

# In some strange way, trouble is good for people. Posttraumatic growth following the Canterbury earthquake sequence

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## Abstract

*Posttraumatic growth has been documented after exposure to trauma in individuals with major depression, posttraumatic stress disorder and other anxiety disorders but has not been examined in individuals without these psychological conditions. The current study analysed interview data to explore whether posttraumatic growth was reported by psychologically healthy individuals affected by the Canterbury earthquakes. Transcripts from semi-structured interviews with 99 Canterbury residents with moderate-to-high earthquake exposure, without symptoms of psychological disorders, were examined using thematic and content analysis to identify reported aspects of posttraumatic growth. Three analysts coded emerging themes until theme saturation occurred. Differences in male and female participants' endorsement of themes, including co-existing positive and negative outcomes, were included in subsequent content analysis. Posttraumatic growth was widely reported by both males and females. Relevant themes included improved relationships, feeling stronger in oneself, greater appreciation of life, and spiritual change. Another theme, a stronger sense of community, reflected a qualitatively novel aspect of posttraumatic growth, not reported in prior research. The prevalence*

*of this theme may have been due to the shared nature of the earthquake sequence. Overall, participants reported positive appraisals of their circumstances, of others, and of themselves. Having a role to play appeared to contribute to important aspects of post-earthquake functioning, including taking action, coping, and making a contribution. Women, more than men, reported the positive strategies of self-care and connecting with others. The current study indicates that psychologically healthy individuals experience posttraumatic growth, suggesting that psychological dysfunction, or substantial or ongoing distress are not needed for posttraumatic growth to occur. This is contrary to existing theories of posttraumatic growth and suggests that current models of posttraumatic growth processes may be incomplete. Existing models may also be improved by considering the role played by psychological resilience by considering collective experiences such as a stronger sense of community.*

**Keywords:** *Posttraumatic growth, Canterbury Earthquakes, thematic analysis, content analysis, sense of community*

## Introduction

*Where there is ruin there is hope for a treasure.*

Rumi (cited by Wilcox, 1997, p. 33)

Positive changes have been reported after exposure to traumatic events such as war, exile, illness, disaster related to natural hazards, assault, and terrorism. Researchers have coined the terms *posttraumatic growth* (Tedeschi & Calhoun, 1996), *stress-related growth* (Park, Cohen & Church, 1996), and *growth through adversity* (Joseph & Linley, 2005) to describe trauma-related positive change. Several domains of posttraumatic growth have been identified, including increased appreciation of life, more meaningful relationships, increased personal strength, changed priorities, and a richer existential and spiritual life (Tedeschi & Calhoun, 2004). However, much of the existing research has been conducted with individuals with marked psychopathology, such as posttraumatic stress disorder, major depression, or other anxiety disorders. It is unclear the extent to which

positive changes can occur without experiencing such psychological dysfunction.

Alongside aspects of posttraumatic growth commonly measured by psychometric instruments such as the Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996), qualitative research has found reports of posttraumatic growth in the form of increased compassion for others struggling with similar difficulties and more engagement in health-related activities, such as increased exercise and improved nutrition among individuals who survived cancer (Morris et al. 2012). Other research, with nurses in a post-earthquake context, has identified changed perspectives and values, including feeling fortunate (Johal & Mounsey, 2015).

Posttraumatic growth theories synthesised by Janoff-Bulman (2004) outline how trauma creates challenges to particular aspects of one's worldview. Individuals appear to have an inner drive to rebuild these worldviews to incorporate the trauma. This means the views that are modified are typically those challenged by the trauma, leading to positive change that varies according to the type of trauma experienced (Shakespeare-Finch & Armstrong, 2010). Different traumas involve qualitatively different experiences of distress and pose different challenges to one's view of the world, self, and others. If a traumatic illness is experienced, people may be forced to recognise that health is fragile and that it is important to nurture their bodies. Following earthquakes, challenged worldviews might relate to prior beliefs about a stable Earth.

Posttraumatic growth among psychologically healthy individuals has rarely been examined. Theories of posttraumatic growth, from Janoff-Bulman (2004) and Tedeschi and Calhoun (2004) for example, posit that distress is needed to trigger the process of posttraumatic growth. It becomes challenging to apply these extant theories of posttraumatic growth to individuals who are less distressed by an event. This is because, under the current theories, these individuals are thought to engage in less cognitive and emotional processing in response, resulting in less posttraumatic growth. It therefore remains unclear whether psychologically healthy individuals also experience posttraumatic growth, and if so, how it manifests. By extension, it remains unclear whether posttraumatic growth is experienced by psychologically resilient individuals - being individuals with a capacity to maintain adaptive functioning in response to stressors (Mancini & Bonanno, 2010).

On September 4th 2010, Christchurch, New Zealand, was struck by a magnitude 7.1 earthquake which caused widespread property damage, but no loss of life and few injuries. Six months later on the 22<sup>nd</sup> of February 2011, a second earthquake, of magnitude 6.3, killed 185 people and injured several thousand (Ardagh et al., 2012). Liquefaction, being water-saturated layers of underground sand and silt forced upwards through cracks in the ground, was extensive in the September, and even more so in the February, earthquakes. Parts of some suburbs may never be reoccupied. A state of emergency was declared the day after the February earthquake and the central business district was cordoned off, that cordon lasting, in part, until June 2013. Several thousand houses were found to be irreparable and were marked for demolition.

Research has since explored health and wellbeing impacts of the Canterbury earthquake sequence, finding a substantial minority of the earthquake exposed general population have increased disaster-related psychological difficulties including posttraumatic stress disorder, anxiety disorders, depression and nicotine dependence (Fergusson & Boden, 2014), with higher distress in those with greater earthquake exposure (Fergusson, Boden, Horwood & Mulder, 2014a). Self-reported sleep disturbance, stress, and cognitive dysfunction were widespread (Helton, Head & Kemp, 2011; Kemp, Helton, Richardson, Blampied & Grimshaw, 2011). Cognitive disruption was also identified during a sustained attention to response task in a small Christchurch sample soon after the February earthquake (Helton & Head, 2012). Strain and anxiety found in general practice patients (Johal, Mounsey, Tuohy & Johnston, 2014b) have resulted in practical, emotional, and professional challenges for nurses (Johal, Mounsey, Brannelly & Johnston, 2016), and increased workload for general medical practitioners (Johal, Mounsey, Brannelly & Johnston, 2014a). Earthquake-related psychological impacts have also been reported in a significant minority of medical students (Carter, Bell, Ali, McKenzie & Wilkinson, 2014) and university staff (Bell, Carter, Boden, Ali, McKenzie & Wilkinson, 2016).

However, there were also some notable exceptions. Although short-term increases were seen in anxiolytic and sedative/hypnotic prescriptions, this was not sustained, and no overall impact was observed (Beaglehole, Bell, Beveridge & Frampton, 2015b). There was also a 20 percent reduction in daily psychiatric admissions observed in the 30 days immediately

following the February earthquake (Beaglehole, Bell, Bereridge & Frampton, 2015a). These negative indicators of psychological distress highlight how much of the Canterbury population may have even experienced positive impacts following the earthquakes. However, little research has explored positive changes following the Canterbury earthquakes.

Fergusson, Horwood, Boden and Mulder (2014b) provided one of the very few pieces of research on this aspect of the Canterbury earthquakes. They found that a representative sample of the Canterbury population reported positive changes after the Canterbury earthquake sequence, including: improved relationships with family and neighbours; greater appreciation of life; increased children's maturity; and greater personal strength. Women reported more positive changes than men, and greater immediate impact of the earthquakes related to greater endorsement of positive changes. Johal & Mounsey (2016) examined positive changes reported by nurses after the Canterbury earthquakes and found increased value placed on relationships, clarification of values and priorities, increased self-awareness and confidence, valuing the experience, and viewing themselves as lucky.

Positive impacts were also observed in the education sector. Research with school teachers found that the earthquake sequence galvanised the already strong positive culture within schools, with schools providing support and care for school staff members, who viewed their role as supporting pupils and their families, emotionally and practically (Mutch, 2015). There is also evidence that academic functioning improved overall in response to the February 2011 earthquake: University students' grade average after the February 2011 earthquake improved overall compared to the previous year, although students reporting higher levels of stress, anxiety, and depression achieved lower marks. Such findings suggest a high degree of psychological function amongst some of the affected students. According to Kemp, Helton, Richardson and Blampied (2013), those who were not affected by anxiety and depression after the earthquakes achieved higher grades than expected.

The current study aimed to expand the body of literature on positive psychological impacts of the Canterbury earthquakes, with a focus on psychologically healthy individuals. It used thematic and content analysis to examine the nature of posttraumatic growth in a group of psychologically healthy individuals after the Canterbury earthquake sequence of 2010 and 2011, to:

- explore whether posttraumatic growth is reported by a population of earthquake-affected but psychologically healthy individuals;
- identify factors that psychologically healthy individuals report as contributing to posttraumatic growth;
- examine whether themes previously found to correlate with posttraumatic growth in other populations are evident for psychologically healthy individuals following earthquake-related trauma; and
- compare posttraumatic growth between psychologically healthy males and females.

## Methods

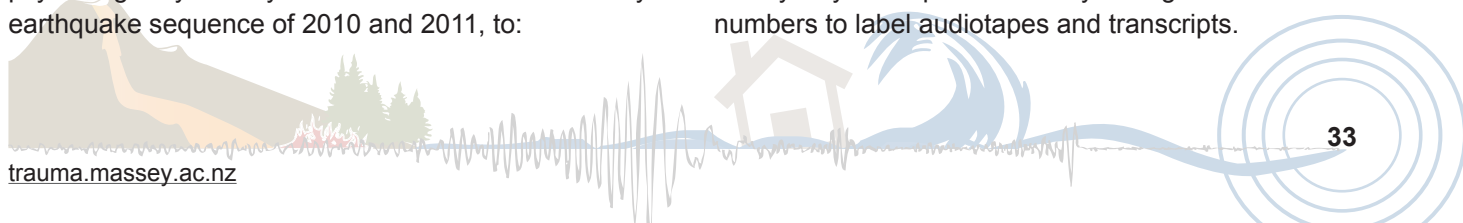
### Participants

Participants were psychologically healthy Canterbury residents who self-identified as coping well, without psychiatric diagnoses or having sought treatment for earthquake-related distress - despite moderate-to-high exposure to earthquake-related events such as physical injury or illness, witnessing falling buildings, seeing dead bodies, the death of a loved one, income or property loss, or problems with housing caused by earthquake-related events. Participants were recruited through articles, opinion pieces, and community notices in local newspapers, and via word of mouth.

### Procedure

All recruitment and data collection was conducted 2 to 3 years after the September 2010 and February 2011 earthquakes, over the course of 13 months, from January 2013 to February 2014. Potential participants were screened by telephone to determine that they broadly met inclusion criteria. Participants who appeared to be eligible were subsequently met in person, to confirm eligibility and to complete semi-structured open interviews. Details of other assessments conducted over the study timeframe are included in a separate publication, by Smith, McIntosh, Carter, Colhoun and Jordan (2016).

Participants were interviewed by one of six interviewers using structured prompts, asking about their experiences at the time of the earthquakes and the subsequent effects of those earthquakes, including positive effects such as posttraumatic growth. Interviews were recorded, downloaded, and transcribed verbatim. Participant anonymity was preserved by using identification numbers to label audiotapes and transcripts.



### Thematic analysis

Thematic analysis was used to explore themes in interview transcripts. Analysis was based on methods established by Boyatzis (1998) for identifying, coding and describing themes within a piece of communication. Ten transcribed interviews were examined and coded independently by three analysts to develop an initial set of themes. Several stages of coding refinement and theme generation produced a consensus on ideas that appeared most important to participants, to the point of theme saturation. An additional set of five, randomly selected, transcripts were then examined independently by the three analysts.

### Content analysis

In addition to the rich findings produced by thematic analysis, content analysis can be used to answer different research questions about qualitative data; for example, whether the frequency of endorsement of themes was influenced by gender. Where a sample size allows, as in the current study, it is possible to answer important research questions by converting the codes of interest into a numeric representation. These representations can be used to conduct relevant quantitative comparisons such as Chi-square tests or t-tests, depending on the research question (Boyatzis, 1998, pp. 128-136). Such analysis is rarely conducted in qualitative research due to sample sizes commonly being too small to make meaningful quantitative comparisons between groups within the sample. However this mixed-methods approach to research allows for quantitative and qualitative methods to complement each other and answer different research questions about the same data.

Identified themes were converted to quantitative codes which were applied to all 99 transcripts, using the software NVivo (Version 21, 2012). Two analysts reviewed all coded text to ensure consistent code application. Two analysts then independently analysed ten randomly selected transcripts using the final coding system to determine inter-rater reliability. Inter-rater agreement was calculated as the number of agreements divided by the total number of pieces of coded data. Cohen's *kappa* was also calculated, to help ensure that inter-rater agreement was not solely due to chance.

NVivo data for each sub-code were converted into dichotomous yes/no variables to indicate whether transcripts included each of the codes. These

dichotomous variables were exported into SPSS statistical analysis software, and 2 x 2 Chi-square tests for independence tested whether there were gender differences in the application of each code.

## Results

Participants were 33 males and 66 females aged 18-72 years, with an average age of 50 years ( $SD = 11.12$ ). Seventy percent of the sample was married or in a committed relationship, 11 percent were separated or divorced, four percent were widowed, and 15 percent were never married. Median education level was an undergraduate university degree. Seventy-eight participants were of New Zealand European descent, with one participant of Māori descent, one of Cook-Island Māori decent, one Indian, and others of German, Chinese, Irish, Celtic, and other European descent. Further sample characteristics are outlined in Smith et al. (2016).

### Thematic analysis results

The majority of identified themes fell into positions along a valenced continuum of participants' appraisals, as shown in Figure 1: from *improvement* of self or situation; to *positive appraisal* of self, others or situation; to *neutral, dispassionate descriptions* of events and actions; to description of the *absence of negative* elements; or to a sense of *burden* related to the earthquakes. Participants' descriptions fell along the entire valenced continuum, with individual participants describing both hardship and positive outcomes.

### Posttraumatic growth

Analysis included sub-themes under the theme *Improvement/ posttraumatic growth* that reflected improvement in outlook or circumstances, including improved relationships, feeling stronger in one's self, greater appreciation of life, and spiritual change. They also included one theme reflecting posttraumatic growth after a community-wide trauma: a greater sense of community, as shown in Table 1. The proportion of the sample reporting posttraumatic growth and other themes is shown in Table 2.

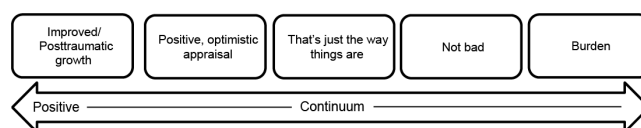


Figure 1. Continuum of valenced themes

*Positive appraisal*

The theme *positive appraisal* was prominent in participants' descriptions. Several sub-themes relating to this aspect were identified, as shown in Table 3. Participants appeared positive about knowing what they needed in order to cope, and pursuing this. Many perceived prior challenging experiences, including prior earthquake experiences, as positive in promoting psychological health or ways of coping. Participants also reported viewing circumstances or events as humorous or ironic.

*That's just the way things are*

As shown in Table 4, the theme of *that's just the way things are* reflects sub-themes of neutral descriptions of earthquake events, including acknowledgement of the extraordinary nature of the major earthquakes, the strong emotion or shock they experienced, and hardship and uncertainty for self and for others. Hardships posed challenges and demanded responses, and were described as a reality alongside positive outcomes of the earthquake sequence.

*Not bad*

As shown in Table 5, the theme of *not bad* included sub-themes of how participants viewed their earthquake experiences in terms of the absence of negative responses, that they did not feel overwhelmed or traumatised, did not feel unsafe, expected loved ones to be unharmed, and that consequences of the earthquakes would not be dire. Sub-themes included

in the code of *not bad* are consistent with the optimistic appraisal noted in other themes.

*Burden*

The theme *burden* comprised accounts from a minority of participants who described their experiences using negative-valence words such as "ghastly", "devastating", "terrible", "awful", "very stressful", "overwhelming" or "too much". These descriptions of struggle are summarised in Table 6. These terms were distinguished from descriptions of general hardship because they described a sense of extreme difficulty with circumstances, reflecting emotional heaviness and frustration, and difficulty coping with earthquake-related events. This sense was generally associated with circumstances or events which had passed or which were time-bound, rather than an ongoing perception of not coping. Examples included having to accept help from others, employment ending, staying in makeshift accommodation, enduring loud alarms, or having to share an office with many other people.

*Non-valenced themes*

Two themes included sub-themes from across the continuum of valenced themes, *life philosophies* and *role to play*. Both appeared important for helping participants cope with earthquake-related events.

The theme *life philosophies* concerned the way personal values and approach to life were helpful for coping and living in the post-earthquake environment, as shown in Table 7. For some participants, this was expressed in sub-themes reflecting consciously choosing to view

Table 1.  
 Codes and Examples of Participants' Responses for Theme of Improvement/Posttraumatic Growth

<b>Improvement/ posttraumatic growth</b>	<b>Coded text from thematic analysis</b>
Greater sense of community	<i>Definitely a greater sense of community...People are friendlier and people in the neighbourhood speak freely to one another. I've lived where I am for three and a half years, I moved to Christchurch from the country and it did take me a while to get to know people locally, but definitely the earthquake has accelerated that.</i>
Greater appreciation of life	<i>It's made me realise that when you have a really good day, you should just be completely in the really good day. I don't have any sort of 'futuring'. I don't 'future' much now at all. I suppose they will rebuild my house one day, but it's just enough now to be in every day as it is.</i>
Self as stronger	<i>Having all been through that experience together it's something that you share and knowing that you can get through gives you more confidence and knowledge that you can cope with these things, that you aren't ignoring how you would cope with a difficult situation, so it does give you strength and courage.</i>
Better relationships	<i>It brought us closer together in that we talked a lot about how the situation wasn't great and financially it might ruin us, but we had each other and we weren't going to let it define us.</i>
Spiritual/ philosophical change	<i>I haven't even felt 'why them and not us?', there's no point worrying about that, and there have been some comments like 'we moved buildings and we were saved' and I think that's great but what about those who didn't move before the buildings collapsed and they weren't saved. I think my faith has become raw, just more basic, uncomplicated, don't worry about answering questions, just know that there is a lot more open and basically we can't change a lot.</i>

Table 2.  
Frequency of Codes Referenced for the Total Sample and by Gender

Code	Total sample endorsement <i>n</i>	Male endorsement % ( <i>n</i> )	Female endorsement % ( <i>n</i> )	$\chi^2$	<i>p</i> value	<i>Phi</i>
<b>Improvement</b>						
Appreciate the present more	57	42.4% (14)	65.2% (43)	3.77	.05	-.22
Better relationships	39	27.3% (9)	45.5% (30)	2.33	.13	-.18
Greater sense of community	61	66.7% (22)	59.1% (39)	.43	.51	.09
Self as stronger	54	39.4% (13)	62.1% (41)	3.71	.05	-.22
Spiritual change or solidification	17	3.0% (1)	24.2% (16)	-	-	-
<b>Optimistic, positive appraisal</b>						
Appreciate others' input	72	66.7% (22)	75.8% (50)	.52	.47	-.10
Committed to Christchurch	16	15.2% (5)	16.7% (11)	-	-	-
Count your blessings	87	81.8% (27)	90.9% (60)	.96	.34	-.13
Knowing what you need	96	93.9% (31)	98.5% (65)	.39	.53	-.13
<b>Sub-codes</b>						
<i>Need exercise</i>	32	39.4% (13)	28.8% (19)	.70	.29	.11
<i>Need the familiar</i>	12	15.2% (5)	10.6% (7)	-	-	-
<i>Need 'home'</i>	21	3.0% (1)	30.3% (20)	-	-	-
<i>Need others**</i>	70	48.5% (16)	81.8% (54)	10.25	.001	-.35
<i>Need self-care*</i>	48	30.3% (10)	57.6% (38)	5.51	.02	-.26
<i>Need to keep busy</i>	28	33.3% (11)	25.8% (17)	.31	.58	.08
<i>Need to look for the positive aspects</i>	15	6.1% (2)	19.7% (13)	-	-	-
Lucky compared to others	53	42.4% (14)	59.1% (39)	1.83	.18	-.16
Lucky compared to what might have been	37	33.3% (11)	39.4% (26)	.14	.71	-.06
Positive sense of self	67	66.7% (22)	68.2% (45)	.00	1.00	-.02
Prior experience as good for current coping	36	39.4% (13)	34.8% (23)	.05	.83	.05
Learn from experiences	34	36.4% (12)	33.3% (22)	.01	.94	.03
See humour or irony	34	39.4% (13)	31.8% (21)	.27	.60	.08
See opportunities	39	42.4% (14)	37.9% (25)	.05	.83	.04
View as fun, exciting, interesting	52	50.0% (33)	57.6% (19)	.25	.62	.07
<b>Not bad</b>						
Expect things will be okay	34	33.3% (11)	34.8% (23)	.00	1.0	-.01
Expect others will be okay	18	18.2% (6)	18.2% (12)	-	-	-
Not traumatised	50	42.4% (14)	54.5% (36)	.85	.36	-.11
<b>How it is</b>						
Acknowledge an extraordinary event	61	57.6% (19)	63.6% (42)	.13	.72	-.06
Acknowledge hardship for others	89	87.9% (29)	90.9% (60)	.01	.91	-.05
Acknowledge hardship for self	98	100.0% (33)	98.5% (65)	.00	1.00	.07
Experience strong emotion or shock	85	81.8% (27)	87.9% (58)	.26	.61	-.08
Uncertainty	50	51.5% (17)	50.0% (33)	.00	1.00	-.01
<b>Life philosophy</b>						
Don't worry about what you can't control	28	21.2% (7)	31.8% (21)	.75	.39	-.11
It is what it is	46	42.4% (14)	48.5% (32)	.13	.72	-.06
Prioritise time and energy according to values	33	24.2% (8)	37.9% (25)	1.28	.26	-.14
<b>Role to play</b>						
	33	37.0% (17)	30.2% (16)	.25	.62	.07
<b>Burden</b>						
	32	18.2% (6)	39.4% (26)	3.61	.06	-.21

\* =  $p < .05$ ; \*\* =  $p < .01$

events in particular ways, such as focusing on positive aspects of a situation or focusing on the future, not the past. Others reported applying learning from previous experiences, that life is not easy or fair. Others reflected that particular values were important, being either pre-existing values or values that had changed in response to their earthquake experiences. These values included

valuing people, not possessions, appreciating and enjoying the present, and recognising that death is part of life.

The theme *role to play* reflected participants' contributions to the earthquake recovery as an important part of coping, maintaining self-esteem, and connecting

Table 3.  
Codes and Examples of Participants' Responses for Theme of Positive Appraisal

Code	Coded text from thematic analysis
Knowing what you need	<i>Talking about it with my partner [helped me cope], taking time out to be together, even if we didn't go anywhere, just simply scheduling our lives so that no one rings us before 10 am on the weekends, and we have put down some guidelines that the family can ring us only if it's an emergency, other than that, don't bother us. We deliberately schedule some time together. We hadn't thought about that before.</i>
Count your blessings	<i>Again you see the silver lining in everything but one of the really lucky things from my point of view is that I have been able to stay in my home. That's my little sanctuary and I feel safe there, and I've been able to stay there. We have had all the insurance hassles and the house is going to be demolished so I'm not going to be able to live there but the good thing is they aren't going to pull it down for another year, so we can stay there and it gives you time to find something.</i>
Appreciate others' input	<i>We had a wonderful guy coming in, when he could get past the cordon, but sometimes the soldiers or the Police didn't want to let him in. A farmer from Oxford who came in with a truck and trailer and two thousand litres of water and he would go round our little loop and distribute [it], and he came in with other things sometimes, food. That was pretty good.</i>
Positive sense of self	<i>I've always considered myself quite a strong person anyway, but I probably think now if you can survive and get through what we've had to get through in Christchurch in the last two or three years you are a pretty strong person.</i>
Lucky compared to others	<i>Then I managed to come home after I had been at my friend's place and I had power and water and gas, so I was quite lucky whereas a lot of people didn't have those things.</i>
View circumstances as fun, exciting, interesting	<i>I turned on the light and remember seeing the walls bulge, just being really, really excited because it was cool – that first one was like an experience. I had been through a couple of wee earthquakes, just small ones, and had always wondered what it would be like to be in a big one, anyway I got it. It was cool. I was pumped afterwards, this was awesome, everything was shaking.</i>
Seeing opportunities for Christchurch and oneself	<i>I think the city is going to be fabulous, I think it's just going to be an awesome place. I hope that I'm still alive in twenty odd years; it's going to be magic. It's not my regular words, but for the first time ever we will have a city that's a New Zealand city as opposed to being an English city, it's going to be European, Asian, Pacific Island, Maori, it's going to be the lot, when previously we've had a Scottish city in Dunedin, or an English city in Christchurch, those sorts of things, and that's a positive.</i>
Lucky compared to what might have been	<i>There was a sense of 'gosh, that could have been me, had I not been made redundant from that position [in the building that collapsed] or had I been re-employed to do the programme that they were looking for someone to take on again', so there was slightly that 'dodged bullet', grateful to not be there, because I would have been the sort of person that would have been in the office.</i>
Experiences are useful for learning	<i>One of the things that came out of the earthquake for me was the realisation that in some strange way trouble is good for people, because when everything is going well who cares but when the community is threatened there is a survival response and a communal response to preserve the community and the amenities that you have got... I think my experience of the earthquake was an affirmation that I believe about the possibilities of human nature. You had people burgling and burning properties but the statistics will prove that's in the minority. I even believe that crime dropped in Christchurch in the immediate twenty-four months, and also suicides, I don't know whether that's true, so what does that say about what disaster does for us. I lost a friend and people lost husbands and wives and people died but maybe it taught us all something...</i>
Prior experiences as good for coping ability in the earthquakes	<i>Also, prior to the earthquake, a couple of years before that, my partner had died and I would say that going through the last eighteen months of life and his death probably was as traumatic as anything that I did and in the back of my mind I go 'well it's not as bad as that'. I sometimes wonder if I became emotionally fit or resilient, I'm not sure.</i>
See humour or irony	<i>I got in his car and I'll always remember he said to me... 'Put the seatbelt on' and I really wasn't listening, I wasn't processing very well, and I heard him say again more firmly and more commandingly, 'Put your seatbelt on'. And I remember thinking, 'What a strange thing to say (laughs). We've just been in a huge earthquake'.</i>
Committed to Christchurch	<i>I feel a strong sense of us, which I probably have always felt because I am an adopted Cantabrian so I chose to live here, I wasn't born here.</i>

Table 4.  
Codes and Examples of Participants' Responses for Theme of That's Just the Way Things Are

Code	Coded text from thematic analysis
Acknowledge hardship for self	<i>It wasn't too bad you know, we had a roof on top [of the makeshift toilet in the garden] and it was all possible and it didn't feel yucky because it was your own home and you could do it like the Scouts would do it. We had no water, I can't recall for how long, four weeks. No electricity, the electricity came back first, but it probably took a week.</i>
Acknowledge hardship for others	<i>[The earthquake] upset the neighbours quite a bit so I spent a bit of time standing around talking to them and had to go into the house next door with the lady because she was too scared to go in by herself, all the ornaments were everywhere</i>
Experience strong emotion or shock	<i>I felt incredibly sad for Christchurch, and I think I was pretty exhausted at that stage, and I felt quite emotional</i>
Acknowledge an extraordinary event	<i>You would see the damage on TV and...there was definitely something happening there, I couldn't put a common handle on it, you definitely felt something, you were seeing history. For a lot of people living through these quakes is similar [to] historical things, to the likes of Princess Di being killed, September 11, moon landings, all these very significant historical markers in our lives.</i>
Uncertainty	<i>You carry on because you can't change it and that's the hardest thing, whereas with a business if something is failing you can find out what it is, adapt and fix it. If you are unwell you can help yourself get better, a good lifestyle, if you are unfit you can do exercising and bring yourself up to a level of fitness where you feel great, all those things give you an element of choice in what you want to do, but those damn earthquakes, you couldn't, there was absolutely nothing</i>

Table 5.  
Codes and Examples of Participants' Responses for Theme of Not Bad

Code	Coded text from thematic analysis
Not traumatised	<i>The earthquakes themselves haven't really worried me yet you hear them coming and you almost in your own mind saying 'now I wonder what direction that's from and how big it's going to be' and then it's a competition, so it's not really affected me. They come into the category I can't do anything about it so whatever, and I think I'm quite lucky in feeling that way because I know a lot of people that don't and can't and don't understand this at all.</i>
Belief that circumstances and others would be okay	<i>I didn't at any point feel fearful of the situation or was more shocked thinking, I think within about fifteen minutes we were outside the building so there's no point in thinking about my Mum and daughter, just trust it's all fine until you find out otherwise.</i>

Table 6.  
Codes and Examples of Participants' Responses for Theme of Burden

Code	Coded text from thematic analysis
A sense of burden: a feeling of being overwhelmed, having difficulty coping.	<i>I've had to make myself remember that it's attitude that matters and that I'm allowed to have days where I feel like absolute crap and I've been through periods of feeling really dreadful but I've got through them. The Salvation Army knocked on the door one day and said 'are you OK', and I just bawled my eyes out, I didn't know what to do. We had no water, no sewer, we had no phone, no power, we had candles, it was beyond explaining.</i>

Table 7.  
Codes and Examples of Participants' Responses for Theme of Life Philosophies

Code	Coded text from thematic analysis
It is what it is	<i>You put things on the timeline and it seems to stretch out further and further. There's nothing you can do about it, you have got to be philosophical and accept that there are a hell of a lot of other people who are in way worse situations. My parents had suffered quite a bit in particular. When I was young my sister died and so I grew up with this kind of sense that we live and work in a broken world, that bad things will happen that one can't expect life to be easy.</i>
Prioritise actions according to your values	<i>There was one guy with quite a bad injury and it was bleeding quite a lot and asked him if he needed help and perhaps it would be a good idea if he went to hospital, but he assured me that he was OK. He seemed OK to me and he looked like he was under control and the bleeding wasn't too bad and he was on a mission. Other than that the people were OK. For me people were the highest value, are they alright?</i>
Don't worry about what you can't control	<i>You don't dwell on the things that have gone wrong and you don't dwell on things that are in the past because you can't change them so you get on and make the most of them now.</i>



Table 8.  
Codes and Examples of Participants' Responses for Theme of Role to Play

Code	Coded text from thematic analysis
Role to play – as useful for coping; prescriptive for actions; contributing to sense of self as capable and sense of contributing to greater cause	<i>I'm proud of what I do because it's a good job and you help people in the minimalist way but it's such an extremely important and emotionally raw time in your lives, and the smallest thing you do or say can make even just the smallest bit of difference, but it can really affect their whole being just for that time.</i>

with others – as shown in Table 8. Roles provided a course of action that gave participants purpose and a sense of efficacy. Roles also allowed distractions from worrying about the effects of the earthquakes, allowing participants to carry on with tasks and to view themselves as functional and coping. Acknowledging the value of roles encouraged pride in contributions and a sense of connection to others. These benefits appeared to play a part in aspects of participants' posttraumatic growth such as a sense of increased personal strength and a greater sense of community.

### Content analysis results

When treating the themes as quantitative codes, values for Cohen's *kappa* ranged from .58 to .77. This showed moderate to good inter-rater reliability for the ten randomly selected co-rated transcripts. Two of the ten transcripts showed moderate inter-rater reliability and eight transcripts showed good inter-rater reliability. Frequency of agreement on code classification ranged from 76 percent to 85 percent agreement.

Two of the themes were marked by a significant difference between genders. Within the code of *knowing what you need*, a Chi-square test for independence indicated a significant difference between genders for the sub-code 'need self-care', with a higher percentage of women reporting self-care (58%,  $n = 38$ ) compared with men (30%,  $n = 10$ ).

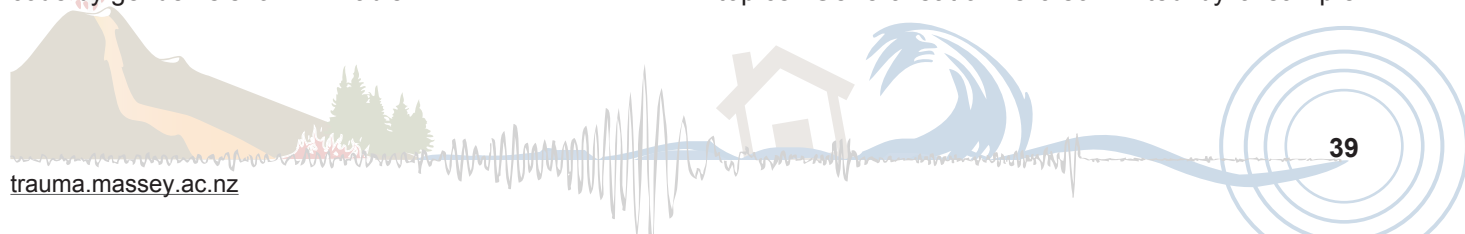
Women were also more likely to report needing to connect with others, and to report that others complemented their coping efforts. A Chi-square test for independence found a significant difference between genders for the code *need others*. More than 81 percent of women ( $n = 54$ ) and 48 percent of men ( $n = 16$ ) reported that others aided their coping. No significant gender differences were found in the other codes. Both Chi-square tests were applied subject to the Yates continuity correction. The resulting distribution of each code by gender is shown in Table 2.

## Conclusion

The current study indicates that posttraumatic growth did occur in a psychologically healthy sample of earthquake-affected individuals. Some sub-themes relating to posttraumatic growth were similar to aspects reported by other groups, including after illness or bereavement. These themes included improved relationships, a sense of the self as stronger, a greater appreciation of life, and changes in spirituality or existential thought. However the code or sub-theme, *greater sense of community* reflects a qualitatively novel aspect of posttraumatic growth that has not been commonly reported in studies of posttraumatic growth. The prevalence of this theme can be attributed to the shared experience of the Canterbury earthquakes, as has been identified in other Canterbury earthquake-related research, by Lambert (2014) and Mutch (2015).

In spite of their overall psychological health, the current participants described experiencing some distress associated with potentially traumatic events. They also reported engaging in a process that produced posttraumatic growth. Participants showed evidence of self-awareness to meet their coping needs, and positive appraisals of their circumstances, of others, and of themselves. Having a formal or informal role to play after the earthquakes was important for informing actions, coping, and feelings of having made a contribution. More women described self-care and connecting with others as a positive way to cope, compared to men.

A number of methodological issues are noteworthy when interpreting the current results. The study focused on individuals coping well after the Canterbury earthquakes. This means that results cannot be generalised to the overall earthquake-affected population of Canterbury or to other populations affected by natural hazard events. Six different interviewers interviewed participants using a semi-structured format. Differences between these interviewers may have contributed to differences in how participants were encouraged to pursue particular topics. Generalisation is also limited by a sample



that was initially purposive, rather than using a more generalizable sampling procedure such as random sampling.

This study nonetheless has substantial strengths. Interview data from the full sample of 99 participants were included in thematic analyses. This means the current study is the first research of this kind to examine posttraumatic growth in a relatively large sample of psychologically healthy individuals after community wide earthquake-related events. The use of semi-structured interviews and thematic analysis allowed for an in-depth exploration of the nature of posttraumatic growth in a New Zealand sample, and of participants' perceptions of their experiences.

Accounts of hardship or burden were apparent in participants' acknowledgement of hardship for themselves and others, descriptions of strong emotion or shock, and reports of sometimes burdensome earthquake experiences. These accounts indicate that hardship and difficulty were experienced alongside posttraumatic growth. In line with theory from Lazarus (1983), participants did not deny the reality of the post-earthquake situation or downplay their difficulties in looking for positive aspects of their experiences.

A lot of existing research has examined posttraumatic growth in samples including individuals with marked psychological dysfunction. The current study has shown that psychologically healthy individuals exhibit posttraumatic growth in similar ways to people suffering from psychological disorders. Definitions of resilience suggest that such psychologically functional individuals might experience little disruption and distress in the face of adversity (Mancini & Bonnano, 2010). Models of posttraumatic growth (Janoff-Bulman, 2004; Tedeschi & Calhoun, 2004) propose that such distress is integral to the process of posttraumatic growth. Psychologically healthy and resilient individuals may therefore be expected to exhibit little posttraumatic growth. However, psychologically healthy participants in the current research reported difficulty associated with major earthquake-related events. They had nonetheless engaged in processes that produced posttraumatic growth without experiencing major functional impairment. Findings from the current study show that worldviews were sufficiently challenged and accommodated within a positive framework to produce psychological growth. This would suggest that psychological dysfunction, or substantial or ongoing distress is not needed for posttraumatic growth to occur.

Part of this apparent anomaly may be explained by sub-themes of positive appraisal identified in the current research, specifically in terms of the self, circumstances, and others. Resilient, psychologically healthy individuals have previously been found to experience more positive emotions in adverse circumstances, reporting frustration but also emotions such as interest, excitement, and eagerness (Tugade & Fredrickson, 2004). These positive emotions enable them to attribute more positive meaning to their circumstances. Experiencing positive emotions in a stressful situation can also help broaden an individual's focus, to consider diverse ways of reacting (Fredrickson, 2004), helping facilitate an interplay between positive emotion, openness to experience, resilience, and posttraumatic growth.

The community-wide nature of shared trauma resulting from the Canterbury earthquakes may have resulted in relatively novel facets of posttraumatic growth such as a greater sense of community. This aspect has also been reported in other Canterbury earthquake-related research (Lambert, 2014; Mutch, 2015). It highlights how positive changes can occur in a community and go on to influence posttraumatic growth at the level of the individual. The greater support perceived from a community, captured by the theme *greater sense of community*, may facilitate further posttraumatic growth – considering that perceived support from others has been observed to promote posttraumatic growth in prior research by Lev-Wiesel and Amir (2006) and Taku et al. (2009). This is nonetheless another aspect of the current research that needs to be generalised with caution, considering Janoff-Bulmann's (2004) point that qualitatively different trauma results in different challenges to assumptive worldviews and that this in turn, results in different aspects of posttraumatic growth. Earthquakes are a distinct source of trauma. There are many other traumas which are not experienced on such a wide social scale and which are less likely to lead to such a greater sense of community.

Cognitive processes involved in posttraumatic growth have also been highlighted by the current study. Participants reported a cognitive position of positive appraisal including counting their blessings, appreciating others' input, seeing humour or irony in circumstances, and considering themselves lucky compared with others or compared with what might have been. These cognitive strategies were reported by participants as a way to help them cope and appeared to contribute to posttraumatic growth. Some participants described

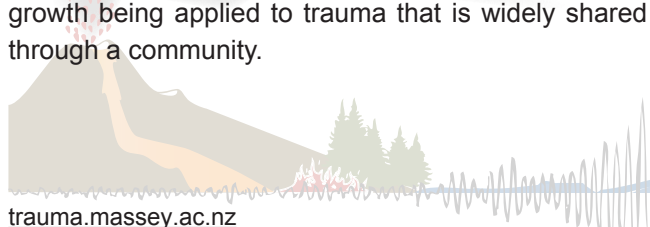
deliberately choosing to take a particular cognitive stance, such as only talking about positive things, not ruminating over loss or difficulty, not focusing on the past, or not focusing on things that couldn't be changed. The extent that individuals recognised that certain ways of thinking could contribute to feeling better or worse, points to the role of metacognition, being aware of a process of thinking rather than simply the content of thinking, in the posttraumatic growth process.

Themes in the current study show how individuals also responded to their environments in ways that aided adaptation and fulfilment, acting in accordance with their own values to meet needs for autonomy, competence, and relatedness. This is consistent with Joseph and Linley's (2005) theory, that posttraumatic growth is more likely to occur when individuals are following their own values, so that they attribute a positive meaning to changed worldviews. The current participants' reports of knowing what they needed is a clear example of individuals operating in a way consistent with their values in identifying what was needed to help coping, and acting to meet these needs. Positive accommodation of the earthquakes into participants worldview, resulting in posttraumatic growth, was also shown in themes and coded content. Modified worldviews, that life is more fragile and unpredictable than had been thought before the earthquake sequence, appeared to favour an attitude of living for each day and making the most of each moment.

In summary, findings from the current study indicate that psychologically healthy individuals can experience posttraumatic growth. Worldviews appear to have been challenged sufficiently to bring about posttraumatic growth, suggesting that psychological dysfunction, or substantial or ongoing distress, are not needed for posttraumatic growth to occur. This is contrary to existing theories of posttraumatic growth. Existing models of the posttraumatic growth process (Janoff-Bulman, 2004; Joseph & Linley, 2005; Tedeschi & Calhoun, 2004) may therefore be improved by future research into how psychological resilience may influence the positive impact of trauma. Experiences of a stronger sense of community form another relatively novel aspect of posttraumatic growth identified in the current research. This aspect may complement models of posttraumatic growth being applied to trauma that is widely shared through a community.

## References

- Ardagh, M. W., Richardson, S. K., Robinson, V., Than, M., Gee, P., Henderson, S., ... Deely, J. M. (2012). The initial health-system response to the earthquake in Christchurch, New Zealand, in February, 2011. *The Lancet*, *379*, 2109-2115. doi:10.1016/S0140-6736(12)60313-4
- Beaglehole, B., Bell, C., Beveridge, J., & Frampton, C. (2015a). Psychiatric admissions fall following the Christchurch earthquakes: An audit of inpatient data. *Australian and New Zealand Journal of Psychiatry*, *49*, 346-350. doi: 10.1177/0004867414560651
- Beaglehole, B., Bell, C., Frampton, C., Hamilton, G., & McKean, A. (2015b). The impact of the Canterbury earthquakes on prescribing for mental health. *Australian and New Zealand Journal of Psychiatry*, *49*, 742-750. doi: 10.1177/0004867415589794
- Bell, C., Carter, F., Boden, J., Ali, A., McKenzie, J., & Wilkinson, T. (2016). Psychological impact of the Canterbury earthquakes on university staff. *New Zealand Medical Journal*, *129*, 18-28. [www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2016/vol-129-no-1430-19-february-2016/6812](http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2016/vol-129-no-1430-19-february-2016/6812)
- Boyatzis, R. (1998). *Transforming qualitative information: Thematic analysis and code development*. London: Sage.
- Carter, F. A., Bell, C. J., Ali, A. N., McKenzie, J., & Wilkinson, T. J. (2014). The impact of major earthquakes on the psychological functioning of medical students: A Christchurch, New Zealand study. *New Zealand Medical Journal*, *127*, 54-66. [www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2014/vol-127-no-1398/6211](http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2014/vol-127-no-1398/6211)
- Fergusson, D. M., & Boden, J. M. (2014). The psychological impacts of major disasters. *Australian and New Zealand Journal of Psychiatry*, *48*, 597-599. doi: 10.1177/0004867414538677
- Fergusson, D. M., Boden, J. M., Horwood, L. J., & Mulder, R. T. (2014a). Perceptions of distress and positive consequences following exposure to a major disaster amongst a well-studied cohort. *Australian and New Zealand Journal of Psychiatry*, *49*, 351-359. doi: 10.1177/0004867414560652
- Fergusson, D. M., Horwood, L. J., Boden, J. M., & Mulder, R. T. (2014b). Impact of a major disaster on the mental health of a well-studied cohort. *JAMA Psychiatry*, *71*, 1025-1031. doi: 10.1001/jamapsychiatry.2014.652
- Fredrickson, B. L. (2004). The broaden-and-build theory of positive emotions. *Philosophical Transactions of the Royal Society of London Series B-Biological Sciences*, *359*, 1367-1377. doi 10.1098/rstb.2004.1512
- Helton, W. S., & Head, J. (2012). Earthquakes on the mind: Implications of disasters for human performance. *Human Factors*, *54*, 189-194. doi:10.1177/0018720811430503
- Helton, W. S., Head, J., & Kemp, S. (2011). Natural disaster induced cognitive disruption: Impacts on action slips. *Consciousness and Cognition*, *20*, 1732-1737. doi: 10.1016/j.concog.2011.02.011
- Janoff-Bulman, R. (2004). Posttraumatic growth: Three explanatory models. *Psychological Inquiry*, *15*, 30-34. [www.jstor.org/stable/20447198](http://www.jstor.org/stable/20447198)
- Johal, S., Mounsey, Z., Tuohy, R., & Johnston, D. (2014a). Coping with disaster: General practitioners' perspectives on the impact of the Canterbury earthquakes. *PLoS Currents*, *6*. doi: 10.1371/currents.dis.cf4c8fa61b9f4535b878c48eca87ed5d



- Johal, S., Mounsey, Z., Tuohy, R., & Johnston, D. (2014b). Patient reactions after the Canterbury earthquakes 2010-11: A primary care perspective. *PLoS Currents*, 6. doi: 10.1371/currents.dis.4ad3beea9e155dd5038a8d2b895f0df4
- Johal, S. S., Mounsey, Z., Brannelly, P., & Johnston, D. M. (2016). Nurse perspectives on the practical, emotional, and professional impacts of living and working in post-earthquake Canterbury, New Zealand. *Prehospital and Disaster Medicine*, 31, 10-16. doi: 10.1017/S1049023X15005439
- Johal, S. S., & Mounsey, Z. R. (2015). Finding positives after disaster: Insights from nurses following the 2010-2011 Canterbury, NZ earthquake sequence. *Australasian Emergency Nursing Journal*, 18, 174-181. doi: 10.1016/j.aenj.2015.09.001
- Joseph, S., & Linley, P. A. (2005). Positive adjustment to threatening events: An organismic valuing theory of growth through adversity. *Review of General Psychology*, 9, 262-280. doi: 10.1037/1089-2680.9.3.262
- Kemp, S., Helton, W., Richardson, J., Blampied, N., & Grimshaw, M. (2011). Sleeplessness, stress, cognitive disruption and academic performance following the September 4, 2010, Christchurch earthquake. *Australasian Journal of Disaster and Trauma Studies*, 2, 11-18. [www.massey.ac.nz/~trauma/issues/2011-2/AJDTS\\_2011-2\\_Kemp.pdf](http://www.massey.ac.nz/~trauma/issues/2011-2/AJDTS_2011-2_Kemp.pdf)
- Kemp, S., Helton, W. S., Richardson, J. J., Blampied, N. M., & Grimshaw, M. (2013). How does a series of earthquakes affect academic performance? In K. Pfeifer & N. Pfeifer (Eds.), *Forces of nature and cultural responses* (pp. 51-67). New York: Springer.
- Lambert, S. (2014). Indigenous peoples and urban disaster: Māori responses to the 2010-12 Christchurch earthquakes. *Australasian Journal of Disaster and Trauma Studies*, 18, 39-48. [www.massey.ac.nz/~trauma/issues/2014-1/AJDTS\\_18-1\\_Lambert.pdf](http://www.massey.ac.nz/~trauma/issues/2014-1/AJDTS_18-1_Lambert.pdf)
- Lev-Wiesel, R., & Amir, A. M. (2006). Growing out of ashes: Posttraumatic growth among Holocaust child survivors: Is it possible? In L.G.C.R.G. Tedeschi (Ed.), *Handbook of posttraumatic growth: Research and practice* (pp. 248-263). Mahwah, New Jersey: Erlbaum.
- Mancini, A., & Bonanno, G. (2010). Resilience to potential trauma: Toward a lifespan approach. In J. Reich, A. Zandra, & J. Hall (Eds.), *Handbook of adult resilience* (pp. 259-273). New York: Guilford Press.
- Morris, B.A., Shakespeare-Finch, J., & Scott, J. L. (2012). Posttraumatic growth after cancer: the importance of health-related benefits and newfound compassion for others. *Supportive Care in Cancer*, 20, 749-756. doi: 10.1007/s00520-011-1143-7
- Mutch, C. (2015). Quiet heroes: Teachers and the Canterbury, New Zealand, earthquakes. *Australasian Journal of Disaster and Trauma Studies*, 19, 77-86. [www.massey.ac.nz/~trauma/issues/2015-2/AJDTS\\_19\\_2\\_Mutch.pdf](http://www.massey.ac.nz/~trauma/issues/2015-2/AJDTS_19_2_Mutch.pdf)
- Park, C. L., Cohen, L. H., & Murch, R. L. (1996). Assessment and prediction of stress-related growth. *Journal of Personality*, 64, 71-105. doi: 10.1111/j.1467-6494.1996.tb00815.x
- QSR International (2012). NVivo (Version 10). Retrieved from [www.qsrinternational.com](http://www.qsrinternational.com)
- Shakespeare-Finch, J., & Armstrong, D. (2010). Trauma type and posttrauma outcomes: differences between survivors of motor vehicle accidents, sexual assault, and bereavement. *Journal of Loss & Trauma*, 15, 69-82. doi: 10.1080/15325020903373151
- Smith, R., McIntosh, V., Carter, J., Colhoun, H., Jordan, J., Carter, F., & Bell, C. (2016). Thriving after trauma: posttraumatic growth following the Canterbury earthquake sequence. *Australasian Journal of Disaster and Trauma Studies*, 20, 125-134. [www.massey.ac.nz/~trauma/issues/2016-2/AJDTS\\_20-2\\_Smith.pdf](http://www.massey.ac.nz/~trauma/issues/2016-2/AJDTS_20-2_Smith.pdf)
- Taku, K., Tedeschi, R. G., Cann, A., & Calhoun, L. G. (2009). The culture of disclosure: Effects of perceived reactions to disclosure on posttraumatic growth and distress in Japan. *Journal of Social and Clinical Psychology*, 28, 1226-1243. doi: 10.1521/jscp.2009.28.10.1226
- Tedeschi, R. G., & Calhoun, L. G. (1996). The posttraumatic growth inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress*, 9, 455-471. doi:10.1007/bf02103658
- Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, 15, 1-18. doi: 10.1007/bf02103658
- Tugade, M. M., & Fredrickson, B. L. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality & Social Psychology*, 86, 320-333. doi: 10.1037/0022-3514.86.2.320
- Wilcox, L. (Ed.). (1997). *Sayings of the Sufi sages*. Washington, DC: MTO Shahmaghsoudi.