher empathy levels of physicians correlates with better patient outcomes. The role of empathy in osteopathic practice has been poorly investigated.
Objective: To explore the feasibility of analysing the link between the empathy of osteopaths and the improvement in persistent musculoskeletal pain patients.
Participants: 13 trainees attending the 5th year in a reference osteopathic teaching institution and 39 patients with chronic musculoskeletal pain.
Methods: Trainees were tested for their empathy level by using the Jefferson Scale of Physician Empathy-Health Professional. Trainees with a score higher than the 80th percentile and lower than the 20th percentiles were identified as "highly" and "poorly" empathic therapists and were assigned respectively to the HET and LET group. Each trainee was assigned to patients. Pain intensity was monitored throughout the study by the validated Numerical Rating Scale (NRS).
Results: Patients included into the HET and LET groups had comparable baseline characteristics. Both groups benefited from the treatment. The mean NRS improvement score in the HET group was 6.4 (95% CI 5.3 to 7.5; $p < 0.0001$). The LET mean NRS improvement score was 3.5 (95% CI 2.1 to 4.8; $p < 0.0001$). The intergroup difference indicated that the two patient groups differed in pain intensity starting from the third treatment (T3 $p = 0.0032$ and T4 $p = 0.0021$).
Conclusions: Research on the link between empathy of therapists and the outcome of Osteopathic Manipulative Treatment for chronic musculoskeletal pain appears feasible. The reported findings might help to design further confirmatory studies.

Introduction

Empathy in patient care can be defined as a "*predominantly cognitive (rather than an affective or emotional) attribute that involves an understanding (rather than feeling) of experiences, concerns and perspectives of the patient, combined with a capacity to communicate this understanding, and an intention to help*" [1]. Thus, although affective and behavioural capacities are involved, cognition is crucial to empathy, making it a suitable skill to be taught in the educational training [2–7]. Since the introduction of the term empathy in 1909 [8], the concept of empathy and its clinical implication in psychological and medical care were extensively discussed, and the attention to this skill progressively increased in the last decades [3,9]. Around 80% of patients recommend an empathic physician to other people [10]. Many patients consider empathy as a condition of the clinical relationship and a key factor to define the quality of a therapy [4,11]. Apparently, an empathic interaction improves both patient and physician satisfaction, thus contributing to patient compliance and improving patients' overall health [3,12–17]. Moreover, some studies suggested a link between physician empathy and clinical results in various clinical contexts [18–22]. The effect of empathy on the pain context is not clear and is still poorly studied. Some studies found that in contexts perceived as highly empathic, pain perception increases, depending on individual differences in attachment style [23,24]. Other studies found a positive effect of

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https://doi.org/10.1016/j.ijosm.2019.02.002
Received 16 December 2016; Received in revised form 15 February 2019; Accepted 22 February 2019

empathy in reducing participant pain severity [25,26]. However, often these studies were not conducted in rigorous well-controlled clinical settings.

Osteopathy bases its tenets on a holistic approach to patient care, that encompasses the integration of structure and function, the emotional and social aspects of health and healing [27,28]. Although osteopathy arguably comes from a strict biomedical background and is having difficulty adopting a biopsychosocial model, it remains a person-centred profession [28–31], in which the ability to establish an empathic engagement between the therapist and patient may assume a meaningful role [32–34].

Chronic pain is a major global health problem and its management has an important socioeconomic impact [35,36]. Most clinical practice guidelines for the management of chronic musculoskeletal pain focus on medical treatment and there are no clear recommendations about non-pharmacological management options [37]. However, in chronic patients the efficacy of medical treatment is often limited and most drugs have substantial side effects [38]. Further, considering the complex nature of chronic pain that involves biological, psychological and social factors, a more integrated approach may be beneficial to chronic pain management [39–46]. Even if osteopathy's efficacy is mostly based on empirical evidence [47–51] and some studies fail to identify significant benefit [52], patients with chronic pain often present to osteopaths. The lack of standardization based on controlled studies and the lack of defined protocols limit the possible efficacy of osteopathic intervention in this field [53,54].

Studies concerning empathy in osteopathic medicine are restricted to descriptive in academic contexts [55–59]. No studies have assessed the direct impact of empathy on the outcomes of osteopathic treatments of patients with chronic pain.

The aim of this preliminary work is to explore the feasibility of a study that investigates the association between empathy level of osteopaths and expected patient improvement.

Methods

Setting and participants

This study was conducted at the Centro di Medicina Osteopatica (CMO) clinic of the Istituto Superiore di Osteopatia (ISO) in Milan (Italy), from November 2014 to April 2015. The CMO private clinic delivers approximately 10 first consultations per week, and about 30% of them concerns chronic musculoskeletal complaints. The treatments are provided by trainees under the supervision of an experienced tutor. The therapists for this study were recruited among the trainees attending the 5th academic year because they have at least 150 h of clinical practice. Their recruitment was done at the beginning of the final academic year, first by means of posters displayed in the ISO and then by face-to-face contact with the research coordinator. The study protocol was reviewed and approved by an expert board of the institute, according to the standards of the Declaration of Helsinki, the “Good Clinical Practice” Guidelines, and the recommendation of the National Committee on Bioethics. To assure voluntary and confidential participation, the trainees signed an informed consent and completed the Italian version of the Jefferson Scale of Physician Empathy (JSE-HP) [7,60].

The study population was selected among patients with chronic musculoskeletal pain presented at the CMO for their first visit. Patients with diffuse or focal pain in musculoskeletal tissue or related neural tissue persisting for 3 months or longer were included into this study [61–63]. Patients with visceral pain, migraine, other neurological, rheumatic or vascular diseases, acute pain and no pain were excluded. The study coordinator was responsible to verify the patient inclusion/exclusion criteria. All the included patients gave their written informed consent.

The measurement of empathy

In order to evaluate empathy level, the Italian version of JSE-HP was administered to trainees. The JSE-HP is a version of the Jefferson Scale of Empathy developed for healthcare administration. This tool consists in 20 items, each answered on a 7-point Likert-type scale (from 1 = strongly disagree to 7 = strongly agree). The JSE-HP scoring ranges from a minimum of 20 points to a maximum of 140 points. Higher scores correlate to greater empathic relationship with patients. In an Italian sample of 289 physicians, the mean score was 115.1 (SD = 15.5), and the median was 118. The 25^{th} and 75^{th} percentiles were respectively 108 and 126. Cronbach's coefficient alpha was 0.85 [60].

Clinical outcome measures

The numerical rating scale (NRS) is a reliable, sensitive [64,65] and useful [66] tool to monitor musculoskeletal pain [67,68].

Procedure

The study coordinator administered the JSE-HP questionnaire to trainees. All of them (100%) participated in the study. Each participant was identified by a numerical code printed on the questionnaire. Demographic data (age and gender) were collected in the same questionnaire. We set up two groups, one consisting of the highly empathy trainees (HET, scores higher than the 80^{th} percentile, specifically higher than 110/140 points), the other one consisting of the low empathy trainees (LET, scores lower than the 20th percentile, specifically lower than 98/140 points). The trainees with scores between the 20^{th} and the 80^{th} percentiles were excluded. Each patient was assigned to his/her trainee in a blind fashion based on the automatic clinic delivery program. After the first visit, patients were scheduled to be treated by the same operator every time. Interventions were packages of care, as currently provided in the clinic routine. All patients received four 45-min osteopathic manipulative treatment (OMT) within eight weeks of baseline evaluation. The precise timing among sessions depended on the patient diagnosis and clinical availability within a range of 15 days. An external assessor asked the patients to fill the NRS form, in absence of the assigned therapist, before each treatment and at the follow-up visit, one month after the last treatment. The trainees and patients were blinded to the JSE-HP scores. The trainees were blinded to the NRS scores collected by external assessors throughout the study.

Statistical analysis

Statistical analysis (GraphPad Prism version 6.00 for Windows, GraphPad Software, La Jolla California USA, www.graphpad.com) were performed in a blind fashion by an external assessor. 2-way repeated measures ANOVA was performed to evaluate the effect of OMT treatment and time (before each treatment and at the follow-up visit, one month after the last treatment) on the NRS pain outcomes. Bonferroni corrections were used for multiple comparisons. Differences in categorical variables at baseline between the two groups were calculated by using Fisher's exact test. p-values lower than 0.05 were considered statistically significant. All data were reported as mean ± standard deviation.

Results

Baseline characteristics

Among 41 trainees evaluated for their empathy level by the JSE-HP scale, 13 were enrolled and participated in the study. HET group consisted of 8 trainees (age = 25.9 ± 4.29 years, M:F = 5:3). LET group consisted of 5 trainees (age = 23.6 ± 0.55 years, M:F = 2:3). The two

Table 1
Comparison of trainee baseline characteristics in study groups. HET, High Empathy Trainees; LET, Low Empathy Trainees; M, male; F, female; JSE-HP, Jefferson Scale of Physician Empathy; NRS, numerical rating scale; *n.s.* non-significant. The values are expressed as mean ± standard deviation.

Trainee characteristics	HET	LET	*p*
Gender (M, F)	5, 3	2, 3	*n.s.*
Age (years)	25.88 ± 4.29	23.60 ± 0.55	*n.s.*
JSE-HP score	112.50 ± 3.38	90.80 ± 9.42	<0.0001

Table 2
Patient characteristics at baseline in HET and LET group. HET, High Empathy Trainees; LET, Low Empathy Trainees; M, male; F, female; JSE-HP, Jefferson Scale of Physician Empathy; NRS, numerical rating scale; *n.s.* non-significant. The values are expressed as mean ± standard deviation.

Patient characteristics	HET	LET	*p*
Gender (M, F)	10, 13	6, 8	*n.s.*
Age (years)	40.39 ± 18.55	42.36 ± 15.70	*n.s.*
NRS (1−10)	7.26 ± 2.07	7.07 ± 1.82	*n.s.*

therapist groups had similar demographic characteristics and the same number of hours of supervised clinical practice. In contrast, the difference in their empathy score was significant as expected (112.5 ± 3.38 points vs 90.8 ± 9.42 points; $p < 0.0001$) (Table 1).

HET patients were 23 subjects (age = 40.39 ± 18.55 years; NRS score at baseline = 7.26 ± 2.07). LET patients were 14 subjects (age = 42.36 ± 15.70 years; NRS score at baseline = 7.07 ± 1.82). An average number of 3 patients per therapist was recruited over 6 weeks. The baseline patient characteristics were similar in both study groups ($p > 0.05$) (Table 2). Spinal pain (71% among which 38% cervical, 27% lumbar, 3% dorsal and 3% coccyx pain), chest and shoulder pain (16% among which 8% scapular, 5% shoulder and 3% chest pain), lower limb pain (8%) and cranial mandibular pain (5%) were the patient reported regions of pain. No statistically significant differences were observed for both the NRS level and main reported regions of pain (70% HET patients vs 79% LET patients, $p = 0.36$ reported spinal pain). No patients dropped-out.

Patient pain response to OMT

ANOVA revealed a significant group/time interaction (F = 6.29, $p = 0.0001$), suggesting that OMT resulted in a different effect on the two groups over the treatment course (Fig. 1). The OMT efficacy was observed when both high empathic and low empathic trainees administered the treatment (Table 3). The mean NRS improvement score in HET group at the end of the study was 6.4 (95% CI 5.3 to 7.5;

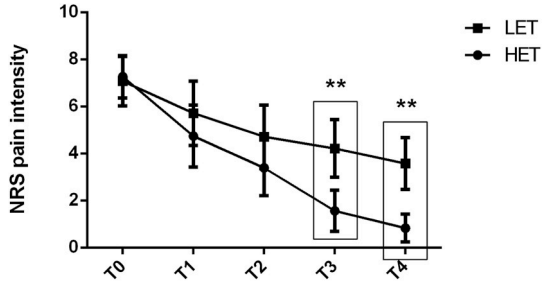

Fig. 1. The effect of OMT on pain intensity, as assessed by using the NRS scale, was evaluated in patients treated by highly empathic (HET) or poorly emphatic (LET) therapists at every time point. T0 refers to the baseline mean score; T1, T2 and T3 refer to the scores obtained before each treatment, and T4 to the score obtained at follow-up visit one month after the last treatment. Data are plotted as mean and 95% CI. *$p \leq 0.05$; **$p \leq 0.001$; ***$p \leq 0.0001$.

Table 3
Mean difference of NRS pain in HET and LET group over the time. HET, High Empathy Trainees; LET, Low Empathy Trainees.

HET group	Mean Difference	95% CI	*p*
T0 vs. T1	2.522	1.444 to 3.599	<0.0001
T0 vs. T2	3.870	2.792 to 4.947	<0.0001
T0 vs. T3	5.696	4.618 to 6.773	<0.0001
T0 vs. T4	6.435	5.357 to 7.512	<0.0001
LET group			
T0 vs. T1	1.357	−0.024 to 2.738	*n.s.*
T0 vs. T2	2.357	0.976 to 3.738	<0.0001
T0 vs. T3	2.857	1.476 to 4.238	<0.0001
T0 vs. T4	3.500	2.119 to 4.881	<0.0001

$p < 0.0001$). The LET mean NRS improvement score was 3.5 (95% CI 2.1 to 4.8; $p < 0.0001$). Moreover, the intergroup difference was not significant at T0 ($p = 0.1203$), T1 ($p = 0.5909$) and T2 ($p = 0.4227$), but it was significant at T3 ($p = 0.0032$) and T4 ($p = 0.0021$), indicating that the two patient groups differed in pain intensity starting from the third treatment.

Discussion

It was widely suggested that there could be a relationship between physician empathy and clinical results in various clinical settings [18–22]. However, the feasibility and acceptability of studies directly investigating this issue in osteopathic medicine has not so far been evaluated. Preliminary studies are indeed necessary to establish the most effective protocol, the procedure to collect data and randomize therapists and patients, the way to recruit subjects and define the most informative outcome measures [69,70]. We thus decided to lay the ground for future randomized control trials selecting musculoskeletal pain as a field of interest. Chronic pain is largely represented in the general population and has an important socioeconomic impact [35]; there is a moderate-quality evidence supporting the overall efficacy of OMT in these patients [47–51]. Moreover, cognitive and emotional factors, including empathy, may influence pain experience and perception [23–26,71–73], particularly in chronic patients [46,74,75].

Our exploratory results support the short-term effectiveness of OMT in relieving musculoskeletal pain, in agreement with some previous studies [76,77]. Although after OMT the pain intensity improves over 3–12 months in chronic patients [47,48,50,51], we observed relatively faster effects of treatment. Several confounding factors could contribute. First, we did not record the specific pain duration and the use of concomitant medications. Second, we did not systematically investigate the possible underlying mechanisms of musculoskeletal pain [78]. The nature of chronic pain is complex. The pain evolution observed may reflect a predominance of nociceptive pain mechanisms in the studied participants. We may speculate that the central modulation of pain concomitant with mechanical local and/or regional factors [79] may have influenced the response to treatment in both groups. It should however be taken into account that several studies show similar short-term pain response [76,77,80–84].

Previous studies link factors within clinician-patient relationships to various elements associated with treatment outcomes [1,85,86]. Theoretically, any factor that could improve this relationship, including the empathic engagement between the therapist and patient, may influence clinical outcomes [1,87]. Several models of effectiveness highlighted how the empathically communicating clinician influences patient outcome. This could be realized on one hand by enabling clinicians to accurately fulfil core clinical tasks, and on the other hand by enhancing the patient compliance and adherence to treatment [88,89]. The trainees' empathic skill, including communication skills and the ability to build a trusting and confidential relationship was suggested to improve the accuracy of a biopsychosocial diagnosis and, in turn, the treatment

planning [90]. Furthermore, these skills may impact on the patient emotions and musculoskeletal pain management [73,91,92]. Further, empathic communication of therapists may transmit support and pain validation to patients [33] and then influence the patient pain experience.

The different trend of pain level we observed in the two groups might suggest a potential involvement of the empathic disposition of therapist. However, our study was not designed to assess the efficacy of the levels of therapist empathy on the patient response to OMT. This approach appeared to be feasible and could be considered a starting point to assess the empathy level in osteopaths associated to the clinical response of a wide range of patients.

Strengths and limitations

This study was conducted in a specific clinical setting, respecting our day-to-day clinical practice and without altering the normal patient and trainee behaviour. This setting permitted to achieve the full participation of trainees and a good patient recruitment rate. Moreover, we did not observe patient drop-out during treatment and at the follow-up assessment. On the other side, the findings of this study are not generalizable and are limited by the above-mentioned factors related to chronic pain diagnosis and to the procedure of provided intervention. Further, several factors influencing pain experience of patients, ranging from the use of analgesics to the biopsychosocial sphere, need to be taken into account in future studies.

Finally, although the JSE-HP high score is predictive of empathic behaviour, the measurement of patient perception could be a useful tool to confirm the establishment of an effective empathic trainee-patient relationship [93].

Conclusions

This preliminary study supports the feasibility of investigating whether the degree of therapist empathy might associate to the overall outcome of OMT in patients with chronic musculoskeletal pain. Further studies are needed to evaluate the effectiveness of empathic therapists treating patients with chronic pain. The results will be relevant for both the clinical practice of osteopaths and the teaching of osteopathy to trainees.

References

[1] Hojat M. Empathy in Health Professions Education and Patient Care. Springer International Publishing; 2016. p. 74.
[2] Hojat M, Mangione S, Nasca TJ, Cohen MJM, Gonnella JS, Erdmann JB, et al. The Jefferson scale of physician empathy: development and preliminary psychometric data. Educ Psychol Meas 2001;61(2):349–65.
[3] Derksen F, Bensing J, Lagro-Janssen A. Effectiveness of empathy in general practice: a systematic review. Br J Gen Pract 2013;63(606):e76–84.
[4] Mercer SW, Reynolds WJ. Empathy and quality of care. Br J Gen Pract 2002 Oct;52(Suppl):S9–12.
[5] Neumann M, Wirtz M, Bollschweiler E, Mercer SW, Warm M, Wolf J, et al. Determinants and patient-reported long-term outcomes of physician empathy in oncology: a structural equation modelling approach. Patient Educ Counsel 2007;69(1–3):63–75.
[6] Coulehan JL, Platt FW, Egener B, Frankel R, Lin CT, Lown B, et al. Let me see if I have this right. Words that help build empathy, vol. 135. Annals of Internal Medicine; 2001. p. 221–7.
[7] Hojat M, Gonnella JS, Nasca TJ, Mangione S, Veloksi JJ, Magee M. The Jefferson Scale of Physician Empathy: further psychometric data and differences by gender and specialty at item level. Acad Med 2002;77:S58–60.
[8] Stueber K. Empathy. Stanford Encycl Philos 2008 Available from: https://plato.stanford.edu/archives/sum2008/entries/empathy/.
[9] Rogers CR. On Becoming a Person: A Therapist's View of Psychotherapy. Boston, MA: Houghton Mifflin Company; 1961.
[10] Vedsted P, Heje HN. Association between patients' recommendation of their GP and their evaluation of the GP. Scand J Prim Health Care 2008;26(4):228–34.
[11] Irving P, Dickson D. Empathy: towards a conceptual framework for health professionals. Int J Health Care Qual Assur 2004;17(4):212–20.
[12] Bikker AP, Mercer SW, Reilly D. A pilot prospective study on the consultation and relational empathy, patient enablement, and health changes over 12 months in patients going to the Glasgow Homoeopathic Hospital. J Altern Complement Med 2005 Aug;11(4):591–600.
[13] Suchman AL, Roter D, Green M, Lipkin Jr. M. Physician satisfaction with primary care office visits. Collaborative study group of the American academy on physician and patient. Med Care 1993;31(12):1083–92.
[14] Ha JF, Longnecker N. Doctor-patient communication: a review. Ochsner J 2010;10(1):38–43.
[15] Lelorain S, Brédart A, Dolbeault S, Sultan S. A systematic review of the associations between empathy measures and patient outcomes in cancer care. Psycho Oncol 2012;21:1255–64.
[16] Kane GC, Gotto JL, Mangione S, West S, Hojat M. Jefferson scale of patient's perceptions of physician empathy: preliminary psychometric data. Croat Med J 2007;48(1):81–6.
[17] Hojat M, Louis DZ, Maxwell K, Markham FW, Wender RC, Gonnella JS. A brief instrument to measure patients' overall satisfaction with primary care physicians. Fam Med [Internet] 2011;43(6) 412–7. Available from: http://eutils.ncbi.nlm.nih.gov/entrez/eutils/elink.fcgi?dbfrom=pubmed&amp%5Cnid=21656396&amp%5Cnretmode=ref&amp%5Cncmd=prlinks.
[18] Del Canale S, Louis DZ, Maio V, Wang X, Rossi G, Hojat M, et al. The relationship between physician empathy and disease complications. Acad Med 2012;87(9):1243–9.
[19] Markham F, Hojat M, Louis DZ, Markham FW. Physicians ' empathy and clinical outcomes for diabetic patients physicians ' empathy and clinical outcomes. Acad Med 2011;86(November 2015):359–64.
[20] Lobchuk MM, Bokhari SA. Linkages among empathic behaviors, physical symptoms, and psychological distress in patients with Ovarian cancer: a pilot study. Oncol Nurs Forum [Internet] 2008 Sep 1 [cited 2017 Apr 28];35(5):808–14. Available from:. http://www.ncbi.nlm.nih.gov/pubmed/18765327.
[21] Rakel D, Barrett B, Zhang Z, Hoeft T, Chewning B, Marchand L, et al. Perception of empathy in the therapeutic encounter: effects on the common cold. Patient Educ Couns [Internet] 2011 Dec [cited 2017 Apr 28];85(3):390–7. Available from:. http://www.ncbi.nlm.nih.gov/pubmed/21300514.
[22] Pereira L, Figueiredo-Braga M, Carvalho IP. Preoperative anxiety in ambulatory surgery: the impact of an empathic patient-centered approach on psychological and clinical outcomes. Patient educ couns [Internet] 2016 May [cited 2017 Apr 18];99(5):733–8. Available from:. http://www.ncbi.nlm.nih.gov/pubmed/26654958.
[23] Sambo CF, Howard M, Kopelman M, Williams S, Fotopoulou A. Knowing you care: effects of perceived empathy and attachment style on pain perception. Pain [Internet] 2010;151(3):687–93. Available from: https://doi.org/10.1016/j.pain.2010.08.035.
[24] Hurter S, Paloyelis Y, Williams AC de C, Fotopoulou A. Partners' empathy increases pain ratings: effects of perceived empathy and attachment style on pain report and display. J Pain [Internet] 2014 Sep [cited 2017 May 2];15(9):934–44. Available from:. http://www.ncbi.nlm.nih.gov/pubmed/24953886.
[25] Leong LEM, Cano A, Wurm LH, Lumley MA, Corley AM. A perspective-taking manipulation leads to greater empathy and less pain during the cold pressor task. J Pain [Internet] 2015;16(11):1176–85. Available from: https://doi.org/10.1016/j.jpain.2015.08.006.
[26] Goldstein P, Shamay-Tsoory SG, Yellinek S, Weissman-Fogel I. Empathy predicts an experimental pain reduction during touch. J Pain [Internet] 2016;17(10):1049–57. Available from: http://www.ncbi.nlm.nih.gov/pubmed/27363627.
[27] Osborn GG, Meoli FG, Buser BR, Clearfield MB, Bruno JP, Sumner-Truax L. The comprehensive osteopathic medical licensing examination, COMLEX-USA: a new paradigm in testing and evaluation. J Am Osteopath Assoc 2000 Feb;100(2):105–11.
[28] Fahlgren E, Nima AA, Archer T, Garcia D. Person-centered osteopathic practice: patients' personality (body, mind, and soul) and health (ill-being and well-being). PeerJ 2015;3:e1349.
[29] Kuchera ML. Applying osteopathic principles to formulate treatment for patients with chronic pain. J Am Osteopath Assoc 2007;107(10 Suppl 6):ES28–38.
[30] General Osteopathic Council. Osteopathic practice standards. Osteopath Pract Stand 2012(September):1–32.
[31] History OIA. Current context of the osteopathic profession. Osteopath Int Alliance 2012(March):1–22.
[32] Elkiss M, Jerome J. Touch - more than a basic science. J Am Osteopath Assoc 2012;112(8):514–7.
[33] Consedine S, Standen C, Niven E. Knowing hands converse with an expressive body - an experience of osteopathic touch. Int J Osteopath Med [Internet] 2016;19:3–12. Available from: https://doi.org/10.1016/j.ijosm.2015.06.002.
[34] Goldstein P, Shamay-Tsoory SG, Yellinek S, Weissman-Fogel I. Empathy predicts an experimental pain reduction during touch. J Pain [Internet] 2016 Oct [cited 2017 May 2];17(10):1049–57. Available from:. http://www.ncbi.nlm.nih.gov/pubmed/27363627.
[35] Latham J, Davis BD. The socioeconomic impact of chronic pain. Disabil Rehabil [Internet] 1994 Jan 28;16(1):39–44. Available from: http://www.tandfonline.com/doi/full/10.3109/09638289409166435.
[36] Gereau IVRW, Sluka KA, Maixner W, Savage SR, Price TJ, Murinson BB, et al. A pain research agenda for the 21st century. J Pain [Internet] 2014;15(12):1203–14. Available from: https://doi.org/10.1016/j.jpain.2014.09.004%5Cnpapers3://publication/doi/10.1016/j.jpain.2014.09.004.
[37] Ernstzen D, Hillier S, Louw Q. Clinical practice guidelines for the management of chronic musculoskeletal pain in primary health care: a systematic review. Man Ther [Internet] 2016;25:e143. Available from: http://www.sciencedirect.com/science/article/pii/S1356689X16303009.
[38] Kapur BM, Lala PK, Shaw JLV. Pharmacogenetics of chronic pain management. Clin Biochem [Internet] 2014;47(13–14):1169–87. Available from: https://doi.org/10.1016/j.clinbiochem.2014.05.065.
[39] Licciardone JC, Gatchel RJ, Kearns CM, Minotti DE. Depression, somatization, and somatic dysfunction in patients with nonspecific chronic low back pain: results from the OSTEOPATHIC trial. Journalof Am Osteopath Assoc 2012;112(12):783–91.
[40] Turk D, Gatchel R. Psychological approaches to pain management: a practitioner's

handbook. Acute pain management; 1996. p. 55–77.
[41] Nielson WR, Weir R. Biopsychosocial approaches to the treatment of chronic pain. Clin J Pain 2001;17:S114–27.
[42] Gatchel RJ, Peng YB, Peters ML, Fuchs PN, Turk DC. The biopsychosocial approach to chronic pain: scientific advances and future directions. Psychol Bull 2007;133(4):581–624.
[43] Scascighini L, Toma V, Dober-Spielmann SSH. Multidisciplinary treatment for chronic pain: a systematic review of interventions and outcomes. Rheumatology (Oxford) [Internet] 2008;47(5):670–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/18375406.
[44] Hylands-White N, Duarte RV, Raphael JH. An overview of treatment approaches for chronic pain management. Rheumatol Int 2016:1–14.
[45] Edwards RR, Sullivan MD, Wasan AD. The role of psychosocial processes in the development and maintenance of chronic pain. J Pain 2016;17.
[46] Bushnell MC, Čeko M, Low LA. Cognitive and emotional control of pain and its disruption in chronic pain. Nat Rev Neurosci 2013;14(7):502–11.
[47] Licciardone JC, Kearns CM. Somatic dysfunction and its association with chronic low back pain, back-specific functioning, and general health: results from the OSTEOPATHIC trial. J Am Osteopath Assoc 2012;112(7):420–8.
[48] Licciardone JC, Kearns CM, Crow WT. Changes in biomechanical dysfunction and low back pain reduction with osteopathic manual treatment: results from the OSTEOPATHIC Trial. Man Ther 2014;19(4):324–30.
[49] Task force on the low back pain clinical practice guidelines. American osteopathic association guidelines for osteopathic manipulative treatment (OMT) for patients with low back pain. J Am Osteopath Assoc [Internet] 2016 Aug 1 [cited 2017 Mar 30];116(8):536. Available from:. http://www.ncbi.nlm.nih.gov/pubmed/27455103.
[50] Franke H, Franke J-D, Fryer G. Osteopathic manipulative treatment for chronic nonspecific neck pain: a systematic review and meta-analysis. Int J Osteopath Med [Internet] 2015 [cited 2017 Mar 30];18(4):255–67. Available from:. http://www.sciencedirect.com.pros.lib.unimi.it/science/article/pii/S1746068915000498.
[51] Franke H, Franke J-D, Fryer G. Osteopathic manipulative treatment for nonspecific low back pain: a systematic review and meta-analysis. BMC Musculoskelet Disord [Internet] 2014 Dec 30 [cited 2017 Mar 30];15(1):286. Available from:. http://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/1471-2474-15-286.
[52] Orrock PJ, Myers SP. Osteopathic intervention in chronic non-specific low back pain: a systematic review. BMC Muscoskelet Disord 2013;14(1):129.
[53] Cerritelli F, Verzella M, Barlafante G. Quality of life in patients referring to private osteopathic clinical practice: a prospective observational study. Complement Ther Med [Internet] 2014 [cited 2017 Mar 30];22(4):625–31. Available from:. http://www.sciencedirect.com.pros.lib.unimi.it/science/article/pii/S096522991400079X.
[54] Osteopathy OIA, Osteopathic Medicine. A global view of practice, patients, education and the contribution to healthcare delivery. A glob view pract patients. Educ Contrib to Healthc Deliv 2013;102.
[55] Calabrese LH, Bianco JA, Mann D, Massello D, Hojat M. Correlates and changes in empathy and attitudes toward interprofessional collaboration in osteopathic medical students. J Am Osteopath Assoc [Internet] 2013;113(12):898–907. Available from: http://jaoa.org/article.aspx?articleid=2094419.
[56] Chen D, Lew R, Hershman W, Orlander J. A cross-sectional measurement of medical student empathy. J Gen Intern Med 2007;22(10):1434–8.
[57] Kimmelman M, Giacobbe J, Faden J, Kumar G, Pinckney CC, Steer R. Empathy in osteopathic medical students: a cross-sectional analysis. J Am Osteopath Assoc 2012;112(6):347–55.
[58] McTighe AJ, DiTomasso RA, Felgoise S, Hojat M. Correlation between standardize patients' perceptions of osteopathic medical students and students' self-rated empathy. J Am Osteopath Assoc 2016 Oct;116(10):640–6.
[59] McTighe AJ, DiTomasso RA, Felgoise S, Hojat M. Effect of medical education on empathy in osteopathic medical students. J Am Osteopath Assoc 2016 Oct;116(10):668–74.
[60] Di Lillo M, Cicchetti A, Lo Scalzo A, Taroni F, Hojat M. The Jefferson Scale of Physician Empathy: preliminary psychometrics and group comparisons in Italian physicians. Acad Med 2009 Sep;84(9):1198–202.
[61] Merskey H, Bogduk N. Classification of chronic pain. Seattle IASP Press; 1994.
[62] Treede R-D, Rief W, Barke A, Aziz Q, Bennett MI, Benoliel R, et al. A classification of chronic pain for ICD-11. Pain [Internet] 2015 Jun [cited 2017 Mar 30];156(6):1003–7. Available from:. http://www.ncbi.nlm.nih.gov/pubmed/25844555.
[63] International Association for the Study of Pain. Musculoskeletal pain fact sheet No. 1 [Internet] Available from: http://iasp.files.cms-plus.com/Content/ContentFolders/GlobalYearAgainstPain2/20092010MusculoskeletalPain/1.Musculoskeletal Pain Fact Sheet Revised 2017.pdf; 2017 Apr 14.
[64] Ferraz MB, Quaresma MR, Aquino LR, Atra E, Tugwell P, Goldsmith CH. Reliability of pain scales in the assessment of literate and illiterate patients with rheumatoid arthritis. J Rheumatol 1990 Aug;17(8):1022–4.
[65] Salaffi F, Stancati A, Silvestri CA, Ciapetti A, Grassi W. Minimal clinically important changes in chronic musculoskeletal pain intensity measured on a numerical rating scale. Eur J Pain [Internet] 2004 Aug [cited 2016 Nov 18];8(4):283–91. Available from:. http://doi.wiley.com/10.1016/j.ejpain.2003.09.004.
[66] Williamson A, Hoggart B. Pain: a review of three commonly used pain rating scales. J Clin Nurs 2005 Aug;14(7):798–804.
[67] Downie WW, Leatham P a, Rhind VM, Wright V, Branco J a, Anderson J a. Studies with pain rating scales. Ann Rheum Dis 1978;37(4):378–81.
[68] Dworkin RH, Turk DC, Wyrwich KW, Beaton D, Cleeland CS, Farrar JT, et al. Interpreting the clinical importance of treatment outcomes in chronic pain clinical trials: IMMPACT recommendations. J Pain 2008 Feb;9(2):105–21.
[69] Vogel S, Draper-rodi J. The importance of pilot studies, how to write them and what they mean. Int J Osteopath Med [Internet 2017;23:2–3. Available from: https://doi.org/10.1016/j.ijosm.2017.02.001.
[70] Whitehead AL, Sully BGO, Campbell MJ. Pilot and feasibility studies: is there a difference from each other and from a randomised controlled trial? Contemp Clin Trials [Internet] 2014;38(1):130–3. Available from: https://doi.org/10.1016/j.cct.2014.04.001.
[71] Bingel U, Wanigasekera V, Wiech K, Ni Mhuircheartaigh R, Lee MC, Ploner M, et al. The effect of treatment expectation on drug efficacy: imaging the analgesic benefit of the opioid remifentanil. Sci Transl Med 2011;3(70). 70ra14.
[72] Benedetti F. Placebo and the new physiology of the doctor-patient relationship. Physiol Rev [Internet] 2013;93(3):1207–46. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23899563.
[73] Pincus T, Holt N, Vogel S, Underwood M, Savage R, Walsh DA, et al. Cognitive and affective reassurance and patient outcomes in primary care: a systematic review. Pain [Internet] 2013;154(11):2407–16. Available from: https://doi.org/10.1016/j.pain.2013.07.019.
[74] Bushnell MC, Case LK, Ceko M, Cotton VA, Gracely JL, Low LA, et al. Effect of environment on the long-term consequences of chronic pain. Pain 2015;156(Suppl):S42–9.
[75] Villemure C, Bushnell MC. Cognitive modulation of pain: how do attention and emotion influence pain processing? Pain 2002;95. 195–9.
[76] Fryer G, Alvizatos J, Lamaro J. The effect of osteopathic treatment on people with chronic and sub-chronic neck pain: a pilot study. Int J Osteopath Med 2005;8(2):41–8.
[77] Schwerla F, Bischoff A, Nuernberger A, Genter P, Guillaume J-P, Resch K-L. Osteopathic treatment of patients with chronic non-specific neck pain: a randomised controlled trial of efficacy. Forschende Komplementärmed 2008;15(3):138–45.
[78] Smart KM, Blake C, Staines A, Doody C. The discriminative validity of 'nociceptive,' 'Peripheral neuropathic,' and 'central sensitization' as mechanisms-based classifications of musculoskeletal pain. Clin J Pain [Internet] 2011;27(8):655–63. Available from: http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2011-20610-001&site=ehost-live%5Cnhttp://k.smart@ucd.ie%5Cnhttp://ovidsp.tx.ovid.com/ovftpdfs/FPDDNCOBNBEDAE00/fs046/ovft/live/gv023/00002508/00002508-201110000-00001.pdf.
[79] Jones LE, O'Shaughnessy DFP. The pain and movement reasoning model: introduction to a simple tool for integrated pain assessment. Man Ther 2014;19(3):270–6.
[80] Evans R, Brønfort G, Nelson B, Goldsmith CH. Two-year follow-up of a randomized clinical trial of spinal manipulation and two types of exercise for patients with chronic neck pain. Spine (Phila Pa 1976) [Internet] 2002;27(21):2383–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/12438988.
[81] Aure OF, Hoel Nilsen J, Vasseljen O. Manual therapy and exercise therapy in patients with chronic low back pain. Spine (Phila Pa 1976) [Internet] 2003 Mar [cited 2017 Apr 4];28(6):525–31. Available from:. http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=00007632-200303150-00002.
[82] Ghroubi S, Elleuch H, Baklouti S, Elleuch MH. Les lombalgiques chroniques et manipulations vertébrales. Étude prospective à propos de 64 cas. Ann Réadaptation Médecine Phys [Internet] 2007;50(7):570–6. Available from: http://www.sciencedirect.com/science/article/pii/S0168605407000487.
[83] Lau HMC, Wing Chiu TT, Lam TH. The effectiveness of thoracic manipulation on patients with chronic mechanical neck pain - a randomized controlled trial. Man Ther [Internet 2011;16(2):141–7. Available from: https://doi.org/10.1016/j.math.2010.08.003.
[84] Senna MK, Machaly SA. Does maintained spinal manipulation therapy for chronic nonspecific low back pain result in better long-term outcome? Spine (Phila Pa 1976) [Internet] 2011;36(18):1427–37. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21245790%5Cnhttp://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=00007632-201108150-00002.
[85] Kelley JM, Kraft-Todd G, Schapira L, Kossowsky J, Riess H. The influence of the patient-clinician relationship on healthcare outcomes: a systematic review and meta-analysis of randomized controlled trials. PLoS One [Internet] 2014;9(4):e94207 Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3981763&tool=pmcentrez&rendertype=abstract.
[86] Hall AM, Ferreira PH, Maher CG, Latimer J, Ferreira ML. The influence of the therapist-patient relationship on treatment outcome in physical rehabilitation: a systematic review. Phys Ther 2010 Aug;90(8):1099–110.
[87] Hojat M, Louis DZ, Maio V, Gonnella JS. Empathy and health care quality. Am J Med Qual: Off J Am College Med Qual. United States 2013;28:6–7.
[88] Neumann M, Bensing J, Mercer SW. Analyzing the"nature" and "specific effectiveness" of clinician empathy: a theoretical overview and contribution towards a theory-based research agenda. Patient Educ Couns 2009 2009;74(74):339–46. 74339 –346.
[89] Squier RW. A model of empathic understanding and adherence to treatment regimens in practitioner-patient relationships. Soc Sci Med 1990;30(3):325–39.
[90] Street RL, Makoul G, Arora NK, Epstein RM. How does communication heal? Pathways linking clinician-patient communication to health outcomes. Patient Educ Counsel 2009;74(3):295–301.
[91] Thomson OP, Collyer K. 'Talking a different language': a qualitative study of chronic low back pain patients' interpretation of the language used by student osteopaths. Int J Osteopath Med [Internet] 2017 Jun;24:3–11. Available from: https://linkinghub.elsevier.com/retrieve/pii/S174606891630044X.
[92] Linton SJ, Boersma K, Vangronsveld K, Fruzzetti A. Painfully reassuring? The effects of validation on emotions and adherence in a pain test. Eur J Pain 2012;16:592–9.
[93] Hojat M, DeSantis J, Gonnella JS. Patient perceptions of clinician's empathy. J Patient Exp [Internet] 2017;4(2):78–83. Available from: http://journals.sagepub.com/doi/10.1177/2374373517699273.