

# Accepted Manuscript

Australian osteopathic students' perceptions of interprofessional relationships

Brett Vaughan, Lecturer, Keri Moore, Chris Macfarlane, Sandra Grace

PII: S1746-0689(16)30037-2

DOI: [10.1016/j.ijosm.2016.06.004](https://doi.org/10.1016/j.ijosm.2016.06.004)

Reference: IJOSM 417

To appear in: *International Journal of Osteopathic Medicine*

Received Date: 9 January 2015

Revised Date: 9 May 2016

Accepted Date: 23 June 2016

Please cite this article as: Vaughan B, Moore K, Macfarlane C, Grace S, Australian osteopathic students' perceptions of interprofessional relationships, *International Journal of Osteopathic Medicine* (2016), doi: 10.1016/j.ijosm.2016.06.004.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



**Osteopathic students' perceptions of interprofessional relationships.**

Brett Vaughan<sup>1,2,3</sup>  
Keri Moore<sup>1,3</sup>  
Chris Macfarlane<sup>1</sup>  
Sandra Grace<sup>3</sup>

<sup>1</sup> Centre for Chronic Disease Prevention & Management, College of Health & Biomedicine, Victoria University, Melbourne, Australia

<sup>2</sup> Institute of Sport, Exercise and Active Living, Victoria University, Melbourne, Australia

<sup>3</sup> School of Health & Human Sciences, Southern Cross University, Lismore, Australia

**Corresponding Author**

Brett Vaughan  
Lecturer, Osteopathy  
Discipline of Osteopathic Medicine  
College of Health and Biomedicine  
Victoria University  
PO Box 14428  
Melbourne VIC 8001  
Australia  
P. 61 3 9919 1210  
F. 61 3 9919 1030  
E. [brett.vaughan@vu.edu.au](mailto:brett.vaughan@vu.edu.au)

**Australian osteopathic students' perceptions of interprofessional relationships.**

ACCEPTED MANUSCRIPT

**ABSTRACT****Background**

Interprofessional education is increasingly included in health profession education programs as governments strive to improve patient care and outcomes through interprofessional teams.

**Objective**

To investigate Australian osteopathy students perceptions of interprofessional relationships.

**Design**

Single administration of a questionnaire to students explore perceptions of interprofessional relationships.

**Setting**

Two Australian university-based osteopathy programs.

**Methods**

Students completed the Interdisciplinary Education Perception Scale (IEPS) and a demographic questionnaire. Descriptive data were generated for each of the IEPS items, total and factor scores.

Ordinal logistic regression was used to evaluate the association between the IEPS items and the demographic variables: age; gender; university; and year level. Cronbach's alpha was calculated as the reliability estimate.

### Participants

Students enrolled in the osteopathy programs at Victoria University (Melbourne, Australia) and Southern Cross University (Lismore, Australia).

### Results

Responses from 319 students were analysed (63% response rate). The mean total IEPS score was 246.46 ( $\pm$  23.79). No association was observed for the demographic variables and eleven of the IEPS items in the regression models. *Moderate* odds ratios were observed for year 3 students in relation to their perception of autonomy and respect, where these perceptions were less positive compared to students in other year levels. Age, gender and university were significant in the regression models for other IEPS items however these odds ratios were either *trivial* or *small*. Cronbach's alpha was 0.818 indicating an acceptable internal structure for the 18-item IEPS.

### Conclusions

The perception of Australian osteopathy students towards interprofessional relationships was largely positive, and not associated with demographics such as age, gender, program year level

and the university they were attending. Students identified positive aspects such as the need to cooperate with other professions and that osteopaths are well trained. Where demographics were associated with an IEPS item, the odds ratio was typically *trivial* to *small*. Aspects that may also need to be improved were identified, including the students' perception of the status of osteopathy in the eyes of other health professions. The data from the present study could be used to inform the development of interprofessional programs involving osteopaths and osteopathy students. Further work to replicate the results of the present study is required.

## INTRODUCTION

There is a growing interest in collaborative approaches to help manage the costs and complexities of healthcare for people with chronic health conditions.<sup>1</sup> Interprofessional collaboration (IPC) is one approach that is providing a way forward, as no single discipline can provide all that is required. The introduction of interprofessional education (IPE) into pre-professional teaching programs can improve students' knowledge about other health professions,<sup>2-4</sup> improve interprofessional communication,<sup>2</sup> and provide students with the skills to participate in collaborative patient care.<sup>3</sup> IPE may help break down professional barriers,<sup>5</sup> increase respect,<sup>4</sup> improve skills related to communication<sup>6,7</sup> and teamwork,<sup>8</sup> and encourage students to see interprofessional patient care as a normal part of practice as a health professional.<sup>9</sup>

IPE occurs on both planned and unplanned occasions when learners from two or more health professions take the opportunity to learn from, with and about each other's clinical practice to improve the quality of health-care services.<sup>10</sup> However, students in health profession education programs typically learn in a uni-professional environment<sup>11</sup> with limited interaction with other healthcare students, particularly in clinical placements and patient care. According to Lapkin et al.,<sup>11</sup> '... on campus IPE initiatives should be supported by deliberate opportunities for IPE during the experiential learning that occurs during clinical placements'.

The healthcare outcomes associated with interprofessional practice or collaborative care<sup>12-14</sup> suggest that IPE should be a compulsory component of all healthcare education. How best to embed this education in health curricula is yet to be established, with few quality studies published on the effectiveness of IPE in relation to improved patient outcomes.<sup>15</sup> There are limited examples

of IPE in osteopathic education in the literature, and those examples typically refer to osteopathic education in the United States.<sup>16-19</sup> The generalisability of these studies is limited due to the differing nature of osteopathic practice in the US compared to many other countries, including Australia and New Zealand.

IPE is being introduced into the osteopathy teaching programs at Victoria University (VU), Melbourne, Australia<sup>20</sup> and Southern Cross University (SCU), Lismore, Australia. The current paper presents data collected from the 2014 cohort of osteopathy students at VU and SCU using the IEPS. The aim of the present study was to identify the cohorts' perception of interprofessional relationships prior to substantial exposure to it so as to inform curricula development, and potentially identify issues that may be specific to osteopathy students participating in IPE.



## METHOD

This study was approved by the VU and SCU Human Research Ethics Committees.

### Participants

Students enrolled in the osteopathy programs at both VU and SCU were invited by email to participate in the study. Paper versions of the questionnaires were distributed in the practical skills classes for each year level during March and April 2014, and students were asked to return completed questionnaires to a central location. Students were free to complete the questionnaire at any time. Students who were not present in the practical skills class were able to obtain a copy of the questionnaire from one of the researchers. All students were sent an email reminder to ensure that all students had the opportunity to complete the questionnaire. Consent was implied by completing the questionnaire and all responses were anonymous.

### Measure

The IEPS was chosen for this study as it has previously been utilised in similar studies to evaluate health student perceptions of interprofessional relationships.<sup>19, 21-23</sup> A number of authors have also suggested that data from the IEPS can be valuable in guiding the design of IPE programs,<sup>24</sup> and in assessing changes in attitude.<sup>22</sup> Previous authors have used the IEPS to explore the impact of IPE before the introduction of IPE in their curricula,<sup>19</sup> and also to measure changes in students' perceptions of IPC before and after their education programs.<sup>24, 25</sup>

Participants were invited to complete a demographic questionnaire (age, gender, university and year level), and the Interdisciplinary Education Perception Scale (IEPS) as a paper-based survey on one occasion. The IEPS was originally developed by Luecht et al.<sup>26</sup> It contains 18 items in 4 factors:

1. Competence & Autonomy;
2. Perceived Need for Cooperation;
3. Perception of Actual Cooperation; and
4. Understanding of Others' Values.

Each item is scored on a Likert-type scale of 1-6 with responses from *strongly disagree* to *strongly agree*. Higher scores represent a more positive perception.

#### Data analysis

All data were entered into SPSS Version 21 (IBM Corp, USA) for analysis. Descriptive statistics were generated for each of the demographic variables, and IEPS items, factors and total score. For comparative purposes, means and standard deviations for the IEPS total and factor scores were calculated based on the raw scores, and the weighted scores<sup>a</sup> described by Luecht et al.<sup>26</sup> The relationship between the demographic variables and each of the IEPS items was explored using the *rms* package (version 4.4-0)<sup>27</sup> in *R* (version 3.2.2).<sup>28</sup> Ordinal logistic regression was performed with an Akaike criterion (AIC) cutoff. Odds ratios (OR) were calculated for significant

---

<sup>a</sup> IEPS factor score weightings were applied as per the authors' instructions. Factor 1 had a weighting multiple of 2, Factor 2 - multiple of 6, Factor 3 - multiple of 3, Factor 4 - multiple of 4

variables and interpreted according to Hopkins.<sup>29</sup> Cronbach's alpha was calculated for the IEPS and each of its factors to evaluate internal consistency.

ACCEPTED MANUSCRIPT

**RESULTS**

Three-hundred and nineteen (N=319) responses were received from the two universities representing an overall response rate of 63%. Response rates were 75% (263/329) and 36% (56/92) from VU and SCU respectively, suggesting a possible bias towards the opinions of the students from VU. Demographic data are presented in Table 1.

ACCEPTED MANUSCRIPT

Table 1. Demographic data.

	Total	University						
		Victoria University			Southern Cross University			
		n	Across University	Within University	n	Across University	Within University	
<b>Total responses</b>	319							
<b>Year Level</b>	Year 1	131 (41%)	108	82%	42%	23	18%	41%
	Year 2	41 (13%)	40	98%	15%	1	2%	2%
	Year 3	35 (11%)	35	100%	13%	0	0	0
	Year 4	52 (16%)	33	63%	12%	19	37%	33%
	Year 5	60 (19%)	47	78%	18%	13	22%	23%
<b>Age Group</b>	18-20	98 (31%)	95	97%	36%	3	3%	5%
	21-23	93 (29%)	88	95%	33%	5	5%	9%
	24-26	51 (16%)	44	86%	16%	7	14%	12%
	27-29	21 (7%)	13	62%	5%	8	38%	14%
	30 plus	53 (17%)	21	40%	8%	32	60%	57%
<b>Gender</b>	Male	143 (45%)	117	82%	45%	26	18%	46%
	Female	175 (55%)	146	83%	55%	29	17%	54%

Descriptive data for each of the IEPS items and factors is presented in Table 2 and histograms for each IEPS item are found in Supplementary File 1.

**Table 2.** Descriptive statistics for each item, total and factor score.

	Mean	Std. Deviation	Range	Min	Max
<b>Factor 1 - Competence &amp; Autonomy</b>					
Raw score	37.30	2.03			
Weighted score	74.60	8.12			
1. Individuals in my profession are well-trained	5.19	0.750	5	1	6
3. Individuals in my profession demonstrate a great deal of autonomy	4.58	0.951	5	1	6
4. Individuals in other professions respect the work done by my profession	4.08	0.926	5	1	6
5. Individuals in my profession are very positive about their goals and objectives	4.97	0.737	5	1	6
7. Individuals in my profession are very positive about their contributions and accomplishments	5.06	0.675	3	3	6
9. Individuals in other professions think highly of my profession	3.85	0.962	5	1	6
10. Individuals in my profession trust each other's professional judgment	4.68	0.751	5	1	6
13. Individuals in my profession are extremely competent	4.88	0.841	5	1	6
<b>Factor 2 - Perceived Need for Cooperation</b>					
Raw score	8.83	1.52			
Weighted score	52.98	9.12			
6. Individuals in my profession need to cooperate with other professions	5.13	0.729	5	1	6
8. Individuals in my profession must depend upon the work of people in other professions	3.70	1.236	5	1	6
<b>Factor 3 - Perception of Actual Cooperation</b>					
Raw score	23.92	2.49			
Weighted score	71.76	7.47			
2. Individuals in my profession are able to work closely with individuals in other professions	4.67	0.877	5	1	6
14. Individuals in my profession are willing to share information and resources with other professions	4.82	0.768	4	2	6
15. Individuals in my profession have good relations with people in other professions	4.60	0.817	5	1	6
16. Individuals in my profession think highly of other related professions	4.38	0.878	6	0	6

17. Individuals in my profession work well with each other	5.02	0.767	6	0	6
<b>Factor 4 - Understanding of Others' Values</b>					
Raw score	11.78	1.95			
Weighted score	47.12	7.80			
11. Individuals in my profession have a higher status than individuals in other professions	3.25	1.104	5	1	6
12. Individuals in my profession make every effort to understand the capabilities and contributions of other professions	4.38	0.849	4	2	6
18. Individuals in other professions often seek the advice of people in my profession	4.16	1.023	6	0	6
<b>Total score - raw</b>	<b>81.83</b>	<b>7.99</b>			
<b>Total score - weighted</b>	<b>246.46</b>	<b>23.79</b>		<b>52</b>	<b>108</b>

#### Ordinal logistic regression

Each of the demographic variables were entered into an ordinal logistic regression model for each IEPS item. None of the demographic variables were significant in the model for items 1, 2, 5, 6, 8 and items 10 to 16 (Supplementary File 2). Year level was significant in the regression model for item 3 *Individuals in my profession demonstrate a great deal of autonomy* and item 4 *Individuals in other professions respect the work done by my profession*. For students in years 2, 4, and 5 the odds ratios were *small*. The odds ratios for year 3 students were *moderate* for both items suggesting year 3 students were less likely to agree with these statements than year 1 students. This finding is also consistent with item 9 *Individuals in other professions think highly of my profession* (OR 4.80, *moderate*) and item 18 *Individuals in other professions often seek the advice of people in my profession* (OR 3.56, *moderate*).

Age was significant in the regression models for items 7 *Individuals in my profession are very positive about their contributions and accomplishments*, 9 *Individuals in other professions think highly of my profession* and 17 *Individuals in my profession work well with each other* although they are classified as either *trivial* or *small* ORs. *Small* ORs were observed for University for items 7 *Individuals in my profession are very positive about their contributions and accomplishments*, 9. *Individuals in other professions think highly of my profession* and 18 *Individuals in other professions often seek the advice of people in my profession*. For the latter two items SCU students were more likely to agree with these items than students from VU. Gender was only significant for two items; 7 *Individuals in my profession are very positive about their contributions and accomplishments*, and 9. *Individuals in other professions think highly of my profession* although both ORs are *trivial*.

#### Internal consistency

Cronbach's alpha for the IEPS was 0.818 however the 4 factors demonstrated variable internal consistency. Factors 1 ( $\alpha = 0.761$ ) and 3 ( $\alpha = 0.736$ ) were acceptable, however Factors 2 ( $\alpha = 0.218$ ) and 4 ( $\alpha = 0.332$ ) were well below an acceptable level. Table 3 presents the *item-total correlation* and *if item deleted* statistics. IEPS items 8 and 11, if removed from the analysis, would improve the overall alpha score, and also demonstrated negligible correlation with the total IEPS score. This suggests that these items may not be measuring the underlying IEPS construct of interprofessional relationships.

**Table 3.** Internal consistency statistics.



IEPS Item	Item-Total Correlation	Cronbach's Alpha if Item Deleted
1. Individuals in my profession are well-trained	0.466	0.806
2. Individuals in my profession are able to work closely with individuals in other professions	0.482	0.804
3. Individuals in my profession demonstrate a great deal of autonomy	0.319	0.814
4. Individuals in other professions respect the work done by my profession	0.483	0.804
5. Individuals in my profession are very positive about their goals and objectives	0.500	0.805
6. Individuals in my profession need to cooperate with other professions	0.252	0.816
7. Individuals in my profession are very positive about their contributions and accomplishments	0.477	0.806
8. Individuals in my profession must depend upon the work of people in other professions	0.119	0.833
9. Individuals in other professions think highly of my profession	0.474	0.804
10. Individuals in my profession trust each other's professional judgment	0.473	0.806
11. Individuals in my profession have a higher status than individuals in other professions	0.102	0.830
12. Individuals in my profession make every effort to understand the capabilities and contributions of other professions	0.451	0.806
13. Individuals in my profession are extremely competent	0.495	0.804
14. Individuals in my profession are willing to share information and resources with other professions	0.496	0.804
15. Individuals in my profession have good relations with people in other professions	0.558	0.801
16. Individuals in my profession think highly of other related professions	0.516	0.802
17. Individuals in my profession work well with each other	0.483	0.805
18. Individuals in other professions often seek the advice of people in my profession	0.448	0.806

## **DISCUSSION**

Previous work by McFayden et al.<sup>30</sup> suggested that positive student perceptions of IPE may be 'idealistic'. Each student cohort participating in IPE will be different and bring their own perceptions, ideas and experiences<sup>3, 23</sup> which influence their perceptions of IPE. It is important that evaluation of IPE is continued to deepen our understanding of the IPE student experience. The data collected in the present study provides a single point-in-time evaluation of Australian osteopathy students' perceptions of interprofessional relationships. The response rate from VU was excellent and SCU response rate was consistent with other Australian evaluation studies into IPE.<sup>31, 32</sup>

Mean IEPS total and factor scores were all less than that reported for osteopathic medicine students in the study by Hawk et al.<sup>19</sup> It is likely that this difference is due to the differences in training between the US student cohort in the Hawk et al.<sup>19</sup> study and the non-medical training for students in the present study. This assertion is supported by the IEPS data from chiropractic<sup>19</sup> and occupational therapy students.<sup>22</sup> Osteopathy students in the present study demonstrated the lowest mean value for factor 2 *Perceived Need for Cooperation*, of any of the professions in the previously mentioned studies.<sup>19, 22</sup> The two items in this factor are instructive – the students recognise the need to cooperate with other professions, but see osteopaths as operating independently in the health system. This information could inform the design of IPE curricula for osteopathy students to encourage direct engagement in team-based care.

### **Demographics**

*age*

*Trivial to small* ORs were observed for age in the regression models for a number of items. For example, item 17 *Individuals in my profession work well with each other*, as age increased so did the OR for agreeing with this statement. A similar pattern emerged for item 9 *Individuals in other professions think highly of my profession*. This may reflect a greater understanding of the place of osteopathy in the healthcare system, where older students are able to draw on both their own experiences with healthcare and the information that they have gained during their osteopathy course. Conversely, the younger students may not have had exposure to a range of health professionals and are in the early stages of their training to become an osteopath.

#### *gender*

Gender was only significant in two (items 7 and 9) of the eighteen IEPS item regression models with *small* ORs (1.64 and 1.43 respectively) where females were more likely to agree with these items. This result is relatively consistent with other research using the IEPS where no difference for gender has been observed.<sup>22, 33-35</sup> Overall, females in the present study demonstrated higher mean scores across a number of IEPS items. This potentially reflects a more positive view of the osteopathic profession by female students, however they were also more likely to see the status of osteopathy as being lower when compared to male students. Curran et al.<sup>36</sup> found that mean scores on their IPE questionnaire were typically higher for females, although the reported effect sizes were small.

The literature presents some evidence of gender differences when using the Readiness for Interprofessional Learning Scale (RIPLS), with females generally reporting more positive

perceptions towards IPE.<sup>33</sup> It may be that the interpretation of the items on the RIPLS and IEPS are affected by gender and further investigation of the psychometric properties of the IEPS, particularly differential item function, is required to investigate the effect of gender.

#### *university*

For the majority of IEPS items, university was not a significant variable in the ordinal regression models - it is reasonable to conclude that Australian osteopathy students have similar perceptions of their own and other professions with regard to interprofessional practice and education. SCU students were more likely to agree with item 7 *Individuals in my profession are very positive about their contributions and accomplishments* (OR 2.81, *small*). Conversely VU students were more likely to agree with item 9 *Individuals in other professions think highly of my profession* (OR 2.33, *small*) and item 18 *Individuals in other professions often seek the advice of people in my profession* (OR 2.74, *small*). Where associations were identified for these three items, they are difficult to explain without exploring the student's responses in a qualitative approach, and the small OR's suggest there may only be a minimal association between the university a student attended, and their response to the three items.

#### *year level*

Year level was significant in the regression models for a number of items however the odds ratios were *trivial* to *small* for students in years 2, 4 and 5 (Supplementary File 2). The regression model for a number of items identified that year 3 students, in two cases, demonstrated moderate ORs where they were less likely to agree with the statement (items 3, 4, 9 and 18). Data were only

available from Year 3 students in the VU osteopathy program, therefore the results by year level are less generalisable than other demographics, however research into the education environment at VU in 2013 suggested that Year 3 students had a less positive perception of their education environment compared to other year levels.<sup>37</sup> The less positive perception of the educational environment may also be reflected in the less positive perception of interprofessional relationships. This assertion is only speculative as there are no comparable data available from other osteopathy teaching institutions. That said, the associations between year level and a number of IEPS items may also be reflected in other educational environment measures and warrants further investigation.

### IEPS factors

#### *1. Competence & Autonomy*

Participants in the present study consider that osteopaths are well trained (item 1). This item appears to be one of the items that consistently achieves the highest, or near highest, mean ratings of all of the IEPS items. Conversely, the lowest mean score was demonstrated for item 9 *Individuals in other professions think highly of my profession*. Notwithstanding associations with gender and university, this suggests that Australian osteopathy students are unsure about the status of their profession in the eyes of other health professions, given the mean value is between the 3 (somewhat disagree) and 4 (somewhat agree) points on the Likert-type scale – a position that is consistent with work in physiotherapy by Pinto et al.<sup>34</sup> This suggests osteopathy students need to more fully explore the standing of the osteopathic profession in the eyes of other professions. For that reason, creating opportunities for osteopathy students to work with, and learn from, other

students may enable osteopathy students to appreciate the contribution of their profession to the healthcare system. This is critical for patient-centred care, for example, a student sharing/collaborating patient care with a general practitioner - students need to know how such referrals are managed.

## 2. *Perceived Need for Cooperation*

Osteopathy students in the present study recognise the need to cooperate with other health professionals to provide care for their patients, as demonstrated by the high mean score for Item 6. This result is consistent with other studies that have employed the IEPS, and provides a starting point for the development of IPE programs at pre-registration level. As students in the present study have had little or no exposure to formal IPE in their program, their opinions are likely to be based on the content of the current pre-registration education program and/or experience as healthcare consumers. The mean score for item 8 *Individuals in my profession must depend upon the work of people in other professions* suggests that these students are unsure about the relationship of osteopaths to other health professionals when managing patients. Work by Orrock<sup>38, 39</sup> and Burke et al.<sup>40</sup> suggests that osteopaths do depend upon the work of other health professionals through the referral of patients for further investigations or management. That said, the internal consistency statistics for item 8 suggest that it may not be measuring the interprofessional relationship construct. This item may require rewording to better capture this construct. The implications for the curriculum here are that there is a need to review how collaborative relationships between osteopathy and other health professions could work: Collaborations with which disciplines? About which conditions/patients? How will such collaborations affect patient outcomes? Both factor 1 & 2 support the need for students to receive

structured guidance in their relationships with other practitioners and IPE can provide support for this process.

### *3. Perception of Actual Cooperation*

Students in the present study had, in general, a positive perception of other health professions and the ability of osteopaths to work with, and share information and resources with other health professionals. This positivity provides support for explicit curricular changes that strengthen teamwork and interprofessional understanding rather than relying on ad hoc / unstructured development of relationships.<sup>41</sup>

### *4. Understanding of Others' Values*

The lowest mean score for any of the IEPS items was item 11 *Individuals in my profession have a higher status than individuals in other professions*. That is, students in the present study did not consider osteopathy to have the same perceived status of other health professions. This appears to not be unusual as mean scores for this item tend to be low in other studies using the IEPS.<sup>23, 42</sup> Although Australian osteopathy students have a positive perception of their own profession, when asked to rate the status of the profession compared to other health professions, they appear to be less positive. Pinto et al.<sup>34</sup> reported that perceptions about status may be related to years as a health professional rather than the actual profession that one belongs to. There is some evidence for the time required for development of a professional attitude.<sup>43</sup>

Data from other work into IPE suggests that successful patient outcomes can be achieved when all members of the healthcare team cooperate,<sup>34</sup> and have respect for the status of each of the professions in that team.<sup>23</sup> The implications for the curriculum are that future IPE programs involving osteopathy students will need to reinforce that osteopathy can make a positive contribution to the healthcare team. This could be achieved by utilising osteopaths and other health professionals who have clinical experience and experience to model working in multidisciplinary team environments that also include osteopaths.

#### Internal consistency & psychometrics

The internal consistency results for all IEPS in the present study are similar to those of Salvatori et al.<sup>44</sup> and Keshtkaran et al.<sup>35</sup> Further comparisons are difficult as other authors who have utilised the IEPS have not reported this statistic,<sup>19, 22</sup> or reported modified versions of the IEPS.<sup>21, 23, 33, 41, 45, 46</sup> McFayden et al.,<sup>45</sup> Leitch,<sup>46</sup> and Williams and Webb<sup>21</sup> have all proposed alternative factor structures for the IEPS. However work by Vaughan et al.<sup>47</sup> demonstrated that data from their study did not adequately fit the respective models when subjected to confirmatory factor analysis. The internal consistency of factors 2 and 4 in the present study, along with data presented by other authors,<sup>21, 45, 46</sup> suggests the factor structure and psychometric properties of the IEPS require further investigation.

That said, the value of the IEPS appears to be its item level data, and not that obtained from the factor or total scores, and as such, authors using this measure should always be encouraged to report item level data. Data from the present study will be used to explore the construct validity of the IEPS using Rasch analysis. Future research could be directed towards the investigation of



changes in these items over a period of time where students are exposed to IPE or interprofessional care scenarios.

### Limitations

Bias occurs at different levels within this study. The response rates from each university were different, with approximately four times as many students from VU completing the questionnaire, compared to students from SCU. This is a product of the number of students enrolled in the program at SCU being less than at VU, however the overall response rate for SCU was also lower. Year 3 students at SCU did not complete the questionnaire, and only one Year 2 SCU student chose to complete the questionnaire - this likely accounted for some of the differences for the year level results. Therefore, the associations between year level and IEPS item should be interpreted with caution until further data is collected. A response bias may also exist given that students who completed the questionnaire may have already had ideas about IPE, even in the absence of a formal IPE program. It is also possible that students who completed the questionnaire during their practical skills class may have communicated their responses to other students thereby introducing a degree of contamination of the data. A national context bias may also be considered with Lie et al.<sup>33</sup> suggesting that IPE perception data may differ between countries and this study evaluated perceptions of osteopathy students at two Australian universities (VU & SCU). However, they do serve as comparative data for future studies at other osteopathy teaching institutions utilising IPEP programs.

## **CONCLUSION**

The current paper has presented data about Australian osteopathy students' perceptions of IPE through their responses to the IEPS at a single point-in-time. Osteopathy in Australia is playing an increasing role in the nation's healthcare and has a role to play in interprofessional patient care. The results of the present study are the first to provide an insight into Australian osteopathy students' attitudes towards interprofessional relationships, that is, the students' perception of osteopathy, and an understanding of how osteopaths work with other professions.

There is a need for osteopathic educators to explore educational strategies and redesign the osteopathic curriculum to develop interprofessional learning in their students. The results highlight some of the challenges of implementing an IPE program in pre-registration osteopathy courses such as the attitude toward independent practice, along with some of the perceived challenges for the osteopathic profession such as the perception of osteopathy through the eyes of other health professionals.

This study is part of the larger study on IPE hence the results will inform the development of IPE programs at the participating universities and promote the role of osteopathy in IP teams and collaborative healthcare. Accordingly, at this early stage of analysis we suggest curriculum designers consider the following:

- 1) Osteopathy students need to more fully explore the standing of the osteopathic profession in the eyes of other professions;

- 2) There is a need to understand how collaborative relationships between osteopathy and other health professions could work: Which disciplines? About which conditions/patients? How will such collaborations affect patient outcomes?
- 3) Explicit curricular changes that strengthen teamwork and interprofessional understanding need to be included rather than relying on ad hoc / unstructured development of relationships; and
- 4) Future IPE programs involving osteopathy students need to reinforce that osteopathy can make a positive contribution to the healthcare team.

Given that osteopathy students undertake most of their clinical education in on-campus, teaching clinics with limited scheduled interaction with other health students and professionals, it is critical that we implement curricula changes to embed IPE so that all future osteopaths are able to fully participate in the national and international interprofessional health care agenda.

**REFERENCES**

1. Brownie S, Thomas J, McAllister L, Groves M. Australian health reforms: enhancing interprofessional practice and competency within the health workforce. *J Interprof Care* Jan 29 2014. doi:10.3109/13561820.2014.881790
2. Parsell G, Bligh J. Interprofessional learning. *Postgraduate Medical Journal* 1998;**74**:89-95.
3. Hammick M, Freeth D, Koppel I, Reeves S, Barr H. A best evidence systematic review of interprofessional education: BEME Guide no. 9. *Medical Teacher* 2007;**29**:735-51.
4. Clark PG. Values in health care professional socialization: Implications for geriatric education in interdisciplinary teamwork. *The Gerontologist* 1997;**37**:441-51.
5. Barnsteiner JH, Disch JM, Hall L, Mayer D, Moore SM. Promoting interprofessional education. *Nursing outlook* 2007;**55**:144-50.
6. Buck MM, Tilson ER, Andersen J. Implementation and evaluation of an interdisciplinary health professions core curriculum. *J Allied Health* 1998;**28**:174-8.
7. Yarborough M, Jones T, Cyr TA, Phillips S, Stelzner D. Interprofessional education in ethics at an academic health sciences center. *Acad Med* 2000;**75**:793-800.
8. Reeves S, Freeth D. The London training ward: an innovative interprofessional learning initiative. *J Interprof Care* 2002;**16**:41-52.
9. Hall P. Interprofessional teamwork: Professional cultures as barriers. *J Interprof Care* 2005;**19**:188-96.
10. Centre For The Advancement Of Interprofessional Education. Defining IPE. 2002; <http://caipe.org.uk/resources/defining-ipe/>. Accessed November 16, 2014.

11. Lapkin S, Levett-Jones T, Gilligan C. A systematic review of the effectiveness of interprofessional education in health professional programs. *Nurse Educ Today* 2013;**33**:90-102.
12. Gilbert JH, Yan J, Hoffman SJ. A WHO report: Framework for action on interprofessional education and collaborative practice. *J Allied Health* 2010;**39**:196-7.
13. World Health Organization. Framework for action on interprofessional education and collaborative practice. Geneva: World Health Organization. 2010.
14. Kent F, Keating J. Patient outcomes from a student-led interprofessional clinic in primary care. *J Interprof Care* 2013;**27**:336-8.
15. Reeves S, Zwarenstein M, Goldman J, Barr H, Freeth D, Hammick M, et al. Interprofessional education: effects on professional practice and health care outcomes. *Cochrane Database of systematic reviews* 2008;**1**.
16. Calabrese LH, Bianco JA, Mann D, Massello D, Hojat M. Correlates and Changes in Empathy and Attitudes Toward Interprofessional Collaboration in Osteopathic Medical Students. *JAOA: Journal of the American Osteopathic Association* 2013;**113**:898-907.
17. Mészáros K, Lopes IC, Goldsmith PC, Knapp KK. Interprofessional education: cooperation among osteopathic medicine, pharmacy, and physician assistant students to recognize medical errors. *JAOA: Journal of the American Osteopathic Association* 2011;**111**:213-8.
18. Mackintosh SE, Adams CE, Singer-Chang G, Hruby RJ. Osteopathic Approach to Implementing and Promoting Interprofessional Education. *JAOA: Journal of the American Osteopathic Association* 2011;**111**:206-12.
19. Hawk C, Buckwalter K, Byrd L, Cigelman S, Dorfman L, Ferguson K. Health professions students' perceptions of interprofessional relationships. *Acad Med* 2002;**77**:354-7.
20. Victoria University. Interprofessional Education Program (IPEP). 2014; <http://www.vu.edu.au/interprofessional-education-program-ipep>. Accessed November 15, 2014.

21. Williams B, Webb V. Examining the measurement properties of the Interdisciplinary Education Perception Scale (IEPS) in paramedic education. *Nurse Educ Today* 2012;**33**:981-5.
22. Rose MA, Smith K, Veloski JJ, Lyons KJ, Umland E, Arenson CA. Attitudes of students in medicine, nursing, occupational therapy, and physical therapy toward interprofessional education. *J Allied Health* 2009;**38**:196-200.
23. Giordano C, Umland E, Lyons KJ. Attitudes of faculty and students in medicine and the health professions toward interprofessional education. *J Allied Health* 2012;**41**:21-5.
24. Goelen G, De Clercq G, Huyghens L, Kerckhofs E. Measuring the effect of interprofessional problem-based learning on the attitudes of undergraduate health care students. *Med Educ* 2006;**40**:555-61.
25. Baker C, Pulling C, McGraw R, Dagnone JD, Hopkins-Rosseel D, Medves J. Simulation in interprofessional education for patient-centred collaborative care. *J Adv Nurs* 2008;**64**:372-9.
26. Luecht R, Madsen M, Taugher M, Petterson B. Assessing professional perceptions: design and validation of an Interdisciplinary Education Perception Scale. *J Allied Health* 1990;**19**:181.
27. Harrell FJ. rms: Regression Modeling Strategies. 2015; 4.4-0:<https://cran.r-project.org/web/packages/rms/index.html>. Accessed 15 December, 2015.
28. R Core Team. R: A language and environment for statistical computing. 2014; [www.R-project.org/](http://www.R-project.org/). Accessed December 1, 2014.
29. Hopkins W. A scale of magnitudes for effect sizes. 2015; <http://www.sportsci.org/resource/stats/effectmag.html>. Accessed 20 December, 2015.
30. McFadyen A, Webster V, Maclaren WM, O'Neill M. Interprofessional attitudes and perceptions: Results from a longitudinal controlled trial of pre-registration health and social care students in Scotland. *J Interprof Care* 2010;**24**:549-64.

31. Williams B, Brown T, McCook F, Boyle M, Palermo C, Molloy A, et al. A pilot study evaluating an interprofessional education workshop for undergraduate health care students. *J Interprof Care* 2011;**25**:215-7.
32. Wakely L, Brown L, Burrows J. Evaluating interprofessional learning modules: health students' attitudes to interprofessional practice. *J Interprof Care* 2013;**27**:424-5.
33. Lie DA, Fung CC, Trial J, Loheny K. A comparison of two scales for assessing health professional students' attitude toward interprofessional learning. *Medical education online* 2013;**18**.
34. Pinto A, Lee S, Lombardo S, Salama M, Ellis S, Kay T, et al. The impact of structured inter-professional education on health care professional students' perceptions of collaboration in a clinical setting. *Physiotherapy Canada* 2012;**64**:145-56.
35. Keshtkaran Z, Sharif F, Rambod M. Students' readiness for and perception of inter-professional learning: A cross-sectional study. *Nurse Educ Today* 2014;**34**:991-8.
36. Curran VR, Sharpe D, Forristall J, Flynn K. Attitudes of health sciences students towards interprofessional teamwork and education. *Learning in Health and Social Care* 2008;**7**:146-56.
37. Vaughan B, Carter A, Macfarlane C, Morrison T. The DREEM, part 1: measurement of the educational environment in an osteopathy teaching program. *BMC medical education* 2014;**14**:99.
38. Orrock P. Profile of members of the Australian Osteopathic Association: Part 1 The practitioners. *Int J Osteopath Med* 2009;**12**:14-24.
39. Orrock PJ. Profile of members of the Australian Osteopathic Association: Part 2–The patients. *Int J Osteopath Med* 2009;**12**:128-39.
40. Burke SR, Myers R, Zhang AL. A profile of osteopathic practice in Australia 2010–2011: a cross sectional survey. *BMC Musculoskelet Disord* 2013;**14**:1-10.
41. Shrader S, Kern D, Zoller J, Blue A. Interprofessional teamwork skills as predictors of clinical outcomes in a simulated healthcare setting. *J Allied Health* 2013;**42**:1E-6E.

42. Neville CC, Petro R, Mitchell GK, Brady S. Team decision making: design, implementation and evaluation of an interprofessional education activity for undergraduate health science students. *J Interprof Care* 2013;**27**:523-5.
43. Cruess RL, Cruess SR, Boudreau JD, Snell L, Steinert Y. Reframing Medical Education to Support Professional Identity Formation. *Acad Med* 2014;**89**:1446-51.
44. Salvatori PS, Berry SC, Eva KW. Implementation and evaluation of an interprofessional education initiative for students in the health professions. *Learning in Health and Social Care* 2007;**6**:72-82.
45. McFadyen A, Maclaren W, Webster V. The Interdisciplinary Education Perception Scale (IEPS): An alternative remodelled sub-scale structure and its reliability. *J Interprof Care* 2007;**21**:433-43.
46. Leitch J. Exploring psychometric properties of the interdisciplinary education perception scale in health graduate students. *J Interprof Care* 2013;**28**:52-7.
47. Vaughan B, Macfarlane C, Dentry T, Mendoza G. The Interdisciplinary Education Perception Scale (IEPS): which factor structure? *Education in Medicine Journal* 2014;**6**.



**AUTHOR CONTRIBUTION STATEMENT**

BV conceived the study. All authors were involved in the literature review. BV conducted the data analysis. All authors contributed to the development of the manuscript and approved the final version.

**ETHICAL STATEMENT**

This study was approved by the Victoria University Human Research Ethics Committee and Southern Cross University Human Research Ethics Committee.

ACCEPTED MANUSCRIPT

**STATEMENT OF COMPETING INTERESTS**

Brett Vaughan is a member of the Editorial Board of the International Journal of Osteopathic Medicine but was not involved in review or editorial decisions regarding this manuscript.

ACCEPTED MANUSCRIPT

**IMPLICATIONS FOR PRACTICE**

- Interprofessional education is not commonplace in Australian osteopathy programs
- The results provide information to inform changes to Australian osteopathy programs to ensure adequate exposure to interprofessional education and care prior to graduation
- Educators should be aware of the attitudes of students to interprofessional care and reinforce the place osteopathy can play in team care