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Recognising the impact on students of a crisis event in an educational setting – developing response recommendations

Christchurch Earthquake Health Professionals Research Group

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AKO AOTEAROA
NATIONAL CENTRE FOR TERTIARY TEACHING EXCELLENCE

Canterbury District Health Board
Te Poari Hauora ō Waitaha

University of Otago
Te Whare Wānanga o Otāgo
New Zealand

CPIT
TE MĀTĀPUNA O TE MĀTAURAKA

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About the Christchurch Earthquake Health Professionals Research Group

The Christchurch Earthquake Health Professionals Research Group is a collaboration involving health professionals from the University of Otago (Christchurch), the Canterbury District Health Board (CDHB), and the Christchurch Polytechnic Institute of Technology (CPIT) that was formed in July 2011 to investigate the impact of the Christchurch earthquakes and aftershocks on healthcare students learning and wellbeing. A brief description of the members in the group is located below.

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The medical and nursing students who took the time to contribute to this research.

Executive Summary

Background

This study emerged from the earthquake experiences within the Canterbury Region, which commenced with a 7.1 earthquake in September 2010 and continue to this day. Recognition of the widespread impact of such events formed the basis for this research, which focussed on understanding the experiences of medical and nursing students engaged in tertiary level education. There is a paucity of existing international literature and knowledge in relation to the experiences of, and reaction to crisis by tertiary level students. The research presented here is a significant contribution to addressing this gap.

Context

Existing research into the impact of crisis events on adult student learning is limited. The specific educational area focussed on in this study is that of tertiary level medical and nursing students. Christchurch hosts both a School of Medicine and undergraduate as well as postgraduate nursing education centres. In additional, the local District Health Board has a number of hospitals which take on new entry to practice and entry to specialty practice nursing students, who although registered are part of a supportive programme which includes expectations regarding continuing education. Following the earthquakes all of these institutions were affected to varying degrees, including loss of venues and access to resources for extended periods of time.

Methods

Study aims:

1) Explore student reactions and adaptations to of a crisis situation

2) Identify ways in which positive adaptation can be facilitated

3) Formulate practice recommendations

Methodology:

A collaborative study was developed in response to the earthquake experiences, with representatives of the major organisations involved in medical and nursing education in the Canterbury area. This included the Centre for Postgraduate Nursing Studies, University of Otago, Christchurch; the Christchurch School of Medicine, University of Otago, Christchurch; the Department of Psychological Medicine, University of Otago, Christchurch; the Christchurch Polytechnic Institute of Technology and the Canterbury District Health Board. A convenience sample of tertiary level medical and nursing students was identified, and invitations to participate were disseminated.

A specific survey tool was developed to address the central questions. This included a combination of closed and open ended questions, rating scales, and psychometric tests. Measures used included the Depression, Anxiety, and Stress Scale (DASS); the PTSD Checklist (PCL); the Eysenck Personality Questionnaire – Brief Version (EPQ-BV); Work and Social Adjustment Scale (WSAS); Connor-Davidson Resilience scale (CD-RISC). These scales were selected because they were determined to be the most psychometrically sound for examining the variables of interest in this study.

Results

This data was considered in relation to the four student sub-groups identified within the study:

- Undergraduate nursing students (UNursS)
- Nurses engaged in postgraduate studies (NursPS)
- Nurses engaged in continuing education (NursCE)
- 4th, 5th & 6th year undergraduate medical students (UMedS)

Findings have been presented in terms of qualitative and quantitative data. These include comparison of demographic profiles, thematic interpretation of free text responses, scoring and analysis of the specific measures. Key findings included:

Demographics:

- 469 students participated in the survey
- Response rates for the individual cohorts varied between 9-70%
- Over 90% of the nursing cohorts were female; less than 60% of the medical cohort were female
- Over 75% of the nursing cohorts identified as European only ethnicity; less than 50% of the medical cohort identified as European only

Measures of physical and mental health

- Self-reported mental health and physical health issues increased, subsequent to the earthquakes
- The NursPS cohort produced the highest mean score for resilience, followed by the NursCE cohort (CD-RISC; Connor & Davidson, 2003)
- The UNursS cohort consistently scored higher (greater severity) than the two other nursing cohorts (NursPS & NursCE), and UMedS cohort on the Depression, Anxiety and Stress Scale – DASS-21 (Lovibond & Lovibond, 1995) and the PTSD Checklist – PCL (Weathers ,1993), and in some comparisons this reached statistical significance.

Qualitative findings:

Qualitative data related to the nursing cohorts was subjected to thematic analysis and is presented here; the data specific to the medical cohort was restricted to the researcher assistant working with the School of Medicine cohort, due to privacy concerns.

Positive aspects of the experience were grouped under the following themes:

- Sense of community
- Enhanced relationships with family and friends

Perceptions of what the educational institution could do to help reduce the impact of the earthquake and aftershocks were varied across the groups but core consideration was evident in the following three areas:

- Communication

- Resource access
- Flexibility of course curriculum and processes

Perception of issues that have hindered learning post the earthquake events again provided specific concerns within each group, but could be considered in regards to the following core areas:

- Personal interpretation / meaning of events
- Resource limitations and constraints
- Competing priorities
- Altered patterns of daily living

Recommendations:

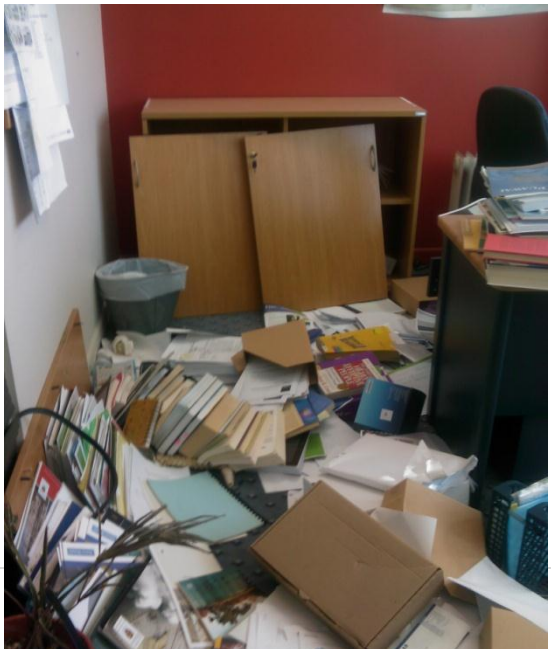
Following analysis of the data, the following recommendations were formulated:

- That educational institutions actively develop a crisis response strategy that considers the potential for flexible course development

- That educational institutions acknowledge the expectations of students and incorporate planning for and education of staff in relation to crisis response

- That educators and educational institutions are aware of potential sequelae to crisis events and identify a response framework that supports students and acknowledges individual pathways to recovery and re-integration into the educational system

- Recognition that there can be positive elements associated with a crisis event, and the importance of identifying and fostering these



Director's office: Postgraduate Centre for Nursing Studies Feb 2012

Introduction

Background

The Canterbury region has experienced a number of significant earthquakes, with associated aftershocks, since September 4, 2010. These have proved disruptive in a number of ways, and at the height of the crisis culminated in the implementation of a national State of Emergency. The widespread physical disaster impacted on structural, economic and social functions, which in turn led to the implementation of significant change in existing infrastructure and processes. Inevitably, this had a number of implications in terms of education.

While this disaster has specific and unique effects for the Canterbury region and in terms of earthquake research, there is no doubt that it also has the potential to lead to greater understanding and knowledge related to other unexpected, traumatic and significant events. In this sense, the potential learning has relevance nationally and across many vocational settings.

One area of interest is that which focuses on aspects of teaching and learning and the resulting generation of new knowledge, new processes and altered understandings. It can be suggested that this event is a single specific incident, and therefore of limited relevance to outsiders, but the argument can equally be put forward that this provides a 'case study' situation. As such, it provides many potential avenues for exploration and from which a number of relevant inferences and recommendations can derive.

Project Context:

While New Zealand (NZ) has a long standing history of seismic activity, the earthquake events that commenced with a 7.1 magnitude quake represented an unexpected crisis, in terms of location, severity and impact. Christchurch city was traditionally considered a 'low risk area for direct earthquake activity, with the assumption that any significant activity would likely occur within the known fault lines, most probably the Alpine Fault. The September 2010 earthquake had its epicentre 40km west of Christchurch at a depth of 11km, following the rupture of a previously unrecognised fault. While significant structural damage occurred, there were relatively few injuries (Cubrinovski et al, 2010). This has been attributed to a number of causes, including the time of day (early hours of the morning), the rigorous building codes within NZ, and the distance from the city centre (Ingham & Griffiths, 2011).

The impact of the September earthquake on teaching and learning was associated largely with the damage to buildings, resulting in the need to relocate teaching sessions and limiting access to resources including clinical teaching units, study spaces, lecture rooms and libraries. In addition, the damage to individuals' homes and within the wider environment impacted on the physical ability to study and access materials. A third factor was the psychological impact of knowing that the area had experienced a major earthquake, and that there was no guarantee this would not be repeated. This led to increased anxiety and the need to 'rethink' the fundamental reality in which students lived. The unspoken assumption of a 'safe' physical environment was lost, and the continuous aftershocks added to this sense of dislocation.

Kemp et al (2011) report two studies carried out in the aftermath of the September quake, which sought to explore the psychological impact of this event. The first of these identified that self-reported sleeplessness, cognitive dysfunction and heightened stress, depression and anxiety were common amongst members of the general public (n=240) who had experienced the earthquakes. Acknowledgment was also made of positive experiences

associated with the disaster. Participants completed a questionnaire which asked them about their experiences following the earthquake. This included the Depression Anxiety Stress Scales (DASS); questions about sleep disruption; personality measures; self assessment of cognitive disruption; and rating of a series of 'positive' statements related to the experience. This study indicated that the earthquake had resulted in substantial cognitive disruption, which was shown to have greater impact on women compared to men. This gender inequity is also seen in the study by Ardagh et al (2012) which identifies a higher proportion of females than males seeking medical care subsequent to the earthquake events.

The second study reported by Kemp et al (2011) examined the impact of the earthquakes on the academic performance of undergraduate students enrolled at Canterbury University. This was undertaken with the intention to see whether the self-reported cognitive disruption was associated with actual changes in cognitive performance. Links had been shown by Helton et al (2011) "between performance on the cognitive disruption scale and performance on a vigilance task" (p.15) following the September earthquakes. More general studies identified a relationship between sleep deprivation and vigilance, but not specifically in relation to cognitive performance (Altena, van der Werf, Strijers & van Someren, 2008). In order to assess likelihood of changes in cognitive performance, the grade point averages of undergraduate students enrolled in 2009 and 2010 were compared. There was no evidence to suggest an overall deterioration in grades, in fact a slightly improved grading was evident between semester one and two in 2010, compared to both 2008 and 2009 measures. However, it was acknowledged that there may have been a "more generous assessment" in 2010 as markers either "consciously or unconsciously allowed for earthquake effects" (Kemp et al, 2011, p.16). The suggestion of gender related impact identified in the first study was not present in the second study.

A lower magnitude but overall more devastating earthquake occurred on February 22nd, 2011, at 12.51pm. This earthquake recorded 6.3 on the Richter scale, but it was much shallower at only 5k deep, and with the epicentre only 10k south east of the city centre. The most significant factor linked to the higher incidence of injury, death and structural damage was the high Peak Ground Acceleration (PGA). While the Richter Scale measures the energy released during the peak of an earthquake, the PGA measures how much the earth shakes in a given location (Kahn, 2005, Reyners, 2011). The PGA recorded in February reached 2.2g, two and a half times greater than that of the September event and one of the highest ever recorded (Royal Society of New Zealand, 2011). The cumulative effect of these two major earthquakes, together with the continuing aftershocks, resulted in considerable damage to infrastructure, including collapse of buildings, severe damage to roads, power, sewerage, and interruptions to communication systems. The time of day, nature of the event (PGA, depth and epicentre) as well as the proximity to a highly occupied, built up area, resulted in 182 deaths and 6659 recorded injuries (Ardagh et al, 2012).

The impact on education providers was profound. The core agencies associated with medical and nursing education in Christchurch are the Christchurch Polytechnic Institute of Technology (CPIT) which provides undergraduate nursing education, the University of Otago which includes the Christchurch School of Medicine and the Centre for Postgraduate Nursing Education. Additional educational direction and support is also provided through the Canterbury District Health Board (CDHB), via the Professional Development Unit (PDU), Nurse Entry to Practice (NETP) and New Entry to Specialty Practice (NESP) programmes. Each of these educational providers was impacted significantly by the earthquake events, with serious damage to buildings, loss of access to resources, and issues for individual teaching, support and administration staff. Inevitably, this must impact on students and their ability to engage with education.

The CPIT campus which houses the nursing faculty and the offices and teaching rooms of the Postgraduate Centre for Nursing Studies were physically within the cordoned off area following the February quake. Access to both of these was limited once the cordon was withdrawn, and on-going repairs required before students could return. This resulted in relocation of teaching sessions for many months, and frequent closures and evacuations following major aftershocks. Chan and Jenkins (2012) describe the impact on the CPIT as involving the closure of the central campus for six weeks, loss of information technology capacity, and a resultant period of forced, rapid change. Ongoing research is also occurring which aims to explore "the most appropriate and optimal role(s) for education providers in disaster situations, determine effective ways to minimise disruption to programme delivery and student learning" specific to the CPIT Bachelor of Nursing programme (Seaton, Conlon, Yarwood & Seaton, 2012). The Christchurch School of Medicine building, housed as part of the Christchurch Hospital required major repairs to meet all building codes, and remains closed to this date (September, 2012). The CDHB facilities also faced major disruption, including loss of working space, and relocation of facilities. Loss of power meant loss of access to electronic databases and computing support and services. These impacts were further exacerbated by damage to student's homes, loss of personal study space, public facilities and even physical dislocation for some from their homes and communities.

These institutions by necessity found innovative and flexible responses to manage this crisis. There was considerable movement towards e-learning and the need to identify alternative locations suitable for clinical as well as academic teaching. Given the specialised nature of healthcare education, there were concerns expressed over the loss of access to clinical skills labs and simulation centres, as well as to physical library resources. With access to teaching spaces limited, students found themselves working from a variety of settings. Between March and October of 2011, the Centre for Postgraduate Nursing Studies successfully ran 12 papers, including 37 study blocks, despite being unable to occupy its teaching premises. Alternative sites for lectures and clinical assessment training included sports facilities, residential buildings, a philatelic centre and the horticultural society rooms (Clifford, Reilly & Knopick, 2012). For undergraduate nursing students, lectures were shifted to Lincoln University, and the multi-story School of Medicine building which included lecture theatres, library and teaching spaces remains closed (as of 1/10/2012). The School of Medicine Library (which included the Mary Lambie Nursing collection) has continued to operate, working at various times from a treatment room in a hospital ward, the Riccarton Cricket Club, and the Princess Margaret Hospital library (Hughes, Phibbs & Jeffs, 2012).

Previous research:

A number of studies have attempted to identify the impact of natural disasters on populations, particularly in relation to mental health issues (Carr et al, 1995; Norris et al, 1999; Bodsvardottir, & Elklit,; Bryant, 2009). Post-Traumatic Stress Disorder (PTSD), depression and anxiety related conditions are identified as the most common psychological disorders following a disaster (Bryant, 2009). While these studies have focussed on the wider community, others have looked specifically at children and adolescents (Garrison et al, 1995; Swenson et al 1996) or older persons (Cherniak, 2008; Jia et al, 2010). While this provides a level of background information about likely responses, there remains a gap in terms of the specific impact on individuals engaged in university level education, and the significance of natural disasters on ability to continue with study.

The focus of this study has been on the educational impact for students engaged in health studies, and in particular those engaged with tertiary level medical and nursing education. This population was selected to allow consideration of a number of factors that may be used to provide more generalisable and widely applicable findings, with the potential to relate to other tertiary and adult education settings.

While research has been undertaken looking at the impact of natural disasters and other crisis situations on primary and secondary education, there appears to be limited literature that relates to the impact on tertiary education, or which seeks to explore students' perceptions and responses (Shaheen, 2007; Lemieux et al 2010; Davis, Grills-Tacquechel & Ollendick, 2010; Meyer & Wilson, 2011). Where there is research looking at the impact of disasters on university level students, this is largely focused on the psychological effects. Davis, Grills-Tacquechel and Ollendick (2010) compared a group of 68 New Orleans area university students who were displaced as a result of Hurricane Katrina with a group who were not displaced. This study identified that displaced students had experienced higher levels of trauma exposure and subsequent distress, and more symptoms of PTSD (post-traumatic stress disorder) and depression compared to the non-displaced group. However, while this study examined the effects on psychological functioning, it did not specifically consider the implications of these findings in terms of continuing study and engagement in the educational system. It was noted that "*universities should consider specific training for counsellors, faculty, and other employees who live and work in areas with a high probability for natural disasters*" (Davis et al, 2010, p.347).

A further study which considered the impact of Hurricanes Katrina and Rita explored issues of mental health, substance use and adaptive coping amongst social work students (Lemieux et al 2010). These authors acknowledge existing evidence that identifies that disciplines with a combined coursework and clinical component "evoke more stress than do traditional graduate programmes" (p2). A survey was distributed to social work students from four universities in disaster-affected areas (sample size N=416). This included a range of questions around spiritual support, altruism, optimism, peritraumatic emotional responses, volunteer activities, hurricane related stressors, previous traumatic experiences and mental health. The questions around mental health included scales for assessing depression and posttraumatic stress disorder. Substance use was also measured, and questions asked in relation to adaptive coping. Results identified approximately half of the respondents (n=47%) showed symptoms of depression at or above the clinical level; sixteen percent reported substance use and five percent showed PTSD-symptoms at the clinical level. Specific implications of the findings for education were discussed. Recommendations included the importance of educators providing students with factual information about the prevalence, symptoms and risks of developing secondary traumatic stress. Acknowledgment was also made of the need to emphasise "*culturally specific risks and resiliencies*" as a proactive measure to support student empowerment. (p12).

Watson, Loffredo and McKee (2011) also looked at the impact of weather related natural disasters. They carried out a survey of 515 university students to ascertain student's emergency preparedness and disaster recovery needs following a major hurricane in 2008. The survey explored issues related to the evacuation process, communication, financial impact, health issues and availability of services. This study included both qualitative and quantitative analysis of findings. The results included identification that 47% of respondents stated that the storm had negatively affected their academic performance, however within the sub group of students who were enrolled in the Graduate School of Biomedical Sciences, this reached 62%. Qualitative analysis of open ended questions identified three major themes – being prepared; needing to be connected; and returning to normalcy. In conclusion, the authors identified that "*the major lessons learned are that the emergency preparation of students requires greater specificity and that discussion about post storm recovery expectations is essential. Following a natural disaster, students experience more distress than may be readily apparent*" (p362). Given the spontaneous and unpredictable nature of natural disasters, it is not surprising that the majority of studies associated with

these commence in the period following the event. One exception to this is Nolen-Hoeksema and Morrow's (2001) study of the effects of the 1989 Loma Prieta earthquake. The authors had coincidently assessed a group of Stanford University students (n=137) for measures of emotional health two weeks prior to the earthquake. These were then repeated at 10 days and seven weeks post the earthquake to test predictions about which of the students would demonstrate the most significant and long lasting symptoms of depression and post-traumatic stress. Their findings showed that students who had already demonstrated a ruminative response to depressed mood prior to the earthquake were more likely to show signs of depression and symptoms associated with PTSD after the earthquake. However, some students showed a decrease in PTSD and depressive symptoms after the earthquake, which the authors suggests may be linked to positive distractions such as contributing to the relief effort. It was also postulated that this could link to enhanced feelings of efficacy. The impact of the event was not specifically considered in relation to educational engagement, completion or outcome.

Other areas of focus within the education literature which are relevant to this study include the movement towards active development of resilience within students, and the nature of education related to disaster management and response. As healthcare professionals, there is an expectation that some education will be included in the curriculum in relation to disasters, and that this may have a psychologically protective element for individuals. Consideration has been given to the content of healthcare curricula (Jennings-Sanders et al, 2005; Markenson, Dimaggio & Redliner, 2005; NeSmith, 2006; Chapman & Arbon, 2008, Pfenninger, 2010) as well as to the processes of learning and critical thinking that may help shape responses at times of crisis (Bulson & Bulson, 2011). Resilience has also been identified as a specific concept of relevance in health care, as well as other, professions. Specific links have been made between educational approaches and the development of resiliency, and the opportunity to consciously focus on its inclusion as part of curriculum development (Howe, Smajdor & Stokl, 2012; Tempski, Martins & Paro, 2012).

While these are areas of related interest, it remains clear that there is little specific research looking at the impact on university level education, or on health care practitioner's education in relation to disasters. This gap suggests that there is a clear need for additional research which will identify the impact and implications of disaster and crisis events on teaching and learning, and which can in turn generate recommendations and guidelines for practice that will inform future policy and protocol development.

Participants

The cohorts sought were chosen to allow consideration of the differing implications and impact of a crisis situation for those who are engaged in full time education (ie undergraduate students), and those students who are juggling study with full or part time occupational employment (postgraduate nursing students and new graduate nurses). The groups also allow for a range of cultural comparisons and considerations, and it is likely that some degree of comparison related to gender, ethnicity, age, and immigrant status may be possible.

There is a strong emphasis within both nursing and medical education on the provision of culturally safe (nursing) and culturally competent (medicine) curriculum, and recognition of these aspects are likely to be of particular interest (NCNZ, 2009; MCNZ 2006a; MCNZ 2006b). The emphasis on ensuring culturally appropriate care and responsiveness for students who identify as Tangata Whenua has long been recognised within nursing

(Ramsden, 2002; Wepa, 2006). It is likely that a number of students affected by the earthquake will identify as Maori, and as such there is clear responsibility in terms of the Treaty of Waitangi to ensure that the research process is responsive to their needs, and draws clearly on the principles of partnership, participation, and protection. The principles of partnership were addressed by early consultation with relevant organisations, including Te Komiti Whakarite (CDHB) and the Maori consultation processes for research through University of Otago and CPIT.

Participation was open to all students, and it is hoped that by means of an open and inclusive recruiting approach, with clear opportunities to seek clarification around the process and its expected outcomes, that students felt able to participate in a culturally safe manner. Protection was addressed through adherence with ethical principles, as evidenced by ethics committee approvals, and the inclusion of Maori support. Other forms of occupational and educational institute support services available to participants were outlined on the information sheets related to this project. There is a commitment within this research to ensuring awareness and support for the development of Maori frameworks within educational curriculum, and it was anticipated that the findings from this research may highlight aspects specific to cultural subgroups (Macfarlane et al, 2008).

Rationale and Study Objectives

Rationale

The rationale underpinning this project is recognition of the potential for impact, distress and impaired ability to study resulting from a significant crisis event (the Canterbury earthquakes). It has been recognised anecdotally that the first (September) earthquake led to student distress, reduced access to technology, altered teaching schedules, and for some students' fear of entering teaching buildings or coming into the city. The hypothesis underlying this study was that these effects are likely to be exacerbated following the February 22nd earthquake, and that this may adversely affect students learning experiences and opportunities.

Media speculation suggested significant numbers of students withdrew from study in the Christchurch region as a result of the earthquakes, and identified a subsequent withdrawal of foreign students seeking to study in New Zealand (Binning, 2011; Tan, & Turner, 2011). There are international students enrolled in both medicine and nursing e programmes in Christchurch, and it is anticipated that future analysis of survey responses may provide insight into these students' responses to and plans in relation to continuing education in NZ. This will provide a clearer understanding of the impact of crisis events on foreign students and their specific needs in terms of educational response and need for support (Cameron & Mead, 2003; Butcher & McGrath, 2004).

The widespread disruption to normal services, access to technology, teaching rooms and labs together with the potential for personal and family impact in the form of injury, distress, loss of residential and workplace buildings will inevitably influence student motivation, willingness to engage and ability to do so. A common response in natural disasters has been the movement of teaching and learning to online and media supported formats (Henderson, 2005; Garland & Morimoto, 1996). While this can enable continued access to educational programmes, there are also issues in terms of access to needed technology, and student acceptance and adaptability. The re-ordering of priorities, both personal and professional and changing workplace expectations also need to be considered. This project has provided the opportunity to explore students' responses and their expectations in terms of support and resilience.

This research was the result of a collaboration between the Centre for Postgraduate Nursing Studies, University of Otago; the Christchurch School of Medicine, University of Otago; Christchurch Polytechnic Institute of Technology; and the Canterbury District Health Board.

Alternate teaching venue: Addington Race Course. Clinical practice setting for students studying Advanced Health Assessment

Study Objectives

The goals of this study were to 1) explore the type and range of student reactions and adaptations to the impact of an unexpected crisis situation, 2) recognise ways in which positive adaptation can be facilitated and 3) provide recommendations for educational institutes and support organisations derived from these findings, which are relevant across a range of settings and levels of education.

Benefits to Tertiary Teaching and Learning Practices

The benefits to tertiary teaching and learning include an enhanced awareness of the impact of crisis situations on student learning, and in particular the responses of students to unforeseen events. This awareness will be transferable to a number of other settings and circumstances, and may generate unique knowledge in this field. Comparisons will be possible between the specific sub groups enrolled in this study, which potentially will facilitate recognition and appropriate response to differing educational needs, as typified within these populations. It is envisaged that this will assist in developing a more culturally responsive approach and one that is able to anticipate and allow for proactive responses to potential situations.

The learners specifically involved in this study and the similar cohorts of health care students nationally (up to 30,000) will be influenced through the dissemination of findings from this study. However, it is likely that the findings will be transferrable outside of the specific healthcare field, and as such may be of benefit in all tertiary education settings.

Expected outcomes:

- Description of tertiary level medical and nursing students responses, decision making processes, critical thinking and reactions to an unanticipated / emergency event
- Determine differences specific to the following cohorts: postgraduate healthcare students, undergraduate healthcare students, newly graduated nurses
- Identify factors which support individual students, educational providers and educational delivery systems in their response and adaptation to crisis events
- Formulation and dissemination of recommendations which can inform organisational development and support services

Damage to roads and vehicles was widespread

Methods

Participants

E-mail invitations were sent to 421 nurses engaged in postgraduate study with the University of Otago, Christchurch; 149 nurses engaged in continuing education (NetP or ESP programmes) with the Canterbury District Health Board; 253 4th, 5th, and 6th year undergraduate medical students from the University of Otago, Christchurch; and approximately 600 undergraduate nursing students from the Christchurch Polytechnic Institute of Technology (CPIT) were made aware of the study by their tutors and posters placed around the campus.

Survey

This project utilised an anonymous survey format to collect data relating to the impact of the Canterbury earthquakes and aftershocks on healthcare students' learning and wellbeing. Due to the sensitive nature of the material being solicited from respondents, it was decided that an anonymous survey format be employed to preserve the identity of the respondent. An additional strength in using an anonymous survey was that it would yield more accurate responses, thereby reducing the potential for social desirability bias. Three separate surveys were used during the study; one for the undergraduate nursing cohort, one for the undergraduate medical school, and one for the registered nurses engaged in either postgraduate studies or continuing education. The three surveys were quite similar in nature with the major difference being that the undergraduate nursing survey did not provide the option of being re-surveyed and/or interviewed, in response to CPIT Ethics Committee directives.

The survey was made available online and included questions on demographics, cognitions and experiences associated with the earthquakes and aftershocks, personality, resilience, and questions about the impact of the earthquake on study performance. The survey also contained free text questions around what factors helped or hindered learning after the earthquake and aftershocks, whether anything positive had come out of the earthquake and aftershocks, and lastly what more the institution could have done to reduce the impact of the earthquake and aftershocks. Due to the survey being anonymous, it was not possible to follow-up respondents who produced 'clinically significant' scores on the mental health scales included in the survey. To counter this, a list of contact numbers for a range of support services was provided both on the information sheet attached to the email invitation and on the first page of the survey.

The survey commenced with questions related to gender, age, ethnicity, length of time resident in NZ, relationship status, and current role. Participants were also asked whether they were present in Christchurch at the time of the September, February and June earthquakes. At this point they were asked to self-assess the impact of the earthquake and aftershocks in terms of their living arrangements, provision of their course of study, own ability to study and finances. In relation to this, participants were asked to provide two scores – one of the impact 'at worst' and one for 'currently'. Further specific questions asked about aspects associated with disruption to study, and the impact on ability to study. These were followed by questions relating to perceptions of support, obligations towards others, and sense of safety in regard to living and working in Christchurch. Participants were also specifically asked if they had considered leaving Christchurch as a result of the earthquakes and aftershocks. This was followed by questions relating to physical and mental health, both prior to and following the earthquakes, and a free text question asking whether anything positive had come from the experience. Psychometric scales were then presented, followed

by further free text questions relating to what participants felt had either helped or hindered their learning during this time, and what specific actions their institutional organisation could have instituted to reduce the impact of the earthquake.

Measures used in the survey

DASS-21

The Depression, Anxiety, and Stress Scale (DASS) (Lovibond & Lovibond; 1995a; Lovibond & Lovibond, 1995b) is a self-report scale designed to measure the negative emotional states of depression, anxiety, and stress. The DASS comes in two versions; a 42 item scale and a shorter version consisting of 21 items. The DASS-21 was used in this study, which meant that scores had to be summed and then multiplied by two to give an overall score. Respondents rate the extent to which they have experienced each symptom over the past week, using a four-point severity/frequency scale. Scores for each sub-scale are determined by adding the scores for the relevant items, again multiplying by two. The maximum score is 42 in each of the depression, anxiety, and stress scales; higher scores indicating more impairment. The DASS has been shown to have high internal consistency, producing coefficient alpha values of 0.91, 0.84, and 0.90 for the depression, anxiety, and stress subscales respectively (Lovibond & Lovibond, 1995b). Although the DASS may contribute to the diagnosis of anxiety or depression, it is not designed as a diagnostic tool and should not be used to replace a face to face clinical interview (Lovibond & Lovibond, 1995a). Recommended cut-off scores for conventional severity labels (normal, moderate, severe) are indicated in Table 1.

Table 1. Recommended Cut-off Scores for the DASS-42* (Lovibond & Lovibond, 1995a)

	Depression	**Anxiety**	**Stress**
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	37+

*Scores obtained on the DASS-21 need to be multiplied by 2 to calculate the final score

PCL

The PTSD Checklist (PCL) is a 17-item self-report measure of the 17 DSM-IV symptoms for post-traumatic stress disorder (PTSD) that can be used as a screening tool for PTSD, aiding in diagnostic assessment of PTSD, and monitoring symptom change during and after treatment. Three versions of the PCL are available: (1) the PCL-M is a military version whereby questions refer to a “stressful military experience”, the PCL-S is a non-military version that refers to a “specific stressful experience”, and the PCL-C is a civilian version where the questions do not refer to a specific event, but rather a “stressful experience from the past”. The PCL-C was used in this study. The PCL can be scored in different ways: a *total symptom severity score* can be calculated by summing the scores from each of the 17 items. Scores can range from 17 to 85 with higher scores indicating greater impairment. Currently, the gold standard for diagnosing PTSD is a structured clinical interview such as the Clinician-Administered PTSD Scale (CAPS) (National Centre for PTSD; U.S. Department of Veteran affairs, 2012). When necessary, the PCL can be scored to provide a *presumptive diagnosis*. This can be made by:

1. Determining whether an individual meets DSM-IV symptom criteria, i.e., at least one B item (questions 1-5), three C items (questions 6-12), and at least two D items

(questions 13-17). Symptoms rated as 'moderately' or above (responses 3 through 5) are counted as present.
2. Determining whether the total severity score exceeds a given cut-point.
3. Combining methods (1) and (2) to ensure that an individual has sufficient severity as well as the necessary pattern of symptoms required by the DSM-IV (National Centre for PTSD; U.S. Department of Veteran Affairs, 2012).

The National Centre for PTSD located within the U.S Department of Veterans Affairs (2012) recommends that two factors be taken into consideration when choosing a PCL cut-point score; the goal of assessment, and the prevalence of PTSD in the target setting. When the goal is to use the PCL as a screening tool or to maximise detection of possible cases a lower cut-point is advised. A higher cut-point is advised when informing diagnosis or to minimise false positives. With respect to prevalence, the lower the estimated prevalence of PTSD in a given setting, the lower the optimal cut point. For instance, the 'Centre' has suggested a cut-point score between 30-35 where the estimated prevalence is below 15 percent (e.g. primary care).

The PCL has demonstrated strong psychometric properties, including internal consistency (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Weathers, Herman, Huska, & Keane, 1993), test-retest reliability (Blanchard et al., 1996; Ruggiero, Del Ben, Scotti, & Rabalais, 2003), strong convergent validity with both the Mississippi PTSD scale (Weathers et al., 1993) and MMPI-2 Keane PTSD Scale (Blanchard et al., 1996), and good sensitivity and specificity (Blanchard et al., 1996).

EPQ-BV

The Eysenck Personality Questionnaire – Brief Version (EPQ-BV) (Sato, 2005) is a 24-item self-report scale designed to measure extraversion and neuroticism. It is a newly revised version of the Eysenck Personality Questionnaire – Revised Short form (EPQR-S; Eysenck & Eysenck, 1992, as cited in Sato, 2005). The newer EPQ-BV does not contain both the Psychoticism and Lie scales. Sato (2005) argues that the Psychoticism Scale is rarely used and is associated with various psychometric problems, hence the removal of this scale. In addition, he removed the Lie Scale because it could be replaced "by embedding items from other scales measuring social desirability if necessary" (Sato, 2005, p. 547). One final change was the response format was changed from a yes-no response to a 5-point Likert-type scale to improve the reliability of the measures; responses ranging from *not at all* (1), *slightly* (2), *moderately* (3), *very much* (4), to *extremely* (5). Scores on each of the extraversion and neuroticism scales range from 12 to 60 with higher scores denoting a greater degree of either extraversion or neuroticism. When compared with the EPQR-S, the EPQ-BV demonstrated superior internal consistency and performed equally as well with respect to concurrent validity, and test-retest reliability (Sato, 2005).

WSAS

The Work and Social Adjustment Scale (WSAS) is a simple 5-item self-report measure of functional impairment. Scores range from 0 to 40 with higher scores indicating greater impairment in work, social, and related areas. Furthermore, "a WSAS score above 20 appears to suggest moderately severe or worse psychopathology. Scores between 10 and 20 are associated with significant functional impairment but less severe clinical symptomology. Scores below 10 appear to be associated with subclinical populations" [at least for obsessive-compulsive disorder and depressive disorders] (Mundt, Marks, Shear, & Griest, 2002, p. 463). More recently, the WSAS has been shown to be a valid, reliable, and change sensitive measure of work, social and other adjustment in phobic disorders (Mataix-

Cols et al., 2005), eating disorders (Tchanturia et al., 2012), and chronic fatigue syndrome (Cella, Sharpe, & Chalder, 2011).

CD-RISC

The Connor-Davidson Resilience scale (CD-RISC; Connor & Davidson, 2003) is a 25-item self-report measure of resilience. Scores range from 0 to 100, with higher scores reflecting greater resilience. The CD-RISC has been tested using both general population and clinical samples, and demonstrates excellent psychometric properties, with high internal consistency and good validity (Connor & Davidson, 2003; CD-RISC manual, n.d.)

Data Analysis

Data was collected electronically through the programme "Survey Monkey" and transferred to SPSS where simple descriptive statistical analysis was performed. Free text questions were subjected to thematic analysis (recognition of patterns and recurrent themes) using the framework outlined by Braun and Clarke (2006). A theme is defined as a representation of something important about the data, in relation to the research question. It represents a level of "patterned response or meaning within the data set" (Braun & Clarke, 2006, p.82). Elements taken into consideration when determining themes include prevalence, strength of expression, and 'richness' of data (Braun & Clarke, 2006).

Ethics Approval and Maori Consultation

Ethics approval for the project was obtained from the Upper South A Regional Ethics Committee in relation to those students working within the CDHB (i.e. the NetP nurses), the University of Otago Human Ethics Committee in relation to medical and postgraduate nursing students enrolled with the University of Otago, and the CPIT Ethics Committee in relation to undergraduate nursing students enrolled at CPIT. In addition, consultation with Maori on the project was sought from Te Komiti Whakarite (Canterbury District Health Board) and the Maori/Indigenous Health Institute (University of Otago, Christchurch).

Given the anonymous nature of the survey, it was identified that it would not be possible to provide any direct support to students who disclosed issues of concern or whose scores on the psychometric tests indicated a potential clinical issue. This was addressed by including contact details for the relevant support services (i.e. these were specific to the sub-group completing the survey) available through each organisation.

Litchfield St: minutes after the Feb. 22nd earthquake, approx 500m from the Centre for Post Graduate Nursing Studies

Results

This section provides a cohesive summary of both the quantitative and qualitative findings from the study. To reiterate, four separate cohorts were surveyed during this study:

1. Undergraduate nursing students (UNursS)
2. Nurses engaged in postgraduate studies (NursPS)
3. Nurses engaged in continuing education (NursCE)
4. 4th, 5th & 6th year undergraduate medical students (UMedS)

Participants were surveyed under the course related groups to allow potential comparisons between discreet categories of students. It was hypothesised that there would likely be demographic differences between the groups, and that this may lead to recognition of needs unique to the different groups. It is anticipated that continuing analysis in relation to this will be undertaken, and form the basis for future publications. Further potential research questions are likely to arise in relation to aspects of professional culture, gender and ethnicity as the data continues to be explored. Maintaining the occupational and educational boundaries between the groups also allowed for the surveys to contain tailored information – in particular to provide targeted support information and details for specific counselling and / or health services associated with each institution. Similarly, each of the collaborating organisations had their own processes for Maori consultation and ethical approval, which required defined groups.

Quantitative Findings

The response rate varied between the four cohorts with the UMedS cohort providing the highest response rate of 70 percent. The response rates are listed in Table 1.

Demographics

Over 90 percent of the respondents from the nursing cohorts were female, whereas slightly under 60 percent of the UMedS cohort were female. In addition, the mean ages for the NursPS, NursCE, UNursS, and the UMedS cohorts were 43.2, 32.7, 27.0, and 23.4 years respectively. Among the nursing cohorts over 75 percent of the NursPS and NursCE (combined) were either in a married, defacto, or civil union arrangement, whereas slightly over a quarter of the UNursS cohort was in a similar position. With respect to self-reported ethnicity using the sole/combination (Level 1) output method, over three quarters of the nursing cohorts (combined) identified with the European Only group. In comparison, slightly under half of the UMedS cohort identified with the European Only group (see Table 2 for more detail).

Mental and Physical Health

On a measure of resilience (CD-RISC; Connor & Davidson, 2003), the NursPS cohort produced the highest mean score (74), followed by the NursCE cohort (70.5). The mean scores for the UNursS cohort and the UMedS cohort were 68.7 and 65.1 respectively. Lastly, the UNursS cohort consistently scored higher (greater severity) than the two other nursing cohorts (NursPS & NursCE), and UMedS cohort on the DASS-21 (Lovibond & Lovibond, 1995) and the PCL (Weathers ,1993), see Table 2 for more detail.

There was a substantial increase in the number of self-reported mental health issues after the earthquakes and aftershocks with the nursing cohorts (combined) experiencing the greatest increase (91.3%), while there was an increase of 88.2 percent for the medical school cohort. The nature of the mental health issues were not clear for all respondents, but where additional information was provided by respondents, anxiety and sleep disturbances were commonly reported. Also, among the nursing cohorts (combined) slightly under a third of respondents who reported mental health issues after the earthquake and aftershocks received treatment for the issue. A series of independent samples t-tests were conducted to examine whether there was a statistically significant difference between those respondents who self-reported experiencing mental health issues after the earthquake and aftershocks and those who did not, and scores on the mental health scales. There was a significant difference between both groups on all the scales except for the extraversion sub-scale of the EPQ-BV. For example, there was a significant difference between the mean PCL score of the group of respondents who self-reported experiencing mental health issues after the earthquake events [M = 43.69, SD = 15.14] and the group who did not [M = 29.59, SD = 11.57] (t = 7.742, df = 133.3, p = <.001; Mean difference: 14.10, 95% CI: 10.50, 17.71).

In addition, an independent samples t-test was conducted among the nursing cohorts (combined) to examine whether there was a statistically significant difference between males and females in relation to the mental health scales. The test did not reveal a statistically significant difference between males and females across any of the scales. For instance, there was no significant difference between the mean CD-RISC score for the female group [M = 70.13, SD = 14.44] and the male group [M = 70.85, SD = 14.60}, (t = .175, df = 275, p = .861; Mean difference: 0.72, 95% CI: -7.36, 8.80).

A Pearson correlation analysis was conducted to see what type of relationship there was between age and the scales used for this study. Several statistically significant results were found. Age was correlated with all the MH scales (weak correlations) except for the WSAS. The relationship was predominantly negative (or inverse), except for the CD RISC. For example a significant and negative relationship was found between age and depression score on the DASS (r = -1.86, N = 277, p =.002). This correlation was low in strength.

A series of one-way ANOVAs were performed to examine the relationship between various demographic variables (e.g. education status and relationship status) and scores on the mental health scales when comparing the different nursing cohorts. A number of statistically significant results were found. For instance, a one-way ANOVA, examining the relationship between education status and PCL score among the nursing cohorts (combined) revealed a statistically significant difference between groups F (2, 282) = 6.36, p = .002. Post-hoc Games-Howell tests showed a statistically significant difference between the NursPS group (M = 29.07, SD = 11.80) and the UNursS group (M = 35.87, SD = 14.72). Those in the NursPS group reported significantly lower scores on the PCL scores than those in the UNursS group (Mean difference: -6.80, 95% CI: -10.88, -2.72). There were no other significant differences between the groups.

Also, a one-way ANOVA was conducted to examine whether there were statistically significant differences among the nursing cohorts (combined) with respect to relationship status (e.g. single, in a relationship, married/defacto/civil union) and PCL-C score. The

results revealed a statistically significant difference between groups F (2, 281) = 4.01, p = .019. Post-hoc Games-Howell tests showed a statistically significant difference between the 'married/defacto/civil union' group (M = 31.25, SD = 12.15) and the 'in a relationship' group (M = 36.71, SD = 15.06). Those in the 'married/defacto/civil union' group reported significantly lower PCL scores than those in the 'in a relationship' group (Mean difference: -5.46, 95% CI: -10.31, -.60). There were no other significant differences between the groups.

Even though several of the scales employed in this study were not specific diagnostic tools, there were a number of respondents whose scores could be categorised as 'clinically significant'. A clinically significant behaviour in this instance is one that deviates from established normative levels (e.g. social, developmental, or educational), appears to be chronic, and results in some form of impairment (e.g. social, occupational, or medical) (Barlow, Nock, & Hersen, 2009). For example, the percentage of respondents from the UNursS, NursPS, NursCE, and UMedS cohorts with a total severity score above 35 (upper cut-point for the primary care population) on the PCL, indicating a presumptive diagnosis of PTSD was 40.4, 24.3, 30.8, and 17.2 percent respectively.

Also, the percentage of respondents who produced scores on the DASS – depression subscale that was 14 or higher, indicating depressive symptomology was 12.1, 6.8, 23.1, and 12.6 percent respectively.

In addition, there was also an increase in the number of self-reported physical health issues with the nursing cohorts (combined) experiencing an increase of 130 percent, while there was a 55.6 percent increase for the medical school cohort. It was not clear from the survey responses what all the physical health issues were, but when additional information was provided by respondents, respiratory problems and sleep disturbances were often reported.

Other Quantitative Findings (Nursing Cohorts)

In relation to the disruption to study, the greatest loss or disruption for survey respondents 'at worst' was around course time, lecture theatre availability, having a place to study at their institution, the provision of library services, opportunities for peer interaction on campus, and having a place to study at home.

In terms of social support, over half of both the UNursS cohort (53.2%), and the NursPS and NursCE cohorts (combined) (57.2%) endorsed being either 'supported' or 'extremely supported' by their education institution following the earthquakes and aftershocks. Also, half of the UNursS cohort (50.5%), and over half of the NursPS and NursCE cohorts (combined) (59.8%) endorsed being either 'supported' or 'extremely supported' by their clinical setting. Lastly, over four fifths of the UNursS cohort (82.6%), and close to three quarters of the NursPS and NursCE cohorts (combined) (72.4%) endorsed being either 'supported' or 'extremely supported' by people in their life in general (e.g. friends, family, neighbours, and health professionals).

Nearly a quarter of UNursS cohort (23.6%), and close to a fifth of NursPS and NursCE cohorts (combined) (16.9%) considered leaving Christchurch as a result of the earthquake and aftershocks.

Impairment in areas such as sleep, concentration, anxiety, mood, and alcohol and drug use was greatest directly after the earthquakes and aftershocks. It appears that these levels

abated by the time the respondents completed the online questionnaire (3-6 months post June 13th aftershock). For instance, close to half of the UNursS cohort (48.7%) said that the impact of the earthquakes and aftershocks 'at worst' was severe, whereas only 2.6 percent said that it was severe 'currently'. A similar finding was observed with the NursPS and NursCE cohorts (combined).

Lastly, over half of the UNursS cohort and close to half of the NursPS and NursCE cohorts (combined) said that something positive had come out of the earthquake and aftershocks for them. More information on this is provided in the qualitative analysis section.

Table 2 Descriptive summary of the AKO Survey – quantitative results						
	UOC Cohort	**CDHB Cohort**	**UOC & CDHB Cohort Combined**	**CPIT Cohort**	**CPIT, UOC & CDHB Cohort Combined**	**Medical School Cohort**
Responses						
Total started survey	76	13	89	203	292	210
Total completed survey	75	13	88	202	290	177
Response rate	75/421 (17.8%)	13/149 (8.7%)	88/570 (15.4%)	202/600 (33.7%)	290/1,170 (24.8 %)	177/253 (70.0%)
Mean age (years)	43.23	32.69	41.6	27.0	30.3	23.4
Gender						
Male	5 (6.6%)	0	5 (5.6%)	8 (3.9%)	13 (4.5%)	76 (36%)
Female	70 (92.1%)	13 (100%)	83 (93.2%)	189 (93.1%)	272 (93.2%)	124 (59%)
No response	1 (1.3%)		1 (1.1%)	6 (3.0%)	7 (2.4%)	10 (5%)
Ethnicity	N/A	N/A	N/A	N/A	N=290	N=210
*Sole/Combination (Level 1)**						No Response 35 (16.7%)
European only					241 (83.1%)	103 (49.0%)
Maori only					4 (1.4%)	0
Pacific Peoples only					4 (1.4%)	0
Asian only					11 (3.8%)	60 (28.6%)
MELAA* only					4 (1.4%)	5 (2.4%)
Other Ethnicity only					0	0
European/Maori					14 (4.8%)	2 (1.0%)
Maori/Pacific Peoples					1 (0.3%)	0
Two Groups not Elsewhere Identified					9 (3.1%)	4 (1.9%)
Three Groups					2 (0.7%)	1 (0.5%)

* In the sole/combination form of output, there are sole ethnic categories for respondents who report only one ethnic group, and combination categories for respondents who give more than one ethnic group. Examples of combination categories are Samoan/Tongan, NZ European/Mäori and Mäori/Pacific

** MELAA: Middle Eastern, Latin American, and African

Table 2 cont. Descriptive Summary – Quantitative Results						
	UOC Cohort	**CDHB Cohort**	**UOC & CDHB Cohort Combined**	**CPIT Cohort**	**CPIT, UOC & CDHB Cohorts Combined**	**Medical School Cohort**
Mental Health Issues (self-reported)						
Before earthquakes N (%)	4 (5.3%)	3 (23.1%)	7 (8.0%)	39 (19.4%)	46 (15.9%)	17 (8.7%)
After earthquakes N (%)	13 (17.8%)	6 (46.2%)	19 (22.1%)	69 (35.0%)	88 (31.1%)	32 (16.3%)
% change	225.0% ↑	100% ↑	171.4% ↑	76.92% ↑	91.3% ↑	88.2% ↑
Physical Health Issues (self-reported)						
Before earthquakes N (%)	8 (10.8%)	1 (7.7%)	9 (10.3%)	21 (10.5%)	30 (10.5%)	9 (4.6%)
After earthquakes N (%)	18 (24.7%)	3 (23.1%)	21 (24.4%)	48 (24.0%)	69 (24.1%)	14 (7.2%)
% change	125.0% ↑	66.7% ↑	133.3% ↑	129.6% ↑	130.0% ↑	55.6% ↑
Mental Health Measure						
DASS-21						
Dep. Mean (SD)	3.6 (5.0)	5.9 (6.3)	3.9 (5.2)	6.1 (7.5)	5.4 (6.9)	5.8 (8.0)
Anx. Mean (SD)	2.0 (2.8)	4.3 (5.3)	2.3 (3.4)	5.2 (6.7)	4.3 (6.0)	2.8 (4.5)
Stress Mean (SD)	5.3 (5.8)	8.5 (6.2)	5.8 (5.9)	8.7 (7.8)	7.8 (7.4)	6.8 (7.4)
Total Mean (SD)	10.7 (11.4)	18.6 (15.4)	12 (12.3)	19.75 (19.71)	17.6 (18.1)	15.5 (17.8)
PCL-C Mean (SD)	29.0 (11.8)	32.2 (14.7)	29.5 (12.2)	35.9 (14.7)	34.0 (14.3)	29.2 (11.9)
WSAS Mean (SD)	14.8 (9.2)	12.4 (10.7)	10.2 (9.4)	12.7 (9.4)	13.5 (9.4)	15.8 (10.4)
CD-RISC Mean (SD)	74.0 (13.8)	70.5 (15.2)	73.4 (14.0)	68.7 (14.4)	70.2 (14.4)	65.1 (14.7)
EPQ-BV						
Extraversion	37.2 (8.9)	33.5 (6.7)	36.6 (8.7)	38.9 (10.1)	38.9 (8.4)	37.4 (8.1)
Neuroticism	20.1 (6.2)	24.2 (4.8)	21.3 (6.2)	25.4 (9.3)	24.6 (8.1)	24.4 (8.1)

SD = Standard deviation

DASS-21 (Depression, Anxiety, and Stress Scale), PCL-C (Post-traumatic Stress Disorder Checklist – Civilian, WSAS (Work and Social Adjustment Scale, CD-Risc (Connor-Davidson Resilience Scale), EPQ-BV (Eysenck Personality Questionnaire – Brief Version)

Qualitative Findings (Nursing Cohorts)

Analysis of four of the free-text questions from the student survey revealed a number of key themes. The themes and supporting quotes are presented here.

Q. Has anything positive come out of the earthquakes and aftershocks for you?

Theme: *Sense of community*

There were a number of responses that centred on the idea of bringing people together:

> "For everyone here for the quakes, it gives a sense of belonging… an event we will always be connected by"
>
> "Brought friends and community together, shown a resilient and beautiful side of Christchurch people, and the rest of the country"
>
> "I feel that the one positive thing to come out of these earthquakes and aftershocks is a renewed sense of community and support. Through the disasters people have had to band together to support one another and countless stories of selflessness and love have become known. There is now a greater sense of appreciation for one another and for what we have left instilled in the Cantabrian people".

Theme: *Enhanced relationships with family and friends*

One of the most salient themes to emerge from the responses was the strengthening of relationships with family and friends:

> "I feel I have learnt more about my family and have even stronger connections with my family"
>
> "More of a community feel in our neighbourhood. Closer to family and friends"
>
> "Greater appreciation for my life and my family and friends
>
> "Got to spend more time with friends and family in the weeks following the earthquake"
>
> "I value and love my family and friends more"

Theme: *Impact on the environment*

Another theme that stood out among the responses was that out of the destruction to the environment (i.e. damaged homes and vehicles), people were supported by institutions and organisations:

> "I'm getting a new house, don't know where it's going to be because we are orange, but I can have a new house"
>
> "I got a new car through insurance. I took myself and children on holiday with the red cross money"

Theme: *Disaster preparedness and future planning*

The earthquake and aftershocks has resulted in on-going planning and preparation for similar emergency situations in the future:

> "I now know that I am able to handle large disasters and am more prepared for any other disaster"
>
> "…have a survival kit in order and family know what to do and where to meet in an emergency"
>
> "I have been able to gauge how well I cope in emergency situations and think about what I may need to do next time or in the future and also work out emergency strategies with family"

Theme: *Implications for work/clinical role*

The Canterbury earthquake experience has led to role development and strengthened work relationships:

> "Opened the doors to a lot more opportunities for my nursing as I moved out of my comfort zone (or rather was chucked out) therefore more willing and able to cope with change"
>
> "Stronger working partnerships formed across the health sector and within teams"

Theme: *Impact on education*

Relationships between tutors and students were strengthened as a result of the earthquake experience:

> "I now feel that I know the teachers at my educational provider more personally, making it easier to approach them when needed for emotional support or educational support"

Theme: *Self-efficacy and resilience*

The earthquake experience helped individuals realise how capable they are in emergency situations and how much they can cope with:

> "I have learnt to be more resilient and how to put good coping skills in place for myself and help others to do the same"
>
> "I am more resilient than I realised. I can cope with a lot more and now I do not sweat the sweat the small stuff"
>
> "Although it has affected my mental health, I have coped overall and feel stronger in some ways. I feel I can cope with more than I thought"

Q. What could your educational institution do to help reduce the impact of the earthquake and aftershocks on your studies?

The themes that emerged from this question are presented here in two parts; the first part looks at the themes that were evident among the nurses engaged in postgraduate studies or continuing education and the second part the themes that were identified among the undergraduate nursing student cohort.

Nurses Engaged in Postgraduate Studies or Continuing Education

Theme: *Adjust academic requirements*

One of the most notable themes here was the desire for the disruptions to be taken into account when setting academic deadlines and marking assignments:

> "Reduce the assignment criteria"
>
> "More flexibility with assignment dates i.e. allow longer"
>
> "Extensions for theoretical work if there has been a physical and psychological impact"
>
> "…I think the extension for the assignment due the following week could have been more than the weekend – especially since it was all such a new experience"

Theme: *Communication*

There appeared to be a polarisation with respect to the perceived quality of communication by education providers, with some respondents speaking highly of the education provider, while others were less pleasing:

> "Was well looked after despite all the changes as a result of the earthquake. Great communication and flexibility on the institutions behalf"
>
> "Clear communication via personal email as well as institute email. The library was poor at communicating service changes etc."

Theme: *Library access*

The inability to access the library was mentioned frequently by respondents as an impediment to learning:

> "An easily accessible library would be helpful. UOC could have made a deal with chch polytech to use the library at certain times etc."

Theme: *Flexibility in delivery and course content*

Several of the respondents commented on the alternative curriculum delivery options and the modified course content:

> "Given my current institution (Otago university)has had issues with no access to building, no lecture rooms, library access etc they have done an amazing job to find alternative venues (certainly entertaining having a lecture at the racecourse with the

noise of the race intermittently coming in) and continued to provide post grad education"

Theme: *Access to supervisors*

Access to and support from tutors was a theme that emerged for a handful of respondents:

> "More support from tutors/easier access to tutors"

> "I completed my Masters study in December 2010 and therefore relied heavily on the support from my academic supervisors. So supervisor and access to staff was an important element for me"

Theme: *Nothing more*

The acknowledgement that the institution could do little more given the circumstances was a particularly salient theme to emerge from the responses:

> "Nothing. They were great"

> "At present nothing. Was well looked after despite all the changes as a result of the earthquake. Great communication and flexibility on the institutions behalf"

> "Nothing further, they have gone out of their way to retain a sense of normality and as a result of this my study hasn't really been interrupted, they were also very gracious with extensions on assignments following both earthquakes as the time I had to complete these was effected and also found it very hard to focus on study when there were so many other stressful things going on"

Theme: *Acknowledgement of positives and staff impact*

Another major theme to emerge from the responses was the gratitude towards institutional staff:

> "I thought the postgrad centre for nursing studies did an excellent job with out-of-town students such as myself - I found myself worrying about centre staff I had come to know over the past 3 years & powerless to do anything to make it better"

> "I didn't recognise at the time the impact the earthquake and other staff related matters had on me at the time, but both Otago and the hospital academic support was outstanding. The course kept us informed of all changes. I have been very well supported"

<u>Undergraduate Nursing Students</u>

Theme: *Additional lectures and tutorials*

A popular theme to emerge from the undergraduate respondents was the need for additional lectures and tutorials:

> "Offer additional lectures/tutorials on subjects that are more difficult"

> “If it was possible it would be good to have more tutorials and additional learning exercises however I’m not sure that’s realistic”

> “Allowing more time to be spent with tutors in smaller groups. Our tutorials were taken away from us so we could get through all the content in lectures. I found the tutorials the best place to learn the content so having to learn this independently was more difficult”

Theme: *Online learning option*

A number of respondents brought up the idea of recording all lectures and making them available online:

> “Have more online lectures and work ready to go in case of an event that prevents us coming/or wanting to come to Polytech”

> “Always have online study as a back up option”

> “Online lessons or putting whatever was missed in class onto Moodle”

Theme: *Timely and accurate communication*

Timely and accurate communication by the institution around continued delays was a major theme to emerge from the responses:

> “The only thing I can really think of is communication, communication, communication!”

> “Clear communication at the beginning would have been very helpful”

> “The biggest thing is communication - particularly knowing when we should expect to know what's happening. Waiting to hear anything can be the most anxious time, once you know that you are not "forgotten" & that something is in the pipeline, you tend to forget about that issue, and gives ability to focus on others at the time”

> “Just keeping the students informed on what is needed from us, like do we need to do readings, what chapters, what we could do towards assignments/tests/essays Let us know when we can go back on campus when you know. Answer emails”

> “Keep us informed of the safety of the buildings, altered library servicing hours, modified course outlines, constant update of Moodle sites with less misleading info”

Theme: *Financial consideration*

A theme that emerged from a number of responses was the need for financial support and consideration for those who were impacted by the earthquake and aftershocks:

> “Financially supporting students who have been effected as a direct consequence to the earthquake, ie grants for transport costs to different locations”

> “A little financial support (like how at UC and displaced high schools each student got $500) would make an amazing difference in my life”

Theme: *Support*

This was another area where responses were polarised. The provision of additional support was a significant theme to emerge from some of the responses, while with others it was sufficient given the circumstances:

> "Be more supportive and understanding"
>
> "Be more empathetic towards dire personal circumstances. Be supportive. Help meet learning requirements. Encouragement to continue and succeed"
>
> "Some sort of support for nursing students out on clinical as we are very stressed and having to work 5days a week clinical and work weekends for our own jobs"
>
> "Tutors were amazingly supportive within the med/surg course and placements"
>
> "They are doing everything they can to help and support students through the tough times"
>
> "I believe they did all they could to support the students in a difficult situation"

Q. Since the earthquake and aftershocks, what has helped your learning?

The following themes emerged for both the undergraduate nursing student cohort and the cohort of nurses engaged in either postgraduate studies or continuing education.

Theme: *Supportive supervisors and tutors*

A number of respondents mentioned the support they received from either their supervisors or tutors:

> "Two weekly meetings with my supervisor, to keep on track. After having about four months off working on my thesis what so ever"
>
> "Support and the ability for tutors let you talk through your experiences. Having some understanding in our ability to study effectively and offering extra support"
>
> "The supportive tutors we have who would understand that we were under stress and sometimes finding things hard to stick in our head due to other stresses"
>
> "The supportive network of friends in the course, and especially the unselfishness of the tutors' love of teaching. It is more challenging moments for the tutors as they have to juggle between work, organising the right timetable for the students, and especially most challenging for those with family. Without these, I would have given up hope in studying at Christchurch and return home"

Theme: *Peer support*

Another form of support for respondents during the earthquake experience came from their peers:

> "I have been fortunate to have a colleague completing the same courses as me and so that peer support and encouragement has been vital"

> “Talking to other people who are also doing study and listening to their stories”
>
> “Having good friends to study with and a laugh during class to help me feel more relaxed”

Theme: *Perseverance*

A notable theme to emerge from respondents was the notion of ‘just getting on with it’:

> “Being bloody minded/determined that the natural disaster wasn’t going to derail my plans”
>
> “Thinking that I am not going to let the earthquakes get in the way of study”
>
> “Not sure. Just attitude to persevere”
>
> “A new determination to achieve my goals of becoming an RN regardless of what challenges are presented to me”

Theme; *Resilience and coping*

A number of respondents wrote about finding ways of managing study and the earthquakes:

> “Nothing actually. It reinforced that I am a strong woman and have managed to continue to study although it has affected my marks. Anyone who decided to undertake study this year is amazing”
>
> “I have come to rely on myself more and had been creative in utilising educational resources”
>
> “While I found it hard to concentrate in lecturers, I am able to learn through my own reading and revision which has been helpful”

Theme: *Nothing*

A number of respondents stated that nothing has helped their learning:

> “Nothing – I was in survival mode. It just was what it was. The situation as surreal”
>
> “Not a lot really, finding it very hard to concentrate and have lost enjoyment”

<u>Undergraduate Nursing Students</u>

Two themes emerged among the undergraduate nursing students that were distinct from the themes to emerge for nurses engaged in postgraduate studies or continuing education; an alternative campus, and the availability of online learning.

Theme: *An alternative campus*

The move to a temporary alternative campus (Lincoln University) was mentioned by a number of respondents:

> “The relocation to Lincoln also helped”
>
> “Continuing courses at Lincoln was good”

> “The availability of resources even though library was down, especially in Lincoln”

> “Going out to Lincoln, instead of town. It had a beautiful, well resourced township that made life a little easier, getting supplies in one place. Car pooling to Lincoln, for the ‘sharing and debriefing’ that took place on the trip was 100% valuable”

Theme: *Online learning*

Having access to study material online proved invaluable:

> “Online lessons or putting whatever was missed in class onto Moodle”

> “Have some classes delivered online”

> “Providing a lot of the material online with recordings of the lectures has made it easier to catch up on lectures as I sometimes cannot afford to make it to lectures some days”

Q. Since the earthquake and aftershocks, what has hindered your learning?

The following themes emerged for both the undergraduate nursing student cohort and the nurses engaged in either postgraduate studies or continuing education.

Theme: *Inability to concentrate*

A number of respondents reported not being able to concentrate because of the threat of further aftershocks:

> “The interruption of aftershocks and being able to calm down and concentrate afterwards. Not being able to sleep, concentrate and a constant waiting for a big one that may harm myself or others. Feelings of helplessness and exhaustedness”

> “My ability to concentrate and feeling fatigued and at times "out of my body" and numb. I was just going through the motions but at the same time trying to learn as much as I could because this will all come to an end at some stage (I hope!!!)”

Theme: *Lack of motivation*

Issues with motivation were common among respondents:

> “Slight loss in motivation and finding it hard to clearly understand instructions and directions”

> “My own personal motivation”

> “At times a complete feeling of unmotivation, something not experienced before all the aftershocks”

> “I feel quite run-down due to the stress of the year and this is affecting my motivation to study hard for the remaining time of study”

Theme: *Fatigue/Sleep deprivation*

Difficulty sleeping and fatigue was reported by numerous respondents:

> “Not getting enough sleep some nights after being woken by aftershocks and then getting up early the next morning and trying to concentrate in lectures and tutorials”
>
> “In the period following the quakes focusing and remembering information was difficult and there was a constant feeling of exhaustion plus sleep difficulties which impaired learning”
>
> “I usually can't sleep well whenever there is a big aftershock felt”
>
> “Being woken up early in the morning by aftershocks unable to get back to sleep then having to get up for clinical placements with minimal sleep”

Theme: *Increased family and work commitments*

This theme emerged among all nursing cohorts, but was more salient among the nurses engaged in either postgraduate studies or continuing education:

> “My commitments to work and family. My daughter was very sick in Feb, and has continued to get sick. Her school was moved to another area miles away, and then there was constant closers due to aftershocks and snow. This adds stress trying to organise drop off and pick up. My daughter also has a medical condition that i am constantly worried about now if we are unable to get to her if there is another emergency. So my learning has been hugely hindered. It is not my priority”
>
> “Needing and wanting to be with my family so I can support them and they can support me”
>
> “My commitments to work and family”

Theme: *Access to learning resources*

Inability to access lecture theatres, the library, computers, and online content was reported by many respondents:

> “No access to library which I used a lot before earthquake”
>
> “Change of location for lectures - having limited access to computers and library services”
>
> “Not having the library and the routine we used to have was hard”
>
> “No library- difficult to get required resources, no study area (i prefer not to study at home due to family distractions and have no private area in which to study) no parking to access any resources”

<u>Undergraduate Nursing Students</u>

Several themes emerged for the undergraduate nursing student cohort that did not feature with the cohort of nurses engaged in either postgraduate studies or continuing education, which included increased commuting times, the integrity of buildings used for learning, and increase in transportation costs.

Theme: *Increased commuting times*

Travelling out to Lincoln University was reported by several respondents as an impediment to learning:

> "Initially it was the travelling to Lincoln campus (cost, time, car pool relationships) but it gave us more time to study in small groups and share our eq experiences in our class group"

> "Having to travel to Lincoln from Woodend was very costly in petrol and took a lot of time to get there which cut into my study time"

Theme: *Integrity of the buildings*

Some of the respondents reported that the safety of the buildings was somewhat questionable:

> "Not feeling safe in the buildings at CPIT especially N & S blocks"

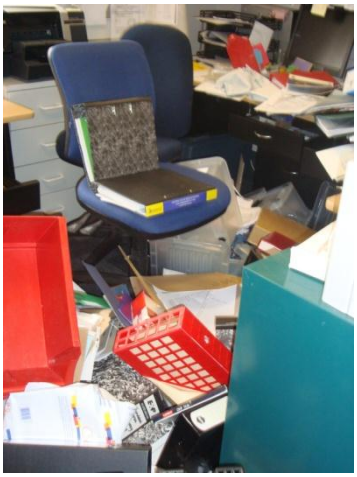
Theme: *Increased transportation costs*

A handful of respondents reported the additional cost of commuting to Lincoln was a factor the impeded learning:

> "Being relocated out to Lincoln University. Geographically this was a huge distance for me to travel and I was concerned about being so far away from my children's school after being separated from them in the Feb earthquake. The cost of travelling also hindered my learning as I could not afford to travel out to Lincoln particularly if only 1 class was scheduled therefore I missed some class time that I normally wouldn't have missed"

> ""Having to make long trips to Lincoln University which was not only time consuming but financially stressful"

> "Transportation and financial especially when the lectures were moved to Lincoln"



Nurse Educator's office, Christchurch Hospital

Discussion

Study limitations

Sample size was less than anticipated, which has implications for the ability to identify statistically significant comparisons amongst cohorts. Further work in regard to possible comparisons is continuing. Due to a number of factors, including continued aftershocks and associated disruptions, the survey commenced later than originally planned, which may have impacted on recruitment.

The sample was limited to medical and nursing tertiary level students, so that generalisability outside of these groups is limited. However, the core findings relating to responses to unexpected or crisis situations have relevance in a number of potential circumstances and contexts.

Discussion

This study has explored the responses of a group of tertiary level students in the aftermath of a major natural disaster. There is very limited published research available which considers the impact on tertiary education, or which focuses on health professionals. The current study identifies similarities between cohorts, but also significant differences. The areas of difference are of particular interest, as these have the potential to allow further exploration of factors which have created a greater sense of individual resiliency, coherence or commitment to education. There was acknowledgement by the students involved in this study of the impact this experience had in regards to continuing their education. This was evident in comments concerning difficulties with concentration, motivation, fatigue and sleep deprivation. Other factors identified included additional costs, competing commitments at home and at work, and reduced access to personnel and learning resources. However, despite this, and in line with international research, responses were tempered by a recognition of the magnitude of the events and the opportunity to see positive aspects in the experience (Nolen-Hoeksma & Morrow, 1991; Kemp, Helton, Richardson, Blampied & Grimshaw, 2011).

Previous studies that focused on university students experiences of weather related natural disasters (Watson et al, 2010; Davis et al ; Lemieux et a, 2010), while providing some useful context and identification of areas for future development, are essentially presenting reactions to a single crisis event. While there are inevitably on-going issues and consequences associated with this, it remains a single event in time, with a defined point at which the physical nature of the disaster ends. Of concern in the case of the Canterbury earthquakes if the recognition that the ‘event’ is on-going – significant aftershocks are continuing at close to two years post the initial event. This changes the nature of the response and reaction of individuals, as there is no ‘end’ to the event – the very nature of reality has changed. This also suggests the need for on-going monitoring, recognition of secondary trauma resulting from exhaustion and acknowledgment of the cumulative stress effects over time.

Physical and mental impact

Recognition of the physical as well as the mental impacts of a disaster are essential to understanding students limitations in terms of academic engagement. When physical injuries are combined with limited access to resources, then concerns with mobility provides a further barrier to continuing with education. All students faced dislocation from their regular educational venues, for some this required considerable effort to relocate, arrange

transport and budget for additional unanticipated costs. While specific physical issues were not always clarified within the participant's responses, it was clear that issues associated with sleep disturbances and respiratory problems were high. An overall increase within the nursing cohort of 130% and of 55% within the medical cohort of physical problems suggests this is a significant factor to consider. Numerous studies have linked sleep disturbances with cognitive functions, and this has the potential to influence student's ability to engage with and complete cognitive tasks. This is of particular concern with health professionals, given the likelihood of involvement with critical decision making and other higher cognitive functions required in risk assessment, differential diagnostics, therapeutics and treatment initiation. While some of the student participants in this study were already registered health care practitioners working as well as studying, for those who were full time students, they continued to face integrated clinical and academic stresses with the requirement to complete clinical placements. Previous studies looking at health professionals and the impact of sleep deprivation have identified increased risks of inattention, clinical error, and workplace related accidents (Lockley et al, 2007; Owens, 2007). Similar findings are apparent in the literature which looks at the impact on student learning (Trockel, Barnes & Eggert, 2000). Pilcher and Walters (1997) identified that sleep deprivation in college students was associated with poorer cognitive performance; however, the students themselves did not recognise this, typically rating their concentration and performance ability higher than for non sleep-deprived participants.

While the findings overall suggest that the majority of students were not exhibiting symptoms of negative adjustment, there was a significant increase in self-reported mental health issues. A number of factors may contribute to this. There is the possibility that while students were aware of increased mental stress and associated issues (as evident in the high levels of reporting post-earthquake), that in being aware they were also able to address these effectively and to develop a range of coping and adaptive skills. Alternatively, it may be that the high number of students reporting such issues is linked to gender, (% of all participants in this study were female) with several previous studies identifying a greater willingness by females to acknowledge and identify health related issues (Kemp, 2011; Ardagh et al, 2012). While unable to provide a definitive answer without further research, other factors could also be explored, such as the potential for health professionals to have a greater awareness, understanding and recognition of health related issues which may go unrecognised by a more general population, or that specific stressors associated with care-giving in the aftermath of a disaster are linked to higher levels of mental health disturbance but countered by the provision of support services and de-briefing opportunities.

Resiliency

Resilience can be defined as "adaptation within the context of significant adversity" (Luthar, Cicchetti & Becker, 2000, p.543). The current study showed that 'positives' are still able to be recognised by those who have experienced crisis situation, in this case a natural disaster. Many students identified the impact of teamwork and belonging to a community as providing a sense of structure, and allowed them to feel that they were contributing to the social reconstruction occurring around them. This sense of community can be obtained through traditional geographical and social dimensions, but also through the engagement with learning and professional communities. Norris et al (2007) describe aspects of community resilience, suggesting that "it is a process linking a network of adaptive capacities (resources with dynamic attributes) to adaptation after a disturbance or adversity" (p.127). Participant

responses in the current study suggest a sense of engagement with 'community' – the professional community of health care workers, the learning community associated with their educational institution, and the social/geographical community within which they live. Participants expressed a sense of belonging and many identified the benefits perceived to accrue from contributing to one or more of these 'communities'; this may be in relation to distraction (as suggested by Nolen-Hoeksma & Morrow, 1991), or as a way of feeling valued and regaining a sense of control.

Participants also identified the need for perseverance, recognising that this was not a 'short term' adjustment. At the same time, comments demonstrate that students valued the flexibility that became necessary in order to complete the curriculum and manage course expectations. As well as process related factors that were seen as 'facilitators' in completing educational programmes, mention was made of the importance of individual / personal factors in the form of peer and staff support.. This was identified in comments responding to the question "what could your educational institution do to help reduce the impact of the earthquake and aftershocks on your study?" Positive acknowledgment was made of the pastoral involvement of tutors and teachers, and appreciation of flexibility and responsiveness to change and the sense that everyone was 'in this together'. In this way, the research also elicited the role and expectations that students had of the educational organisations, clearly identifying opportunities for future consideration. These included the importance of access to supervisors, suggestions that materials be prepared in advance in anticipation of possible online transference, flexibility in regards to course expectations, and consideration given to alternate library access if needed. A core feature that was emphasised was the need to consider communication formats and to ensure that information, both in relation to teaching but also to general information and updates relating to the disaster, are readily accessible and updated.

What is yet to be seen is the impact on education given the long term nature of recovery from such natural disasters. Christchurch can learn from the experience of other centres in regards to planning not only contingencies in responding and managing future crisis events, but the possible implications and sequelae to the current recovery process: Ongoing distress may be present but not apparent (Watson et al., 2011).

Social cohesion and community

As health professionals, whether registered or full time students, it was clear that there was a sense of being connected to (Watson, Loffredo & McKee, 2011) and contributing to the wider experience of crisis, having something of value to 'offer' which contributed to a sense of self validation. Several participants also commented on the changed social value of 'students' within the wider community, the public recognition of student contributions, and a general improvement in future disaster preparedness. The significance of this increased valuing and ability to plan has the potential to further support student resilience and sense of recovery.

Communication alternatives were acknowledged as a significant factor in ensuring the sense of community cohesion present in learning communities was maintained. This was evidenced in the movement to using social media, establishing facebook sites to support staff and disseminate information, and increased update of blogs, twitter and other electronic formats. This was also evidenced in the wider student community, with examples from Christchurch being reported in the literature (Bruns & Burgess, 2012; Dabner, 2012), as well as recognition from earlier disaster responses (Ahmed, 2011; Keim & Noji, 2011).

Relevance

While this study draws on the experiences of a community facing crisis, there are aspects of this event which are relevant to all settings. A clear message from the literature and the voices of the study participants is that preparation is needed before an event such as this occurs, if it is to be successfully managed (FEMA, 2003; Watson, Lofredo & McKee, 2011; Chan & Jenkins, 2012). The existence of supportive networks and community frameworks can be seen as providing a structure from which to build rapid responses in time of need. There is a need to develop an awareness of potentials, even if the 'worst' never comes to pass. By actively considering and responding to the idea that sudden change could be forced upon a teaching organisation, the preparation is there – it may not be needed in regard to a natural disaster, but to one of many other possibilities, including unforeseen changes to population growth, reduced economic resources, or simply the need for greater flexibility to meet changing student expectations. Similarly, crisis does not need to be a negative experience – many positives have come from periods of educational and social crisis, with new approaches, theoretical frameworks and innovative praxis developing.

By gaining the specific responses of students, it is possible to recognise the issues of most significance to them – which may not always be the same as those of others. Opening dialogue with students around mutual expectations, the roles of student and teacher, and the responsibilities of each provides the groundwork for understanding and responding to crisis. Again, the absence of crisis does not negate the usefulness of this approach, as benefits can be seen in terms of establishing an inclusive learning community.

Summary

This research provides a New Zealand context for exploring the experiences and responses of nursing and medical students to a natural crisis event. Whilst earthquakes are an anticipated fact of living in this country, the Christchurch setting has provided a unique opportunity to establish the impact on education given the number of campuses there are. This is unprecedented not only in the magnitude of the seismic activity but the region in terms of population in comparison to the location of historical earthquake events. Much of the international research that exists covers a range of natural disasters form hurricanes, to floods to fires as well as earthquakes. The specific focus on undergraduate and postgraduate education for health professionals informs and enables comparisons to be made between other sampled population groups. This may be in terms of responses, future planning needs for both students and educational settings, as well as contributing to the development of the universal understanding of the concept of resilience. In regards to the latter, there is opportunity to develop further research into what extent is resilience innate or develops as a result of adversity and/or other learning opportunities.

Of importance, the results of this research do not only have relevance for Christchurch. As the country sits on a major fault line there is an existing reality for New Zealand to think and plan for how to respond and manage similar or other crisis events. Research by McClure, Wills, Johnston and Recker (2011) found that the Palmerston North participants rated the likelihood of having an earthquake event to be higher since the initial event in 2010. Wellingtonians rated it higher prior to the event as it has long been expected this is where a significant seismic event was most likely (McLure et al.). In so saying, the reverse to be true; up until the triggering event Christchurch citizens did not think civil defence messages would apply to them. The recommendations of the current research therefore provide a platform to enable other educational settings to think and plan accordingly.

Aspects of resiliency and evidence to show that 'positives' are able to be recognised by those embedded in this context provide an important direction for educational communities. Many students identified the impact of teamwork and a sense of community as providing a

sense of structure, and allowing them to feel that they were contributing to the social reconstruction occurring around them. This perception was extended to the educational organisations, with positive acknowledgment of the pastoral involvement of tutors and teachers, the appreciation of flexibility and responsiveness to change and the sense that everyone was ‘in this together’.

Recommendations

In light of the above results, the following recommendations have been made:

1. Recognition of the importance of flexibility in course delivery, in particular with regard to development of on-line learning options / opportunities, general academic and clinical support for students being available via alternate formats / process

Implications: need to recognise potential for variation in learning opportunities and incorporate this into course planning and higher level administration / course design

Recommendation: that educational institutions actively develop a crisis response strategy that considers the potential for flexible course development. This is likely to include (but not limited to)

- Considering current 'back-up' of course teaching materials and resources; physical and virtual access to these; prioritisation of key elements
- Identifying degree of flexibility inherent in course, in terms of content and delivery
- Alternative opportunities / venues / resources identified at a generic level
- Identify implications in terms of course completion, external and internal qualification requirements and credentialing if course content or access to experiential placements was limited or altered

2. Recognition of the actual and potential role of tertiary level education and administration staff in supporting student through crisis situations.

Implications: regardless of formal role criteria or job description, it is apparent that students expect a degree of personal and professional support in relation to continuing their studies. The impact of this on educational and support staff will be explored further in subsequent studies.

Recommendation: that educational institutions acknowledge the expectations of students and incorporate planning for and education of staff in relation to crisis response. This may include consideration of the following aspects:

- Need to access alternate methods of communication. Examples from the ChCh experience and from other international disaster and crisis events includes: ability to institute channels of communications using traditional measures – telephone, printed material, advertisements in newspapers; utilisation of alternate technologies including social media sites, twitter, group e-mail and texting
- Ensure access to contact details is available in more than one site, and still accessible in the event of catastrophic failure of essential services (ie loss of urgent and backup electricity supplies limiting access to electronically stored information)
- Development of contact 'cascade' systems to share the responsibility of contacting individuals (can be developed within both staff and student groups)
- Develop ways to demonstrate recognition of student concern – aspects identified by respondents include ensuring consistency of information distributed; evidence of planning including rationale and justification for changes in practice and teaching; acknowledgment and unified response to specific issues such as course assessments and financial implications of relocation of teaching venues.

- Preparation of staff to respond in ways that support the student body to develop resilience and coping strategies – in house education, knowledge development, personal coping and recognition of own coping abilities and response to crisis (this will be explored further in subsequent research)
- Inclusion of teaching processes and student services that facilitate a sense of community
- Application of a Cultural Safety model that supports and recognises individual responses and does not assume a 'generic' pathway of recovery or adaptation

3. Recognition of likely increase in physical and mental health issues within the student cohort subsequent to a crisis event. Alongside of this is the importance of recognising existing levels of resilience and of protective factors within varying levels of nursing professional education.

Implications: It is likely students will experience physical, emotional, psychological and adjustment responses following a crisis event or series of events. This will inevitably impact their ability to study, complete assignments, interact in both a personal and professional sense and potentially to feel 'safe' returning to previously familiar environments.

Recommendation: that educators and educational institutions are aware of potential sequelae to crisis events and identify a response framework that supports students and acknowledges individual pathways to recovery and re-integration into the educational system. Aspects which should be considered in developing such a framework include:

- Initial research suggests that there are differences in terms of student responses associated with level / type of educational programmes being undertaken. Undergraduate nursing students appeared to be more vulnerable in some ways compared to those engaged in education as a component of occupational status. One element suggested by the current research that may contribute to this is the sense expressed by those students engaged in work as well as student roles of being part of a specific community. This was expressed through reference to being part of a wider professional response, being able to contribute in a practical way, being useful and able to apply their nursing skills. This group also indicated being part of a team within the workplace was a strong supporting factor. This sense of team work and community is a protective element that could be strengthened within educational programmes.
- Taking the nursing student responses as a whole, there was a 130% increase in reported incidence of physical health issues post the earthquakes, and a 91% reported increase of mental health issues. In comparison, medical undergraduate students reported a 55.6% and 88.2% incidence respectively. Both groups had elements of clinical work associated with the role, so it is clear that there is room to explore the contributing factors to this further. However, the implications of on going health issues must be considered in regard to ability to access education, complete required course and clinical work and in terms of ability to focus on and complete assessments.
- While quantifiable elements of physical and mental issues are in general likely to reduce over relatively short periods of time, there is evidence of on going issues that may be less immediately apparent and which may last for considerable periods of time. Examples to consider here are the difficulty in focussing and maintaining or

returning to previous levels of cognitive ability (eg ‘quake brain’). This is significant in planning workloads and assessment processes.

- Recognise the potential for impairment in terms of sleep, concentration, anxiety, mood and alcohol and drug use

4. Recognition that there can be positive elements associated with a crisis event, and the importance of identifying and fostering these.

Implications: while not necessarily present for all individuals, there are likely to be specific and generic positives that can be identified following a crisis event, and used as a focus for developing and supporting resilience and recovery.

Recommendation: actively seek to identify and acknowledge the ‘positives’ that can emerge following a crisis event. Use these as a foundation for future development of educational communities.

- Develop ways of introducing the concept of ‘positives’ – seeking these from emerging experiences rather than imposing them
- Evidence from current and previous research suggests that a strong sense of community and the recognition of greater than expected resilience and self-efficacy can become apparent – consider how these can be actively developed in current educational policies and how these could be drawn on in times of crisis to support the development of a cohesive response

Dissemination of Findings:

Presentations given to date:

Australian and New Zealand Association for Health Profession Educators (Conference) Rotorua, New Zealand from the 26th to 28th June, 2012. Presentation title: “Stuck in the Liquefaction”. The theme of this conference was “Professionalism Under Pressure”. Presented by Heather Josland, School of Nursing and Human Services, Christchurch Polytechnic Institute of Technology

Advanced Nursing Series (Professional seminar series) May 17, 2012. “The impact of the Christchurch earthquake on student learning; early findings”. This will be held at the Centre for Postgraduate Nursing Studies, University of Otago Christchurch. Presented by Sandra Richardson, Centre for Postgraduate Nursing Studies, University of Otago.

Australasian Nurse Educators Conference (Conference) 23-25th November 2011, Hamilton, New Zealand. Presentation title: “The impact of the Christchurch Earthquake event on student learning” The theme of this conference was ”innovations in nurse education and practice, ‘thinking aloud, thinking ahead’”. Presented by Sandra Richardson, Centre for Postgraduate Nursing Studies, University of Otago.

Papers accepted for presentation:

Net 22nd International Networking for Education in Healthcare (Conference), Cambridge, United Kingdom from the 6th to 8th September, 2012. The theme for this is “Curriculum Innovations and Enhancement; Educational Context; Partnership Working; Student's Teachers, and Service Users”. . Presented by Lisa McKay (School of Nursing and Human Services, Christchurch Polytechnic Institute of Technology; Centre for Postgraduate Nursing Studies, University of Otago, Christchurch).

Horatio: 2nd European Festival of Psychiatric Nursing (Conference) 20-23 September 2012, Stockholm, Sweden. Presentation title: “Recognising the impact of a natural disaster on the resilience and mental health of nursing students in an educational setting.” The theme for this conference is “Vision, Knowledge and Practice in Psychiatric and Mental Health Nursing”. Presented by Lisa McKay (School of Nursing and Human Services, Christchurch Polytechnic Institute of Technology; Centre for Postgraduate Nursing Studies, University of Otago, Christchurch).

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