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### ► To cite this version:

H. Mhadhbi, B. Thierry-Hildenbrand, J. Draper-Rodi, J.E. Esteves, Mathieu Ménard. Pain knowledge and fear-avoidance beliefs of French osteopathy students and educators towards chronic low back pain: An osteopathic educational institution-based cross-sectional survey. *International Journal of Osteopathic Medicine*, 2021, 42, pp.61-68. 10.1016/j.ijosm.2021.12.002 . hal-03557557

**HAL Id: hal-03557557**

**<https://hal.science/hal-03557557v1>**

Submitted on 22 Feb 2022

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Title page

Pain knowledge and fear-avoidance beliefs of French osteopathy students and educators towards chronic low back pain: An Osteopathic Educational Institution-based cross-sectional survey.

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## 1 TITLE

2 Pain knowledge and fear-avoidance beliefs of French osteopathy students and  
3 educators towards chronic low back pain: *An Osteopathic Educational Institution-*  
4 *based cross-sectional survey.*

5

## 6 ABSTRACT

7 Background: Practitioners' fear-avoidance beliefs can influence positively or negatively  
8 therapeutic outcomes in their patients. This study reports pain knowledge and fear-  
9 avoidance beliefs of French osteopathy students and educators towards the  
10 management of chronic low back pain (cLBP).

11 Methods: An online cross-sectional survey was proposed to educators and students.  
12 It included sociodemographic characteristics and two questionnaires: the FABQ-HC to  
13 assess beliefs on the effects of physical and work activities for people with cLBP, and  
14 the NPQ to assess participants' knowledge of pain.

15 Results: Participants (N=172) had mean FABQ-HC subscale scores of 11.02±4.44  
16 (Physical activity) and 24.37±11.78 (Work). The mean NPQ total score was  
17 11.90±2.05. There were no significant score differences between students and  
18 educators ( $p>0.05$ ). Results showed that Year 4 students (N=65) had a significantly  
19 better score ( $p<0.05$ ) at the FABQ-HC Physical Activity than Year 5 students (N=71).  
20 Educators (N=36) having less than 10 years of practice in osteopathy had better scores  
21 than other educators ( $p<0.01$ ) at the FABQ-HC Work. Educators and students in the  
22 study show similar scores to other French HCPs and international osteopaths on the  
23 FABQ-HC Physical activity. In contrast, they scored lower on the FABQ-HC Work.

24 Conclusions: The main finding was that educators and students belonging to the same  
25 OEI have no significantly different beliefs about cLBP and no significantly differing

26 knowledge of pain. There is potential to improve pain education especially concerning  
27 the beliefs around cLBP concerning work activity.

28

29

#### KEYWORDS

30

31 Osteopathic Medicine

32 Beliefs

33 Chronic pain

34 Low back pain

35 Education

36

37

38

#### FUNDING SOURCES

39 This research did not receive any specific grant from funding agencies in the public,  
40 commercial, or not-for-profit sectors.

41

42

## BACKGROUND

43 Chronic low back pain (cLBP) has been identified as one of the leading global causes  
44 of disability throughout the world associated with significantly reduced quality of life  
45 with those affected for both physical and mental aspect [1]. In a recent population-  
46 based survey conducted on 17,249 participants in France in 2018, nearly 40% of adults  
47 reported chronic low back pain [2].

48 Osteopaths are primary contact practitioners who mainly manage patients with  
49 musculoskeletal pain symptoms (62%), located for 42.6% in the spine and with 20% of  
50 patients reporting chronic pain [3].

51 Manual therapy is included as second-line non-pharmacological care in the French  
52 High Authority for Health (*Haute Autorité de Santé*) guidelines for the management of  
53 patients with non-specific low back pain [4]. This is consistent with several non-specific  
54 low back pain primary care management recent guidelines [5–8]. Manipulations could  
55 provide mild to moderate improvements in pain and function (with generally low to  
56 moderate-quality evidence)[9].

57 According to the French decrees relating to education in osteopathy [10]: “*The*  
58 *osteopath, in a systemic approach, following osteopathic diagnosis, carries out*  
59 *mobilisations and manipulations to manage the somatic dysfunctions of the human*  
60 *body [...]*”. In this definition, strong emphasis is put on the physical components of  
61 care and less on the behavioural, cognitive or emotional components of osteopathic  
62 care that are common to all health care professionals (HCP) [11, 12]. Considering the  
63 high number of pain presentations in osteopathic practice [3], it is therefore critical to  
64 ensure that osteopaths have efficient training in the neurophysiology and mechanisms  
65 of pain and don't hold harmful beliefs regarding cLBP. We therefore felt it was important

66 to assess the pain knowledge and the beliefs of our students and educators in order  
67 to take a baseline view.

68 Attitudes and beliefs concerning low back pain amongst musculoskeletal practitioners  
69 including osteopaths [13–16], chiropractors [17], physiotherapists [18, 19] and more  
70 broadly HCP [20] have often been studied constituting useful comparison literature for  
71 our model of education with other models. Previous studies on the attitudes and beliefs  
72 of osteopaths towards chronic low back pain (cLPB) in the UK [21] and Spain [22] have  
73 hypothesised that osteopaths would have a more biopsychosocial approach towards  
74 cLBP patients than other HCP. Moreover, patients seem to report stronger person-  
75 centeredness in complementary care than with conventional care [23]. However,  
76 results showed that osteopaths' attitudes and beliefs towards cLBP may be no different  
77 than those from other HCP [24, 25]. In addition, a modern conceptual approach  
78 regarding the neurophysiology of pain is essential in practitioners' skills to adequately  
79 explain pain experience of an individual [26–28]. The definition of pain has recently  
80 been revised to capture this [29]. A biomedical and mechanistic view of care cannot  
81 fully and holistically account for the totality of this experience. Pain education, including  
82 its biological, psychological and social dimensions, is a recent part of the French  
83 osteopathic curriculum [30]. Undergraduate pain education (Teaching Unit 2.15)  
84 amounts to just 20 hours, equating to 0.4% of total teaching time [30].

85 Practitioners' attitudes and beliefs can influence positive (placebo) or negative  
86 (nocebo) therapeutic outcomes in their patients [31], may influence their treatment  
87 approach [20] and could be detrimental to the recovery of cLBP patients when wrong  
88 messages are sent [32]. Beliefs about the body and pain are therefore considered to  
89 form key considerations in the treatment of pain-related disabilities [33].

90 The Fear Avoidance Beliefs Questionnaire (FABQ) is used to evaluate patients' beliefs  
91 about how physical activity and work affect their low back pain [34]. The FABQ-HC was  
92 designed as an adapted version of the FABQ for use with HCP [35]. The FABQ was  
93 translated into French in 2004 and its psychometric properties (test-retest reliability,  
94 construct validity and responsiveness) are acceptable [36].

95 The Neurophysiology Pain Questionnaire (NPQ) was developed to identify the barriers  
96 to reconceptualization of the clinical diagnosis of chronic pain based on the findings  
97 that patients have a poor knowledge and some difficulty understanding the  
98 neurophysiology of the pain [37]. The main goal of this test is to evaluate the patient's  
99 beliefs/conceptions of the pain mechanism. This has been reported as a crucial factor  
100 in the pain becoming chronic and could limit the efficacy of therapeutic interventions  
101 [37, 38]. The NPQ has been used in several educational studies to assess the  
102 understanding of health undergraduate students regarding pain neurophysiology [39–  
103 42].

104 Education in osteopathy is evolving towards university standards in France to promote  
105 high-quality education and clinical practice [43].

106 To our knowledge, no studies have specifically addressed the attitudes of French  
107 osteopathic educators towards cLBP patients. Their beliefs are crucial as they may  
108 impact both patients [20] and students' attitudes towards patients. Furthermore, final-  
109 year osteopathy students are a population that has often been studied concerning  
110 professional identity [44], impact of language they use on patients' beliefs [45],  
111 attitudes toward psychosocial risk factors [46], clinical assessment [47–49], and  
112 perceived preparedness [50, 51]. However, the beliefs of this specific population in a  
113 French OEI towards cLBP has to our knowledge never been evaluated. Our hypothesis



114 is therefore that Year 4 and Year 5 osteopathy students develop the same beliefs as  
115 their educators.

116 The aim of this study was to evaluate the pain knowledge and the beliefs towards cLBP  
117 of Year 4, Year 5 osteopathy students, and educators at the same French OEI towards  
118 the management of cLBP patients via the FABQ-HC and the NPQ.

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## MATERIALS AND METHODS

### *Design*

121 A cross-sectional quantitative questionnaire-based survey was conducted and  
122 reported following the STROBE statement [52] including two versions; one for the  
123 students and one for the educators. The survey differed between the two versions only  
124 by the sociodemographic part. The study protocol was approved by the XX Research  
125 Ethics Committee in June 2020 and met the requirements of the Declaration of Helsinki  
126 for research on human beings.

127

### *Study population*

129 Year 4 (n=71) and Year 5 (n=65) osteopathy students of the XX OEI were invited to  
130 take part in the study. Information was given about this study during an introductory  
131 clinical practice course on the 31<sup>st</sup> of August 2020 for the Year 4 students and on the  
132 14th of September 2020 for Year 5 students. The study was explained and proposed  
133 to all educators through the return to campus meeting on the 28<sup>th</sup> August 2020.

134 Inclusion criteria were being student in Year 4 or Year 5 or being educator in the  
135 osteopathy programme of the XX Institute. Exclusion criteria were not being an  
136 osteopath for the educators or those (educators and students) who didn't consent to  
137 participate. Out of the 36 educators who responded, one was involved in pain science  
138 teaching.

139

### *Measures and instruments*

141 The French version of two validated questionnaires were used: the Fear Avoidance  
142 Beliefs Questionnaire for Health Care Practitioners (FABQ-HC) and the

143 Neurophysiology of Pain Questionnaire (NPQ) [34, 37]. The survey also included a  
144 sociodemographic section.

145 **The sociodemographic questionnaire:** for educators this recorded their age,  
146 gender, years of experience as practitioners and educators, whether they achieved a  
147 continuing professional development (CPD) course in the field of pain, and education  
148 undertaken other than osteopathy. For students, it only included age, gender and  
149 previous education before studying osteopathy.

150 **The FABQ** is used to evaluate patients' beliefs about how physical activity and  
151 work affect their low back pain [34]. The FABQ was translated into French in 2004 and  
152 its psychometric properties (test-retest reliability, construct validity and  
153 responsiveness) are acceptable [36]. The adapted version for HCP was used (FABQ-  
154 HC) [35]. Its adaptation was made by deleting the word "other" in the introduction of  
155 the questionnaire giving this instruction: "these are statements that (other) patients  
156 have expressed about their low back pain" [35]. It is a 16-item questionnaire, graded  
157 on a 7-point Likert scale (strongly disagree to strongly agree) with two sections. Items  
158 1 to 5 assess beliefs about physical activity and items 6 to 16 assess beliefs about  
159 work.

160 A cut-off score corresponds to a score above 14 (out of 24) for the Physical Activity  
161 subscale and above 34 (out of 42) for the Work subscale [35]. Scores that exceed  
162 these values suggest important fear-avoidance beliefs for their relative subscale.

163 **The NPQ** was developed to identify the barriers to reconceptualization of the  
164 clinical diagnosis of chronic pain based on the findings that patients have a poor  
165 knowledge and some difficulty understanding the neurophysiology of the pain [37]. The  
166 main goal of this test is to evaluate the patient's beliefs/conceptions of the pain  
167 mechanism. This has been reported as a crucial factor in the pain becoming chronic

168 and could limit the efficacy of therapeutic interventions [37, 38]. It has also been used  
169 to assess neurophysiology of pain knowledge in physiotherapy students [53],  
170 osteopathy students [40], health care final-year students [54] and osteopaths [14]. A  
171 validated version of a 19-item questionnaire was proposed in French in 2015 [38]. The  
172 French version of the NPQ has been shown to be acceptable, valid, and with  
173 acceptable reliability in patients with chronic spinal pain [55].

174

#### 175 *Setting and data collection*

176 This study was carried out at the XX Institute in August and September 2020.  
177 Educators received an email with a link to participate and to respond online (Google  
178 Forms) on their smartphone or laptop to the survey during the teachers' back-to-school  
179 meeting on the 26th August 2020. Students received a separate email to participate in  
180 the study during a clinical course scheduled on the 31st August for Year 4 osteopathy  
181 students and on the 12th September 2020 for Year 5 osteopathy students. Educators  
182 and students who completed the survey were deemed to consent to participate.

183

#### 184 *Statistical analysis*

185 Raw data was exported from Google Forms into an Excel file (Microsoft Office 2016  
186 for PC). Descriptive statistics for each participant for the 3 scores were calculated.  
187 Different tests were used to analyse our results. The "R" software (version 4.03 for PC)  
188 was used to run the statistical tests. For sample sizes greater than 30, we assumed  
189 that the distribution of the sample means was fairly normally distributed according to  
190 the central limit theorem. For supposed normal distributions, a p-value using the Fisher  
191 test was computed so as to assess the homoscedasticity.

192 In cases of normality and homoscedasticity, we calculated a 95 % confidence interval  
193 for the mean for each questionnaire. Furthermore, for comparison of means, a p-value  
194 was computed using the Z test (alpha set at  $p < 0.05$ ) and the Cohen's d effect size  
195 was calculated.

196 In cases of non-normality or non-homoscedasticity, non-parametric statistics were  
197 used to evaluate differences. Thus, we calculated a 95% bootstrapped confidence  
198 interval for the mean (1 000 re-samples), and for median comparison, a p-value was  
199 computed using the Mann-Whitney test (alpha set at  $p < 0.05$ ) and the Cliff's d effect  
200 size was calculated.

201 The FABQ-HC score from different previous studies was compared when applicable  
202 with the results from the present study by means of a one-way ANOVA test using  
203 summary data.

## 205 RESULTS

### 206 *Participants*

207 A total of 172 participants participated with 36 educators, 65 Year 5 students and 71  
208 Year 4 students. Response rates were 80% (36/45) for educators, 94% for Year 5  
209 students (65/69) and 97% (71/73) for Year 4 students. 59.3% of participants were  
210 female (102/172), the mean age was  $22.4 \pm 1.4$  years for Year 4 students,  $23.5 \pm 1.5$   
211 years for Year 5 students and  $35.9 \pm 8.5$  years for educators. Educators had a mean  
212 of  $10.1 \pm 6.4$  years of experience as osteopaths and  $6.8 \pm 5.0$  years of experience as  
213 educators. Details on sociodemographic characteristics for each group are provided in  
214 Table 1.

215 \*\*\* Insert Table 1 about here \*\*\*

216

217 *Comparative score between sociodemographic groups on the two questionnaires*

218 Results showed that Year 4 students have a significantly lower score ( $p < 0.0116$ ; CI  
219 95% [0.10 -3,08],  $d = 0.36$ ) at the FABQ-HC Physical Activity than the Year 5 students  
220 ( $10.39 \pm 3.93$  vs  $11.98 \pm 4.80$ ). However, there were no differences between these two  
221 groups for the FABQ-HC Work ( $24.90 \pm 4.39$  vs  $23.54 \pm 6.37$ ) and the NPQ ( $11.94 \pm$   
222  $1.95$  vs  $12.31 \pm 2.13$ ).

223 No differences were found between Year 4 students and educators for FABQ-HC  
224 Physical Activity ( $p > 0.05$ , CI95% [1.70;1.97],  $d = 0.03$ ), for the FABQ-HC Work ( $p >$   
225  $0.05$ , CI95% [2.52;2.72],  $d = 0.02$ ) and for the NPQ ( $p > 0.05$ , CI95% [0.47;1.19],  $d =$   
226  $0.18$ ).

227 Additionally, between Year 5 students and educators, results did not show differences  
228 for the FABQ-HC Physical Activity ( $p = 0.30$ , IC 95% [0.52;3.43],  $d = 0.30$ ), for the  
229 FABQ-HC Work ( $p = 0.35$ , CI95% [1.60;4.13],  $d = 0.19$ ) and for the NPQ ( $p > 0.34$ ,  
230 CI95% [0.20;1.55],  $d = 0.31$ ). All results are presented in Table 2.

231 \*\*\* *Insert Table 2 about here* \*\*\*

232

233 *Impact of level of education, years of osteopathic experience and previous pain CPD*  
234 *on the two questionnaires*

235 Significant differences were found between students' previous education level with the  
236 FABQ-HC Physical Activity ( $p=0.0262$ ,  $d=-0.27$ ): Year 4 students with a bachelor's  
237 degree had a significantly better score ( $p < 0.0017$ ; CI95% [5.45-9,36],  $d=0.58$ ) at the  
238 FABQ-HC Physical Activity ( $7.00 \pm 3.57$ ) than Year 5 students without a bachelor's  
239 degree ( $11.08 \pm 3.70$ ).

240 However, there were no differences for the two other questionnaires FABQ-HC  
241 Physical Work ( $p=0.4483$ ; CI95% [23.09-26.82],  $d=0.03$ ) and NPQ ( $p=0.3409$ ; CI95%

242 [9.82-13.00],  $d=-0.08$ ). Additionally, no significant differences were found in Year 5  
243 students for any of the questionnaires.

244 A significantly better score was attained by educators who had less than 10 years of  
245 experience as osteopaths ( $p<0.00001$ ,  $d=0.01$ ) for the FABQ-HC Work ( $23.44 \pm 7.63$ )  
246 versus educators who graduated more than 10 years ago ( $26.17 \pm 6.64$ ).

247 No significant differences were found between the mean scores of the years of  
248 experience as an educator or previous pain CPD for any of the three scores. All results  
249 are presented in the Table 3.

250 \*\*\* *Insert Table 3 about here* \*\*\*

251 \*\*\* *Insert Table 4 about here* \*\*\*

252

253

## DISCUSSION

254 This study explored the pain knowledge and the fear-avoidance beliefs of  
255 undergraduate students and educators from one French OEI on the management of  
256 patients with cLBP. The primary findings of this study indicate that the educators and  
257 students shared similar beliefs about cLBP and have no significantly differing  
258 knowledge of pain.

259 *Summary of findings and comparison to known literature*

260 This is the first study to evaluate French osteopaths' pain knowledge and beliefs  
261 towards cLBP in educators and Year 4 and Year 5 osteopathy students and to compare  
262 students to their educators on the basis of two validated French-version at a single  
263 institution. This provides a useful basis to evaluate the curriculum, for offering an  
264 update of knowledge to educators, for assessing the students' skills acquisition in this  
265 area and overall for improving the level of education according to evidence-based data.  
266 Regarding the part of the FABQ that explores beliefs about exercise and low back pain,  
267 educators did not have statistically different scores to French rheumatologists [56] and

268 French general practitioners [35] as illustrated in table 4. This is a quite honourable  
269 result. It seems to show that osteopaths in our OEI (students and educators) do not  
270 have more deleterious beliefs than HCP who are among those who receive the most  
271 patients with musculoskeletal pain.

272 By comparison, regarding the FABQ-HC related to work-related beliefs, the educators  
273 scored lower than Spanish osteopaths [22] and French rheumatologists [56] and  
274 French general practitioners [35]. This result was unexpected and is hard to explain.  
275 However, we can hypothesise that osteopaths in France who are not fully HCP do not  
276 want to oppose a medical leave issued by a medical doctor. They may therefore tend  
277 not to favour a return to work if a general practitioner has indicated a work interruption.  
278 Educators who graduated as osteopaths less than 10 years ago showed significantly  
279 better results at the FABQ-HC Work ( $23.44 \pm 7.63$ ) than those who graduated more  
280 than 10 years ago ( $26.17 \pm 6.64$ ). Regarding these results, we did not find similar  
281 results specific to educators in the literature. However, this is consistent with previous  
282 studies that showed that osteopaths with less time as practitioners tend to have a more  
283 evidence-based attitude towards cLBP [21]. In France, the osteopathy programme has  
284 mainly evolved a lot during the past ten years in terms of quantity and quality. More  
285 newly trained osteopaths may have benefited from programmes that are more in line  
286 with current recommendations.

287 Regarding the NPQ score, French educators had higher pain knowledge score than  
288 Spanish health science students [41], but lower scores than Australian osteopaths [14].  
289 In addition, educators who have undertaken specific CPD on pain do not appear to  
290 have different scores from those who have not whether on both FABQ-HC or NPQ.  
291 There is potential to improve pain education to optimise educators' knowledge in this  
292 field. The results did not show any significant differences in scores between students



293 and educators for the three questionnaires. It means that students who do rotations in  
294 the clinic (Year 4 and Year 5 students) and their educators share similar beliefs.  
295 Educators could therefore create these beliefs in students during the first three pre-  
296 clinical years. However, this remains hypothetical.

297 This result is more surprising from the point of view of the NPQ as we expected  
298 educators to have higher scores. It would be valuable to repeat this study in the future  
299 as the recent osteopathic curriculum changes put more emphasis on certain  
300 fundamental knowledge related to pain (allostasis, biopsychosocial model,  
301 interoception, enactivist approach to pain, predictive processing models of perception)  
302 that was not present before [30, 57].

303 Significant differences were found between students' previous level of education with  
304 the FABQ-HC Physical Activity: students with a bachelor's degree had a significantly  
305 better score at the FABQ-HC Physical Activity ( $9.60 \pm 5.35$ ) than students without a  
306 bachelor's degree ( $11.42 \pm 4.23$ ).

307 Year 4 students unexpectedly scored significantly higher than Year 5 students did on  
308 the FABQ-HC physical activity score. The implementation of the new evidence-based  
309 lectures over the last two years may be starting to bring positive changes. However,  
310 20% of the Year 4 students had at least a Bachelor's degree on beginning the  
311 osteopathic curriculum. Previous education before studying osteopathy had the  
312 greatest impact on the FABQ physical activity score (these students have an average  
313 of  $7.00 \pm 3.57$  versus  $11.08 \pm 3.70$  for the rest of the class). Most of these came with a  
314 sports sciences background that could have had a positive effect on beliefs concerning  
315 physical activity. Moreover, 32% of Year 5 students scored above the cut-off on FABQ  
316 Physical Activity compared to 11% of Year 4 students.

317 The other scores did not differ between Year 4 and Year 5 students. The subscale  
318 score for the work part of the FABQ is significantly lower than for physiotherapy  
319 students [58] or for French rheumatologists [56] and French general practitioners [35].  
320 There appears to be a possibility for improvement in the teaching of beliefs regarding  
321 low back pain and work as the scores of both students and educators appeared to be  
322 significantly higher than those found in the literature. All European cLBP guidelines  
323 deliver similar messages for the management of non-specific pain: keeping active,  
324 continuing or returning to work and avoiding bed rest [59]. This is consistent with a  
325 previous study that found that UK osteopathy students may have attitudes that are not  
326 aligned with European guidelines [60].

#### 327 *Applications for education and practice*

328 One of the challenges of training adults is to find a way of facilitating the transition from  
329 academic learning to training for their future profession. It is essential to ensure that  
330 osteopaths adopt an appropriate attitude towards low back pain based on non-harmful  
331 beliefs to deliver appropriate treatment to their patients. Indeed, clinicians with positive  
332 attitudes are more likely to follow management guidelines. [61]. There was no effect  
333 on any score for the educators having taken CPD dedicated to pain. However, we had  
334 no information concerning what type of CPD had been completed, its content, or when  
335 it was completed. There is potential to improve pain education in osteopaths and future  
336 osteopathy curricula in France.

337 In addition, guidelines can sometimes be perceived as threats to professional identity  
338 [62, 63] by some osteopaths and particularly by some educators according to their own  
339 attitudes towards the osteopathic principles and their further application in clinical  
340 context [64].

341 To address these barriers requires some educational strategies to contribute  
342 meaningfully to the attitudes of future professionals with new models and theoretical  
343 frameworks for osteopathic care [65]. To shape a professional identity [66] as a person-  
344 centred living tradition of care [67] with specific strategies by the worldwide community  
345 of practice depends on whether osteopathy is regulated at an academic level [68] or  
346 not [69]. It must positively consider the rich diversity of practice and education as a  
347 piece of the puzzle [70], finding a way between osteopathic principles and evidence  
348 [57].

#### 349 *Study limitations*

350 This study explored the knowledge and fear-avoidance beliefs towards cLBP of a  
351 single OEI; it did not represent the characteristics of the overall osteopathic population  
352 of students and educators in France. Moreover, no previous studies have explored  
353 these scores in other French OEIs; it is not possible to know if the results characterised  
354 an average score or not and if educators represented a specific population in terms of  
355 knowledge and beliefs. Assessing knowledge, perceptions, beliefs and attitudes to  
356 pain management and care among osteopathy students is essential to determine the  
357 effectiveness of current pain education. However, it is also a challenge as there is no  
358 gold standard instrument to assess these elements [71].

359 The FABQ-HC was developed in France [35, 56] with groups of rheumatologists and  
360 general practitioners, never used for French osteopaths and is not the most used  
361 instrument in the literature making comparisons difficult. The most widely-used  
362 questionnaires in the literature are the HC-PAIRS [72] and the PABS.PT [73] which  
363 are not yet translated, culturally adapted or validated in French.

#### 364 *Perspectives for research*

365 Future research will assess attitudes, beliefs towards cLBP and pain knowledge in the  
366 same participants as part of a longitudinal study. The simple methodology developed  
367 in this study is easy to implement [74]. It will be used to assess the effectiveness and  
368 the impact of the training provided at the OEI. These first results constitute also a useful  
369 baseline comparison for future research. This can also be used as a simple tool to  
370 evaluate the impact of a future specific CPD on pain knowledge and beliefs towards  
371 cLBP on osteopaths.

372

373

### CONCLUSION

374 This is the first study to explore the pain knowledge and the fear-avoidance beliefs  
375 towards cLBP of French osteopaths. This study supports the hypothesis that educators  
376 and students belonging to the same OEI share similar beliefs about cLBP and  
377 knowledge of pain. Previous education in sports science seems related to better scores  
378 concerning cLBP and physical activity for students whereas previous CPD had no  
379 effects on any score for the educators.

380 There is potential to improve pain education especially concerning the beliefs  
381 regarding cLBP concerning work. Future studies should focus on establishing strong  
382 methodologies to assess effectively osteopathy students' attitudes and beliefs allowing  
383 for feedback on the education provided. This could lay the foundations for a new  
384 generation of clinicians that will graduate with positive beliefs and attitudes towards  
385 pain and a background in best practices that should lead to better inter-professional  
386 cooperation for the benefit of chronic pain sufferers.

387

388

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	Year 4 students	Year 5 students	Educators
Number	71	65	36
Age - mean in years (SD)	22.4 (1.4)	23.5 (1.5)	35.9 (8.5)
Gender women N (%)	48 (68)	45 (69)	9 (25)
Education's grade equal or higher than a bachelor's degree for students N (%)	12 (17)	8 (12)	/
Years of experience as an osteopath mean (SD)	/	/	10.1 (6.4)
Years of experience as an educator mean (SD)	/	/	6.8 (5.0)
Previous pain CPD N (%)	/	/	10 (27.8)

Table 1 - Sociodemographic characteristics of the population evaluated

Category	FABQ-HC PHYSICAL ACTIVITY		FABQ-HC PHYSICAL WORK		NPQ
	Mean (SD)	Cut-off score >14 % (N)	Mean (SD)	Cut-off score >34 % (N)	Mean (SD)
Year 4 students (N = 71)	10.39 (3.93)	11.26 (8)	24.90 (4.39)	1.41 (1)	11.94 (1.95)
Year 5 students (N = 65)	11.98 (4.80)	32.31 (21)	23.54 (6.37)	3.08 (2)	11.63 (2.19)
Educators (N = 36)	10.53 (4.87)	19.44 (7)	24.81 (7.39)	5.56 (2)	12.31 (2.13)
<b>TOTAL</b>	<b>11.02 (4.44)</b>	<b>20.93 (36)</b>	<b>24.37 (5.78)</b>	<b>2.91 (5)</b>	<b>11.90 (2.05)</b>
<b>Year 4 students vs Year 5 students</b>					
CI95%	[0.10 ; 3.08]		[-0.49 ; 3.22]		[-0.39 ; 1.02]
Unilateral Z-test (p-value)	p = 0.018		p = 0.075		p = 0.190
Effect size (Cohen's d)	d = 0.36		d = 0.25		d = 0.15
<b>Year 4 students vs Educators</b>					
CI95%	[-1.70 ; 1.97]		[-2.52 ; 2.72]		[-0.47 ; 1.19]
Unilateral Z-test (p-value)	p = 0.44		p = 0.47		p = 0.20
Effect size (Cohen's d)	d = 0.03		d = 0.02		d = 0.18
<b>Year 5 students vs Educators</b>					
CI95%	[-0.52 ; 3.43]		[-1.60 ; 4.13]		[-0.20 ; 1.55]
Unilateral Z-test (p-value)	p = 0.07		p = 0.19		p = 0.07
Effect size (Cohen's d)	d = 0.30		d = 0.19		d = 0.31

Table 2 - Mean (SD) and Cut-off score of each questionnaires (FABQ-HC Activity, Work and NPQ) for the three groups (Year 4 students, Year 5 stu

idents and Educators) and comparison of scores between each groups (CI 95%, p-value and effect sizes were reported).

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	FABQ-HC PHYSICAL ACTIVITY	FABQ-HC PHYSICAL WORK	NPQ
<b>Education's grade equal or higher than a bachelor's degree (students only)</b>			
Yes (N = 20) - Mean (SD)	9.60 (5.35)	24.75 (4.37)	11.70 (2.44)
No (N = 116) - Mean (SD)	11.42 (4.23)	24.16 (5.61)	11.81 (2.01)
Mean difference	1.82	-0.59	0.11
Test Fisher (5 %)	homoscedasticity	homoscedasticity	homoscedasticity
Size effect : d Cliff	d = - 0.27	d = 0.06	d = -0.02
CI (95%) (yes)	[7.10 ; 12.10 ]	[ 22.70 ; 26.80 ]	[ 10.56 ; 12.84 ]
CI (95%) Bootstrap ( yes )	[ 7.45 ; 11.45 ]	[ 23.15 ; 26.40 ]	[ 10.90 ; 12.75 ]
CI (95%) Bootstrap ( no )	[ 10.65 ; 12.19 ]	[ 23.14 ; 25.18 ]	[ 11.44 ; 12.18 ]
Mann-Whitney test (one tailed)	p = 0.0262	p = 0.3264	p = 0.4483
<b>Years of experience as an osteopath</b>			
< 10 (N = 18) - Mean (SD)	9.94 (4.87)	23.44 (7.63)	12.78 (1.93)
≥ 10 (N = 18) - Mean (SD)	11.11 (4.66)	26.17 (6.64)	11.83 (2.15)
Mean difference	1.17	2.73	-0.95
Test Mann-Whitney (5%)	0.07	p < .00001	p = 0.31
Test Fisher (5 %)	homoscedasticity	homoscedasticity	homoscedasticity
CI (95%) Bootstrap (< 10 )	[7.78 ; 13.33]	[20.11 ; 28.89]	[10.94 ; 12.67]
CI (95%) Bootstrap (≥10 )	[7.72 ; 13.39]	[22.28 ; 28.56]	[11.22 ; 13.50]
Size effect : d Cliff	d = -0.02	d = 0.01	d = -0.03
<b>Years of experience as an educator</b>			
< 10 (N = 25) - Mean (SD)	9.88 (5.02)	24.12 (7.96)	12.28 (2.24)
≥ 10 (N = 11) - Mean (SD)	12.00 (3.82)	26.36 (6.64)	12.36 (2.16)
Mean difference	2.12	2.24	0.08
Test Mann-Whitney (5%)	p = 0.11	p = 0.35	p = 0.34
Test Fisher (5 %)	homoscedasticity	homoscedasticity	homoscedasticity
CI (95%) Bootstrap (< 10 )	[ 8.72 ; 12.40 ]	[ 21.48 ; 27.24 ]	[ 11.40 ; 12.96 ]
CI (95%) Bootstrap (≥10 )	[ 9.45 ; 13.91 ]	[ 23.55 ; 29.45 ]	[ 11.27 ; 13.55 ]
Size effect : d Cliff	d = 0.25	d = 0.03	d = 0.01
<b>Previous pain CPD (educators only)</b>			
Yes (N=10) - Mean (SD)	10.50 (4.00)	23.50 (7.54)	12.40 (2.68)
No (N = 26) - Mean (SD)	10.54 (5.38)	25.31 (7.69)	12.27 (2.05)
Mean difference	0.04	1.81	-0.13
Test Fisher (5 %)	homoscedasticity	homoscedasticity	homoscedasticity
Size effect : d Cliff	d = 0.02	d = -0.17	d = 0.02
CI (95%) Bootstrap ( yes )	[ 8.30 ; 12.60 ]	[ 20.00 ; 27.80 ]	[ 11.00 ; 13.90 ]
CI (95%) Bootstrap ( no )	[ 8.58 ; 12.42 ]	[ 22.38 ; 27.92 ]	[ 11.50 ; 13.00 ]
Mann-Whitney test (one tailed)	p = 0.4801	p = 0.2236	p = 0.4801

Table 3 - Impact of educational (bachelor degree) and professional determinants (years of osteopath, years of educators, CPD) on each measured scores (FABQ-HC Activities, Work and NPQ). N

Mean, SD and statistical analysis were reported.

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Questionnaires	Studies	Present study	Van Biesen (2020)	Kennedy (2014)	Kennedy (2014)	Domenech (2011)	Burnett (2009)	Burnett (2009)	Burnett (2009)	Coudeyre (2006)	Poiraudeau (2006)
<b>FABQ-HC</b>	Population	Osteopathy students + educators	Final-year osteopathy students + Osteopaths	Nursing students	Medical students	Physiotherapy students	Physiotherapy students	Physiotherapy students	Physiotherapy students	General practitioners	Rheumatologists
	Participants	172	70	101	64	87	53	44	59	864	266
	Country	France	Spain	Ireland	Ireland	Spain	Australia	Singapore	Taiwan	France	France
<b>FABQ-HC Physical Activity</b>	Mean Score (SD)	11.02 (4.44)	10.69 (5.4)	12.52 (5.8)	11.19 (5.3)	14.3 (5.1)	6.3 (5.1)	11.1 (5.2)	12.2 (4)	9.6 (4.8)	9.2 (4.4)
	p-value (effect size)	<b>vs Educators</b>	0.4405 (0.04)	0.0238 (0.37)	0.2651 (0.13)	0.000095 (0.76)	0.000079 (0.85)	0.3057 (0.11)	0.0869 (0.37)	0.1315 (0.19)	0.0611 (0.29)
	p-value (effect size)	<b>vs year 4 students</b>	0.3486 (0.07)	0.0022 (0.43)	0.1572 (0.17)	<0.00001 (0.86)	<0.00001 (0.90)	0.2156 (0.16)	0.0051 (0.46)	0.055 (0.18)	0.0139 (0.28)
	p-value (effect size)	<b>vs year 5 students</b>	0.0733 (0.25)	0.2583 (0.10)	0.1876 (0.16)	0.0023 (0.47)	<0.00001 (1.15)	0.1877 (0.18)	0.384 (0.05)	0.00006 (0.50)	0.00001 (0.60)
<b>FABQ-HC Work</b>	Mean Score (SD)	24.37 (5.78)	22.29 (7.35)	/	/	20.2 (7.7)	/	/	/	17.5 (6.7)	16.7 (6.9)
	p-value (effect size)	<b>vs Educators</b>	0.049 (0.34)	/	/	0.0012 (0.61)	/	/	/	<0.00001 (1.04)	<0.00001 (1.13)
	p-value (effect size)	<b>vs year 4 students</b>	0.0052 (0.43)	/	/	<0.00001 (0.75)	/	/	/	<0.00001 (1.31)	<0.00001 (1.42)
	p-value (effect size)	<b>vs year 5 students</b>	0.1446 (0.18)	/	/	0.0021 (0.47)	/	/	/	<0.00001 (0.92)	<0.00001 (1.03)

Table 4 – FABQ-HC Physical activity and Work from previous studies. Mean score (SD) and p-value for each comparison study



## Findings

- Educators and students belonging to the same OEI have no significantly different beliefs about cLBP and no significantly differing knowledge of pain.
- Educators and students show similar scores to other French HCPs and foreign osteopaths on the FABQ-HC Physical activity but they scored lower on the FABQ Work.
- There is potential to improve pain education and the French osteopathy curriculum in France especially concerning the beliefs around cLBP in relation to work.

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**Declaration of interests**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

JDR provides continuing professional development courses in France on the biopsychosocial model and as Head of CPD at UCO he provides CPDs to some French Osteopathic Educational Institutions. JE is an associate editor at IJOM and has had no role in review or decision making with respect to this manuscript.