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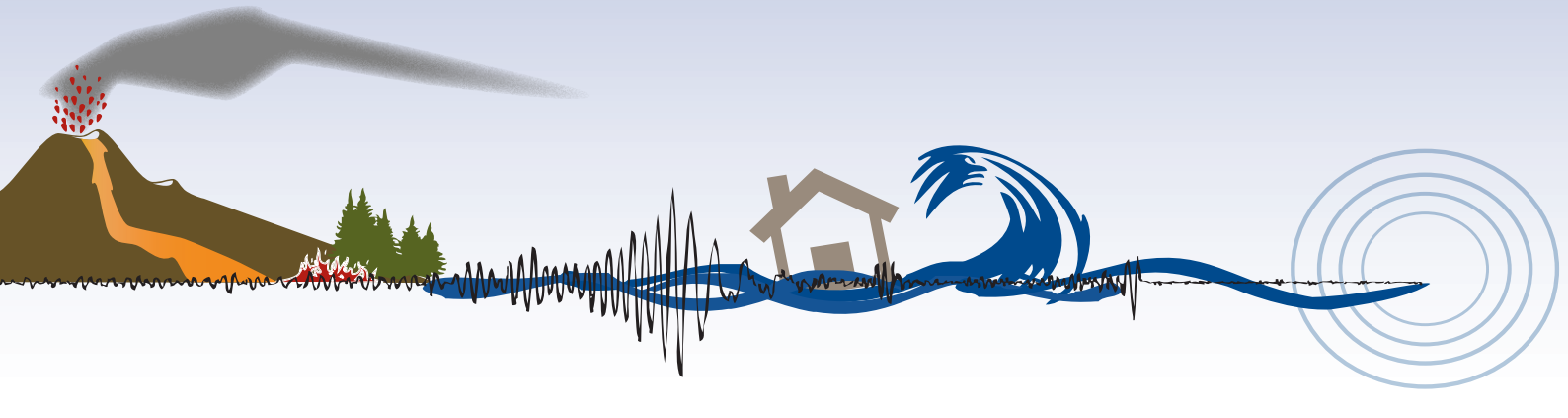

# Contents:
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# Exploring an anniversary effect three years after the February 2011 Christchurch Earthquake

*Ellen A. Turnbull[1],*
*Martin J. Dorahy[1],*
*Eileen Britt[1],*
*Donncha Hanna[2]*

[1] Department of Psychology, University of Canterbury, Christchurch, New Zealand.

[2] School of Psychology, The Queen's University of Belfast, Northern Ireland.



**Author correspondence:**
Martin J. Dorahy,
Department of Psychology,
University of Canterbury,
Private Bag 4800,
Christchurch, 8140,
New Zealand.

Email: martin.dorahy@canterbury.ac.nz

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## Abstract

*The anniversary of a traumatic event can lead to psychological distress. Though triggers of psychological distress have been generally documented in the trauma literature, the impact of earthquake anniversaries is less well understood, particularly in relation to when distress symptoms are most heightened. The present study investigated an anniversary effect on psychological distress three years after the February 2011 Christchurch earthquake, whether this effect differed in communities with different levels of physical impact or financial resource, and if it was more pronounced before or after the anniversary. Respondents were from six Christchurch suburbs differing in socioeconomic status and physical damage from the earthquake. Psychological distress was assessed via self-report measures of posttraumatic stress, depression, and anxiety. Assessment took place 2-3 weeks before the third anniversary (n = 300) and 2-3 weeks after it (n = 300). Symptoms of posttraumatic stress and depression were greater after the anniversary than before, particularly in medium to low socioeconomic status suburbs and those suburbs that experienced greater physical damage from the earthquakes. Contrary to predictions, the findings demonstrate a delayed anniversary reaction that manifested in the weeks following the earthquake anniversary.*

**Keywords:** *Earthquakes, distress, anniversary*

Media coverage (Hilton, 1997), situational cues (Antony & Rowa, 2005), intrusive images (Birrer, Michael, & Munsch, 2007), and external stressors (Mitchell & Ronzio, 2011) can cause distress many years after a traumatic event. The anniversary of a traumatic event can also trigger psychological distress. This *anniversary effect* has been documented in relation to floods (Assanangkornchai, Tangboonngam, Samangsri, & Edwards, 2007), terrorist attacks (Daly et al., 2008), war (Morgan, Kingham, Nicolaou, & Southwick, 1998) and earthquakes (Ye, Fan, Li, & Han, 2014); findings generally support heightened psychological distress around the anniversary of the traumatic event. However, there is a paucity of research into whether that distress is heightened *before* or *after* the anniversary several years after the event. Such an understanding may help to direct resources accordingly, to reduce heightened distress around the anniversary of a traumatic event.

Assanangkornchai et al. (2007) investigated, over a 1 year period, the psychological effects of the 2000 Hat Yai flood. Distress gradually declined over the year; however, the final measurement 3 to 4 weeks before the first anniversary showed increased distress in areas most affected by the floods. Assanangkornchai et al. interpreted these findings as an anniversary reaction. Given flooding is an annual event in the area, it is however possible that an anniversary reaction could be distress about imminent future flooding, rather than memories of past flooding.

Morgan et al. (1998) found that of their 59 Gulf War I veteran participants, 18 experienced an anniversary reaction 2 years after deployment. Participants identified the month of their most severe war-related trauma and an anniversary reaction was evident if their posttraumatic stress (PTS) symptoms were most prelevant in that month. In a second study of the same population, Morgan, Hill, Fox, Kingham, and Southwick (1999) found anniversary effects in a small number of veterans 6 years post-service, showing the long-term presence of an anniversary effect. Daly et al. (2008) found an increase in PTS symptoms among disaster relief workers 2 weeks either side of the first anniversary of the 9/11 terrorist attacks. While these studies provide evidence of anniversary effects across a range of traumatic events which share some similarities with earthquakes,

there are characteristic differences which justify an investigation of earthquake anniversary effects.

There is evidence that earthquake memories for survivors can be vivid (Er, 2003) and distressing (Fan, Zhang, Yang, Mo, & Liu, 2011) around one year after the disaster, but people are also able to show considerable resilience (Bonanno, 2004; 2005). Ye et al. (2014) followed 1,573 adolescents 6, 12, 18, and 24 months following the Wenchuan earthquake. They found rates of depression at 27%, 41%, 32%, and 38% respectively, indicating a high stability of depression as well as a spike around the first and second anniversary. What is currently unclear, and therefore important to address, is the degree to which symptoms increase immediately before or immediately after anniversaries in community groups exposed to earthquakes. Such information will allow for more targeted efforts to reduce the negative impacts of such events.

On 22 February 2011, a 6.3 magnitude earthquake hit Christchurch, New Zealand, resulting in widespread destruction and loss of life (185 deaths; Potter, Becker, Johnston, & Rossiter, 2015). It followed a 7.1 magnitude earthquake in September 2010 which caused major infrastructure damage but no loss of life. The region experienced thousands of aftershocks that continued for years after the initial earthquakes (Dorahy et al., 2016), serving as a constant reminder of the earthquake and the continual danger of living in a seismically active region. In addition, every year the city of Christchurch stops at 12.51pm on 22 February to remember the events of that day (Harris, 2018).

The present study investigated if an anniversary effect of psychological distress was more pronounced immediately before or after the third anniversary of the February 2011 Christchurch earthquake. The analysis accounted for socioeconomic status (SES) and the amount of physical damage caused by the earthquake in each suburb assessed, given the established impact of these factors on psychological distress (Dorahy et al., 2015). Psychological distress is represented by the severity of PTS, depression, and anxiety symptoms. Some previous studies found heightened symptoms of distress before the anniversary, others report heightened symptoms after, and some measured participants' symptoms either side of the anniversary and merged them. It is therefore unclear when in the anniversary period heightened psychological distress may be experienced most severely. Given memory cues begin to become apparent in the lead-up to the anniversary, we predicted higher psychological distress, after controlling for physical impact from the earthquakes and socioeconomic resources, in the weeks preceding the anniversary compared to following the anniversary.

## Method

### *Participants*

This study recruited residents from six Christchurch suburbs ($n$ = 100 per suburb, $N$ = 600). The sample comprised 215 males (35.8%) and 385 females (64.2%) aged between 18 and 91 years ($M$ = 52.66, $SD$ = 18.03). Fifty participants from each suburb were surveyed before the anniversary ($n$ = 300) and another 50 participants from each suburb were surveyed after it ($n$ = 300) to reduce the impact of practice effects associated with a repeated measures design. For pre-anniversary data collection, 433 (29.8%) households declined to participate, while no one was home in 718 (49.5%) households (although a data processing error meant some data in this category were unknown), resulting in a total response rate of 20.7%. For post-anniversary data collection, 296 (20.5%) households declined to participate, while no one was home in 847 households (58.7%), resulting in a total response rate of 20.8%. See Appendix 1 for a breakdown of the number of houses approached in each suburb to reach the quota.

Suburbs in Christchurch were unequally affected by the earthquake. While some were relatively unaffected (particularly those in the West and North of the city), others were significantly affected (e.g., homes uninhabitable, major sewage, electricity, and water disruptions). The researchers (Dorahy et al., 2016) selected three suburbs which were severely physically affected by the earthquakes as assessed by high levels of housing damage and destruction, (i.e., many homes in these areas were no longer safe to enter and others experienced prolonged loss of utilities and major structural damage). These suburbs were chosen to reflect not only physical damage, but also three different levels of SES as determined by the 2006 census, which at the time of the initial earthquake contained the most recent data for each suburb across the city. The remaining three suburbs had comparatively less physical damage (i.e., few demolished or severely damaged houses, little utility disruption) and were matched on SES (low, medium, and high) based on census data.

### *Procedure*

Participants were recruited using a door-to-door approach. Data collection started 3 weeks before the third anniversary (22 February 2014) of the earthquake and lasted 2 weeks, during which 50 participants from each suburb were surveyed. Another 50 participants from each of the same suburbs were surveyed in a 2-week period starting a week after the 22 February anniversary. To ensure the sample was more representative, a systematic method was used for recruitment; on each street the researcher started at the lowest number, working progressively until the quota for that area was reached. The post-anniversary assessments started at the next house on from the last house assessed pre-anniversary.

Question and response options were read to those who agreed to participate and on completion the participants received a one-page sheet outlining services available to those affected by the earthquake, including a free counselling service. Participants were also given a $5 coffee voucher in exchange for their time. This study was approved by the University of Canterbury Human Ethics Committee (HEC 2013/160; 13.1.2014).

During the first data collection window (1-15 February 2014) 39 aftershocks occurred in the Canterbury region. The strongest of these was M3.9 and 5 kilometres deep. Of the 188 people who reported this aftershock to GeoNet, 99.46% ($n$ = 187) experienced light or weak shaking. During the second data collection window (1-15 March 2014) 26 aftershocks occurred in the region, the strongest of which was M3.6 and 9 km deep. Of the 581 people who reported it, 99.14% ($n$ = 576) reported light or weak shaking.

### *Measures*

Participants completed a questionnaire battery assessing psychological distress: the Modified Posttraumatic Stress Symptom Scale (MPSS-SR; Falsetti, Resnick, Resick, & Kilpatrick, 1993), the Patient Health Questionnaire (PHQ-9; Spitzer, Kroenke, Williams, & Patient Health Questionnaire Primary Care Study Group, 1999), and the Generalized Anxiety Disorder scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006). Demographic information related to sex, age, and place of residence during the earthquakes was also collected, as well as where they were living at the time they answered the questionnaire.

The MPSS-SR contains 17 items that correspond to the DSM-IV criteria for Posttraumatic Stress Disorder (PTSD; Falsetti et al., 1993). For PTS symptom severity, the focus of this paper, items were anchored to the earthquake and rated on a 6-point scale (0 = “not at all distressing” to 5 = “extremely distressing”) over the past 2 weeks (e.g., “do you often make efforts to avoid thoughts or feelings associated with the event(s)?”). Total scores for severity were created by summing all items, with a minimum possible score of 0 and a maximum of 85. Higher scores indicate greater PTSD symptom severity, with scores of or above 29 suggesting PTSD. The psychometric properties of the scale are well supported in the literature (e.g., Cronbach’s alpha > .95, Falsetti et al., 1993) and in the current study, with internal consistency at α = .90.

The PHQ-9 comprises nine items measuring symptoms of depression (Spitzer et al., 1999) on a 4-point scale (0 = “not at all” to 3 = “nearly every day”) of how often in the past week a participant felt each symptom (e.g., “little interest or pleasure doing things”). Scores from each item are summed, with higher scores indicating a greater frequency of depression symptoms. Scores above 5, 10, 15, and 20 represent levels of depression in the mild, moderate, moderate-severe, and severe range, respectively. The PHQ-9 is a reliable and valid measure of depression severity (α > .85 in Kroenke, Spitzer, Williams, & Löwe, 2010; α = .89 in the current study).

The GAD-7 is designed to measure general anxiety symptoms using a 7-item questionnaire (Spitzer et al., 2006) rated on a 4-point scale (0 = “not at all” to 3 = “nearly every day”) of how often in the past week the participant felt bothered by a particular problem (e.g., “trouble relaxing”). The sum of all items provides a total score between 0 and 21, with a higher score indicating a greater frequency of anxiety symptoms. Scores over 8 are considered to suggest an anxiety disorder. The GAD-7 has good psychometric properties (α = .89 in Löwe et al., 2008; α = .91 in the current study).

### *Data Analysis*

Analysis was undertaken with SPSS version 23, using three 3-way between-subject Analyses of Variance (ANOVA) models where the independent variables were Anniversary (two levels: before and after), SES (three levels: low, medium, and high), and damage (two levels: physically affected and relatively unaffected). The dependent variables were PTS severity, depression severity, and anxiety severity. The data are available at https://osf.io/njykt/.

## Results

The sex ratio did not significantly differ between participants who responded before or after the anniversary, $\chi^2$ (1, $N$ = 600) = 3.83, $p$ = .061 (68.0% females before anniversary and 60.3% afterwards). However, mean age did differ between participants who responded before or after the anniversary, $t$(598) = 3.23, $p$ = .001, $d$ = 0.26. Those responding after the anniversary ($M$ = 55.02, $SD$ = 17.87) were significantly older than those responding beforehand ($M$ = 50.16, $SD$ = 18.11). Assumptions for ANOVA (e.g., normal distributions, homogeneity of variance) were met for all of the scales (Field, 2013). Table 1 shows the means and standard deviations for each scale across suburbs.

### *Posttraumatic Stress*

There was a significant main effect of anniversary for the PTS severity scores ($F$(1, 588) = 9.54, $p$ = .002, $\eta_p^2$ = .02) with higher severity after the anniversary than before it. There was also a significant main effect for suburb SES ($F$(2, 588) = 16.62, $p$ < .001, $\eta_p^2$ = .05). Participants from the medium SES suburbs had higher scores than low ($p$ = .005) or high ($p$ < .001) SES suburbs. The low SES suburbs had significantly higher severity scores than the high SES suburbs ($p$ = .031). In addition, there was a significant main effect of suburb damage ($F$(1, 588) = 6.87, $p$ = .009, $\eta_p^2$ = .01) with those in the high damage suburbs reporting higher severity scores than those in the low damage suburbs. There were no interaction effects.

### *Depressive Symptoms*

A significant main effect of anniversary was also evident for depressive symptoms ($F$(1, 588) = 8.02, $p$ = .005, $\eta_p^2$ = .01), again with higher severity after the anniversary compared to before. There was also again a significant main effect for suburb SES ($F$(2, 588) = 8.76, $p$ < .001, $\eta_p^2$ = .03), with participants from the low ($p$ = .004) and medium ($p$ < .001) SES suburbs demonstrating higher depression scores than the high SES suburbs. There was a significant main effect of suburb damage ($F$(1, 588) = 6.63, $p$ = .010, $\eta_p^2$ = .01), with those in the high damage suburbs reporting higher severity scores than in the low damage suburbs. Unlike PTS, there was also a significant interaction between SES and damage ($F$(2, 588) = 4.35, $p$ = .013, $\eta_p^2$ = .02). Participants from low and medium SES suburbs living in high damage areas reported more depression symptoms than those in low damaged areas. However, the high SES suburbs showed no difference across levels of damage.

### *Anxiety Symptoms*

There was no significant main effect of anniversary for the anxiety scores ($F$(1, 588) = 1.98, $p$ = .160, $\eta_p^2$ < .01). There was, however, a significant main effect for suburb SES ($F$(2, 588) = 8.30, $p$ < .001, $\eta_p^2$ = .03). Participants from the high SES suburbs had lower anxiety scores than those from the low ($p$ = .030) or medium ($p$ < .001) SES suburbs. In addition, there was a significant main effect of suburb damage ($F$(1, 588) = 6.87, $p$ = .009, $\eta_p^2$ = .01), with those in the high damage suburbs reporting higher anxiety. There were no interaction effects.

Without a control sample assessed at another time of the year, it was difficult to gauge the true impact of the anniversary effect. Achterhof et al. (2018) assessed participants from the same suburbs as the current study ($N$ = 412) 10-11 months after the same earthquake and used the same measures of depression and anxiety. Comparing their total PHQ ($M$ = 3.63; $SD$ = 4.62) and GAD ($M$ = 3.25; $SD$ = 3.72) scores with total before and after scores in the current study showed lower scores before the third year anniversary compared to approximately one month before the first anniversary for both the PHQ, $F$(1, 710) = 17.21, $p$ < .001, $\eta_p^2$ = .03, and GAD, $F$(1, 710) = 7.29, $p$ = .001, $\eta_p^2$ = .01.

Table 1
*Means and Standard Deviations in parentheses) for each scale by suburb*

| | | Low SES | | Medium SES | | High SES | |
|---|---|---|---|---|---|---|---|
| | | High Damage | Low Damage | High Damage | Low Damage | High Damage | Low Damage |
| MPSS-SR Severity | Before | 6.62 (10.28) | 3.26 (5.44) | 8.04 (7.57) | 7.58 (9.75) | 2.62 (5.88) | 1.94 (6.54) |
| | After | 8.68 (12.18) | 5.10 (9.63) | 11.02 (9.63) | 7.90 (8.73) | 5.04 (7.29) | 5.26 (7.03) |
| | Total | 7.65 (11.26) | 4.18 (7.84) | 9.53 (8.74) | 7.74 (9.21) | 3.83 (6.70) | 3.60 (6.96) |
| PHQ-9 | Before | 3.76 (5.83) | 1.88 (3.84) | 3.38 (4.21) | 2.08 (4.44) | 1.04 (2.66) | 1.10 (3.93) |
| | After | 4.32 (6.40) | 2.72 (6.58) | 5.48 (5.74) | 3.00 (4.68) | 1.58 (2.97) | 2.76 (4.08) |
| | Total | 4.04 (6.10) | 2.30 (5.38) | 4.43 (5.12) | 2.54 (4.56) | 1.31 (2.82) | 1.93 (4.07) |
| GAD-7 | Before | 3.62 (5.39) | 2.00 (3.55) | 3.56 (4.52) | 2.94 (4.70) | 1.26 (3.28) | 1.24 (3.55) |
| | After | 3.74 (5.53) | 2.26 (4.87) | 4.88 (5.40) | 2.50 (4.54) | 1.94 (3.77) | 2.36 (3.24) |
| | Total | 3.68 (5.43) | 2.13 (4.24) | 4.22 (5.00) | 2.72 (4.60) | 1.60 (3.53) | 1.80 (3.43) |

However, the post-third year anniversary scores were not significantly different to scores reported just prior to the first anniversary on the PHQ, $F(1, 710) = .71$, $p < .40$, $\eta_p^2 = .001$, and GAD, $F(1, 710) = .94$, $p < .33$, $\eta_p^2 = .001$.

## Discussion

This study investigated whether psychological distress was higher before or after the third anniversary of the February 2011 Christchurch Earthquake, accounting for differences in SES and physical damage. The scores for depression and anxiety were similar to scores 10-11 months after the earthquake; these symptom severities at the third anniversary similar to those evident in the first year after the earthquake indicate a general anniversary effect. Contrary to expectations, however, symptoms were elevated in the immediate weeks *following* the anniversary of the earthquake, compared to the weeks immediately preceding the event. Regardless of the anniversary, participants from low and medium SES suburbs generally had more PTS symptom severity and greater frequency of depressive and anxiety symptoms than participants from higher SES suburbs. In addition, those living in suburbs with high levels of damage had more PTS, depression, and anxiety symptoms than those in less affected suburbs (except when comparing high SES suburbs).

Greater psychological distress after the anniversary may be explained by individuals being less able to avoid thoughts and feelings about the earthquake than before the anniversary. We expected that memory cues becoming apparent in the lead-up to the anniversary would increase distress; perhaps less salient cues may be present in the immediate environment prior to the anniversary compared to the day of the anniversary and those following.

Mental disengagement is a common form of coping for individuals who suffer from PTS symptoms (Clohessy & Ehlers, 1999) and is assisted by the absence of cues that act as reminders of the trauma. The anniversary itself brought memorial services, national media coverage, and increased community dialogue and reminiscence (Harris, 2018). This heightened level of public attention could challenge coping mechanisms by cueing reminders and undermining efforts to disengage mentally. This interpretation is consistent with other findings that greater engagement with reminders of the event, such as media coverage in the case of the 9/11 terrorist attacks, resulted in higher levels of PTS symptoms (Bernstein et al., 2007). An increase in salient cues including greater media and community attention on the anniversary may result in greater psychological distress that persists in the weeks following the anniversary.

The stronger anniversary effect after the event was limited to symptoms of PTS and depression, and not evident with anxiety. Perhaps rather than feeling on edge, worried, and irritable in the aftermath of the anniversary, feelings of loss and mourning are activated: for example, for loved ones, homes, and livelihoods (Harris, 2018). This impacts on symptoms of depression and PTS. A sense of loss has been associated with depressive symptoms (Price, Choi, & Vinokur, 2002). Indeed, individuals who experience loss are more susceptible to depression in response to life stressors (Slavich, Monroe, & Gotlib, 2011). It is also possible that anxiety was heightened before the event due to anxiety about the anniversary itself, while PTS and depression were not affected in this way.

The combination of high damage and lower SES appeared to leave individuals particularly vulnerable to PTS and depression symptoms around the third anniversary of the earthquake. The low SES, high damage and medium SES, high damage suburbs had the highest symptom severity and frequency. In contrast, high SES suburbs were largely buffered from psychological distress influenced by damage experienced during the 2011 earthquake. These findings generally support the hypothesis that individuals from suburbs with greater damage and lower financial resources experience more psychological distress. Individuals from low-income populations experience different physical and psychological impacts and greater vulnerability to disasters (Fothergill & Peek, 2004). Those in lower SES suburbs who were more physically affected are less likely to have financial resources to buffer against the impact of loss and damage, and therefore are more likely to experience distress.

The current study has particular limitations, including a number of potentially confounding variables (e.g., family issues, financial issues, and difficulties relating to insurance coverage) which might affect psychological responses to reminders of the earthquake that were not measured. Additionally, causal mechanisms of the anniversary effect such as increases in salient reminders from the media were not explored; causal explanation was not the aim of this study but presents opportunities for future research. The response rate of approximately 20% both before and after the anniversary, primarily driven by people not being home when the household was approached, potentially reduces the

representativeness of the sample. While there is no reason to expect systematic influences on non-response, future work could employ methods to increase response rate or use demographic sampling quotas to ensure that the sample is representative.

Furthermore, there was a significant difference in age for participants assessed before and after the anniversary. Studies examining psychological distress in adolescents around the time of an anniversary produced similar findings to the present study, indicating age likely does not have a meaningful effect on psychological distress experienced (Fan et al., 2011; Ye et al., 2014). To more robustly identify anniversary effects, the data in this study were compared to data on the same measures of anxiety and depression from the same suburbs 10 to 11 months after the earthquake. A more sophisticated approach could assess participants from each suburb outside the third year anniversary window (e.g., 2 months beforehand).

The extent to which the frequency of anniversaries leads to habituation over time ought to be empirically tested. Finally, because of the large number of aftershocks, some of considerable magnitude (e.g., greater than M5.0), individuals within Christchurch may have their own response to specific aftershocks that were more relevant to them. The current study focussed on the earthquake that led to fatalities and a major city-wide and national response; this was the earthquake which was likely to be the most impactful for the majority of the population. Therefore, it was considered most appropriate to assess anniversary effects within the wider community rather than screening out any participants who were more impacted by a different earthquake in the sequence.

This study shows elevations in PTS and depression symptoms in the weeks following the third anniversary of a fatal earthquake. The findings have implications for both practice and further research. The presence of greater psychological distress after the anniversary than before suggests that community interventions, public health messaging, and resources also need to be available in the weeks following an anniversary (Lambert, 2005). Different coping strategies may be required after the anniversary, when reminders are more salient and visible, than before the anniversary. Further, attention should be paid to areas with less financial resource that have experienced higher damage to reduce the psychological distress experienced by these communities.

## Authors' Note

Martin J. Dorahy ORCiD: https://orcid.org/0000-0003-0171-4913

Donncha Hanna ORCiD: https://orcid.org/0000-0003-3382-4842

The data and hypotheses in this paper have not been disseminated elsewhere. The authors have no conflicts of interest. The data that support the findings of this study are available in The Open Science Framework, https://osf.io/njykt/.

## References

Achterhof, R., Dorahy, M. J., Rowlands, A., Renouf, C., Britt, E., & Carter, J. D. (2018). Predictors of posttraumatic growth 10–11 months after a fatal earthquake. *Psychological Trauma: Theory, Research, Practice, and Policy*, *10*(2), 208-215. doi: 10.1037/tra0000286

Antony, M. M., & Rowa, K. (2005). Evidence-based assessment of anxiety disorders in adults. *Psychological Assessment*, *17*(3), 256-266. doi: 10.1037/1040-3590.17.3.256

Assanangkornchai, S., Tangboonngam, S. N., Samangsri, N., & Edwards, J. G. (2007). A Thai community's anniversary reaction to a major catastrophe. *Stress and Health, 23*(1), 43-50. doi: 10.1002/smi.1118

Bernstein, K. T., Ahern, J., Tracy, M., Boscarino, J. A., Vlahov, D., & Galea, S. (2007). Television watching and the risk of incident probable posttraumatic stress disorder: A prospective evaluation. *The Journal of Nervous and Mental Disease*, *195*(1), 41-47. doi: 10.1097/01.nmd.0000244784.36745.a5

Birrer, E., Michael, T., & Munsch, S. (2007). Intrusive images in PTSD and in traumatised and non-traumatised depressed patients: A cross-sectional clinical study. *Behaviour Research and Therapy, 45*(9), 2053-2065. doi: 10.1016/j.brat.2007.03.005

Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist, 59*(1), 20-28. doi: 10.1037/0003-066X.59.1.20

Bonanno, G. A. (2005). Resilience in the face of potential trauma. *Current Directions in Psychological Science*, *14*(3), 135-138. doi: 10.1111/j.0963-7214.2005.00347.x

Clohessy, S., & Ehlers, A. (1999). PTSD symptoms, response to intrusive memories and coping in ambulance service workers. *British Journal of Clinical Psychology*, *38*(3), 251-265. doi: 10.1348/014466599162836

Daly, E. S., Gulliver, S. B., Zimering, R. T., Knight, J., Kamholz, B. W., & Morissette, S. B. (2008). Disaster mental health workers responding to Ground Zero: One year later. *Journal of Traumatic Stress, 21*(2), 227-239. doi: 10.1002/jts.20311

Dorahy, M. J., Renouf, C., Rowlands, A., Hanna, D., Britt, E., & Carter, J. D. (2016). Earthquake aftershock anxiety: An examination of psychosocial contributing factors and symptomatic outcomes. *Journal of Loss and Trauma*, *21*(3), 246-258. doi: 10.1080/15325024.2015.1075804

Dorahy, M. J., Rowlands, A., Renouf, C., Hanna, D., Britt, E., & Carter, J. D. (2015). Impact of average household income and damage exposure on post-earthquake

distress and functioning: A community study following the February 2011 Christchurch earthquake. *British Journal of Psychology, 106*(3), 526-543. doi: 10.1111/bjop.12097

Er, N. (2003). A new flashbulb memory model applied to the Marmara earthquake. *Applied Cognitive Psychology, 17*(5), 503-517. doi: 10.1002/acp.870

Falsetti, S. A., Resnick, H. S., Resick, P. A., & Kilpatrick, D. G. (1993). The modified PTSD symptom scale: A brief self-report measure of posttraumatic stress disorder. *The Behavior Therapist, 16,* 161-162.

Fan, F., Zhang, Y., Yang, Y., Mo, L., & Liu, X. (2011). Symptoms of posttraumatic stress disorder, depression, and anxiety among adolescents following the 2008 Wenchuan earthquake in China. *Journal of Traumatic Stress, 24*(1), 44-53. doi: 10.1002/jts.20599

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. London: Sage.

Fothergill, A., & Peek, L. A. (2004). Poverty and disasters in the United States: A review of recent sociological findings. *Natural Hazards*, *32*(1), 89-110. doi: 10.1023/B:NHAZ.0000026792.76181.d9

Harris, D. (2018, February 22). Christchurch earthquake memorial service: 'NZ stands with Christchurch'. *The Press.* Retrieved from www.stuff.co.nz

Hilton, C. (1997). Media triggers of post-traumatic stress disorder 50 years after the Second World War. *International Journal of Geriatric Psychiatry*, *12*(8), 862-867. doi: 10.1002/(SICI)1099-1166(199708)12:8<862::AID-GPS595>3.0.CO;2-C

Kroenke, K., Spitzer, R. L., Williams, J. B., & Löwe, B. (2010). The Patient Health Questionnaire somatic, anxiety, and depressive symptom scales: A systematic review. *General Hospital Psychiatry, 32*, 345-359. doi: 10.1016/j.genhosppsych.2010.03.006

Lambert, M. J. (2005). Early response in psychotherapy: Further evidence for the importance of common factors rather than "placebo effects". *Journal of Clinical Psychology*, *61*(7), 855-869. doi: 10.1002/jclp.20130

Löwe, B., Decker, O., Muller, S., Brahler, E., Schellberg, D., Herzog, W., & Herzberg, P. Y., (2008). Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Medical Care, 46*, 266-274. doi: 10.1097/MLR.0b013e318160d093

Mitchell, S. J., & Ronzio, C. R. (2011). Violence and other stressful life events as triggers of depression and anxiety: What psychosocial resources protect African American mothers? *Maternal and Child Health Journal*, *15*(8), 1272-1281. doi: 10.1007/s10995-010-0668-6

Morgan, C. A., Hill, S., Fox, P., Kingham, P., & Southwick, S. M. (1999). Anniversary reactions in Gulf war veterans: A follow-up inquiry 6 years after the war. *American Journal of Psychiatry, 156*(7), 1075-1079. doi: 10.1176/ajp.156.7.1075.

Morgan, C. A., Kingham, P., Nicolaou, A., & Southwick, S. M. (1998). Anniversary reactions in Gulf War veterans: A naturalistic inquiry 2 years after the Gulf War. *Journal of Traumatic Stress, 11*(1), 165-171. doi: 10.1023/A:1024473519720

Potter, S. H., Becker, J. S., Johnston, D. M., & Rossiter, K. P. (2015). An overview of the impacts of the 2010-2011 Canterbury earthquakes. *International Journal of Disaster Risk Reduction, 14,* 6-14. doi: 10.1016/j.ijdrr.2015.01.014

Price, R. H., Choi, J. N., & Vinokur, A. D. (2002). Links in the chain of adversity following job loss: How financial strain and loss of personal control lead to depression, impaired functioning, and poor health. *Journal of Occupational Health Psychology*, *7*(4), 302-312. doi: 10.1037//1076-8998.7.4.302

Slavich, G. M., Monroe, S. M., & Gotlib, I. H. (2011). Early parental loss and depression history: Associations with recent life stress in major depressive disorder. *Journal of Psychiatric Research*, *45*(9), 1146-1152. doi: 10.1016/j.jpsychires.2011.03.004

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine, 166*(10), 1092-1097. doi: 10.1001/archinte.166.10.1092

Spitzer, R. L., Kroenke, K., Williams, J. B., & Patient Health Questionnaire Primary Care Study Group. (1999). Validation and utility of a self-report version of PRIME-MD: The PHQ primary care study. *Journal of the American Medical Association, 282*(18), 1737-1744. doi: 10.1001/jama.282.18.1737

Ye, Y., Fan, F., Li, L., & Han, Q. (2014). Trajectory and predictors of depressive symptoms among adolescent survivors following the Wenchuan earthquake in China: A cohort study. *Social Psychiatry and Psychiatric Epidemiology, 49*(6), 943-952. doi: 10.1007/s00127-014-0821-4

### *Appendix 1: Non-responses by suburb and time collected*

| | | Low SES | | Medium SES | | High SES | | |
|---|---|---|---|---|---|---|---|---|
| | | High Damage | Low Damage | High Damage | Low Damage | High Damage | Low Damage | Total |
| Before | Refused Participation | 85 | 162 | 42 | 88 | 24 | 32 | 433 |
| | Not Home | 182 | 154 | 179 | 203 | X | X | 718 |
| | Total | 267 | 316 | 221 | 291 | 24 | 32 | 1151 |
| After | Refused Participation | 55 | 148 | 29 | 13 | 21 | 30 | 296 |
| | Not Home | 85 | 248 | 120 | 29 | 165 | 200 | 847 |
| | Total | 140 | 396 | 149 | 42 | 186 | 230 | 1143 |

*Note.* X indicates data missing due to a processing error

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# Factor structure of the Brief COPE in a population from Australia and New Zealand exposed to a disaster

*Lee Kannis-Dymand[1],*
*Prudence M. Millear[1],*
*Rachael Sharman[1],*
*Janet D. Carter[2]*

[1] Discipline of Psychology, School of Health and Behavioural Sciences, University of the Sunshine Coast, Queensland, Australia.

[2] Department of Psychology, Speech and Hearing, University of Canterbury, Christchurch, New Zealand.



Author correspondence:
Dr Lee Kannis-Dymand,
Senior Lecturer in Clinical Psychology,
University of the Sunshine Coast, Queensland, Australia.
Email: Lkannisd@usc.edu.au

URL: http://trauma.massey.ac.nz/issues/2020-3/AJDTS_24_3_Kannis-Dymand.pdf

## Abstract

*The Brief COPE is a widely used instrument to measure coping behaviours. However, the number of factors can vary across populations and the contexts in which they are utilised, raising concerns about the generalisability of the coping subscales from one study to another. The current study used participants who had experienced the Canterbury earthquakes in New Zealand or the Queensland floods in Australia (N = 674), randomly divided into two equal groups. First, using principal components analysis (PCA), the following four coping factors were identified and explained 49% of the variance: problem-focused, emotion-focused, dysfunctional, and religious coping. Using the second group of participants, this factor structure was compared with previously published factor structures for the Brief COPE using confirmatory factor analysis and our disaster-affected sample. Using the published item parcels and factors, the best fit for our sample was the factors identified in our initial PCA, rather than that of other researchers, with some configurations having a poor fit or being inadmissible. Results indicate that the structure and item loadings for the Brief COPE do not generalise between studies and similarly named factors may include different items. Therefore, researchers should be mindful of the potential inconsistencies with the Brief COPE and the interpretation of coping behaviours across populations and contexts.*

**Keywords:** *Brief COPE, factor structure, disaster, floods, earthquakes*

The documented frequency and severity of the impact of disasters triggered by natural hazards (hereafter termed disasters) on humans has significantly increased in recent decades (Leaning & Guha-Sapir, 2013). Between 1998 and 2017, such disasters affected around 440 million people per year on average (Wallemacq & House, 2018). A number of situational factors contribute to the severity of psychological outcomes following a disaster including age, gender, loss, access to resources, and social support (Marx, Phalkey, & Guha-Sapir, 2012). Further, two primary factors have been established: a) immediate exposure to environmental conditions that are frightening or life threatening; and b) circumstances that result in significant loss such as the death of family or friends or the loss of housing or employment (Fergusson, Horwood, Boden, & Mulder, 2014).

However, recurrent findings have established that a person's ability to cope with the repercussions of a disaster during all stages (i.e., pre-disaster, during disaster, post-disaster) largely mediates the impact of psychological outcomes (Shing, Jayawickreme, & Waugh, 2016). Multiple studies have demonstrated that coping is a protective factor against disaster-related psychological distress across the lifespan (Bradwell & Lee, 2019; Docena, 2015; Makwana, 2019). Further, recent research on assessing and increasing individual and organisational disaster resilience was embedded within people's coping capacities (Parsons et al., 2016). Therefore, accurate assessment of coping capabilities is an important factor for disaster survivors' wellbeing, including resilience and recovery post-trauma. Consequently, professionals working within a disaster context need to understand coping, through the use of valid assessment tools.

People often equate *coping* with successful management of a problem. However, stress-related literature defines it as any method that people use to deal with stress (Cooper, Katona, & Livingston, 2008). In this context, coping can be considered from a multidimensional perspective that incorporates behavioural and cognitive components (Snell, Siegert, Hay-Smith, & Surgenor, 2011). Coping interconnects situational difficulties to characteristic traits that contribute to individual

evaluations of the stress experienced and the coping styles that are subsequently employed (Folkman & Moskowitz, 2004). Successful coping is a vital component of future mental health outcomes following a distressing event and can play a major role in the long-term wellbeing of an individual following a life-influencing event (Carver, 1997b; Ullman, Townsend, Filipas, & Starzynski, 2007). The presence or lack of successful coping styles can affect the nature of symptoms of mental health conditions such as anxiety and depression (Pang, Strodl, & Oei, 2013; Pozzi et al., 2015) as well as post-traumatic stress disorder (PTSD) and posttraumatic growth (PTG) following trauma (Schuettler & Boals, 2011).

The Brief Coping Orientation to Problems Experienced (COPE) questionnaire is a frequently used self-report instrument that measures coping (Carver, 1997b; Wang et al., 2016). The questionnaire can be utilised in a dispositional format where the respondent rates what they usually do to cope with stress (Carver 1997b; Snell et al., 2011). Alternatively, a situational (current or retrospective) format can be utilised where the respondent rates how much they are or have been using the particular coping behaviour in regard to a specific situation or event (Carver, 1997b; Snell et al., 2011). The Brief COPE contains 28 items that use a 4-point Likert-type scale with responses between 1, indicating "I haven't been doing this at all", to 4, "I've been doing this a lot" (Carver, 1997a).

The original Brief COPE included the measurement of 14 different coping styles, all with acceptable reliability (Carver, 1997b). The Brief COPE has since been employed in a substantial number of studies, many of which have performed exploratory factor analyses to further elucidate the factor structure. However, the lack of consistency in statistical approaches, as well as "…often inappropriate factor analytic techniques used to determine the factor structure of the Brief COPE" (Krägeloh, 2011, p. 216) has resulted in a range of suggested subscales. Many studies have also been specific to particular populations (e.g., cultures, illness groups) and most have relied on sample sizes of fewer than 300 participants. The results of these studies put together led to suggested factor structures ranging from 1 to 12 factors (Krägeloh, 2011). Consequently, the Brief COPE has been factored in varying and inconsistent ways as shown in Table 1 (Amoyal, Fernandez, Ng, & Dwain, 2016; Krägeloh, 2011).

The inconsistency of the Brief COPE's reported factors is a recurrent issue. For example, three primary subscales have been suggested in various studies, measuring the individual's emotion-focused, problem-focused, and dysfunctional coping styles (Cooper et al., 2008; Snell et al., 2011). Cooper et al. (2008) applied the

Table 1
*The factors of the Brief COPE and the items for the structure of the scale in different publications*

| Study and year of publication | Study sample | Number of factors | Factor label given by authors | No. items in factor | Items in factor (using the item numbers as shown in Table 2) |
|---|---|---|---|---|---|
| Carver (1997b)[a] | Hurricane Andrew *N* = 168 | 9 | Active coping, planning, & positive reframing | 6 | 1, 2, 3, 16, 17, 18 |
| | | | Use of emotional support, use of instrumental support | 4 | 7, 8, 21, 22 |
| | | | Venting, self-distraction | 4 | 9, 11, 23, 25 |
| | | | Denial, self-blame | 4 | 10, 24 |
| | | | Substance use | 2 | 12, 26 |
| | | | Religion | 2 | 6, 20 |
| | | | Humour | 2 | 5, 15 |
| | | | Behavioural disengagement | 2 | 13, 27 |
| | | | Acceptance | 2 | 4, 15 |
| Knoll et al. (2005)[b] | German patients having cataract surgery *N* = 110 | 4 | Focus on positive | 6 | 3, 4, 5, 15, 18, 19 |
| | | | Support coping | 6 | 6, 7, 8, 20, 21, 22 |
| | | | Active coping | 4 | 1, 2, 16, 17 |
| | | | Evasive coping | 6 | 10, 11, 14, 24, 25, 28 |
| | | | Items excluded from scale | 6 | 9, 12, 13, 23, 26, 27 |
| Snell et al. (2011) | Mild, traumatic brain injury patients, NZ. *N* = 147 | 3 | Approach | 11 | 1, 2, 3, 4, 5, 6, 16, 17, 18, 19, 20 |
| | | | Avoidant | 9 | 10, 11, 13, 14, 23, 24, 25, 27, 28 |
| | | | Help-seeking | 4 | 7, 8, 21, 22 |

| Study and year of publication | Study sample | Number of factors | Factor label given by authors | No. items in factor | Items in factor (using the item numbers as shown in Table 2) |
|---|---|---|---|---|---|
| Krägeloh et al. (2012)[c] | University undergraduates, NZ *N* = 616 | 4 | Factor 1 | 4 | 1, 2, 16, 17 |
| | | | Factor 2 | 6 | 3, 4, 5, 15, 18, 19 |
| | | | Factor 3 | 6 | 6, ,7, 8, 20, 21, 22 |
| | | | Factor 4 | 12 | 9, 10, 11, 12, 13, 14, 23, 24, 25, 26, 27, 28 |
| Doron et al. (2014) | French college students *N* = 2,187 | 5 | Avoidance | 8 | 10, 12, 13, 14, 24, 26, 27, 28 |
| | | | Cognitive restructure | 6 | 3, 4, 5, 15, 18, 19 |
| | | | Problem solving | 4 | 1, 2, 16, 17 |
| | | | Distraction | 4 | 9, 11, 23, 25 |
| | | | Support seeking | 4 | 6, 7, 8, 20, 21, 22 |
| Bose et al. (2015)[c] | Patients with chronic heart failure *N* = 183 | 4 | Problem-focused coping | 4 | 1, 2, 16, 17 |
| | | | Avoidant coping | 6 | 10, 12, 13, 24, 26, 27 |
| | | | Socially supported coping | 6 | 7, 8, , 11, 21, 22, 25 |
| | | | Emotional focused coping | 8 | 3, 4, 5, 6, 15, 18, 19, 20 |
| Braseleiro et al. (2016) | Low income community centres, Brazil *N* = 237 | 3 | Religion and positive reframing | 9 | 2, 3, 4, 6, 15, 16, 17, 18, 20 |
| | | | Distraction | 7 | 5, 9, 12, 23, 25, 26, 27 |
| | | | External Support | 4 | 7, 19, 22, 28 |
| | | | Items excluded from scale | | 1, 8, 10, 11, 13, 14, 21, 24 |
| Tang et al. (2016) | University students, Hong Kong *N* = 425 *n* = 204 (English version of COPE) *n* = 221 (Chinese version of COPE) | 11 | Problem-solving | 4 | 1, 2, 16, 17 |
| | | | Accommodation | 4 | 3, 4, 15, 18 |
| | | | Support-seeking | 4 | 7, 8, 21, 22 |
| | | | Substance use | 2 | 12, 26 |
| | | | Self-blame | 2 | 14, 28 |
| | | | Venting | 2 | 11, 25 |
| | | | Denial | 2 | 10, 24 |
| | | | Behavioural disengagement | 2 | 13, 27 |
| | | | Religion | 2 | 6, 20 |
| | | | Self-distraction | 2 | 9, 23 |
| | | | Humour | 2 | 5, 19 |
| Kannis-Dymand et al. (2020) dispositional | NZ earthquakes, Qld floods *N* = 674 | 4 | Problem-focused | 11 | 1, 2, 3, 4, 5, 9, 15, 16, 17, 18, 19 |
| | | | Dysfunctional | 9 | 10, 11, 12, 13, 14, 24, 26, 27, 28 |
| | | | Emotion-focused | 4 | 7, 8, 21, 22, |
| | | | Religious | 2 | 6, 20 |
| | | | Item excluded from scales | | 23, 25 |

*Note.* Where item numbers in articles are different from the original Brief COPE, these items have been renumbered to align with the item numbers used in the original scale for clarity (and as shown in Table 2).

[a] The situational format used by Carver (1997b) was retained in the present research for reference purposes.

[b] Knoll et al. (2005) reported both situational and dispositional measures of coping but used the same four-factor structure for both.

[c] In these studies, authors reported only the Brief COPE scales. Refer to the original research for this information.

Brief COPE to a sample who were caring for people with dementia. They found that the subscales of the Brief COPE indicated strong overall reliability, with the emotion-focused, problem-focused, and dysfunctional coping subscales reaching Cronbach's alphas of .72, .84, and .75 respectively; these are above the typical threshold of .70 (Cooper et al., 2008). However, the three-factor structure noted by Cooper et al. (2008) differs from the three-factor structure identified by Snell et al. (2011) because each subscale was comprised of different individual items across the two studies. Snell et al. (2011) studied a sample of people with mild traumatic brain injury. They used subscales of problem-focused or approach coping, help-seeking or social coping, and dysfunctional or avoidant coping, with Cronbach's alphas of .80, .84, and .77 respectively. In contrast,

Knoll, Rieckmann, and Schwarzer (2005) reported a four-factor model, described as focused on positive, support, active, and evasive coping. Further, Doron et al. (2014), in a French population study, explored previous factor structures of the measure, including 14, three, and two factor models. They concluded that a five-factor combination of problem solving, support seeking, avoidance, cognitive restructuring, and distraction was the most parsimonious and robust model.

Echoing the point made by Krägeloh (2011), the Brief COPE demonstrates a fluctuating and inconsistent factor structure that has been evaluated through conflicting factor analysis methods. Thus, employment of the Brief COPE, utilising subscales based on variable empirical evidence and inconsistent categorisation of its items, limits the research comparing coping styles classified through this measure and the generalisability of findings (Monzani et al., 2015). Further testing of the Brief COPE with larger samples of participants is therefore required to substantiate the factor structure and determine which individual items should be combined to form each subscale.

Carver (1997b) outlined the importance of understanding coping and highlighted the need for further investigation of the Brief COPE's factor structure; 20 years later, few studies have validated this measure specific to disaster survivors. Indeed, only two studies appear to have the specific aim of examining the psychometric properties of the Brief COPE in a disaster sample: Carver's original work with a Hurricane Andrew sample (Carver, 1997b) and Wang and colleagues' Typhoon Morakot flood population (Wang et al., 2016). The Brief COPE is a frequently used tool for assessing coping in several disaster samples, such as earthquakes (Cofini, Carbonelli, Cecilia, Binkin, & di Orio, 2015; Stratta et al., 2014), hurricanes (Bistricky et al., 2019; Glass, Flory, Hankin, Kloos, & Turecki, 2009), and floods (Bei et al., 2013; Wang et al., 2016); therefore, it is essential that the factor structure of this measure is examined in this context. The current study will help ensure that findings of research studies are disseminated with an awareness that coping, as measured by the Brief COPE, may or may not be the same construct.

Given the diversity of ways in which the measure can be factored, the purpose of the current study was to explore the Brief COPE in a sample of disaster survivors. First, we performed a factor analysis of the Brief COPE with a dispositional format using a large sample of Australian and New Zealand participants who had experienced a disaster: the 2010-2011 Queensland Floods or the 2010-2011 Canterbury Earthquakes. Secondly, we compared the fit of this factor structure to the fit of models identified in previous studies using the Brief COPE in a dispositional format. The current study forms part of a larger research project investigating mental health outcomes following a disaster.

## Method

### *Participants*

Participants over the age of 18 years ($N$ = 1,266) were recruited from students at a regional university in south-east Queensland in Australia and from a university in the Canterbury region in New Zealand. We removed 583 individuals who had not completed all questions or who had not experienced either disaster and a further nine who experienced both the earthquakes in Canterbury and the floods in Queensland. The final sample ($N$ = 674, 67.5% female) ranged in age from 18 to 78 years ($M$ = 24.73, $SD$ = 9.14 years). The sample was predominantly of New Zealand- or Australian-European ethnicity ($n$ = 571) with limited participants identifying as Māori ($n$ = 8) or Aboriginal and Torres Strait Islander ($n$ = 1). Most participants were single (77.4%), with others married or in a civil union (19.3%), divorced or separated (2.8%), or widowed (0.4%). Most of the participants classified themselves primarily as full-time students (90.8%), rather than part-time students (4.6%) or full-time (2.3%) or part-time employees (1.5%). Eighty-one participants experienced the Queensland floods and 593 experienced earthquakes and aftershocks in Canterbury between 4 September 2010 and 13 June 2011.

### *Ethics Approval*

This study was approved by the University of the Sunshine Coast Human Research Ethics Committee S/13/473 (Australia) and the University of Canterbury Human Ethics Committee 2012/138 (New Zealand).

### *Procedure*

University-wide emails to the University of the Sunshine Coast and the University of Canterbury invited people to take part anonymously in a non-identifiable web-based survey. A research project information form, along with a question to obtain the participant's age and consent, was provided at the beginning of the survey.

A literature search was conducted to evaluate how the current factor structure of the Brief COPE compared to previous research with a dispositional format. This included considerations of which items are associated with each factor configuration and the number of

overall factors. We entered search dates 1997, to include Carver's first publication of the Brief COPE (Carver 1997b), through to December 2019 into Google Scholar, PubMed, Science Direct, Scopus, and Web of Science. We used the search term "Brief COPE" in the abstract and "dispositional" anywhere in the text. We selected studies for comparison if they clearly stated that their primary aim was a factor analysis of the dispositional version of the Brief COPE. We identified seven studies of the dispositional version and retained the original study by Carver (1997b) that was in a situational format for reference purposes.

### *Measures*

**Demographics.** Information collected included age, gender, marital status, and student or employment classification. Inclusion criteria comprised of experiencing either the Queensland Floods in Australia (i.e., December 2010; January 2011) or the Canterbury Earthquakes in New Zealand (September 4th, 2010; February 22nd, 2011; June 13th, 2011; December 23rd, 2011).

**Coping.** How individuals usually responded to difficult situations or stressful events was measured using the 28-item Brief COPE (Carver, 1997a; see Table 2). The scale has 14 subscales, each with two items, asking about different coping strategies in a dispositional format including: active coping (sample item: "I take action to try and make the situation better"), venting (sample item: "I express my negative feelings"), and seeking emotional support (sample item: "I get comfort and understanding from someone"). Items were rated on a Likert-type scale from 1, "usually do not do this at all", to 4, "usually do

Table 2
*Brief COPE items, as outlined in Carver (1997a)*

| Brief COPE Dimension | No. | Item |
|---|---|---|
| Active coping | 1 | I concentrate my efforts on doing something about the situation I'm in |
| Planning | 2 | I try to come up with a strategy about what to do |
| Positive reframing | 3 | I try to see it in a different light |
| Acceptance | 4 | I accept the reality of the fact that it has happened |
| Humour | 5 | I make jokes about it |
| Religion | 6 | I try to find comfort in my religion or spiritual beliefs |
| Using emotional support | 7 | I get emotional support from others |
| Using instrumental support | 8 | I try to get advice or help from others |
| Self-distraction | 9 | I turn to work or other activities to take my mind off things |
| Denial | 10 | I say to myself this isn't real |
| Venting | 11 | I say things to let my unpleasant feelings escape |
| Substance use | 12 | I use alcohol or other drugs to make myself better |
| Behavioural disengagement | 13 | I give up trying to deal with it |
| Self-blame | 14 | I criticise myself |
| Acceptance | 15 | I learn to live with it |
| Active coping | 16 | I take action to try and make the situation better |
| Planning | 17 | I think hard about what steps to take |
| Positive reframing | 18 | I look for something good in what is happening |
| Humour | 19 | I make fun of the situation |
| Religion | 20 | I pray or meditate |
| Using emotional support | 21 | I get comfort and understanding from someone |
| Using instrumental support | 22 | I get help and advice from other people |
| Self-distraction | 23 | I do something to think about it less, such as going to the movies, watching TV, reading, daydreaming, sleeping or shopping |
| Denial | 24 | I refuse to believe that it has happened |
| Venting | 25 | I express my negative feelings |
| Substance use | 26 | I use alcohol or other drugs to help me get through it |
| Behavioural disengagement | 27 | I give up the attempt to cope |
| Self-blame | 28 | I blame myself for things that happened |

*Note.* In Carver's (1997a) article, only scales are numbered (e.g., 1. Active Coping, 2. Planning, and so on), rather than items being individually numbered.

this a lot". We used the dispositional format of the Brief COPE because of the nature of the disasters focused on; that is, the floods and earthquakes were ongoing in nature, were not necessarily a single incident, and were not specific to a set time or situation. Hence, the participants experienced the occurrence of multiple earthquakes and aftershocks or floods and heavy rainfall over an extended period, potentially followed by loss of shelter and services.

### Data analysis

The data set ($N = 674$) was randomly split into two equal data sets of 337 to allow for the two phases of analysis. The first phase explored the factor structure of the full Brief COPE with principal components analysis (PCA), as outlined by Tabachnick and Fidell (2014), in SPSS (Version 22). Effect sizes of the correlations between the factors (Table 3) were considered using the guidelines of Cohen (1992) as small ($r = .10$), medium ($r = .30$), and large ($r = .50$). The second phase involved a Confirmatory Factor Analysis (CFA) in AMOS to assess the fit of the proposed factor structure identified in this current sample. This phase also tested whether the factor structures identified in previous studies that utilised the dispositional version of the Brief COPE result in equivalent, better, or worse fit than our structure. The goodness of fit of the CFA models was assessed by the Normed Chi-Squared ($X^2/df$), the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA) and its 90% Confidence Interval (90% CI), and Akaike Information Criteria (AIC). Good fit is found in a model where the $X^2/df$ is between 1.0 and 5.0, the CFI and TLI are greater than or equal to .95, and where the point estimate of RMSEA and its 90% CI

Table 3
*The loading of items of the Brief COPE for the four-factor solution (N = 337)*

| No. | Item | Problem-focused | Emotion-focused | Dysfunctional coping | Religious coping | $h^2$ |
|---|---|---|---|---|---|---|
| 16 | I take action to try and make the situation better. | **.736** | .123 | -.132 | .167 | .602 |
| 18 | I look for something good in what is happening. | **.694** | .161 | -.137 | .079 | .533 |
| 3 | I try to see it in a different light. | **.668** | .101 | -.109 | .049 | .471 |
| 2 | I try to come up with a strategy about what to do. | **.666** | .199 | -.102 | .159 | .518 |
| 1 | I concentrate my efforts on doing something about the situation I'm in. | **.662** | .123 | -.055 | .154 | .480 |
| 17 | I think hard about what steps to take. | **.637** | .16 | -.038 | .189 | .518 |
| 4 | I accept the reality of the fact that it has happened. | **.595** | .055 | -.121 | -.075 | .378 |
| 5 | I make jokes about it. | **.562** | -.085 | .236 | -.186 | .413 |
| 19 | I make fun of the situation. | **.555** | -.100 | .173 | -.25 | .411 |
| 15 | I learn to live with it. | **.492** | -.096 | .086 | -.215 | .305 |
| 9 | I turn to work or other activities to take my mind off things. | **.335** | .113 | .128 | -.164 | .169 |
| 22 | I get help and advice from other people. | .128 | **.909** | -.004 | .025 | .844 |
| 21 | I get comfort and understanding from someone. | .125 | **.892** | .005 | .040 | .812 |
| 7 | I get emotional support from others. | .072 | **.887** | -.043 | .045 | .797 |
| 8 | I try to get advice or help from others. | .121 | **.869** | .004 | .039 | .772 |
| 25 | I express my negative feelings. | .129 | **.449** | **.397** | .106 | .387 |
| 14 | I criticise myself. | -.080 | -.132 | **.698** | .100 | .522 |
| 13 | I give up trying to deal with it. | -.130 | -.017 | **.695** | -.108 | .512 |
| 28 | I blame myself for things that happened. | -.144 | -.011 | **.643** | .022 | .435 |
| 12 | I use alcohol or other drugs to make myself better. | .231 | -.132 | **.603** | -.228 | .486 |
| 26 | I use alcohol or other drugs to help me get through it. | .240 | -.103 | **.599** | -.246 | .487 |
| 27 | I give up the attempt to cope. | -.188 | -.093 | **.592** | .018 | .394 |
| 11 | I say things to let my unpleasant feelings escape. | .103 | .250 | **.549** | .102 | .385 |
| 10 | I say to myself this isn't real. | .008 | .143 | **.515** | .138 | .304 |
| 23 | I refuse to believe that it has happened. | -.121 | .116 | **.487** | .168 | .294 |
| 23 | I do something to think about it less, such as going to the movies, watching TV, reading, daydreaming, sleeping or shopping. | .115 | .216 | .283 | -.193 | .177 |
| 20 | I pray or meditate. | .072 | .042 | .114 | **.867** | .771 |
| 6 | I try to find comfort in my religion or spiritual beliefs. | .066 | .084 | .098 | **.839** | .725 |

has an upper bound estimate equal to or less than.08. Between competing models using the same data, the lowest AIC indicates the most parsimonious model (i.e., the best fit using the fewest parameters; Byrne, 2001).

## Results

### *Principal Components Analysis*

The PCA included all 28 items. Although the initial PCA found eight factors with eigenvalues of greater than 1, the scree plot indicated that a four-factor solution was appropriate (Tabachnick & Fidell, 2014). Table 3 shows the PCA with Varimax rotation for four factors with factor loadings on each factor and loadings larger than .30 in bold (following the rule of thumb for interpretation suggested by Tabachnick & Fidell, 2014) and communalities ($h^2$) for each item. The fit of the PCA was satisfactory, KMO = .761, Bartlett's Test of Sphericity, $X^2(378) = 4744.2$, $p < .001$. Based on previous Brief COPE studies, including Carver's original definitions of some of the paired items, the factors in the current study were labelled:

– Factor 1, "problem-focused coping" (11 items), as these items signify actively attempting to find a solution or adapt;
– Factor 2, "emotion-focused coping" (4 items), as these items represent seeking emotional support or guidance from others;
– Factor 3, "dysfunctional coping" (9 items), as these items reflect unhealthy forms of coping such as denial, avoidance, or giving up; and
– Factor 4, "religious coping" (2 items).

The overall solution explained 49.5% of the variance, with the individual factors explaining 18.4%, 13.3%, 11.2%, and 6.6% of the variance, respectively.

The four-factor solution showed three interesting points. First, the two items usually considered to represent Venting as a coping strategy loaded on two separate factors. Item 11 ("I say things to let my unpleasant feelings escape") loaded on the Dysfunctional coping factor while Item 25 ("I express my negative feelings"), loaded on the Emotion-focused coping and Dysfunctional coping factors. Due to this cross-loading, Item 25 was not included in further analysis. Second, the fourth factor comprised only the two items that measure using religion as a coping strategy. To explore these findings, we reran the PCA constraining the output to three factors. In the three factor solution, the two religion items loaded onto the "Emotion-focused coping" factor, but with substantially lower and poorer loadings (Item 6 = .351, Item 20 = .347) than when these items are part of a separate factor (Item 6 = .839, Item 20 = .867). Therefore, we retained the four-factor solution as the fourth factor better represented the structure in this sample.

Third, one item did not load satisfactorily on any of the factors (Item 23, relating to coping using self-distraction) and was removed from further analysis. We retained the second item related to coping using self-distraction (Item 9) which had the lowest loading of Factor 1 items but met the threshold for inclusion (> .30). We acknowledge that these loadings represent limited variance in the factor itself (Tabachnick & Fidell, 2014); however, this highlights issues of the factorial stability of the scale, as item loadings vary in different samples which can lead to quite different decisions on items being retained or discarded.

We created scales for each of the factors and calculated mean scores. Table 4 shows the means, standard deviations, and correlations between these scales. Cronbach's alpha scores indicated that all scales demonstrated good reliability (> .70). Of interest, problem-focused ($M = 2.71$, $SD = 0.53$) and then emotion-focused coping ($M = 2.24$, $SD = 0.84$) were used more frequently than religious ($M = 1.61$, $SD = 0.93$) or dysfunctional ($M = 1.51$, $SD = 0.45$) coping strategies. Problem-focused coping was strongly, positively associated with emotion-focused coping and age (medium and medium-small effect sizes; Cohen,

Table 4
*Means, standard deviations, and correlations between age, gender, and the four types of coping (N = 674)*

| | | Mean *(SD)* | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1 | Age | 24.62 (9.01) | - | .092 | .222*** | .085 | .016 | .110* |
| 2 | Gender | - | | _ | -.002 | .263*** | .034 | -.054 |
| 3 | Problem-focused coping | 2.71 (0.53) | | | (.829) | .221*** | -.017 | .051 |
| 4 | Emotion-focused coping | 2.24 (0.84) | | | | (.889) | .055 | .151** |
| 5 | Dysfunctional coping | 1.51 (0.45) | | | | | (.787) | .052 |
| 6 | Religious coping | 1.61 (0.93) | | | | | | (.884) |

*Note*. Gender: 1 = man, 2 = woman. Range of scores for all scales: 1 to 4. Cronbach's alphas given in brackets on the diagonal.
* $p < .05$, ** $p < .01$, *** $p < .001$.

1992). Dysfunctional coping was not correlated with any other coping factor, age, or gender. Emotion-focused coping was more likely amongst women than men and associated with religious coping (medium and small-medium effect sizes, respectively).

### *Confirmatory Factor Analysis*

We conducted a confirmatory factor analysis (CFA) on the second half of the sample ($n$ = 337) to assess the fit of the factor structure identified by the previous PCA. Additional CFAs then assessed the factor structures identified in previous research (as shown in Table 1) using the current data set. The results of the CFAs are shown in Table 5. The first model (Model 1) tested, a one-factor model, had very poor fit, $X^2/df$ = 19.41 (df = 350), $p$ < .001, CFI = .300, and RMSEA = .165, 90 % CI [.162,.169].

Model 2 testing Carver's (1997b) factor structure of nine factors had reasonable-to-moderate fit. While the $X^2/df$ and RMSEA were acceptable, the CFI and TLI were mediocre. Model 2 had a higher AIC than our model (Model 10), indicating that this nine-factor structure is less parsimonious than our four-factor structure.

Model 3 tested the four-factor structure proposed by Knoll et al. (2005), which identified four factors but comprising different combinations of items than our model. Interestingly, Knoll et al. (2005) used the same factor structure for the Brief COPE for both situational and dispositional coping. However, the fit of Model 3 was poor with none of the goodness of fit indices acceptable. Model 4 tested the three factors proposed by Snell et al. (2011) and showed poor fit of a similar level to Model 3. Model 5 also tested a four-factor structure as described by Krägeloh, Chai, Shepherd, and Billington (2012) in their research using undergraduate students in New Zealand. The model fit poorly, similar to Models 3 and 4. Therefore, whether items were loaded on three or four factors, these models based on patient samples and

Table 5
*Comparison of fit of the CFA models as proposed by previous research, using the current data set (N = 674)*

| Models | $X^2$ | df | $X^2/df$ | CFI | TLI | RMSEA | 90%CI RMSEA | AIC ‡ |
|---|---|---|---|---|---|---|---|---|
| Model 1<br>[One factor] | 6793.01 | 350 | 19.41 | .300 | .244 | .165 | .162 to .169 | 6905.01<br>[812.00] |
| Model 2[a]<br>[Carver, 1997b, 9 factors] | 1336.14 | 314 | 4.26 | .889 | .866 | .070 | .066 to .073 | 1520.14<br>[812.00] |
| Model 3[b]<br>[4 factors, Knoll et al., 2005] | 2372.49 | 203 | 11.69 | .691 | .648 | .126 | .121 to .131 | 2472.49<br>[506.00] |
| Model 4<br>[3 factor, Snell et al., 2011] | 2721.26 | 249 | 10.93 | .676 | .640 | .121 | .117 to .126 | 2823.26<br>[600.00] |
| Model 5[c]<br>[4 factors, Krägeloh et al., 2012] | 3919.64 | 344 | 11.39 | .612 | .573 | .124 | .121 to .128 | 4043.64<br>[812.00] |
| Model 6a[d]<br>[5 factor (Doron et al., 2014] | Model is not positive definite and solution is not admissible | | | | | | | |
| Model 6b[d]<br>[5 factors Doron et al., 2014] | 3707.41 | 340 | 10.90 | .634 | .593 | .121 | .118 to .125 | 3839.41<br>[812.00] |
| Model 7<br>[4 factors, Bose et al., 2015] | 279.50 | 48 | 5.82 | .902 | .865 | .085 | .075 to .094 | 339.50<br>[156.00] |
| Model 8[e]<br>[Brasileiro et al., 2016, 3 factors] | 2456.11 | 167 | 14.71 | .583 | .525 | .143 | .138 to .148 | 2542.12<br>[420.00] |
| Model 9<br>[11 factors, Tang et al., 2016] | 871.18 | 295 | 2.95 | .937 | .920 | .054 | .050 to .058 | 1093.18<br>[812.00] |
| Model 10<br>[Kannis-Dymand et al., 2020, 4 factors] | 742.81 | 290 | 2.56 | .902 | .890 | .068 | .062 to .074 | 864.81<br>[702.00] |

*Note.* ‡ AIC of model as tested is shown on first line with the AIC of the saturated model given in square brackets on the second line. AIC of saturated models may vary where not all of the 28 Brief COPE items were included in the model.

[a] The situational format used by Carver (1997b) was retained in the present research for reference purposes.

[b] Knoll et al. (2005) reported both situational and dispositional measures of coping but used the same four-factor structure for both.

[c] Krägeloh et al. (2012) used the subscales of the Brief COPE for their exploratory factor analysis (reported in Table 3, p. 1144). However, using the subscales in the current sample meant that the model was non-positive definite and not admissible. An admissible solution, albeit with poor fit, was achieved by loading the individual items onto the four factors.

[d] Model 6a was based on the totally disaggregated model, shown as Figure 2 in Doron et al. (2014), whereas Model 6b loaded items directly on to the five latent factors (i.e., dimensions in Figure 2 were removed and items are directly linked to the latent factors).

[e] Brasileiro et al. (2016) model is based on 20 items included from their EFA and CFA.

on university students were not equivalent to the model identified in our sample of disaster survivors.

Model 6a tested the five-factor structure proposed by Doron et al. (2014) in a study of French college students, using the totally disaggregated model (as given in Figure 2 in their article). In this formulation, an item was loaded onto its respective dimension, which then loaded to the overall factor. For example, Item 10, the first of the two items for the dimension Denial, was loaded onto the dimension "Denial" and the dimension then loaded on the factor "Avoidance". Unfortunately, the model was not positive definite and the solution therefore not admissible (i.e., the results indicated negative covariances in the model). We reran the model (Model 6b) with each of the items now loading directly on the factors in the conventional manner of CFAs. While Model 6b did provide an admissible solution, its fit was again poor and not acceptable.

Model 7 tested the four-factor structure of Bose, Bjorling, Elfstrom, Persson, and Saboonchi (2015) amongst patients with chronic heart failure. This model used the subscales of the Brief COPE, rather than allowing items to load directly onto the factors, and demonstrated modest fit, although closer than previous models. Model 8 tested the three-factor structure proposed by Brasileiro et al. (2016) based on a sample from low-income community centres in Brazil. Although eight items were excluded from the analyses (due to low loadings on the factors), this model also demonstrated poor fit. Model 9 tested the 11-factor structure proposed by Tang, Chan, Ng, and Yip (2016) who compared Chinese and English-language versions of the Brief COPE amongst university students in Hong Kong. This model demonstrated reasonable fit similar to the nine-factor model of Carver (1997b). However, as the items for the factors differs between these models, comparison in terms of which is the better fit is problematic.

Finally, Model 10 tested the current study's model of four factors: problem-focused, dysfunctional, emotion-focused, and religious coping. The fit was substantially improved by allowing the errors to covary between the following pairs of items: 12 and 26 (both substance use items), 5 and 19 (both humour items), and 14 and 28 (both self-blame items), $\Delta X^2(3) = 886.0$, $p < .001$. As shown in Table 5, this adjusted model demonstrated reasonable fit, although the CFI and TLI were acceptable at around .90. Of the ten models tested, only Models 2, 9, and 10 had reasonable fit, although none were particularly parsimonious. This was indicated by the AIC for each model, which in each case was greater than the comparable saturated model (shown in square brackets in Table 5). These CFAs indicate that the fit of the Brief COPE is not consistent across the wide range of samples and in the many formulations of the scales in this and previous research. The Brief COPE therefore may not be a valid or reliable measure of coping in future research projects.

## Discussion

The current study explored the factor structure of the Brief COPE in a population of individuals who have recently experienced disasters: the earthquakes in Canterbury, New Zealand, or the floods in south-east Queensland, Australia, in 2010-2011. These disasters caused great hardship in these regions and significant loss of life and property (Alderman, Turner, & Tong, 2013; Duncan, Dorahy, Hanna, Bagshaw, & Blampied, 2013; Kannis-Dymand, Dorahy, Crake, Gibbon, & Luckey, 2015). This study contributes to research on the psychometric properties of the Brief COPE amongst people who have experienced a disaster, alongside Carver's (1997b) original work with survivors of Hurricane Andrew. The current study had two aims: first, to assess the arrangement of the factors amongst New Zealanders and Australians following the earthquakes and floods in their regions, and second, to apply the previously published factor structures of the Brief COPE to this sample of survivors of disasters.

The current study suggests cultural differences and variances related to coping in different environments (e.g., disasters versus surgery or illness) may dictate how the items of the Brief COPE cluster to form a factor. For example, Australia and New Zealand are largely secular compared to other western societies (Donovan, 2014; Nachowitz, 2007); the use of religious coping in this sample was lower than problem-focused or emotion-focused coping. Religious coping loaded as a separate factor, consistent with Carver's (1997b) study of people who experienced a disaster (Hurricane Andrew) where religious coping formed a single factor and a systematic review that noted several studies which identified religious coping as a distinct factor (Krägeloh, 2011). Of note, when religious coping did not form a single factor, it loaded on various subscales depending on the sample and methodology of the respective study (Krägeloh, 2011). Thus, the role of religious coping appears highly contingent on the sample. In the current population of Australasians who have experienced a disaster, religious coping was more suitable, from a statistical standpoint, as a stand-alone factor and a coping strategy that is

utilised less than problem-focused or emotion-focused coping. In the three-factor solution that was tested in our PCA, the two religious coping items did load onto the emotion-focused coping factor, but this structure produced weaker factor loadings.

The other three factors identified in this population are conceptually similar to earlier studies in that the subscales are theoretically related to adaptive (e.g., problem- or emotion-focused) and maladaptive (dysfunctional) ways of coping. However, in line with previous studies, there is inconsistency with which subscale the items loaded on. This highlights the instability of which items represent and collate into each coping subscale. The problem-focused factor in the current sample consisted of the items that Carver (1997b) identified as active coping, planning, and positive reframing, but added the humour and acceptance items. This factor was comprised of almost identical items to the factor in Snell et al. (2011) which used a traumatic brain injury sample, except religion also loaded on their problem-focused approach factor. Interestingly, Snell et al. used a New Zealand-based sample, suggesting that the nature of traumatic brain injury in contrast to a disaster-affected sample impacts how religious coping is utilised.

The composition of the dysfunctional coping factor in our sample had some similarities to a number of previous studies' factor configurations: first, the items in evasive coping, as noted by Knoll et al. (2005); second, the avoidant coping items found by Doron et al. (2014); and third, most of the items under the avoidant (dysfunctional) factor in Snell et al. (2011). That is, denial, self-blame, giving up, and substance use were commonly clustered under dysfunctional coping. Further, the two venting items frequently loaded on the same factor in other research. We found that saying things to let unpleasant feelings escape was related to dysfunctional coping, whereas, expressing negative feelings (Item 25) loaded on both emotion-focused and dysfunctional coping.

One self-distraction item (Item 23: "I do something to think about it less, such as going to the movies, watching TV, reading, daydreaming, sleeping or shopping") did not adequately load on any factor in our study, whereas it has loaded under dysfunctional coping in a number of previous studies (e.g., Snell et al., 2011). In contrast, the second self-distraction item (Item 9: "I turn to work or other activities to take my mind off things") loaded on problem-focused coping in our study but loaded on several other factors in previous research (e.g., Carver 1997b; Doron et al, 2014). The instability of the factor loading for the distraction items highlights the problematic nature of factors within the Brief COPE. Namely, Item 23 appears to capture a form of distraction that is potentially maladaptive. This is consistent with the substantial research evidence from the metacognitive field that distraction, or trying to suppress thoughts, may paradoxically cause an increase in the frequency of the avoided thought or image (Wells & Capobianco, 2020). Item 9, in contrast, may indicate that distraction is being used as a form of attention re-direction for some people. That is, the individual is mindfully detaching from the thought or image that is concerning them and treating it as "background noise" while they focus their attention on work or pleasurable activities; this may act as an adaptive coping strategy (Nassif & Wells, 2014; Wells, 2000).

The remaining factor, emotion-focused coping, consisted of using emotional support and using instrumental support items. This configuration was consistent with Carver's sample of people who experienced a hurricane (1997b) and Snell and colleagues' (2011) help-seeking factor in their New Zealand sample. These items have been reported within one factor (e.g., support seeking, support coping) in other factor analyses; however, a number of those studies also found religious coping loaded on the same factor, which did not occur in the present sample.

While the current study established a factor structure of the Brief COPE amongst people who have experienced a disaster, the study also highlights the inconsistency of items within reported factors across the various studies that have utilised the measure. We examined whether other published factor structures and configurations of items fit the data from our sample. In theory, the Brief COPE should "fit" regardless of the sample or situation to show its robustness and generalisability as a measure of coping. Unacceptable fit would suggest that each study should address coping as a study-specific response to a particular situation or series of events, rather than as a measure of general or one-size-fits-all behaviours. Therefore, with the data from our participants, we assessed the fit of previously published factor models: three (Brasileiro et al., 2016; Snell et al, 2011), four (Bose et al., 2015; Knoll et al., 2005; Krägeloh et al., 2012), five (Doron et al., 2014), nine (Carver, 1997b), and 11 (Tang et al., 2016). These studies were soundly designed with appropriate analyses; consequently, we assessed whether their reported structures were suitable for our current sample. This would suggest if the Brief COPE factor structure is able to be generalised from one study to another. Unfortunately, our results demonstrated that we could not replicate, with acceptable fit, the factors

identified in the previous research. Only the structure from Carver's (1997b) study of survivors of Hurricane Andrew showed a similar and acceptable fit, with the replicated factor structures of the other studies showing poor fit or being inadmissible. This indicates that the fit of the Brief COPE was potentially highly dependent on the sample from which it is derived and, therefore, that findings might be difficult to generalise from one study to another.

Two considerations arise from our comparison of factor structures in the present sample. First is whether the differences arise from the characteristics of the samples used in each study in which coping is measured. It may be that different populations respond with different strategies in different contexts contributing to an inconsistent factor structure (based on shared variances in the statistical analyses). Carver (1997a) noted that each researcher should assess the fit of the Brief COPE scale in each study; we have confirmed this in our comparison of factor structures. Despite coming from the same country, our sample of New Zealand (and Australian) disaster survivors had a different result to the New Zealanders with mild brain injuries in Snell et al.'s (2011) study; studies from the same or similar countries may also require a matching of stressful circumstances.

The second issue addresses the external validity of findings using the Brief COPE and the conceptualisation of problem-focused, emotion-focused, and dysfunctional coping. Researchers should be aware that coping may be more ephemeral and less consistent than expected. This makes comparing previous research and proposed research more difficult and may lead to changes in the way in which coping is conceived and measured. A review of the structure of coping by Skinner, Edge, Altman, and Sherwood (2003) that examined 100 coping measures found little agreement on the conceptualisation and measurement of the core constructs of coping. Skinner et al. (2003) advocated that the commonly used, higher order coping categories (i.e., approach vs. avoidance, problem- vs. emotion-focused, and cognitive vs. behavioural) should no longer be utilised. Rather, they argued that action types of coping, such as mastery, proximity seeking, and accommodation ought to be considered for categorising coping.

Researchers may continue to use the Brief COPE as an inventory of possible coping behaviours, however, they should be aware that they may not be able to compare the findings of one study to another or rely on previous findings for guidance in interpreting their own. Caution is required where there are different items that make up similarly named factors; what is included may substantially change how those coping behaviours can be interpreted or contrasted to other research employing the Brief COPE.

The current study does have a number of limitations to consider. First, the Brief COPE was used in a dispositional format and the findings, therefore, may differ compared to the Brief COPE in a situational format. Second, participants were recruited mainly through regional universities and as such were primarily university students, which may limit generalisability of the findings to the general adult community of Australia, New Zealand, or elsewhere. Similarly, Māori, and Aboriginal and Torres Strait Islander peoples were underrepresented; thus, our results lack validity for the Indigenous cultures of Australia and New Zealand. Third, people who experience trauma may be avoidant of reminders of it, such as being involved in research about that trauma. The current sample therefore may not be representative of all of those that experienced the earthquakes or floods. However, our analyses were based on a large sample ($N > 600$), which adds to the strength of the analyses.

## Conclusion

The Brief COPE loaded on four factors in the current disaster sample. Our findings revealed factor structures that were similar, but not identical, to previous studies, thus highlighting the consistent inconsistencies of the scale and its subscales. These findings echo a number of assertions made in other studies (e.g., Brasileiro et al., 2016; Monzani et al., 2015; Wang et al., 2016) that the Brief COPE's factor structure is variable depending on the sample involved. Correspondingly, other coping measures, such as the Ways of Coping Questionnaire, and how coping is conceptualised suffer recurrent inconsistencies in the literature (De Ridder, 1997; Lundqvist & Ahlström, 2006; Oakland & Ostell, 1996). Future research may clarify coping and its effective measurement through systematic reviews; alternatively, this may cement that coping and its evaluation is context- or stressor-specific and using general coping measures is flawed. This is particularly important when we consider that studies may be comparing previous research on coping, as measured by the Brief COPE, that are not actually measuring the same behaviours. Nonetheless, while the factor structure of the Brief COPE is questionable, it may be clinically valuable in providing qualitative information on how individual people cope with

stress and trauma to inform psychological interventions. However, its utility beyond this is problematic.

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## References

Alderman, K., Turner, L. R., & Tong, S. (2013). Assessment of the health impacts of the 2011 summer floods in Brisbane. *Disaster Medicine and Public Health Preparedness*, *7*, 380-386. doi: 10.1017/dmp.2013.42

Amoyal, N., Fernandez, A. C., Ng, R., & Fehon, D. C. (2016). Measuring coping behavior in liver transplant candidates: A psychometric analysis of the Brief COPE. *Progress in Transplantation*, *26*, 277-285. doi: 10.1177/1526924816655253

Bei, B., Bryant, C., Gilson, K. M., Koh, J., Gibson, P., Komiti, A., ... Judd, F. (2013). A prospective study of the impact of floods on the mental and physical health of older adults. *Aging & Mental Health*, *17*, 992-1002. doi: 10.1080/13607863.2013.799119

Bistricky, S. L., Long, L. J., Lai, B. S., Gallagher, M. W., Kanenberg, H., Elkins, S. R., ... Short, M. B. (2019). Surviving the storm: Avoidant coping, helping behavior, resilience and affective symptoms around a major hurricane-flood. *Journal of Affective Disorders*, *257*, 297-306. doi: 10.1016/j.jad.2019.07.044

Bose, C. N., Bjorling, G., Elfstrom, M. L., Persson, H., & Saboonchi, F. (2015). Assessment of coping strategies and their associations with health related quality of life in patients with chronic heart failure: The Brief COPE restructured. *Cardiology Research*, *6*, 239-248. doi: 10.14740/cr385w

Bradwell, M. W., & Lee, J. (2019). Environmental disaster and mental health: Coping and depression among survivors of multiple disasters. *Best Practices in Mental Health*, *15*, 61-73.

Brasileiro, S. V., Orsini, M. R. C. A., Cavalcante, J. A., Bartholomeu, D., Montiel, J. M., Costa, P. S. S., & Costa, L. R. (2016). Controversies regarding the psychometric properties of the Brief COPE: The case of the Brazilian-Portuguese version "COPE Breve". *PLoS ONE, 11*(3), e0152233. doi: 10.1371/journal.pone.0152233

Byrne, B. M. (2001). *Structural equation modeling with AMOS: Basic concept, applications and programming*. Mahwah, NJ: Lawrence Erlbaum.

Carver, C. S. (1997a). Brief COPE Inventory. Retrieved from http://www.psy.miami.edu/faculty/ccarver/sclBrCOPE.phtml

Carver, C. S. (1997b). You want to measure coping but your protocol's too long: Consider the Brief COPE. *International Journal of Behavioral Medicine, 4*, 92-100. doi: 10.1207/s15327558ijbm0401_6

Cofini, V., Carbonelli, A., Cecilia, M. R., Binkin, N., & di Orio, F. (2015). Post traumatic stress disorder and coping in a sample of adult survivors of the Italian earthquake. *Psychiatry Research*, *229*, 353-358. doi: 10.1016/j.psychres.2015.06.041

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155-159. doi: 10.1037/0033-2909.112.1.155

Cooper, C., Katona, C., & Livingston, G. (2008). Validity and reliability of the Brief COPE in carers of people with dementia: The LASER-AD study. *Journal of Nervous and Mental Disease, 196*, 838-843. doi: 10.1097/NMD.0b013e31818b504c

De Ridder, D. (1997). What is wrong with coping assessment? A review of conceptual and methodological issues. *Psychology and Health, 12*, 417-431. doi: 10.1080/08870449708406717

Docena, P. S. (2015). Adaptive coping, resilience, and absence of anxiety among displaced disaster survivors. *Philippine Journal of Psychology, 48*, 27-49.

Donovan, T. (2014). The irrelevance and (new) relevance of religion in Australian elections. *Australian Journal of Political Science*, *49*, 626-646. doi: 10.1080/10361146.2014.963505

Doron, J., Trouillet, R., Gana, K., Boiché, J., Neveu, D., & Ninot, G. (2014). Examination of the hierarchical structure of the Brief COPE in a French sample: Empirical and theoretical convergences. *Journal of Personality Assessment*, *96*, 567-575. doi: 10.1080/00223891.2014.886255

Duncan, E., Dorahy, M. J., Hanna, D., Bagshaw, S., & Blampied, N. (2013). Psychological responses after a major, fatal earthquake: The effect of peritraumatic dissociation and posttraumatic stress symptoms on anxiety and depression. *Journal of Trauma & Dissociation, 14*, 501-518. doi: 10.1080/15299732.2013.769479

Fergusson, D. M., Horwood, L. J., Boden, J. M., & Mulder, R. T. (2014). 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

Folkman, S., & Moskowitz, J. T. (2004). Coping: Pitfalls and promise. *Annual Review of Psychology, 55*, 745-774. doi: 10.1146/annurev.psych.55.090902.141456

Glass, K., Flory, K., Hankin, B. L., Kloos, B., & Turecki, G. (2009). Are coping strategies, social support, and hope associated with psychological distress among Hurricane Katrina survivors? *Journal of Social and Clinical Psychology*, *28*, 779-795. doi: 10.1521/jscp.2009.28.6.779

Kannis-Dymand, L., Dorahy, M. J., Crake, R., Gibbon, P., & Luckey R. (2015). An exploration of reported cognitions during an earthquake and its aftershocks: Differences across affected communities and associations with psychological distress. *The Journal of Nervous and Mental Disease, 203*, 279-286. doi: 10.1097/NMD.0000000000000282

Knoll, N., Rieckmann, N., & Schwarzer, R. (2005). Coping as a mediator between personality and stress outcomes: A longitudinal study with cataract surgery patients. *European Journal of Personality*, *19*, 229-247. doi: 10.1002/per.546

Krägeloh, C. (2011). A systematic review of studies using the Brief COPE: Religious coping in factor analyses. *Religions, 2*, 216-246. doi: 10.3390/rel2030216

Krägeloh, C. U., Chai, P. P. M., Shepherd, D., & Billington, R. (2012). How religious coping is used relative to other coping strategies depends on the individual's level of religiosity and spirituality. *Journal of Religion and Health*, *51*, 1137-1151. doi: 0.1007/s10943-010-9416-x

Leaning, J., & Guha-Sapir, D. (2013). Natural disasters, armed conflict, and public health. *New England Journal of Medicine*, *369*, 1836-1842. doi: 10.1056/NEJMra1109877

Lundqvist, L. O., & Ahlström, G. (2006). Psychometric evaluation of the Ways of Coping Questionnaire as applied to clinical and nonclinical groups. *Journal of Psychosomatic Research*, *60*, 485-493. doi: 10.1016/j.jpsychores.2005.08.019

Makwana, N. (2019). Disaster and its impact on mental health: A narrative review. *Journal of Family Medicine and Primary Care*, *8*, 3090-3095. doi: 10.4103/jfmpc.jfmpc_893_19

Marx, M., Phalkey, R., & Guha-Sapir, D. (2012). Integrated health, social, and economic impacts of extreme events: Evidence, methods, and tools. *Global Health Action*, *5*. doi: 10.3402/gha.v5i0.19837

Monzani, D., Steca, P., Greco, A., D'Addario, M., Cappelletti, E., & Pancani, L. (2015). The situational version of the Brief COPE: Dimensionality and relationships with goal-related variables. *Europe's Journal of Psychology*, *11*, 295-310. doi: 10.5964/ejop.v11i2.935

Nachowitz, T. (2007). New Zealand as a multireligious society: Recent census figures and some relevant implications. *Aotearoa Ethnic Network Journal, 2*, 17−25. Retrieved from https://ndhadeliver.natlib.govt.nz/delivery/DeliveryManagerServlet?dps_pid=IE25721787

Nassif, Y., & Wells, A. (2014). Attention training reduces intrusive thoughts cued by a narrative of stressful life events: A controlled study. *Journal of Clinical Psychology*, *70*, 510-517. doi: 10.1002/jclp.22047

Oakland, S., & Ostell, A. (1996). Measuring coping: A review and critique. *Human Relations*, *49*, 133–155. doi: 10.1177/001872679604900201

Pang, J., Strodl, E., & Oei, T. P. S. (2013). The factor structure of the COPE questionnaire in a sample of clinically depressed and anxious adults. *Journal of Psychopathology and Behavioral Assessment*, *35*, 264-272. doi: 10.1007/s10862-012-9328-z

Parsons, M., Glavac, S., Hastings, P., Marshall, G., McGregor, J., McNeill, J., ... Stayner, R. (2016). Top-down assessment of disaster resilience: A conceptual framework using coping and adaptive capacities. *International Journal of Disaster Risk Reduction*, *19*, 1-11. doi: 10.1016/j.ijdrr.2016.07.005

Pozzi, G., Frustaci, A., Tedeschi, D., Solaroli, S., Grandinetti, P., Di Nicola, M., & Janiri, L. (2015). Coping strategies in a sample of anxiety patients: Factorial analysis and associations with psychopathology. *Brain and Behavior*, *5*, e00351. doi: 10.1002/brb3.351

Schuettler, D., & Boals, A. (2011). The path to posttraumatic growth versus posttraumatic stress disorder: Contributions of event centrality and coping. *Journal of Loss and Trauma, 16*, 180-194. doi: 10.1080/15325024.2010.519273

Shing, E. Z., Jayawickreme, E., & Waugh, C. E. (2016). Contextual positive coping as a factor contributing to resilience after disasters. *Journal of Clinical Psychology*, *72,* 1287-1306. doi: 10.1002/jclp.22327

Skinner, E. A., Edge, K., Altman, J., & Sherwood, H. (2003). Searching for the structure of coping: A review and critique of category systems for classifying ways of coping. *Psychological Bulletin, 129*, 216-269. doi: 10.1037/0033-2909.129.2.216

Snell, D. L., Siegert, R. J., Hay-Smith, E. J. C., & Surgenor, L. J. (2011). Factor structure of the Brief COPE in people with mild traumatic brain injury. *The Journal of Head Trauma Rehabilitation, 26*, 468-477. doi: 10.1097/HTR.0b013e3181fc5e1e

Stratta, P., Capanna, C., Carmassi, C., Patriarca, S., Di Emidio, G., Riccardi, I., ... Rossi, A. (2014). The adolescent emotional coping after an earthquake: A risk factor for suicidal ideation. *Journal of Adolescence*, *37*, 605-611. doi: 10.1016/j.adolescence.2014.03.015

Tabachnick, B. G., & Fidell, L. S. (2014). *Using multivariate statistics* (6th International ed.). Essex, UK: Pearson.

Tang, K. N., Chan, C. S., Ng, J., & Yip, C. H. (2016). Action type-based factorial structure of Brief COPE among Hong Kong Chinese. *Journal of Psychopathology and Behavioral Assessment*, *38*, 631-644. doi: 10.1007/s10862-016-9551-0

Ullman, S. E., Townsend, S. M., Filipas, H. H., & Starzynski, L. L. (2007). Structural models of the relations of assault severity, social support, avoidance coping, self-blame, and PTSD among sexual assault survivors. *Psychology of Women Quarterly, 31*, 23-37. doi: 10.1111/j.1471-6402.2007.00328.x

Wallemacq, P., & House, R. (2018). *Economic losses, poverty & disasters: 1998-2017*. United Nations Office for Disaster Risk Reduction.

Wang, A. W. T., Cheng, C. P., Chang, C. S., Chen, D. R., Chen, S. T., Shieh, V., ... Hsu, W. Y. (2016). Does the factor structure of the Brief COPE fit different types of traumatic events? *European Journal of Psychological Assessment, 34*(3), 162-173. doi: 10.1027/1015-5759/a000321

Wells, A. (2000). *Emotional disorders and metacognition: Innovative cognitive therapy*. Chichester, UK: John Wiley & Sons.

Wells, A., & Capobianco, L. (2020). Metacognition. In J. S. Abramowitz & S. M. Blakey (Eds.), *Clinical handbook of fear and anxiety: Maintenance processes and treatment mechanisms* (pp. 171–182). Washington DC, USA: American Psychological Association.

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# Contact Details


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**EDITOR**

Professor David Johnston
Email: D.M.Johnston@massey.ac.nz
Telephone: +64 (04) 801 5799 ext. 63672

**MANAGING EDITOR**

Lauren Vinnell
Email: ajdts@massey.ac.nz

**POSTAL ADDRESS**

Joint Centre for Disaster Research
Massey University
P.O. Box 756
Wellington 6140
New Zealand

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