RESEARCH ARTICLE

An interactive teaching module for increasing undergraduate physiotherapy students' cultural competence: A quantitative survey

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Abstract

Objectives: To provide safe and effective healthcare, physiotherapists must be aware of, and able to appropriately respond to, the individual needs of their clients. Cultural competence is an essential part of the curriculum to prepare physiotherapy students for their graduate practice. The primary aim of this study was to investigate the effectiveness of a 4-week educational intervention to increase the perceived cultural competence of undergraduate physiotherapy students and whether effectiveness changed as students progressed in their education. Secondary aims were to understand if a clinical placement prior to the course intervention, or the student's cultural background, influenced the effectiveness of the intervention.

Methods: A prospective cohort study was conducted with 73 students in their second year of an Australian Bachelor of Physiotherapy programme who participated in a 4-week tutorial module to develop their cultural competence. Perception of cultural competence was measured at three time points (pre, post, post 18 months) using the Cultural Intelligence Scale questionnaire which assesses meta-cognitive, cognitive, motivational and behavioural domains. Participant and their parents' country of birth data were collected.

Results: Cultural intelligence scores for the cohort significantly increased from pre- to post-intervention (mean change 0.4, $p < 0.001$). A 3-week clinical placement prior to the teaching intervention had no effect on the change in scores. Students who were not born in Australia, or who had a parent not born in Australia, demonstrated less change in overall cultural intelligence score than Australian-born participants.

Conclusion: Undergraduate physiotherapy students at an Australian university can increase their perceived level of cultural competence by participating in a 4-week classroom-based tutorial module, and this effect can be sustained over an 18-month period. Exposure to cultural diversity is not sufficient by itself for a change in perceived cultural competence. However, classroom-based teaching needs to be responsive to the cultural characteristics of the students.

KEYWORDS
cultural competency, curriculum, main text, students

1 | INTRODUCTION

The need for physiotherapists to practice cultural competence in their interactions with clients is recognised globally to address disparities in health and healthcare. The World Confederation for Physical Therapy's international guidelines for entry-level education (2011) identify cultural competence as an essential part of curriculum preparing students for professional physiotherapy practice. Similar recognition is found in the Health and Care Professions Council's Standards of proficiency in the United Kingdom (2013), the American Physical Therapy Association's minimum required skills for graduates at entry-level (2009) and the Physiotherapy Board of Australia and Physiotherapy Board of New Zealand's Practice Thresholds (2015). Yet, the profession globally is still developing a foundation of rigorous published evidence to inform the effective design of cultural competence education for undergraduate physiotherapy students (Van Kessel et al., unpublished data).

Cultural competence in healthcare at an individual level is the ability to work and communicate effectively and appropriately with people from culturally different backgrounds. While the term 'competence' can suggest achievement of a sufficient qualification, it is now accepted that cultural competence is an ongoing process rather than an endpoint event (Alizadeh & Chavan, 2016). More than 15 models of cultural competence are presented within the healthcare literature, with most identifying cultural awareness, cultural knowledge and cultural skills or behaviour to be important elements of culturally competent practice (Alizadeh & Chavan, 2016).

Culturally competent curriculum should then ensure that students have the knowledge, attitudes and skills required to work effectively with users and providers in the healthcare system (Calvillo et al., 2009). Different theoretical frameworks have been used to underpin curriculum design for developing cultural competence (Van Kessel et al., unpublished data). Purnell and Paulanka (2003) describe a four-step pathway moving through the identification of personal cultural biases; understanding general cultural differences; accepting and respecting cultural differences; and application of cultural understandings. A model developed by Campinha-Bacote (2002) is based on five domains that include cultural awareness and sensitivity, cultural knowledge, cultural skills, participating in cultural encounters and cultural desire. Other programs focus on a component such as providing explicit content about other cultures to help students understand general cultural differences (Ekelman, Dal Bello-Haas, Bazyk, & Bazyk, 2003; Musolino et al., 2009, 2010; Panzarella, 2009).

A variety of teaching strategies are used in cultural competence education including experiential activities, self-reflection, online and classroom teaching activities. Experiential activities support the student to visit different settings; conducting personal interviews with people from diverse cultural backgrounds; and attending a program, function, or organizational meeting of a group unfamiliar to the student (Muzumdar, Holiday-Goodman, Black, & Powers, 2010). Self-reflection activities require the student to write and discuss their own attitudes, beliefs and behaviours (Ekelman et al., 2003;

Musolino et al., 2009, 2010; Panzarella, 2009; Romanello, 2007; Romanello & Holtgrefe, 2009; Werremeyer & Skoy, 2012). Other teaching strategies include online discussion forums, providing reading materials, video segments, documentaries, classroom lectures, case discussions, group work, role plays and simulated patient exercises (Haack & Phillips, 2012; Hawala-Druy & Hill, 2012; Okoro, Odedina, & Smith, 2015; Poirier et al., 2009; Sales, Jonkman, Connor, & Hall, 2013). Students themselves believe that an emphasis on understanding cultural values and beliefs and culturally competent practices would improve their ability to translate these skills to interactions in clinical practice (Romanello, 2007).

In physiotherapy education, the introduction of cultural competence curriculum since the beginning of the century has been in response to wider healthcare and governmental recognition of action needed to address inequalities in healthcare and health outcomes (Stewart, 2002). Yet, a recent survey of 24 Australian entry-level physiotherapy programmes found extensive variability in the structure, teaching and assessment methods used, and the types of resources used to inform teaching of cultural competence (Te, Blackstock, & Chipchase, 2019). The most frequently reported educational methods were case studies or scenarios, lectures/seminars, small group discussions, online/web-based and readings. There is some published evidence for increasing physiotherapy student perceived cultural competence with a combination of classroom and community activities. The educational intervention in Hayward and Li's study (2014) was classroom discussions plus readings, followed by a nine-day trip to Ecuador. Denton et al. (2016) investigated the effect of a much more modest educational intervention that consisted of students attending 12 h of classroom activities plus 4 h of a local wellness education activity with refugees. Both studies demonstrated an immediate increase in the perceived cultural competence of students but neither investigated if the effect was sustained during the programme or had effect on physiotherapy practice.

The aim of this research was to investigate the effectiveness of a 4-week cultural competence teaching module and a 3-week clinical placement for increasing the perceived cultural competence of undergraduate physiotherapy students. The research questions were as follows:

1. Does a 4-week cultural competence tutorial module increase the perceived cultural competence of undergraduate physiotherapy students?
2. Does the perceived cultural competence of undergraduate physiotherapy students change as they progress in their physiotherapy education?
3. Does a 3-week clinical placement in a community physiotherapy clinic prior to the tutorial module influence the change in perceived cultural competence of undergraduate physiotherapy students?
4. Does the cultural background of the undergraduate physiotherapy student influence the change in their perceived cultural competence after the tutorial module?

2 | METHOD

2.1 | Study design

This prospective cohort study was conducted in an urban public university in South Australia. The university has an annual enrolment of approximately 32,000 students, including over 5000 international students. The university offers bachelor (entry), master (graduate entry) and master (postgraduate coursework) level programmes in physiotherapy. The study had ethics approval from the University of Australia Human Research Ethics committee (Protocol no. 200218).

2.2 | Participants

A population-based sampling method was used to invite the cohort of second-year students enrolled in the course 'Behaviour and Society' (now known as 'Biopsychosocial Practice') in the Bachelor of Physiotherapy at the university ($n = 104$) to voluntarily participate. All students enrolled in the course for semester two of 2014 were eligible to participate.

2.3 | Intervention

The intervention took place in September and October 2014 at a university with an educational philosophy that promotes work-integrated learning. The Bachelor of Physiotherapy programme is a 4-year full-time programme where clinical practice opportunities are introduced in the second semester of the second year. The third year is almost exclusively made up of clinical placements, and the fourth year encompasses a combination of clinical and professional learning activities.

The intervention consisted of four 1-h sessions in a 4-week module designed by Dr Caroline Fryer based on Purnell's model for cultural competence (Purnell, 2000) which proposes that a culturally competent health professional develops an awareness of his or her existence, sensations, thoughts and environment without letting these factors have an undue effect on the client. Based on this model, the intervention aimed to teach cultural competence as a conscious adaptation of a physiotherapist's care in a manner that is congruent with the culture of the client. The intervention was delivered in four weekly tutorial sessions covering four topics consecutively: cultural immersion, cultural awareness, cultural difference and cross-cultural communication. The module was embedded within the required second-year course 'Behaviour and Society' which translates psychology of health and sociology of health concepts into physiotherapy practice.

The intervention pedagogy is based on an understanding of transformative learning (Taylor & Laros, 2014). Transformative learning is a process of changing perspectives by identifying a problematic idea or belief, critically examining the assumptions upon which it is based, and exploring alternative new roles and relationships about the idea through dialogue and decision-making (Mezirow, 1990). The core elements of a transformative learning approach are an emphasis on individual experience, the promotion of critical reflection, engaging learners in dialogue, helping learners to be aware of how context influences their learning and facilitating a learning relationship between students and teacher that allows questioning discussions and open sharing of information to achieve understanding (Taylor & Laros, 2014). These elements are present in the intervention module to develop a change in student cultural competence through use of facilitated self-reflection, small group and large group discussions, critiques and role-playing in the four sessions.

The module begins with a 2-h cultural immersion experience for students within the classroom using the Bafa 'Bafa' simulation activity (Simulation Training Systems, 2001). In this session, two simulated cultures are created, and each student is assigned to be a member of one culture. Members are taught the values, expectations and customs of their new culture, without knowing anything about the other group. Once students become familiar with their 'new' culture, they visit to interact with the other culture group. Students' share their observations of the other culture with other members during the session. A debrief discussion led by teachers facilitates students to critically reflect on their comfort in cross-cultural situations.

In the second 1-h session, students are asked to brainstorm what influences a person's values and beliefs about their health and healthcare. The generated list is then compared to Purnell's concept of cultural characteristics (Purnell, 2000) and any differences discussed. Students reflect on their own cultural characteristics and engage in dialogue comparing their culture with the culture of other students, clients, workplaces and the physiotherapy profession.

In the third 1-h session, a case study of a physiotherapist interaction with a client and her son is used for, students to identify potential cultural difference and how misunderstandings can happen in physiotherapy practice. Students are asked to reflect on and share in small groups their own experiences of cross-cultural communication. The explanation, treatment, healers, negotiate, intervention, collaborate, spirituality (ETHNIC[S]) model of questions (Kobylarz, Heath, & Like, 2002) is introduced as a tool to elicit and negotiate cultural issues with a client. Students critique the tool and their own skill in using the tool through role play with other students.

The final 1-h session is focused on cross-cultural communication when the physiotherapist and client do not share the same preferred language. Students use their existing knowledge to suggest good practice when working with an interpreter and critique a video of an assessment conducted by a health professional and interpreter. Students then use online guides to determine best practice when working with interpreters and using teach-back technique (https://www.ceh.org.au/resource-hub/category/communications/) to script and perform role plays to teach these skills to their peers in class.

Students also undertake their first clinical placement as a required component of the second semester of the Bachelor

Programme's second year, as part of the course 'Physiotherapy Clinical Studies 201'. The experience is 3 weeks full-time in a community physiotherapy placement which may be on site at a hospital, an aged care facility, or a physiotherapy clinic. The students observe physiotherapy practice and talk with clients while supervised by a registered physiotherapist. Second-year students attend the placement either before or after the cultural competence 4-week module (see Figure 1). Students can nominate when they attend the placement.

2.4 | Outcome measures

Perceived cultural competence was measured using the 20-item Cultural Intelligence Scale (CQS) (Ang et al., 2007) which examines an individual's capability to function and manage effectively in situations characterised by cultural diversity. The CQS assesses four domains of cultural competence: metacognitive, cognitive, motivational and behavioural. Metacognitive (6-items) refers to the processes of acquiring and understanding cultural knowledge; Cognitive (6-items) refers to knowledge about culture; Motivational (5-items) describes the commitment to learning and functioning in cross-cultural situations; and Behavioural (5-items) refers to the ability to undertake appropriate actions when interacting with people of different cultures. Each item is scored on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). Scores for each subscale were obtained by calculating the mean of the relevant items, and an overall mean score was calculated. Importantly, the CQS does not reduce the concept of cultural competence to racial or ethnic difference (Kumas-Tan, Beagan, Loppie, MacLeod, & Frank, 2007) and is consistent with the Purnell model (Purnell, 2000) of cultural competence encompassing not only ethnicity and race, but also other characteristics of culture such as gender, age, income, education, sexual orientation, ability and faith. The multidimensional construct of the CQS to measure both cognitive and behavioural capabilities (Ang et al., 2007) is consistent with the Purnell model requiring health professionals to both be aware and to consciously adapt practice to be culturally competent (Purnell, 2000). Permission to use the CQS was granted by the Cultural Intelligence Center (email communication, 8 August 2014).

The CQS has demonstrated excellent construct validity (Ang et al., 2007) and convergent validity with the Cross-Cultural Adaptability Inventory and the Openmindedness Scale from the Multicultural Personality Inventory, as well as concurrent and predictive ecological validity demonstrated with samples from multiple cultures, although none with health employees or students (Matsumoto & Hwang, 2013). The CQS can predict cross-cultural judgement and decision making as well as task performance on a problem-solving simulation (Ang et al., 2007). The CQS has been used in pre–post testing of the efficacy of intercultural education (Ang et al., 2007).

Participants' country of birth and the country of birth of each of their parents was collected, this data being subsequently collapsed into either Australia-born or overseas-born. Details of whether each participating student undertook their 3-week clinical placement immediately prior to the cultural competence tutorial module was also collected.

Outcome measures were collected at three time points: pre-intervention, post-intervention, and follow-up. A subsample of participating students ($n = 11$) completed an additional administration of the CQS and the six self-assessment items approximately 1 week after the first survey and prior to the start of the cultural competence module to investigate test–retest reliability. Pre-intervention measures were collected immediately prior to the cultural competence module being taught. Post-intervention measures were collected immediately after the 4-week cultural competence module was completed. Follow-up measures were collected at the beginning of students' fourth year in the physiotherapy undergraduate programme, 18 months after the post-intervention measure. At this time point, all students had completed four clinical placements in hospital and community physiotherapy settings during the third year of the Bachelor of Physiotherapy programme.

2.5 | Data analysis

Dependent variables of CQS and CQS domain scores were assessed for normality and outliers. A generalised linear model was used to assess any changes to the CQS scores over time (pre-intervention, post-intervention and 18-month follow-up). Predictor variables, including the timing of the clinical placement (immediately before or after the intervention, or unknown), parent place of birth and student place of birth, were entered into the models to determine their effect on any changes to the CQS or the CQS domains.

Intraclass correlation coefficients (ICC) were used to determine test–retest reliability of the CQS using responses from the subsample ($n = 11$) of students who completed an additional survey within 1 week of its initial administration. ICC values closer to one indicate more favourable reliability. Minimal detectable change (MDC95), based on a 95% confidence level, was calculated as $1.96 \times SEM \times \sqrt{2}$, where SEM is the standard error of measurement. The value of SEM was calculated as $SD \times \sqrt{(1 - ICC)}$ with the standard deviation (SD) of scores derived from participants completing the pre-intervention survey and the ICC is the test–retest reliability score described above. The MDC_{95} estimates the minimal amount of change able to be interpreted as an increase in the CQS and associated domains for a student and therefore, the smaller the MDC the more sensitive the measure is. All analyses were undertaken using SPSS (version 24) (IBM, 2016).

3 | RESULTS

3.1 | Sample

A total of 73 students of a course cohort of 104 students volunteered to participate in the research yielding a 70% response rate. The
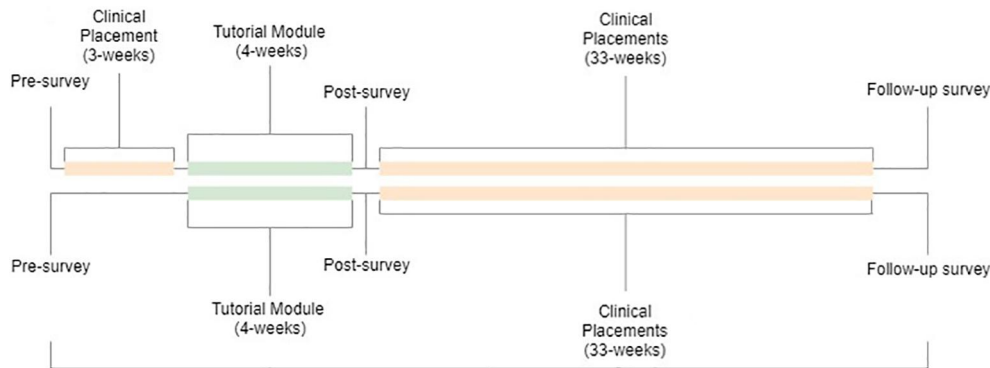
FIGURE 1 Order of clinical placement, intervention teaching module and survey outcome measures.

average age of participants was 21.9 years (range 18–45) and 53 participants were female. Most participants were born in Australia ($n = 51$), three were born in Malaysia and seven were born in other countries (Egypt, England, Hong Kong, India, Japan, Korea and Saudi Arabia). Most parents of participants were born in Australia ($n = 81$), with 41 parents born in 15 other countries. Twenty-eight students completed a 3-week clinical placement prior to the intervention tutorial module.

Of the total of 73 participants, 58 participants returned completed pre-intervention surveys, 53 returned completed post-intervention surveys and 56 participants returned completed surveys at the 18-month follow-up. Of the total of 73 participants, 42 participants completed both the pre- and post-intervention survey, and 26 participants completed all three (pre-, post- and follow-up) surveys. Participants were excluded from the study if they withdrew from the intervention course during its delivery. No participants actively withdrew from the study.

3.2 | Change in perceived cultural competence

The mean CQS score for the cohort significantly increased between pre- and post-intervention measures (mean change 0.4, $p < 0.001$), with a medium effect size (0.56). Mean CQS domain scores also increased significantly in three of the individual CQS domains, with the largest mean change in cognitive (0.8, $p = 0.001$), followed by metacognitive (0.6, $p = < 0.001$) and behavioural (0.3, $p = 0.021$) domains. Full details can be found in Tables 1 and 2. When the analysis was repeated including only the 45 participants who completed both the pre- and post-intervention survey, significant changes in means CQS score and mean CQS domain scores remained.

The changes to overall mean CQS, and each of the CQS domain scores all remained significantly higher than pre-intervention at the 18-month follow-up time point. The medium effect size of the tutorial module at post-intervention (0.56) was sustained at follow-up (0.51) (Table 1).

There was not a significant difference in outcome scores for students who attended a 3-week clinical placement prior to the intervention tutorial module compared to other students. There was no significant difference in overall mean CQS scores between the two student groups, from pre- to post-intervention ($F = 0.857$, $p = 0.358$) or from pre-intervention to follow-up ($F = 2.34$, $p = 0.131$). However, there was a significant difference in the metacognitive domain of the CQS with students who did not attend a clinical placement prior to the intervention module having greater increases to their metacognitive CQS score from pre- to post-intervention, increasing by a mean of 0.384 more than students who attended the prior clinical placement ($F = 4.50$, $p = 0.037$), and 0.434 more at follow-up ($F = 5.985$, $p = 0.017$).

The place of birth of students' parents did have a significant effect on changes to students' overall CQS score and the domains of metacognitive and cognitive scores from pre- to post-intervention ($F = 6.09$, $p = 0.018$, $F = 9.51$, $p = 0.003$ and $F = 5.38$, $p = 0.024$, respectively), and on metacognitive scores at follow-up ($F = 4.58$, $p = 0.013$). Students with parents born in Australia had an average increase in overall mean CQS score of 0.661 ($p = 0.000$) for pre- to post-intervention, with a mean increase of 0.837 in the metacognitive domain ($p = 0.000$), and 1.194 in the cognitive domain ($p = 0.000$). Whereas for students with a parent born overseas, mean changes in CQS score were still positive but were not significant (CQS score 0.154, $p = 0.332$; metacognitive domain 0.052, $p = 0.828$ and cognitive domain 0.329, $p = 0.205$).

3.3 | Test–retest reliability and minimal detectable change

All scales and domains demonstrated good to excellent test–retest reliability. Full details of test–retest reliability and MDC scores are presented in Table 2. As reported in Table 3, 36.8% ($n = 14$) of students met or exceeded the MDC score (indicates reliable and meaningful change) for overall CQS from pre- to post-intervention, between 20% and 30% ($n = 9$ to 13) for each of the CQS domains individually. Results were similar when assessed from baseline to follow-up.

TABLE 1 Changes to pre-, post- and follow-up cultural competence scores with effect sizes

	Pre- to post-intervention						Pre-intervention to follow-up				
Outcome	Pre, m (SD)	Post, m (SD)	n	F	Sig.	Effect size	Follow-up, m (SD)	n	F	Sig.	Effect size
CQS	4.42 (0.75)	4.84 (0.75)	69	18.86	**0.000**	0.56	4.81 (0.79)	82	12.73	**0.000**	0.51
Metacognitive	4.67 (0.88)	5.20 (0.80)	70	20.77	**0.000**	0.68	5.10 (0.93)	83	12.88	**0.000**	0.48
Cognitive	3.09 (1.04)	4.0 (1.17)	70	23.05	**0.000**	0.83	3.55 (1.10)	83	12.71	**0.000**	0.43
Motivational	5.37 (0.88)	5.41 (0.91)	69	0.17	0.679	0.05	5.65 (0.87)	82	4.06	**0.020**	0.32
Behavioural	4.73 (1.05)	5.03 (0.79)	69	5.63	**0.021**	0.32	5.27 (1.09)	82	6.76	**0.002**	0.51

Note: Effect sizes are Cohen's *d*. Bold indicates statistical significance.

Abbreviations: CQS, Cultural Intelligence Scale; m, mean; SD, standard deviation, Sig, statistical significance.

TABLE 2 Test–retest reliability and minimal detectable change (*n* = 11)

Outcome	SD	ICC (95% CI)	SEM	MDC_{95}	Mean change[a] pre- to post	Mean change[b] pre- to follow-up
CQS	0.770	0.91 (0.67–0.98)	0.288	0.798	0.476	0.464
Metacognitive	0.973	0.70 (0.00–0.92)	0.534	1.480	0.628	0.408
Cognitive	1.031	0.83 (0.56–0.97)	0.421	1.167	0.753	0.520
Motivational	0.885	0.97 (0.87–0.99)	0.166	0.460	0.046	0.322
Behavioural	1.005	0.82 (0.38–0.95)	0.424	1.175	0.267	0.555

Abbreviations: CI, confidence intervals; CQS, Cultural Intelligence Scale; ICC, intra-rater reliability, test–retest reliability; MDC_{95}, minimal detectable change at the 95% confidence level; SD, standard deviation of scores from pre-intervention survey; SEM, standard error of measurement.

[a]For *n* = 38 students providing data at both time points for overall CQS and metacognitive domain, *n* = 45 for behavioural domain, *n* = 46 for cognitive and motivational domains.

[b]For *n* = 37 students providing data at both time points for overall CQS and metacognitive domain, *n* = 40 for behavioural domains, *n* = 41 for cognitive and behavioural domains.

TABLE 3 Students in current sample meeting minimal detectable change scores, n (%)

	Pre- to post-intervention, meets MDC		Pre- to follow-up	
Outcome	Yes	No	Yes	No
CQS	14 (36.8)	24 (63.2)	10 (27.0)	27 (73.0)
Metacognitive	10 (25.6)	29 (74.4)	4 (10.5)	34 (89.5)
Cognitive	13 (29.5)	31 (70.7)	7 (17.9)	32 (82.1)
Motivational	13 (28.3)	33 (71.7)	20 (48.8)	21 (51.2)
Behavioural	9 (20.0)	36 (80.0)	13 (32.5)	27 (67.5)

Abbreviation: CQS, Cultural Intelligence Scale.

4 | DISCUSSION

The effectiveness of the educational intervention for increasing the perceived cultural competence of undergraduate physiotherapy students was supported by an increased mean CQS score with a medium effect size, and in all CQS domains except motivation, which was already high at baseline. Importantly these high scores were retained over an 18-month period. The CQS demonstrated excellent test–retest reliability. Together with the analysis of MDC scores, this indicates that a proportion of students saw valid increases in their cultural competence scores beyond that due to chance.

Cultural competence requires the physiotherapist to not only have the knowledge to be aware of cultural difference but to then use their knowledge to adapt their practice (Purnell, 2000). This competency is reflected in the four dimensions of the CQS as qualitatively different facets of a person's overall capability to function and manage effectively in culturally diverse settings (Ang et al., 2007). Significant increases in the metacognitive, cognitive and behavioural domains contributed to the significant change observed in overall mean CQS scores. The cognitive CQS domain purposely reflects knowledge of the norms, practices and conventions in different cultures acquired from education and personal experiences. Therefore, it is not surprising that the mean score of this domain increased the most after an intervention that taught students to be aware of different cultural characteristics and to identify the difference between their own culture and the culture of other individuals, organisations and professions. Development of students' self-awareness of cultural competency is also reflected in the significant increase in metacognitive domain scores. Metacognition refers to awareness of cognitions related to culture, and how these cognitions inform cultural interactions (Ang et al., 2007). The transformative learning approach of the tutorial module purposefully engaged students in the practice of critically reflecting on, and discussing, their understanding of their own culture and their personal beliefs about

cultural differences. While the behavioural domain also showed significant increase in mean score, the change was not as strong as the increase for cognitive and metacognitive domains. The behavioural domain score reflects the student's self-assessment of their capability to exhibit appropriate verbal and non-verbal actions when interacting with people from different cultures. The 4-week teaching intervention in this study did include teaching of communication behaviours for cross-cultural situations (ETHNIC[S] model, working with interpreters), but these were only practiced by students in the classroom with peers. It is likely that to increase students' confidence and competence in these culturally competent behaviours they need to be practiced with people who are more culturally different to the student. It is not known how the self-reported behavioural domain CQS assessment relates to observed behaviour change in clinical practice, and this has been identified as the next step to investigate with undergraduate physiotherapy students.

The study also investigated the effect of a 3-week clinical placement in a community setting prior to the tutorial module and found that completion of the placement did not significantly affect the change in perceived cultural competence of undergraduate students after the intervention. The 3-week clinical placement was an observational experience to familiarise second-year students with physiotherapy clinical practice prior to intensive clinical placements during their third year of the programme. The observational nature of the placement with no dedicated learning objective regarding cultural competence meant that the core elements of critical reflection and dialogue required for a transformation in perspective on cultural competence were missing (Taylor & Laros, 2014) These results suggest that for a clinical placement in a community setting to be effective for developing the perceived cultural competence of undergraduate physiotherapy students, it needs to be supported with dedicated cultural competence teaching pedagogy and resources. These results add further support to work done by Hayward and Li (2014) and Denton et al. (2016) who used the Inventory For Assessing the Process of Cultural Competence among healthcare professionals-Student Version (IAPCC-SV) (J Campinha-Bacote, 2007) to demonstrate that a combination of classroom teaching followed by real-world learning experiences can increase the cultural competence scores of physiotherapy students. However, the combination of classwork and fieldwork experiences that best supports students' development of cultural competence requires further investigation.

The final study aim was to investigate if the cultural background of undergraduate physiotherapy students influenced the change in their perceived cultural competence from the educational intervention. The results showed that the cultural background of the participating students did have a significant effect on their mean change score. Students with Australian-born parents saw greater increases in their overall CQS and metacognitive and cognitive domains when compared to students with overseas-born parents. Furthermore, these results were similar when assessed at the 18-month follow-up with a significant change in the metacognitive domain ($F = 4.58$, $p = 0.013$).

This cohort of undergraduate physiotherapy students started with a lower average CQS score but ended with a higher average CQS score after the 4-week module intervention when compared to a large cohort of graduate business students exposed to a 7-stage teaching intervention (Crowne, 2013). It is interesting to note that subjects in this study rate themselves to be much more motivated and skillful, both cognitively and behaviourally, in cross-cultural situations when compared to the cohort of graduate business students (Crowne, 2013).

The findings of this study are not without limitations. This study used a single cohort from a single university with no control group and the results may not generalise beyond this cohort. The sample size meant the birthplace of students was reduced to a binary variable and so the heterogeneity of overseas birthplaces has not undergone further analysis. Both outcome measures rely on the students' self-assessment and are likely to be biased by a level of social desirability for cultural competence. It should also be noted that p-values have been reported in their entirety, as they were not adjusted to account for the multiple comparisons. The variation in survey completeness by participants is likely due to the survey being distributed as a paper-and-pencil questionnaire and could be improved using online software. The results are strengthened by using comparisons with the literature which suggests further research in this area is worthwhile.

These results are promising given they arise from a brief intervention delivered over a relatively short time frame, and further research within the clinical practice setting could provide greater insight into education requirements. The test–retest reliability of the CQS and the developed questionnaire tools have been established for use in other studies. The MDC scores may provide a useful comparison for other studies using the CQS. Outcome measures and tools that are valid and reliable in measuring cultural competence behaviour in clinical placements need to be developed and tested. The greater challenge remains the need to measure the effect of the cultural competence of both therapists and students on patient outcomes.

5 | CONCLUSIONS

This study demonstrates that undergraduate physiotherapy students at an Australian university are motivated to learn cultural competence and can increase and retain their perceived cultural competence by participating in a 4-week classroom-based module. A 3-week clinical practice experience in a cultural healthcare situation has a limited influence on the self-assessment of cultural competence by undergraduate physiotherapy students, suggesting that exposure to cultural diversity is not sufficient for a change in self-reported cultural competence. This suggests that further research into the combination of classroom and clinical practice-based teaching would provide further insights in this area of curriculum. Both students' own place of birth and that of their parents influences undergraduate physiotherapy students' perceived cultural competence in response

to participating in a 4-week university-based module, especially in the cognitive and metacognitive domains. This suggests that designing classroom-based teaching should be responsive to the characteristics of the cohort of students being taught.

6 | IMPLICATIONS FOR PHYSIOTHERAPY PRACTICE

1. The self-reported cultural competence of undergraduate physiotherapy students can be increased by a 4-week tutorial module.
2. Students' perceived level of cultural competence can be sustained over an 18-month duration while students are engaged in clinical practice.
3. Exposure to cultural diversity is not sufficient by itself for a change in self-reported cultural competence.
4. The change in perceived cultural competence of physiotherapy students by an educational intervention is influenced by their own cultural background.

CONFLICT OF INTEREST
The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS
All listed authors contributed to the concept and design of this study. Caroline Fryer and Gisela van Kessel were responsible for data acquisition, analysis, and interpretation. Sarah Edney was responsible for data analysis, and interpretation. All authors were involved in drafting and revising the document for intellectual content.

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REFERENCES
Alizadeh, S., & Chavan, M. (2016). Cultural competence dimensions and outcomes: A systematic review of the literature. *Health & Social Care in the Community*, 24(6), e117–e130.

American Physical Therapy Association. (2009). *Minimum required skills of physical therapy graduates at entry-level*. Retrieved from http://www.apta.org/uploadedFiles/APTAorg/About_Us/Policies/BOD/Education/MinReqSkillsPTGrad.pdf

Ang, S., Van Dyne, L., Koh, C., Ng, K. Y., Templer, K. J., Tay, C., & Chandrasekar, N. A. (2007). Cultural intelligence: Its measurement and effects on cultural judgment and decision making, cultural adaptation and task performance. *Management and Organization Review*, 3(3), 335–371. https://doi.org/10.1111/j.1740-8784.2007.00082.x

Calvillo, E., Clark, L., Ballantyne, J. E., Pacquiao, D., Purnell, L. D., & Villarruel, A. M. (2009). Cultural competency in baccalaureate nursing education. *Journal of Transcultural Nursing*, 20(2), 137–145. https://doi.org/10.1177/1043659608330354

Campinha-Bacote, J. (2002). The process of cultural competence in the delivery of healthcare services: A model of care. *Journal of Transcultural Nursing*, 13(3), 181–184.

Campinha-Bacote, J. (2007). *Inventory for Assessing the Process of Cultural Competence among healthcare professionals-Student Version (IAPCC-SV©). The process of cultural competence in the delivery of healthcare services: The journey continues* (5th ed.). Cincinnati, OH: Transcultural CARE Associates.

Crowne, K. A. (2013). Cultural exposure, emotional intelligence, and cultural intelligence an exploratory study. *International Journal of Cross Cultural Management*, 13(1), 5–22.

Denton, J. M., Esparza, S., Fike, D. S., Gonzalez, J., & Denton, M. L. (2016). Improvements in cultural competence through classroom and local cross-cultural service-learning activities. *Journal of Physical Therapy Education*, 30(2), 6–13. https://doi.org/10.1097/00001416-201630020-00004

Ekelman, B., Dal Bello-Haas, V., Bazyk, J., & Bazyk, S. (2003). Developing cultural competence in occupational therapy and physical therapy education: A field immersion approach. *Journal of Allied Health*, 32(2), 131.

Haack, S., & Phillips, C. (2012). Teaching cultural competency through a pharmacy skills and applications course series. *American Journal of Pharmaceutical Education*, 76(2), 1–7.

Hawala-Druy, S., & Hill, M. H. (2012). Interdisciplinary: cultural competency and culturally congruent education for millennials in health professions. *Nurse Education Today*, 32(7), 772–778.

Hayward, L. M., & Li, L. (2014). Promoting and assessing cultural competence, professional identity, and advocacy in doctor of physical therapy (DPT) degree students within a community of practice. *Journal of Physical Therapy Education*, 28(1), 23–36. https://doi.org/10.1097/00001416-201410000-00005

Health and Care Professions Council . (2013). *Standards of proficiency: Physiotherapy*. Retrieved from https://www.hcpc-uk.org/standards/standards-of-proficiency/physiotherapists/

IBM. (2016). *IBM SPSS statistics for Windows Version 24.0*. Armonk, NY: IBM Corporation.

Kobylarz, F. A., Heath, J. M., & Like, R. C. (2002). The ETHNIC(S) Mnemonic: A clinical tool for ethnogeriatric education. *Journal of the American Geriatrics Society*, 50(9), 1582–1589. https://doi.org/10.1046/j.1532-5415.2002.50417.x

Kumas-Tan, Z., Beagan, B., Loppie, C., MacLeod, A., & Frank, B. (2007). Measures of cultural competence: Examining hidden assumptions. *Academic Medicine*, 82(6), 548–557. https://doi.org/10.1097/ACM.0b013e3180555a2d

Matsumoto, D., & Hwang, H. C. (2013). Assessing cross-cultural competence: A review of available tests. *Journal of Cross-Cultural Psychology*, 44(6), 849–873. https://doi.org/10.1177/0022022113492891

Mezirow, J. (1990, May). *A transformation theory of adult learning*. Paper presented at the Adult Education Research Annual Conference Proceedings. Athens, Georgia. Retrieved from https://files.eric.ed.gov/fulltext/ED357160.pdf#page=153

Musolino, G. M., Babitz, M., Burkhalter, S. T., Thompson, C., Harris, R., Ward, R. S., & Chase-Cantarini, S. (2009). Mutual respect in healthcare: Assessing cultural competence for the University of Utah interdisciplinary health sciences. *Journal of Allied Health*, 38(2), 54E–62E.

Musolino, G. M., Burkhalter, S. T., Crookston, B., Ward, S. R., Harris, R. M., Chase-Cantarini, S., & Babitz, M. (2010). Understanding and eliminating disparities in health care: Development and assessment of cultural competence for interdisciplinary health professionals at the University of Utah—A 3-year investigation. *Journal of Physical Therapy Education*, 24(1), 25–36.

Muzumdar, J. M., Holiday-Goodman, M., Black, C., & Powers, M. (2010). Cultural competence knowledge and confidence after classroom activities. *American Journal of Pharmaceutical Education*, 74(8), 150.

Okoro, O., Odedina, F., & Smith, W. T. (2015). Determining the sufficiency of cultural competence instruction in pharmacy school curriculum. *American Journal of Pharmaceutical Education*, 79(4), 50.

Panzarella, K. J. (2009). Beginning with the end in mind: Evaluating outcomes of cultural competence instruction in a doctor of physical therapy programme. *Disability and Rehabilitation, 31*(14), 1144–1152.

Physiotherapy Board of Australia & Physiotherapy Board of New Zealand. (2015). *Physiotherapy practice thresholds in Australia and Aotearoa New Zealand.* Retrieved from ///C:/Users/fryerce/Downloads/Physiotherapy-Board—Physiotherapy-practice-thresholds-in-Australia-and-Aotearoa-New-Zealand.PDF

Poirier, T. I., Butler, L. M., Devraj, R., Gupchup, G. V., Santanello, C., & Lynch, J. C. (2009). A cultural competency course for pharmacy students. *American Journal of Pharmaceutical Education, 73*(5), 81.

Purnell, L. (2000). A description of the Purnell model for cultural competence. *Journal of Transcultural Nursing, 11*(1), 40–46. https://doi.org/10.1177/104365960001100107

Purnell, L. D., & Paulanka, B. J. (2003). *Transcultural health care: A culturally competent approach.* Philadelphia, PA: F.A. Davis Company.

Romanello, M. L. (2007). Integration of cultural competence in physical therapist education. *Journal of Physical Therapy Education, 21*(1), 33–39. https://doi.org/10.1097/00001416-200701000-00005

Romanello, M. L., & Holtgrefe, K. (2009). Teaching for cultural competence in non-diverse environments. *Internet Journal of Allied Health Sciences and Practice, 7*(4), 11.

Sales, I., Jonkman, L., Connor, S., & Hall, D. (2013). A comparison of educational interventions to enhance cultural competency in pharmacy students. *American Journal of Pharmaceutical Education, 77*(4), 76.

Simulation Training Systems. (2001). *BaFa' BaFa'.* Retrieved from https://www.simulationtrainingsystems.com/schools-and-charities/products/bafa-bafa/

Stewart, M. (2002). Cultural competence in undergraduate healthcare education: Review of the issues. *Physiotherapy, 88*(10), 620–629.

Taylor, E. W., & Laros, A. (2014). Researching the practice of fostering transformative learning: Lessons learned from the study of andragogy. *Journal of Transformative Education, 12*(2), 134–147. https://doi.org/10.1177/1541344614548589

Te, M., Blackstock, F., & Chipchase, L. (2019). Fostering cultural responsiveness in physiotherapy: Curricula survey of Australian and Aotearoa New Zealand physiotherapy programs. *BMC Medical Education, 19*(1), 326.

Werremeyer, A. B., & Skoy, E. T. (2012). A medical mission to Guatemala as an advanced pharmacy practice experience. *American Journal of Pharmaceutical Education, 76*(8), 156.

World Confederation for Physical Therapy. (2011). *WCPT guideline for physical therapist professional entry level education.* Retrieved from http://www.aefi.net/Portals/1/Repository/Guideline_PTEducation_complete.1481e4b7-e059-464a-9ac4-cadf8021d594.pdf