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## ORIGINAL ARTICLE

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### A prospective survey of chiropractic student experiences with pediatric care and variability of case mix while on clinical placement in Rarotonga

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**Objective:** To compare chiropractic students' perceptions of preparedness for practice before and after a clinical placement in Rarotonga and to report demographics from these experiences.

**Methods:** The students completed deidentified pre- and postplacement surveys assessing pediatric practice preparedness. Students tallied the patient numbers, age, and chiropractic techniques used per visit for each day of clinic placement. On completion of the program, participating students (27/34, or 79% of the student cohort) did a postplacement survey on their perception of practice preparedness. Data were analyzed with the Spearman rho correlation, the Mann-Whitney U test, and regression analysis.

**Results:** There was an increase in perceived preparedness for pediatric practice, ranging from 24.1% of the student cohort at the start of the study to 82.1% following clinical placement in Rarotonga. The change in student preparedness to practice with children was positively correlated with the total number of children managed ( $r_s = .05$ ,  $p = .01$ ) and the number of children managed who were under 10 years of age ( $r_s = .60$ ,  $p = .001$ ). Multiple regression analysis demonstrated a medium positive effect for postprogram preparedness ( $F [4, 20] = 3.567$ ,  $p = .024$ ).

**Conclusion:** Clinical outreach to Rarotonga provided a broad case mix of patients and a change in student perceptions of preparedness to practice with children, which was positively affected by the total number of children managed and the number of children managed who were under 10 years of age.

**Key Indexing Terms:** Chiropractic; Education; Pediatrics; Surveys and Questionnaires

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### INTRODUCTION

It is reported that approximately 8.6% of the weekly caseload of Victorian chiropractors are children.<sup>1</sup> Similarly, a recent European study reported that 8.1% of all visits to chiropractors were for children under the age of 18 years.<sup>2</sup> Further, Lee et al<sup>3</sup> reported more than 30 million annual child visits to chiropractors in the United States.

Chiropractic colleges around the world teach undergraduates the theory and practical applications for the chiropractic management of a broad case mix of patients, including children.<sup>4</sup> All chiropractors are trained and registered to examine and manage children.<sup>5,6</sup> As such, chiropractic colleges provide clinical practice training in the last 2 years of their degree to prepare them for clinical practice on graduation.<sup>7</sup> The majority of chiropractic colleges in Australia and New Zealand have clinical training facilities on-campus or nearby where patients are drawn from the general public and the student population.<sup>8</sup> Some institutes also provide opportunities for

students to participate in clinical placements external to their on-campus facilities and even internationally through an affiliation with Hands on Health Australia.<sup>9</sup> It is unknown whether this change in location and external clinical experience provides a broader and more expansive case mix that more closely resembles chiropractic private practice experiences. The effect of case mix variations on student preparedness for practice with children is also unknown.

The purpose of this study was to compare chiropractic students' perceptions of preparedness for pediatric chiropractic practice before and after a clinical placement in Rarotonga and to report demographics from these experiences

### METHODS

Fourth-year chiropractic students from the New Zealand College of Chiropractic (NZCC) were invited to participate in a 1-week outreach program to Rarotonga in

the Cook Islands. Students were included if they passed their NZCC Chiropractic Center Entrance Examination (a requirement to meet the level of competence to be able to care for public patients) and had expressed an interest in attending the outreach program. The Rarotonga placement occurred prior to the participating undergraduates undertaking pediatric course work at NZCC. Ethics approval was obtained for this study from Monash University Health Research Ethics Committee. Participation in the research was voluntary.

Students managed patients at 1 of 2 sites in Rarotonga, and all visits were supervised by New Zealand registered chiropractors. A short health history and physical exam were undertaken on all patients. The physical exam included range-of-motion and posture assessments, a clinical spinal exam, and orthopedic and neurological screening. Once approved by the supervising clinician for chiropractic care, the patient was adjusted at the spinal level(s) indicated in the assessment.

There were 34 students who participated in the clinic placement. Each student was asked to complete a preprogram survey to assess their self-reported "preparedness" to provide chiropractic care to children. Surveys were deidentified, with each student generating his or her own unique identifiers based on a sequence of letters and numbers, making it possible for responses to be matched throughout the study. The survey items were graded on a 5-point Likert scale from strongly disagree to strongly agree.

At the end of each day of the outreach program, students were instructed to record the number of patient visits, the age of each patient, and the chiropractic technique(s) used for each visit. The tally included both new patients and those that were returning for follow-up care. At the completion of the program and on return to the NZCC, the students completed the postprogram preparedness survey.

The demographics that students recorded daily included the date, the ages of the patients, the number of patients, the location of care, and the chiropractic techniques used for care. This survey instrument was developed by the lead researcher, with the items based on previous surveys in the published literature, including a cross-sectional survey about the use of chiropractic technique pediatric patients<sup>10</sup> as well as surveys of preparedness for practice in medical students.<sup>11,12</sup> The pre- and postplacement surveys on preparedness were from those developed by the lead author for a retrospective survey of 275 chiropractic students across 4 chiropractic institutions.<sup>13</sup> This survey content was verified via an expert panel of pediatric chiropractors and then pilot tested on 3 newly graduated chiropractic students for clarity. The survey was timed to take no more than 15 minutes to complete.

The sample size in the current study was a factor of the cohort of students participating in the placement, with all students ( $n = 34$ ) invited to participate and 25 completing all data sets. Bias was reduced by inviting the entire cohort (rather than a subsample) and by collecting only deidentified information through the use of a unique identifier.

Survey results were not reviewed by any of the placement personnel, including supervisors, with the collected surveys placed in a sealed envelope and mailed to Australia to be tabulated and then analyzed by a separate researcher.

Data tabulation and analysis were performed using SPSS v. 22 (IBM Corporation, Armonk, NY, USA). Data analysis included the use of Spearman rho, which was used to measure the strength of the association between the number of children and age of children managed by the student and reported level of preparedness to manage children. The Mann-Whitney U test was used as a nonparametric procedure to compare the 2 independent groups in this study, namely, the pre- and postpreparedness score variations in comparison to the total number of children seen. A multiple linear regression analysis was used to test the relationship between postprogram preparedness (dependent variable) and the total number of children in various age-groups (independent variables), that is, infants aged less than 1 year, children 1 to 5 years, and children 6 to 10 years (independent variables) compared to postprogram preparedness (dependent variable).

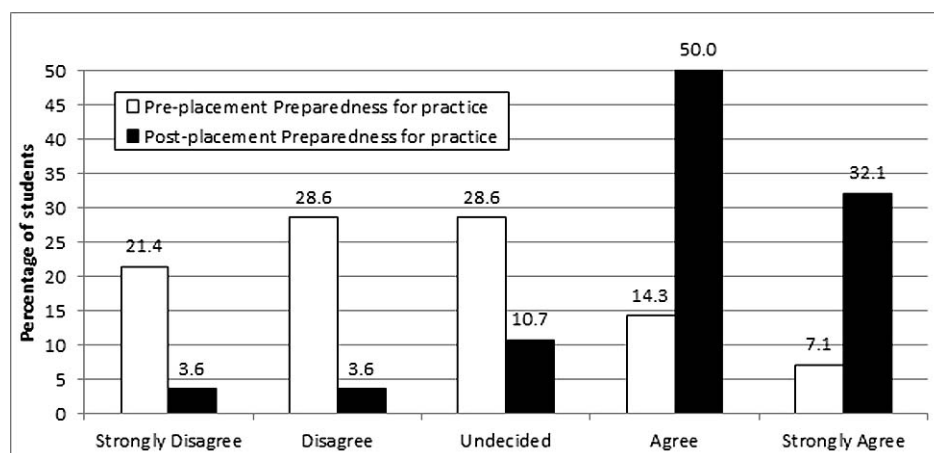
## RESULTS

During the 1-week clinical placement, students managed an average of 44.1 cases. Most students were exposed to a broad case mix of patients, with 16% of patient visits being children ranging from neonates to adolescents. On average, each student saw 7.2 children with 4.4 of them (or 62%) under 10 years.

There were 34 students in the cohort. Of these, 29 participated in some aspect of the surveys; however, complete data sets were achieved from 25 students, representing a 73.5% response rate. On the preplacement survey, only 21.4% of students agreed or strongly agreed that they felt prepared for clinical practice with children, whereas the postplacement survey showed that 82.1% of students agreed or strongly agreed that they felt prepared for clinical practice with children.

As assessed by the Spearman rho, a large positive correlation was noted between the change of perception of preparedness and the total number of children managed ( $r_s = .51$ ,  $n = 27$ ,  $p = .01$ ). The total number of child visits explained 26% of the variance in preparedness scores ( $R^2 = .26$ ). After clinical placement in Rarotonga, the majority of students felt prepared to practice with children, while 17.9% of students were undecided or disagreed that they felt prepared for clinical practice with children (Fig. 1). The students who disagreed with the statement about being better prepared indicated that they did not see any pediatric patients on their placement.

Spearman rho showed a medium positive correlation in the student's postprogram preparedness and the total number of children managed ( $r_s = .45$ ,  $n = 27$ ,  $p = .02$ ). The total number of child visits explained 20% of the variance in postpreparedness scores ( $R^2 = .20$ ). There was also a large positive correlation between the postpreparedness score and the number of children under the age of 10 years who were managed by the students ( $r_s = .60$ ,  $n = 27$ ,  $p = .001$ ). The total number of child visits under 10 years



**Figure 1** - Results of the survey pertaining to perceptions of preparedness for pediatric practice before and after the clinical placement.

explains 36% of the variance in postpreparedness scores ( $R^2 = .36$ ).

There was a difference in the postplacement preparedness results between those who felt prepared (strongly agree) and those who did not (agree, undecided, disagree, and strongly disagree) when assessed with the Mann-Whitney U test for total children seen ( $U = 74.000$ ,  $p = .03$ ; Fig. 2) and total children seen under 10 years ( $U = 30.500$ ,  $p = .002$ ; Fig. 2).

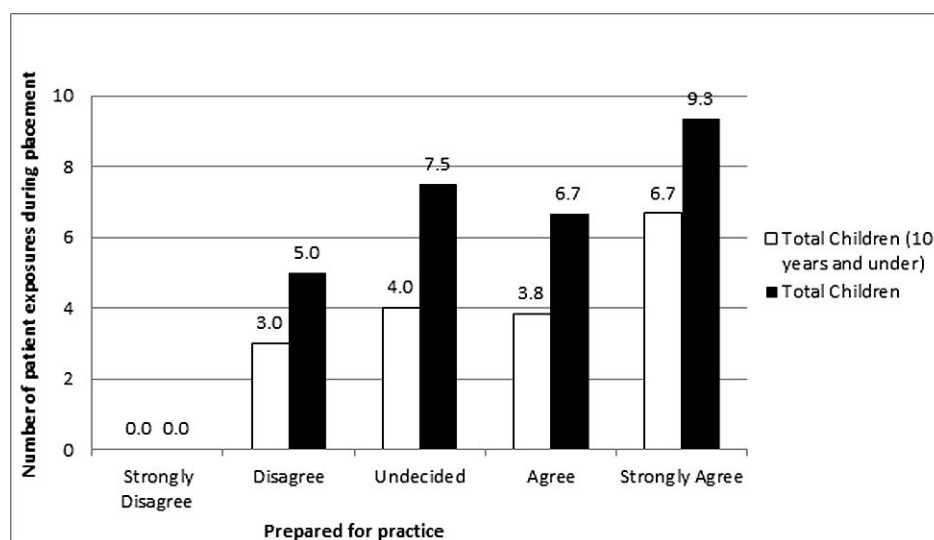
The data met the assumptions necessary to proceed with regression analysis. Collinearity diagnostics showed collinearity tolerances all above .64 and variance inflation factors all below 1.56; therefore, this did not violate the multicollinearity assumption. Normal P-P plots suggested that there were no major deviations from normality. Mahalanobis distances did not identify outliers within the data. Multiple regression analysis demonstrated a medium positive effect for postprogram preparedness ( $F [4, 20] = 3.567$ ,  $p = .024$ ) in the total number of 1- to 5-year-old

visits ( $r = .36$ ) and a large positive effect in total 6- to 10-year-old children managed ( $r = .50$ ), which demonstrated a statistically significant contribution ( $p = .013$ ; Fig. 3).

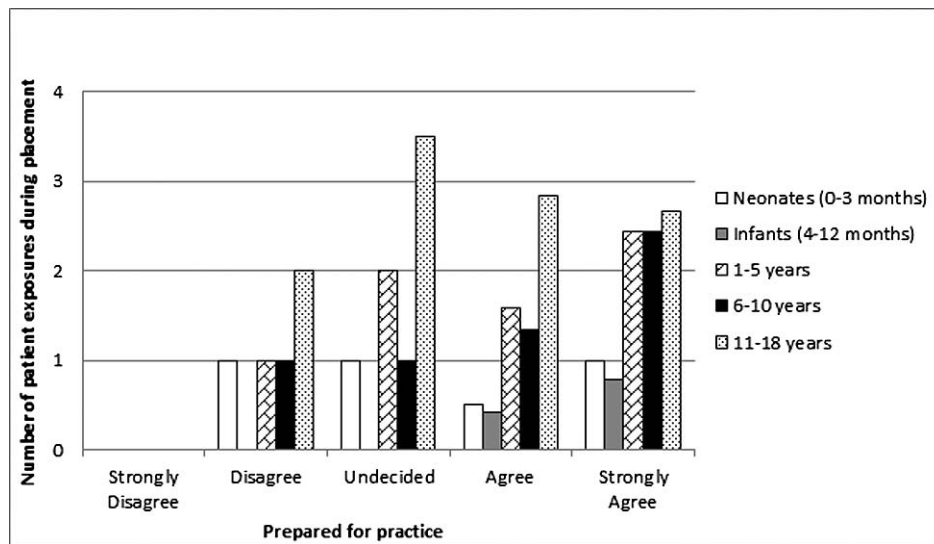
A variety of chiropractic techniques were used by the students with 30% utilizing touch-and-hold technique on neonates, while 60% used an activator instrument. Management of infants (4 to 12 months) similarly showed that 60% of students used an activator or a diversified instrument; however, only 10% used either toggle or touch and hold. While the activator instrument was the most commonly used for children ages 4 months to 5 years, the diversified instrument was most commonly used for children aged 6 to 18 years (Fig. 4).

## DISCUSSION

Student perceptions of preparedness for clinical practice changed after the 1-week clinical placement in Rarotonga. The case mix and the number of child visits



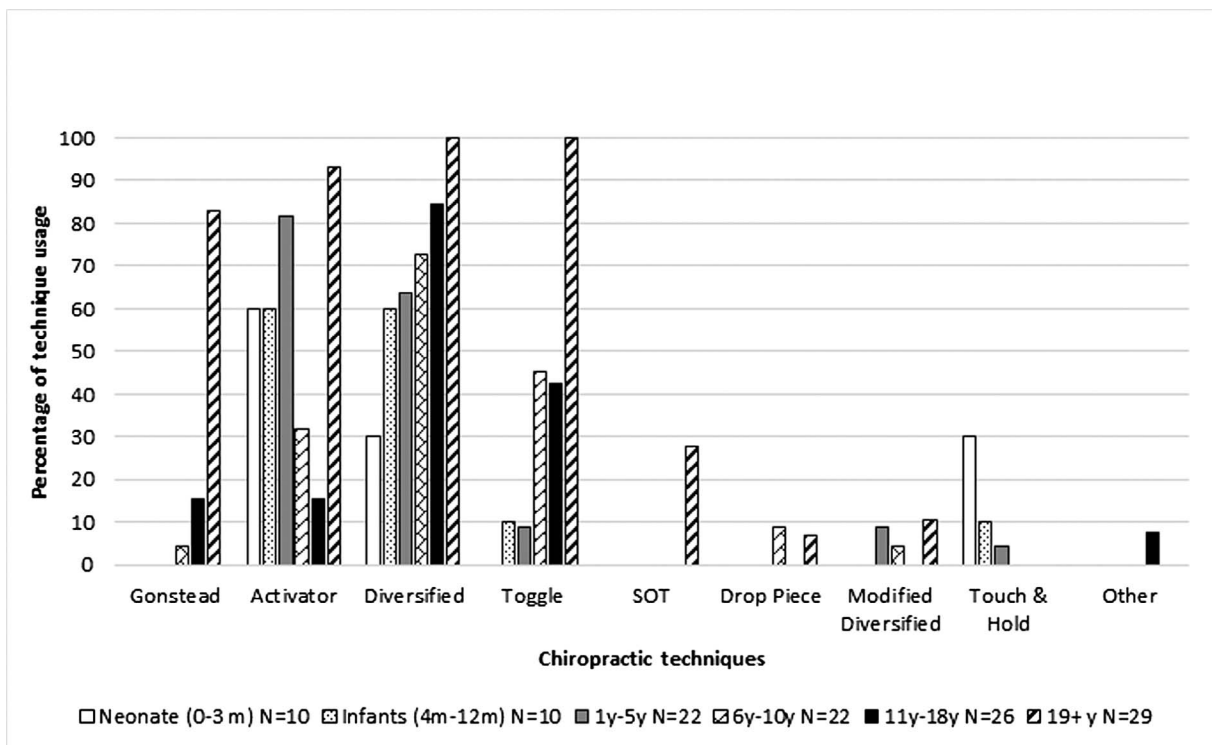
**Figure 2** - Student's perceptions of preparedness for pediatric practice by number of child visits after placement.



**Figure 3** - Relationship between preparedness and mean number of child visits by age-group.

seemed to be important in the students' perceptions of preparedness for practice. The results of this study are in line with a study of medical student training and preparedness for practice by Burford et al,<sup>11</sup> who found that students who had more than 5 clinical exposures agreed or strongly agreed that they were prepared for private practice as a medical practitioner. Interestingly, those students with 2 or fewer clinical exposures did not feel prepared for private clinical practice, the same as those who had no clinical exposure.

This experiential learning community outreach clinical placement also provided a variety in case mix of patients and enhance exposure to the number of clinical cases. Other professions find similar experiences, such as medical students on well-designed rural or remote clinical private practice who felt that such experiences provided a good foundation "by enhancing clinical skills, personal and professional development and increased cultural competencies."<sup>12</sup> Similar findings are reported in studies of paramedics. Sixty-one percent of surveyed paramedic



**Figure 4** - Percentage of chiropractic technique selection per patient age-group.



students on clinical placement in Australia found it to be “useful or very useful”; however, the nature of the clinical placement was important, with students on rural ambulance placements feeling less prepared due to the low callout rate.<sup>14</sup> These same authors also found that the opportunity for more clinical placements in a wide variety of areas within hospitals and the health care system led to greater preparedness in paramedic graduates. In other, similar surveys on preparedness for practice in Chinese medicine<sup>15</sup> and for nurse practitioners,<sup>16</sup> students expressed a desire for more rigorous and relevant clinical placement experiences.

Feeling unprepared for clinical practice is reported in other health professions. For example, a study by Monrouxe et al<sup>17</sup> found that 1 year after graduation, 32% of medical registrars felt unprepared for clinical practice. A lack of exposure to a case-mix variety can also be attributed to a feeling of unpreparedness. According to Freed et al,<sup>18</sup> Australian general practice registrars have no requirement to keep a logbook of patients seen, including the procedures performed, to assess their clinical experience and exposure, and there is concern that current medical registrars have less exposure to pediatric conditions during their training.

This study demonstrated that students’ preparedness to practice was correlated with the variability in age and volume of patient exposures. Further, the chiropractic techniques they used while on the clinical placement trip varied greatly across the range of ages of patients for which they provided care. In general, students use lower-force techniques in younger children and high-velocity low-amplitude techniques more frequently for patients older than 4 months.

### Limitations

The limitations of this study include that the Rarotonga placement took place prior to the pediatrics course work component of the chiropractic program. This would have likely had an impact on students’ perceived level of pediatric preparedness on clinical placement. It is still interesting to note that only a small exposure to children on placement was strongly correlated with the student perception of preparedness. All participants had only 1 tutorial about assessing a pediatric patient during the preplacement training. This may explain the high level of variability in preparedness for clinical practice with children prior to the Rarotonga clinical placement. However, there was still significant change in the postplacement survey results, suggesting the importance of clinical exposures. Comparison of student preparedness where full pediatric training had been undertaken prior to a community outreach would be an area for future research since it is unknown whether more theoretical training prior to placement would alter preparedness changes demonstrated in this study. Another limitation is that confidence does not equal competence, and while students may express that they feel prepared, there was no assessment of practical skills or knowledge in the present study. Therefore, they may feel more competent, but this may not necessarily be the case.

The students who were “undecided” about their preparedness for private clinical practice with infants and children prior to placement may have been anxious about not having already been taught pediatrics. The term “preparedness for practice” may be analogous to confidence, and some students may have been anxious on clinical placement,<sup>11</sup> and this may have affected their confidence and therefore preparedness in managing children.

While this study focused on Rarotonga, universities in Australia send their chiropractic students on clinical placement to local private practices and overseas to Samoa, India, Vietnam, Cambodia, and the Philippines. Further investigation of the experiences of students on these international clinical placements would be useful to determine whether the duration or location of placement alters case mix, technique usage, or the perception of preparedness for practice with children among chiropractic students. The improvement in student preparedness for practice with children after the Rarotonga placement suggests that such placements are an important tool in building clinical experience and confidence in undergraduates. Further investigation is required to demonstrate whether this type of clinical placement should become compulsory training for chiropractic students.

## CONCLUSION

This chiropractic clinical placement to Rarotonga provided a broad case mix of patients, and students used a variety of chiropractic techniques applied in caring for patients. Change in student perceptions pertaining to preparedness for pediatric practice was positively associated with the total number of children managed and with the number of children managed under 10 years of age.

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Concept development: AT. Design: AT, EM, MC. Supervision: EM, MC. Data collection/processing: DR, AT. Analysis/interpretation: AT, EM, MC. Literature search: AT. Writing: AT. Critical review: AT, EM, MC, DR.

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