

How do the attitudes, confidence, knowledge and understanding differ in pre-registration healthcare students towards treating people with chronic pain: an observational, cross-sectional study

Carroll, Sean Paul; Augeard, Nathan; Tennant, Jacob; Seenan, Christopher

Published in:
European Journal of Physiotherapy

DOI:
[10.1080/21679169.2020.1746830](https://doi.org/10.1080/21679169.2020.1746830)

Publication date:
2021

Document Version
Author accepted manuscript

[Link to publication in ResearchOnline](#)

Citation for published version (Harvard):

Carroll, SP, Augeard, N, Tennant, J & Seenan, C 2021, 'How do the attitudes, confidence, knowledge and understanding differ in pre-registration healthcare students towards treating people with chronic pain: an observational, cross-sectional study', *European Journal of Physiotherapy*, vol. 23, no. 5, pp. 311-318. <https://doi.org/10.1080/21679169.2020.1746830>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please view our takedown policy at <https://edshare.gcu.ac.uk/id/eprint/5179> for details of how to contact us.

1 **How do the attitudes, confidence, knowledge and understanding differ in pre-**
2 **registration healthcare students toward treating people with chronic pain: An**
3 **Observational, cross sectional study.**

4 Sean Paul Carroll^a, Nathan Augeard^a, Jacob Tennant^a & Christopher Seenan^a.

5 ^aSchool of Health and Life Sciences, Glasgow Caledonian University, Cowcaddens Road,
6 Glasgow G4 0BA, UK

7 **Corresponding author***: E-mail address: sean.carroll@gcu.ac.uk (S. Carroll). Telephone:
8 0141 331 8306 Address: A266, Govan Mbeki building, School of Health and Life Sciences,
9 Glasgow Caledonian University, Cowcaddens Road, Glasgow G4 0BA, UK

10 Orcid: <https://orcid.org/0000-0001-5615-8518> Twitter: @SPCphysio

11 **Category:** Original Article

12 **Funding:** This research did not receive any specific grant from funding agencies in the
13 public, commercial, or not-for-profit sectors.

14 **Acknowledgements:** The authors would like to thank the participants for giving up their time
15 to complete the questionnaire.

16 **Disclosure of Interest:** The authors declare no conflict of interest.

17 **Dataset Availability Statement:** The dataset used for this study is available from the
18 following DOI:10.17632/m6j9s7yc2w.1

19 **Word count:** 3635

20 **ABSTRACT**

21 **Background** Attitudes, knowledge and understanding may predispose practitioner adherence
22 to clinical guidelines for chronic pain. To date there is no data exploring this in adult, mental
23 health and paediatric nursing, or occupational therapy, podiatry and physiotherapy student
24 healthcare professionals at the same institution.

25 **Methods** We approached 1383 students enrolled on pre-registration healthcare programmes
26 at a Scottish University, using the Healthcare Practitioners Pain and Impairment Relationship
27 Scale (HC-PAIRS) and Pain Knowledge and Understanding Confidence Questionnaire
28 (PUnCQ).

29 **Results:** Three hundred and forty-six students completed the survey (response rate 25%).
30 There was a significant effect of degree discipline on HC-PAIRS and PUnCQ with a
31 moderate effect size of $\eta_p^2 = .212$ and $\eta_p^2 = .204$, respectively. Postgraduate pre-registration
32 physiotherapy students had more positive attitudes toward function with pain, M(SD) HC-
33 PAIRS score=49.6(8.9) CI 95% = 46.5 – 52.8, and greater confidence toward management of
34 chronic pain M(SD)= 6.3 CI 95% = 5.9 – 6.8 compared to the other disciplines surveyed.
35 Undergraduate physiotherapy and mental health nursing also displayed significantly more
36 positive attitudes M(SD) = 55.2 (10.2), CI 95% 53.3 – 57.2, and 62.6 (7.6), 60.1 – 65.2,
37 respectively.

38 **Conclusions:** Physiotherapy students have more biopsychosocial-orientated attitudes, and
39 higher confidence toward the management of people in pain than the other disciplines
40 surveyed. Despite similar levels of knowledge and understanding of pain.

41 **Keywords:** Attitudes, Chronic Pain, Confidence, Knowledge, Health Professional,
42 Education, Understanding.

43

44 **Introduction**

45 Chronic pain is the largest cause of disability globally and affects between 18 to 28 million
46 people in the UK alone [1,2]. Despite the publication of clinical guidelines to inform
47 healthcare providers on best practice nearly half of those who experienced chronic pain in
48 Europe reported receiving insufficient pain management [3]. Previous research has indicated
49 that biomedical-orientated attitudes toward function with pain, held by healthcare
50 professionals, may predispose their clinical recommendations against best practice guidelines
51 [4–7]. Compared to a biopsychosocial viewpoint, biomedical attitudes and beliefs are
52 regarded as reductionist toward function with pain [8].

53 It is thought that knowledge and understanding (K&U) of pain may be a contributing factor
54 toward the prevalence of negative attitudes regarding chronic pain, as more biopsychosocial
55 orientated attitudes have been found in disciplines who receive a larger proportion of pain
56 education in their course [5,9], as well as those receiving structured pain related education
57 [10–12]. Currently, pain education is highly variable across healthcare courses [13,14], and
58 even in those with more curriculum time dedicated to it the amount of time is still
59 disproportional to the prevalence and burden of this long-term condition [15]. This could
60 have clinical implications, as professionals and students alike, may feel a lack of confidence
61 in managing the complexities involved in chronic pain [16–18]. Worryingly, this may affect
62 patients and services, as ineffective management of chronic pain can have major health,
63 social and economic consequences [2].

64 Pain is a multidimensional problem that requires multidisciplinary care due to its various
65 physical, social, and psychological components [19]. Previous research has examined
66 attitudes in students of physiotherapy, nursing, occupational therapy (OT), chiropractic and
67 medicine, in the majority of studies where physiotherapists have displayed more

68 biopsychosocial-orientated attitudes when compared with other pre-registration healthcare
69 courses [5,20]. However, normative values in a cross-sectional study of final year medicine
70 students by Morris et al [21] showed similar scores to the values reported in another study
71 examining final year physiotherapy students within the same city [22]. Despite this, the
72 comparison of normative values between studies is confounded by variance in design,
73 heterogeneity of questionnaires, cultural and socio-genic contributors [20,23]. In order to
74 evaluate the importance of curriculum change for this population, a need exists to assess
75 multiple disciplines within the intended higher education institution (HEI) for change.

76 The aims of this cross-sectional study were to investigate: (1) if there were differences
77 between disciplines in pre-registration healthcare student's attitudes, confidence, knowledge
78 and understanding toward treating people with chronic pain; and (2) examine the magnitude
79 of difference between disciplines, as well as within disciplines between first and final year
80 students.

81 **Methods**

82 *Design*

83 A web based online survey (Survey Monkey, Palo Alto, CA, USA) consisting of two
84 questionnaires collected information on the attitudes, applied K&U and confidence of pre-
85 registration healthcare students toward treating people with chronic pain. The survey was
86 administered in the first trimester of the academic year, and open for a duration of three
87 weeks in October 2017. Participants received a reminder email weekly until the close of the
88 survey. All participants provided consent through the online survey before taking part in the
89 study and were able to withdraw during the survey by closing the browser window. After the
90 survey was completed the responses were downloaded as an anonymised excel spreadsheet
91 from Survey Monkey and stored on a password protected hard drive at Glasgow Caledonian
92 University. Ethical approval for this study was obtained from the Glasgow Caledonian

93 University Ethics Committee (Ref: HLS/PSWAHS/17/007). This research has been reported
94 in line with the Strengthening of the Reporting of Observation Studies in Epidemiology
95 guidelines for cross-sectional studies [24].

96 *Participants*

97 An invitation to join the study was emailed by programme leaders to pre-registration students
98 studying adult, child, mental health and learning disability (LD) nursing, OT, physiotherapy
99 and podiatry degree programmes at Glasgow Caledonian University (GCU). The inclusion
100 criteria consisted of being in a pre-registration healthcare course at GCU, completion of at
101 least 50% of one questionnaire (to allow sufficient data for imputation of missing answers),
102 and having a minimum of ten respondents per course to allow for a degree of generalisability.
103 Responses not meeting the above criteria were deleted before analysis. According to
104 Yamane's formula [25], in order for the study to be powered at 80% (alpha set at .05), a
105 minimum sample size of 328 participants was required.

106 *Outcomes*

107 Two questionnaires were used as primary outcome measures: the Health Care Providers' Pain
108 and Impairment Relationship Scale (HC-PAIRS) [8], and the Pain Understanding and
109 Confidence Questionnaire (PUnCQ) [26,27].

110 The HC-PAIRS is a questionnaire assessing the attitudes and beliefs of healthcare providers,
111 about the relationship between pain and function in patients with chronic low back pain. The
112 total score is based on 15 statements, each scored by a seven-point Likert scale, ranging from
113 "completely disagree" (1) to "completely agree" (7). Individual item scores are totalled, with
114 items 1, 6 and 14 reverse scored, giving the overall HC-PAIRS score. Total scores range from
115 15 to 105, and a lower overall score indicates a more biopsychosocial/positive attitude
116 towards function in chronic pain patients (Supplementary file S1). The HC-PAIRS has

117 demonstrated good convergent validity (Pearson's $r = 0.51$ to 0.77), good to high level of
118 internal consistency, (Cronbach's $\alpha = 0.78 - 0.92$), excellent test-retest reliability
119 (intraclass correlation coefficient >0.75) [28], and has been used previously with healthcare
120 students and professionals [4,10,20,22,29].

121 The PUnCQ [27] is a two-part questionnaire assessing student's K&U of pain, alongside their
122 confidence in applying this understanding (Supplementary file S2). Each question in the
123 PUnCQ is based on one outcome from the core curriculum of the International Association
124 for the Study of Pain (IASP) [30] and British Pain Society (BPS) [31]. Moreover, it was
125 developed by consensus of an expert panel consisting of: an anaesthetist, nurse, pharmacist,
126 physiotherapist, psychologist, occupational therapist working within a pain setting. Thus
127 supporting its construct validity. Furthermore, it has previously been used with final year
128 student medics and physiotherapists [26]. The questionnaire consists of a chronic pain case
129 vignette, with the first set of questions consisting of a 12-item multiple choice questionnaire,
130 assessing K&U in the context of the vignette. Correct answers were awarded a score of 1, and
131 incorrect a score of 0, with a total score range from 0 – 12. A higher overall score would
132 therefore indicate an increased K&U of pain concepts according to the IASP and BPS
133 outcomes for pre-registration pain education. The second part of the tool is a 21-item Likert
134 scale ranging from “not at all confident” (0) to “no problem!” (10), with total score ranging
135 from 0 – 210, and a higher score indicating a higher self-perceived confidence in applying
136 this knowledge and understanding. The overall average confidence score was calculated for
137 each participant as per previous research [26]. Using a per-protocol (PP) data set for
138 preliminary analysis of this questionnaire, the K&U and confidence sections demonstrated
139 adequate internal consistency ($\alpha = 0.58$), and excellent internal consistency respectively ($\alpha =$
140 0.96). Overall median scores of K&U were less than half of total available marks, therefore
141 careful interpretation of this value of internal consistency is warranted.

142 *Data analysis*

143 A Little's Data Missing Completely at Random (MCAR) test, ($\chi^2(2448) = 2552.12, p = .07$)
144 found that the missing data was MCAR. On this condition missing values were imputed using
145 expectation maximisation (EM), with a maximum of 25 iterations, to manage the extent of
146 response bias, and preserve statistical power due to partially missing data [32]. A PP data set
147 where all participants with missing data were removed listwise, was used to cross-examine
148 the results from the imputed data set.

149 The distribution of HC-PAIRS, PUnCQ K&U and confidence scores were determined using a
150 Shapiro-Wilk test. In line with the normal distribution of HC-PAIRS and confidence scores,
151 an ANCOVA was performed on the attitudes and confidence data with discipline as the
152 independent variable. Year of study was adjusted for as a covariate due to variation in group
153 sizes, to allow for a more equitable comparison of pooled means between disciplines. Post-
154 hoc pairwise comparisons with a Bonferroni correction for Type I error, were performed. An
155 exploratory analysis was performed to investigate within group differences for HC-PAIRS
156 and confidence scores, between first and final year students, using independent samples t-
157 tests as per previous research [22].

158 Multiple choice K&U scores were analysed using a Kruskal-Wallis test for differences across
159 course and year of study, and within degree disciplines for differences across year groups, as
160 this data was not normally distributed. To appraise the results, the ANCOVA, Kruskal-Wallis
161 and independent t-tests were repeated with the same statistical tests using the PP dataset
162 (Supplementary table S3; Supplementary table S4). The Statistical Package for the Social
163 Sciences Version 24.0.0.2 (IBM Corp., Armonk, NY, USA) was used to analyse the data.

164 **Results**

165 *Participants*

166 Across all courses surveyed within the university there was 2 238 pre-registration healthcare
167 students. The emails distributed by programme leaders to healthcare students led to an invited
168 sample of 1383 students, of which 605 clicked through to the survey, and 248 participants did
169 either did not supply demographic information, or complete at least 50% of one
170 questionnaire, leading to their exclusion. Due to the low responses from LD (n=2), dual
171 registration LD and child nursing (n=5), and postgraduate adult nursing (n=4) these
172 programmes were excluded. A total of 346 participants met the inclusion criteria, resulting in
173 a final response rate of 25% (n = 346/1383, 25%). This sample size was comparable or
174 superior to previous studies with similar design and population [20,23,26,29]. Descriptive
175 statistics for each group are presented in Table 1.

176 *HC-PAIRS*

177 346 students were included for the analysis of the HC-PAIRS scores among courses.
178 Significant main effects were found by the ANCOVA for both degree discipline $F(7, 337) =$
179 12.986 $p = <0.001^*$, $\eta_p^2 = .212$, and the covariate year of study $F(1, 337) = 22.78$, $p = <0.001$,
180 $\eta_p^2 = .063$. Pairwise comparisons between disciplines are presented in Table 2. A PP
181 ANCOVA validated these findings with comparable results: $F(7, 337) = 12.986$ $p = <0.001$
182 $\eta_p^2 = .209$ and $F(1, 337) = 22.78$ $p = <0.001$, $\eta_p^2 = .057$, respectively (Supplementary table
183 S3).

184 *PUnCQ*

185 A total of 333 students were included in both the confidence and K&U analysis. According to
186 a Kruskal-Wallis test K&U did not differ significantly between degree discipline $H(5)=5.795$,
187 $p = .327$ and did not change significantly within programmes when compared by year of study
188 $H(3)=1.397$, $p=0.706$. These findings were further validated with PP Kruskal-Wallis tests (n
189 = 303) for K&U between course $H(7) = 3.651$, $p = .819$, and year of study $H(3) = 30.227$, $p =$

190 .992. K&U Multiple Choice Scores were generally low with 20% (n = 60/304) of participants
191 achieving 50% or more.

192 An ANCOVA reported significant main effects for confidence with a moderate effect size for
193 discipline $F(7, 324) = 12.34$ ($p = <0.001$, $\eta_p^2 = .204$), and the covariate year of study $F(1,$
194 $346) = 21.99$ ($p = <0.001$, $\eta_p^2 = .061$). Pairwise comparisons between disciplines are shown in
195 Table 3. A PP ANCOVA validated these findings with comparable results ($p = <0.004$, $\eta_p^2 =$
196 $.162$ and $p = <0.001$, $\eta_p^2 = .107$, respectively) (Supplementary table S3).

197

198 The PP independent t-tests supported that results presented in Table 4 were similar except for
199 adult nursing, which had a significant difference in confidence between first and final year in
200 the PP analysis (Supplementary Table S4).

201 **Discussion**

202 *Interpretation of Main Findings*

203 The aim of this cross-sectional study was to explore the attitudes, confidence, K&U of
204 healthcare students toward people with chronic pain across disciplines and between years of
205 study. The results suggest that pre-registration physiotherapy students may have more
206 positive attitudes and higher confidence toward treating people with chronic pain compared
207 to the other disciplines included (Table 2; Table 3). There were no significant differences in
208 pain K&U between any discipline or year group.

209 When comparing the results for physiotherapy students to previous research carried out at the
210 same HEI with a larger sample [22], this study found lower HC-PAIRS scores in final year
211 physiotherapy students implying more biopsychosocial attitude toward function in people
212 with chronic pain. Nevertheless, comparable results were obtained when comparing first year
213 physiotherapy, and the generalisability of the findings to this population were strengthened,

214 due to similar mean differences, and confidence intervals, between first and final year
215 students across both this study -9.2 (CI 95% -14 to -4.5), and research by Ryan et al [22] at
216 this HEI -9.2 (CI 95% -12.2 to -6.1).

217 The HC-PAIRS results for physiotherapy in this study were also supported by previous
218 research from one HEI in England [29], and two in Australia with similar sample sizes
219 [20,33]. However, physiotherapy HC-PAIRS scores were also more positive than larger
220 samples of students from Taiwan, Singapore, Brazil and Saudi Arabia [20,23] although this
221 may in part be due to socio-cultural issues as the authors suggest. One other HEI in Australia
222 [5] found ten and fifteen point lower total HC-PAIRS score for OT and physiotherapy
223 disciplines compared to this study, respectively. However, this study used the 13 item HC-
224 PAIRS in contrast to the 15 item version, thereby limiting comparison of normative values
225 with the results from this study and the literature above. This variance could also be
226 explained by the larger sample, but equally could be due to collecting data toward the end of
227 the final semester and pooling undergraduate and postgraduate scores together. As this will
228 maximise exposure time to curricula, and include those with previous healthcare related
229 education, both of which may lead to improved scores. It may be advantageous for future
230 research to collect start and end of course data within one month of matriculation and
231 graduation to adjust for exposure time. Similar comparisons between professions in this study
232 and the literature highlight a common theme of positive attitudes in Physiotherapy, however
233 the heterogeneity found when comparing different physiotherapy cohorts globally could be
234 due to the socio-cultural issues, or facilitated by learning experiences on clinical placement.
235 Although, clinical placement experience is variable for each student and difficult to
236 generalise its effects on attitudes, confidence and K&U across a degree programme, due to
237 the difference in students own personal perceptions, the placement environment, and practice
238 educator [17,18,34].

239 The results for confidence in physiotherapy students were similar to previous work with a
240 similar sample size utilizing the PUnCQ [26]. Previous research in the literature has
241 highlighted a lack of confidence in treating chronic pain [17], however, there appears to be no
242 research evaluating confidence in a context like the PUnCQ case vignette. Conversely, this
243 research found lower scores for K&U of pain concepts compared to Seenan et al [26] who
244 found most participants selected the correct answer in all but two questions. Although, they
245 sampled two additional HEIs in Scotland in addition to the one in this study, so this
246 difference may relate to heterogeneity among HEI pain education curricula. However, we do
247 not currently have any data on curricula per degree programme to compare across Scotland.

248 As highlighted in Table 4, postgraduate physiotherapy students had the greatest rating of
249 confidence as well as a lower mean HC-PAIRS score in the first year when compared to any
250 other course in their final year. A potential contributor may have been pre-existing attitudes
251 due to previous undergraduate training. This finding however, was not replicated in the
252 postgraduate pre-registration OT students, nor did postgraduate OT students display a
253 difference when compared with their undergraduate counterparts (Table 2). These contrasting
254 results may be explained by the unique requirement, not shared by the postgraduate OT
255 programme, of prior health science related education for entry to the postgraduate
256 physiotherapy course at this HEI. Future research should examine if prior undergraduate
257 healthcare related education (i.e. anatomy, physiology, psychology, sports science) is related
258 to more positive attitudes at the beginning and end of a pre-registration healthcare
259 programme.

260 It appears that the magnitude of change in attitudes could be curriculum specific as displayed
261 when comparing OT and physiotherapy students, only the physiotherapists displayed a within
262 course significant magnitude of difference between first and final year, despite having similar

263 scores in first year. These results in tandem with significant improvements between first and
264 final years' postgraduate and undergraduate physiotherapy (Table 4), support the literature
265 linking physiotherapists, who typically receive more pain education, with more
266 biopsychosocial-orientated attitudes when compared with other programmes [9,13,15].
267 However, from the chosen study design, need for future research and conflicting literature
268 [21] it is hard to generalise this finding.

269 Our results were consistent in showing that final year undergraduate pre-registration
270 physiotherapy students have similar HC-PAIR scores to final year medical students [21,22].
271 However, postgraduate pre-registration physiotherapy still had a lower HC-PAIRS score than
272 both of these groups. It may be that pain education is not the only contributor to
273 improvements in attitudes toward function with pain, and may be impacted by variables such
274 as age, socio-cultural factors, and as discussed before previous healthcare relevant higher
275 education. This could be an explanation for our results where mental health nursing also had
276 a significant improvement to attitudes despite no K&U differences between courses, and
277 generally less pain curricula hours in the UK than physiotherapy [14]. Future research should
278 aim to identify mediators of change in these groups.

279 There is a suggestion from the results that curricular benefit may be finite as indicated by a
280 smaller mean difference and broad confidence intervals in the physiotherapy postgraduate
281 group (Table 3). Furthermore, in the undergraduate disciplines, there was a small variance
282 among the undergraduate disciplines in first year, as data collection started approximately
283 one month after matriculation, this may insinuate that dissimilarity upon entry is in part
284 multi-factorial, and related to: individual, socio-genic [35], and cultural beliefs [23] that
285 contribute to attitudes when beginning the course and potentially their prognosis of
286 improvement.

287 It appears that the capacity to improve K&U of pain concepts alongside attitudes in this
288 population is possible, as research examining both the IASP pain curriculum, and Pain
289 Neurophysiology Education (PNE), have demonstrated they facilitate concurrent increases in
290 positive attitudes and improved K&U from baseline [10–13]. Although, the significance of
291 the results in comparison with this study are bounded by the difference in outcome measures
292 [11,12,36].

293 *Implications for Future Research*

294 Future research should consider a cohort study design, following healthcare students through
295 the duration of their course. In order to better inform cause and effect in the development of
296 attitudes and confidence, including possible mediators identified in this study such as prior
297 education.

298 *Limitations*

299 The main limitations of this study were its that the respondents were self-selected, and
300 demographic information was not collected other than course and year of study, thereby
301 limiting the generalisability of the results through potential sample bias, however this helped
302 to maintain anonymity of participants. There was a high non-response rate from the
303 convenience sample, however, this was similar to previous surveys in the UK [22,29]. The
304 cross-sectional design meant that no assumptions about cause and effect could be made,
305 therefore the results should be interpreted with caution. Moreover, this survey was conducted
306 at one HEI in the UK and the results may not be generalizable.

307 There was a large amount of missing data, and to mitigate response bias, data imputation was
308 used and validated with a post-hoc PP test to include partially completed surveys in the
309 analysis, however no method can account for missing data entirely. For this reason, future

310 studies could utilise ‘pain champions’ to advertise the survey and consider using a paper-
311 based questionnaire to encourage a higher response rate as per previous research [22].

312 Despite a large overall sample some of the healthcare courses i.e. adult nursing and podiatry
313 had a small sample size and comparisons with these disciplines may not be sufficiently
314 powered. The use of a minimum cut-off of 10 respondents per course to enhance
315 generalisability, and less than of completed 50% questionnaire exclusion is not supported in
316 the literature, no guidance could be found to advise on an appropriate minimum response or
317 completion. In addition to this, the variability in the results as highlighted by large confidence
318 intervals, may be still be in part to some small sample sizes in degree programmes, or due to
319 outliers in the data. This is most obvious in the adult nursing cohort who had the highest
320 amount of students enrolled in a course and the lowest sample. Again, a paper based survey
321 endorsed by local ‘pain champions’ may help with more adequate sampling of these groups
322 in future research. Still, this study was the first to compare these six different disciplines at
323 the same HEI with the HC-PAIRS and PUnCQ, and the results are supported with findings
324 from similar research [5,22,29]. Therefore, it is entirely possible this variance is normal and
325 ecologically valid.

326 As the PUnCQ is still in the preliminary stages of validity testing, it is not advisable to make
327 any significant interpretation of the results, beyond the possibility that the K&U of pain
328 concepts relative to the IASP and BPS curricula is low, and confidence is moderate in
329 applying this K&U to a case vignette in this population. While we assessed the internal
330 consistency of the PUnCQ from the PP dataset, the median scores of K&U were less than
331 half of the total available marks, so we would advise careful interpretation of the Cronbach’s
332 alpha value for K&U.

333 **Conclusion**

334 The results suggest that physiotherapy students may have higher confidence in managing
335 people with pain, and more positive attitudes, when compared with occupational therapists,
336 nurses and podiatrists. Despite this, knowledge and understanding is poor overall, with only
337 20% of participants achieving half marks or more, and did not differ between healthcare
338 course. Improvements between first and final year students suggest certain healthcare courses
339 improve attitudes toward chronic pain. However, it appears that this difference exists without
340 any change in knowledge. Future research should follow a cohort through the course of their
341 degree program to examine the relationship between attitudes, confidence and K&U.

342 **Ethical approval:** Glasgow Caledonian University, School of Health and Social Care,
343 Research and Ethics Committee.

344

- 345 [1] Fayaz A, Croft P, Langford RM, et al. Prevalence of chronic pain in the UK: a
346 systematic review and meta-analysis of population studies. *BMJ Open* [Internet]. 2016
347 [cited 2019 Mar 27];6:e010364. Available from:
348 <https://bmjopen.bmj.com/content/6/6/e010364>.
- 349 [2] Goldberg DS, McGee SJ. Pain as a global public health priority. *BMC Public Health*
350 [Internet]. 2011 [cited 2019 Mar 27];11:770. Available from:
351 <http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-11-770>.
- 352 [3] Breivik H, Collett B, Ventafridda V, et al. Survey of chronic pain in Europe:
353 Prevalence, impact on daily life, and treatment. *Eur. J. Pain* [Internet]. 2006 [cited
354 2019 Mar 27];10:287–287. Available from:
355 <http://doi.wiley.com/10.1016/j.ejpain.2005.06.009>.
- 356 [4] Bishop A, Foster NE, Thomas E, et al. How does the self-reported clinical
357 management of patients with low back pain relate to the attitudes and beliefs of health
358 care practitioners? A survey of UK general practitioners and physiotherapists. *Pain*
359 [Internet]. 2008 [cited 2019 Mar 27];135:187–195. Available from:
360 <http://www.ncbi.nlm.nih.gov/pubmed/18206309>.
- 361 [5] Briggs AM, Slater H, Smith AJ, et al. Low back pain-related beliefs and likely practice
362 behaviours among final-year cross-discipline health students. *Eur. J. Pain* [Internet].
363 2013 [cited 2019 Mar 27];17:766–775. Available from:
364 <http://doi.wiley.com/10.1002/j.1532-2149.2012.00246.x>.
- 365 [6] Slade SC, Kent P, Bucknall T, et al. Barriers to primary care clinician adherence to
366 clinical guidelines for the management of low back pain: protocol of a systematic
367 review and meta-synthesis of qualitative studies. *BMJ Open* [Internet]. 2015 [cited
368 2019 Mar 27];5:e007265. Available from:
369 <http://www.ncbi.nlm.nih.gov/pubmed/25900462>.
- 370 [7] Houben RMA, Gijzen A, Peterson J, et al. Do health care providers' attitudes towards
371 back pain predict their treatment recommendations? Differential predictive validity of
372 implicit and explicit attitude measures. *Pain* [Internet]. 2005 [cited 2019 Mar
373 27];114:491–498. Available from:
374 [http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=000063
375 96-200504000-00021](http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=00006396-200504000-00021).
- 376 [8] Rainville J, Bagnall D, Phalen L. Health care providers' attitudes and beliefs about
377 functional impairments and chronic back pain. *Clin. J. Pain* [Internet]. 1995 [cited
378 2019 Mar 27];11:287–295. Available from:
379 <http://www.ncbi.nlm.nih.gov/pubmed/8788576>.
- 380 [9] Briggs E V., Carr ECJ, Whittaker MS. Survey of undergraduate pain curricula for
381 healthcare professionals in the United Kingdom. *Eur. J. Pain*. 2011;15:789–795.
- 382 [10] Colleary G, O'Sullivan K, Griffin D, et al. Effect of pain neurophysiology education
383 on physiotherapy students' understanding of chronic pain, clinical recommendations
384 and attitudes towards people with chronic pain: a randomised controlled trial.
385 *Physiotherapy* [Internet]. 2017 [cited 2019 Mar 27];103:423–429. Available from:
386 <http://www.ncbi.nlm.nih.gov/pubmed/28797666>.

- 387 [11] Hunter J, Watt-Watson J, McGillion M, et al. An Interfaculty Pain Curriculum:
388 Lessons learned from six years experience. *Pain* [Internet]. 2008 [cited 2019 Mar
389 27];140:74–86. Available from:
390 [http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=000063](http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=00006396-200811150-00009)
391 [96-200811150-00009](http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=00006396-200811150-00009).
- 392 [12] Strong J, Meredith P, Darnell R, et al. Does participation in a pain course based on the
393 International Association for the Study of Pain’s curricula guidelines change student
394 knowledge about pain? *Pain Res. Manag.* [Internet]. 2003 [cited 2019 Mar 27];8:137–
395 142. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/14657980>.
- 396 [13] Watt-Watson J, McGillion M, Hunter J, et al. A survey of prelicensure pain curricula
397 in health science faculties in Canadian universities. *Pain Res. Manag.* [Internet]. 2009
398 [cited 2019 Mar 27];14:439–444. Available from:
399 <http://www.ncbi.nlm.nih.gov/pubmed/20011714>.
- 400 [14] Briggs E V., Carrl ECJ, Whittakerl MS, et al. Survey of undergraduate pain curricula
401 for healthcare professionals in the United Kingdom. *Eur. J. Pain* [Internet]. 2011 [cited
402 2019 Mar 27];15:789–795. Available from:
403 <http://doi.wiley.com/10.1016/j.ejpain.2011.01.006>.
- 404 [15] Briggs E V, Battelli D, Gordon D, et al. Current pain education within undergraduate
405 medical studies across Europe: Advancing the Provision of Pain Education and
406 Learning (APPEAL) study. *BMJ Open* [Internet]. 2015 [cited 2019 Mar
407 27];5:e006984. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26260345>.
- 408 [16] Synnott A, O’Keeffe M, Bunzli S, et al. Physiotherapists may stigmatise or feel
409 unprepared to treat people with low back pain and psychosocial factors that influence
410 recovery: a systematic review. *J. Physiother.* [Internet]. 2015 [cited 2019 Mar
411 27];61:68–76. Available from:
412 <https://www.sciencedirect.com/science/article/pii/S183695531500017X?via%3Dihub>.
- 413 [17] Etherton J, Waterfield J. PREPARING TO MANAGE PATIENTS IN PAIN. THE
414 STUDENT PERSPECTIVE: A PILOT. *J. Physiother. Pain Assoc.* [Internet]. 2015
415 [cited 2019 Mar 27];2762:27–33 7p. Available from:
416 <https://www.ingentaconnect.com/content/ppa/pr/2015/00002015/00000038/art00006>.
- 417 [18] Claydon A, Paul-Taylor G. Persistent Pain: Physiotherapy Student Experiences of
418 Person-Centred Care in Musculoskeletal Outpatient Departments. *Int. J. Pract. Learn.*
419 *Heal. Soc. Care* [Internet]. 2017;5:69–83. Available from: [http://e-](http://e-learning.coventry.ac.uk/ojs/index.php/pblh/article/view/411)
420 [learning.coventry.ac.uk/ojs/index.php/pblh/article/view/411](http://e-learning.coventry.ac.uk/ojs/index.php/pblh/article/view/411).
- 421 [19] Kamper SJ, Apeldoorn AT, Chiarotto A, et al. Multidisciplinary biopsychosocial
422 rehabilitation for chronic low back pain: Cochrane systematic review and meta-
423 analysis. *BMJ* [Internet]. 2015 [cited 2019 Mar 27];350:h444. Available from:
424 <http://www.ncbi.nlm.nih.gov/pubmed/25694111>.
- 425 [20] Burnett A, Sze CC, Tam SM, et al. A Cross-cultural Study of the Back Pain Beliefs of
426 Female Undergraduate Healthcare Students. *Clin. J. Pain* [Internet]. 2009 [cited 2019
427 Mar 27];25:20–28. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/19158542>.

- 428 [21] Morris H, Ryan C, Lauchlan D, et al. Do medical student attitudes towards patients
429 with chronic low back pain improve during training? a cross-sectional study. *BMC*
430 *Med. Educ.* [Internet]. 2012 [cited 2019 Dec 26];12:10. Available from:
431 <http://www.ncbi.nlm.nih.gov/pubmed/22429317>.
- 432 [22] Ryan C, Murphy D, Clark M, et al. The effect of a physiotherapy education compared
433 with a non-healthcare education on the attitudes and beliefs of students towards
434 functioning in individuals with back pain: An observational, cross-sectional study.
435 *Physiotherapy* [Internet]. 2010;96:144–150. Available from:
436 <http://dx.doi.org/10.1016/j.physio.2009.09.010>.
- 437 [23] Alshami AM, Albahrani YA. A comparison of the attitudes toward chronic low back
438 pain in Saudi, Australian and Brazilian physical therapy students. *J. Taibah Univ. Med.*
439 *Sci.* [Internet]. 2015 [cited 2019 Mar 27];10:181–187. Available from:
440 <https://www.sciencedirect.com/science/article/pii/S1658361215000311?via%3Dihub>.
- 441 [24] von Elm E, Altman DG, Egger M, et al. The Strengthening the Reporting of
442 Observational Studies in Epidemiology (STROBE) Statement: Guidelines for
443 Reporting Observational Studies. *Ann. Intern. Med.* [Internet]. 2007 [cited 2019 Dec
444 26];147:573. Available from: [http://annals.org/article.aspx?doi=10.7326/0003-4819-](http://annals.org/article.aspx?doi=10.7326/0003-4819-147-8-200710160-00010)
445 [147-8-200710160-00010](http://annals.org/article.aspx?doi=10.7326/0003-4819-147-8-200710160-00010).
- 446 [25] Yamane T. *Statistics: An introductory analysis*. 2nd ed. New York: Harper and Row;
447 1973.
- 448 [26] Seenan C, Harrison H, McParland J, et al. National survey of knowledge and
449 confidence related to pain management of final year physiotherapy students.
450 *Physiotherapy* [Internet]. 2017 [cited 2019 Mar 27];103:e135–e136. Available from:
451 <https://linkinghub.elsevier.com/retrieve/pii/S0031940617302420>.
- 452 [27] Gilbert S, Clark N. and SA. *Pain Understanding and Knowledge Questionnaire*
453 *(PUnCQ)*. Dundee; 2016. p. 23–24. Available from:
454 [https://sites.google.com/site/scottishpainresearchcommunity/sparc-meetings/sparc-](https://sites.google.com/site/scottishpainresearchcommunity/sparc-meetings/sparc-asm-2016)
455 [asm-2016](https://sites.google.com/site/scottishpainresearchcommunity/sparc-meetings/sparc-asm-2016) .
- 456 [28] Moran RW, Rushworth WM, Mason J. Investigation of four self-report instruments
457 (FABT, TSK-HC, Back-PAQ, HC-PAIRS) to measure healthcare practitioners’
458 attitudes and beliefs toward low back pain: Reliability, convergent validity and survey
459 of New Zealand osteopaths and manipulative physiotherapists. *Musculoskelet. Sci.*
460 *Pract.* [Internet]. 2017 [cited 2019 Mar 27];32:44–50. Available from:
461 <https://www.sciencedirect.com/science/article/pii/S2468781217301406?via%3Dihub>.
- 462 [29] Quinn T, Ryan C, Jones D. Physiotherapy students’ attitudes towards the functional
463 ability of patients with chronic low back pain. *Pain Rehabil. - J. Physiother. Pain*
464 *Assoc.* [Internet]. 2014 [cited 2019 Mar 27];2014:20–23. Available from:
465 <https://www.ingentaconnect.com/content/ppa/pr/2014/00002014/00000037/art00005>.
- 466 [30] Fishman SM, Young HM, Lucas Arwood E, et al. Core Competencies for Pain
467 Management: Results of an Interprofessional Consensus Summit. *Pain Med.* [Internet].
468 2013 [cited 2019 Mar 27];14:971–981. Available from:
469 <https://academic.oup.com/painmedicine/article-lookup/doi/10.1111/pme.12107>.

- 470 [31] British Pain Society. A Practical Guide to Incorporating Pain Education into Pre-
471 Registration Curricula for Healthcare Professionals in the UK [Internet]. London;
472 2018. Available from:
473 [https://www.britishpainsociety.org/static/uploads/resources/files/BPS_Pre-
registration_Practical_Guide_Feb_2018_1wsCBZo.pdf](https://www.britishpainsociety.org/static/uploads/resources/files/BPS_Pre-
474 registration_Practical_Guide_Feb_2018_1wsCBZo.pdf) .
- 475 [32] Kang H. The prevention and handling of the missing data. *Korean J. Anesthesiol.*
476 [Internet]. 2013 [cited 2019 Mar 27];64:402. Available from:
477 <http://ekja.org/journal/view.php?doi=10.4097/kjae.2013.64.5.402>.
- 478 [33] Latimer J, Maher C, Refshauge K. The attitudes and beliefs of physiotherapy students
479 to chronic back pain. *Clin. J. Pain* [Internet]. 2004 [cited 2019 Mar 27];20:45–50.
480 Available from: <http://www.ncbi.nlm.nih.gov/pubmed/14668656>.
- 481 [34] Kennedy N, Condon E, O’Sullivan K. Physiotherapy practice educators’ beliefs
482 towards low back pain and influence on student beliefs. *Pain Rehabil. - J. Physiother.*
483 *Pain Assoc.* [Internet]. 2014 [cited 2019 Mar 27]; Available from:
484 <https://www.ingentaconnect.com/content/ppa/pr/2014/00002014/00000036/art00003>.
- 485 [35] Setchell J, Costa N, Ferreira M, et al. Individuals’ explanations for their persistent or
486 recurrent low back pain: a cross-sectional survey. *BMC Musculoskelet. Disord.*
487 [Internet]. 2017 [cited 2019 Mar 27];18:466. Available from:
488 [https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/s12891-017-
1831-7](https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/s12891-017-
489 1831-7).
- 490 [36] Watt-Watson J, Hunter J, Pennefather P, et al. An integrated undergraduate pain
491 curriculum, based on IASP curricula, for six Health Science Faculties. *Pain* [Internet].
492 2004 [cited 2019 Mar 27];110:140–148. Available from:
493 <http://www.ncbi.nlm.nih.gov/pubmed/15275761>.
- 494
495

Table 1: Descriptive statistics presented by programme for each questionnaire

Course	Total Population	HC-PAIRS	CI 95%	Confidence	CI 95%	Knowledge & Understanding*
Adult Nursing	n = 1073	n = 30 61.6 (10.0)	[57.9 – 65.3]	n=29 5.8 (2.0)	[5.0 – 6.5]	n=29 4 (4)
Child Nursing	n = 213	n = 30 63.5 (10.5)	[59.6 – 67.5]	n=30 4.2 (2.2)	[3.4 – 5.0]	n=30 4 (2)
MH Nursing	n = 209	n = 36 62.6 (7.6)	[60.1 – 65.2]	n=35 4.4 (2.6)	[3.5 – 5.2]	n=35 4 (3)
OT PG	n = 91	n = 20 58.7(8.3)	[54.8 – 62.6]	n=20 3.7 (2.0)	[2.8 – 4.7]	n=20 4 (1)
OT UG	n = 239	n = 66 60.6 (7.8)	[58.7 – 62.5]	n=64 4.5 (1.8)	[4.0 – 4.9]	n=64 4 (3)
Podiatry	n = 122	n = 24 62.7(7.8)	[59.4 – 66.0]	n=21 5.6 (1.9)	[4.8 – 6.5]	n=21 4 (3)
PT PG	n = 101	n = 33 49.6 (8.9)	[46.5 – 52.8]	n=30 6.3 (1.1)	[5.9 – 6.8]	n=33 4 (2)
PT UG	n = 250	n = 107 55.2 (10.2)	[53.3 – 57.2]	n=104 5.4 (2.1)	[5.0 – 5.8]	n=104 4 (2)

Results are given as: number of responses, mean, and (standard deviation) unless stated otherwise.
 Total population refers to the total amount of students enrolled on each respective course at this HEI.
 CI: Confidence Intervals; PG: Postgraduate; UG: Undergraduate.
 * Number of responses, Median and (Inter-Quartile Range) given as data non-normally distributed

501 Table 2:

502

Table 2: Pairwise comparisons for HC-PAIRS

	Adult Nursing	Child Nursing	MH Nursing	OT PG	OT UG	Podiatry	PT PG	PT UG
Adult Nursing	0	-1.6 [-8.9 to 5.6]	0.1 [-6.8 to 7.1]	4.6 [-3.6 to 12.7]	1.5 [-4.7 to 7.6]	-0.4 [-8.1 to 7.3]	13.9* [6.7 to 21.1]	6.8* [1.0 to 12.6]
Child Nursing	1.6 [-5.6 to 8.9]	0	1.7 [-5.2 to 8.7]	6.2 [-14.3 to 1.9]	3.1 [-3.1 to 9.2]	1.2 [-6.4 to 8.9]	15.5* [8.4 to 22.7]	8.4* [1.3 to 12.1]
MH Nursing	-0.1 [-7.1 to 6.8]	-1.7 [-8.7 to 5.2]	0	4.5 [-3.4 to 12.3]	-1.4 [-4.5 to 7.2]	-0.5 [-7.9 to 6.9]	13.8* [7.0 to 20.5]	6.7* [-4.6 to 9.1]
OT MSc	-4.6 [-12.7 to -3.6]	-6.2 [-14.3 to 1.9]	-4.5 [-12.3 to 3.4]	0	-3.2 [-10.3 to 4.1]	-5.0 [-13.5 to 3.5]	9.3* [1.4 to 17.3]	2.2 [-9.1 to 4.6]
OT BSc	1.5 [-4.7 to 7.6]	-3.1 [-9.3 to 3.1]	-1.3 [-7.2 to 4.5]	3.1 [-4.1 to 10.3]	0	-1.9 [-8.5 to 4.8]	-12.4* [6.4 to 18.5]	-5.4* [1.0 to 9.7]
Podiatry	0.4 [-7.3 to 8.1]	-1.2 [-8.9 to 6.4]	0.5 [-6.9 to 7.9]	5.0 [-3.5 to 13.5]	1.9 [-4.8 to 8.5]	0	14.3* [6.8 to 21.8]	7.2* [0.9 to -13.5]
PT MSc	-13.9* [-21.1 to -6.7]	-15.5* [-22.7 to -8.4]	-13.8* [-20.5 to -7.0]	-9.3* [-17.3 to -1.4]	-12.4* [-18.5 to -6.4]	-14.3* [-21.8 to -6.8]	0	-7.1* [-12.7 to -1.4]
PT BSc	-6.8* [-12.6 to -1.0]	-8.4* [-14.2 to -2.7]	-6.7* [-12.1 to -1.3]	-2.2 [-9.1 to 4.6]	-5.4* [-9.7 to -1.0]	-7.2* [-13.5 to -0.9]	-7.1* [-1.4 to -12.7]	0

Values given as Mean Difference [95% Confidence Interval]
 *indicates significance of <0.05 with Bonferroni Correction
 Covariates in the model evaluated at year of study = 2.59
 MH: Mental Health, OT: Occupational Therapy, PG: Postgraduate; PT: Physiotherapy, UG: Undergraduate.

503

504

505 Table 3:

506

Table 3: Pairwise comparisons for PUnCQ confidence

	Adult Nursing	Child Nursing	MH Nursing	OT PG	OT UG	Podiatry	PT PG	PT UG
Adult Nursing	0	-1.4 [-0.2 to 2.9]	1.0 [-0.4 to 2.5]	1.5 [-0.3 to 3.2]	1.1 [-1.9 to 2.4]	-0.7 [-1.8 to 1.6]	-1.2 [-2.8 to 0.4]	0.2 [-1.1 to 1.4]
Child Nursing	-1.4 [-2.9 to 0.2]	0	-0.4 [-1.9 to 1.1]	0.9 [-1.6 to 1.8]	-0.3 [-1.6 to 1.1]	-1.5 [-3.2 to 0.2]	-2.6* [- 4.2 to - 1.0]	-1.2* [-2.5 to -0.1]
MH Nursing	-1.0 [-2.5 to 0.5]	0.4 [-1.2 to 1.8]	0	0.5 [-1.2 to 2.1]	0.2 [-1.4 to 1.1]	-1.1 [-2.8 to 1.0]	-2.2* [- 3.7 to - 0.7]	-0.9* [-2.0 to 0.3]
OT MSc	-1.5 [-3.2 to 0.3]	-0.9 [-1.8 to 1.6]	-0.5 [-2.1 to 1.2]	0	-0.3 [-1.9 to 1.2]	-1.6 [-3.4 to -0.3]	-2.7* [- 4.4 to - 0.9]	-1.3* [-2.8 to 0.2]
OT BSc	-0.2 [-2.5 to 0.2]	0.3 [-1.1 to 1.6]	-0.1 [-1.4 to 1.1]	-0.3 [-1.2 to 1.9]	0	-1.2 [-2.7 to 0.3]	-2.4* [- 3.7 to - 1.0]	-1.0* [-1.9 to -0.1]
Podiatry	0.7 [-1.6 to 1.8]	1.5 [-0.2 to 3.2]	-1.1 [-0.5 to 2.7]	-1.6 [-0.3 to 3.4]	-1.2* [-0.3 to 2.7]	0	-1.1 [-2.8 to 0.6]	0.3 [-1.2 to - 1.7]
PT MSc	1.2 [-0.4 to 2.8]	2.6* [1.0 to 4.1]	2.2* [0.7 to 3.7]	2.7* [0.9 to 4.4]	2.4* [1.0 to 3.7]	1.1 [-0.6 to 2.8]	0	1.4* [0.1 to 2.6]
PT BSc	0.2 [-1.4 to 1.1]	1.2 [-0.1 to 2.5]	0.9 [-2.0 to 0.3]	1.3 [-0.2 to 1.9]	1.0* [0.1 to 1.9]	-0.3 [-1.7 to 1.1]	-1.4* [- 2.6 to - 0.1]	0

Values given as Mean Difference [95% Confidence Interval].
 *indicates significance of <0.05 with Bonferroni Correction
 Covariates in the model evaluated at year of study = 2.61
 MH: Mental Health, OT: Occupational Therapy, PG: Postgraduate; PT: Physiotherapy, UG: Undergraduate

507

508

Table 4: Comparison of attitudes and confidence scores between first and final year students

	Attitudes			Confidence		
	First Year Mean (SD)	Final Year Mean (SD)	Mean Difference (95% CI)	First Year Mean (SD)	Final Year Mean (SD)	Mean Difference (95% CI)
Adult Nursing	n = 7 64.1 (13.6)	n = 18 59.7 (8.7)	-4.4 (-5.0 to 13.8)	n = 6 4.5 (1.9)	n = 18 6.2 (1.8)	1.7 (-0.2 to 3.5)
Child Nursing	n = 8 63.3 (8.8)	n = 16 62.0 (12.4)	-1.3 (-8.9 to 11.6)	n = 8 3.2 (2.5)	n = 16 4.9 (2.0)	1.7 * (0.3 to 3.7)
MH Nursing	n = 12 67.8 (6.2)	n = 12 60.5 (7.0)	-7.3* (-12.9 to -1.7)	n = 11 4.4 (2.9)	n = 12 4.6 (2.5)	0.2 (2.2 to -2.7)
OT PG	n = 13 58.7 (8.6)	n = 7 58.7 (8.4)	-0.1 (-8.4 to 8.4)	n = 13 3.1 (2.0)	n = 7 4.8 (1.5)	1.7 (-0.1 to 3.6)
OT UG	n = 14 62.9 (8.5)	n = 27 59.8 (7.0)	-3.2 (-1.8 to 8.1)	n = 12 3.9 (2.1)	n = 25 4.8 (1.5)	1.1 (-2.4 to 0.1)
Podiatry	n = 4 67.8 (5.6)	n = 7 63 (11.8)	-4.8 (-9.7 to 19.2)	n = 3 3.4 (0.6)	n = 7 6.7 (1.2)	3.2* (1.0 to 5.4)
PT PG	n = 23 51.2 (9.0) ^c	n = 10 45.0 (7.4) ^a	-6.7* (-13.2 to -0.8)	n = 21 6.4 (1.1) ^d	n = 9 6.2 (1.4)	0.2 (-0.8 to 1.1)
PT UG	n = 24 61.2 (10.7)	n = 36 52.5 (7.7) ^b	-9.2* (-14.0 to -4.5)	n = 22 3.1 (2.4)	n = 35 6.3 (1.4)	3.2* (2.2 to 4.2)

*indicates a significant difference between first and final year at $p=0.05<$

^a indicates a significant difference with all disciplines in year group except from PT BSc

^b indicates a significant difference with OT BSc and Child Nursing

^c indicates a significant difference with Mental Health Nursing, OT BSc and PT BSc

^d indicates a significant difference with all disciplines except podiatry, adult and child nursing

MH: Mental Health, OT: Occupational Therapy, PG: Postgraduate; PT: Physiotherapy, UG: Undergraduate

510

511