

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

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## 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) <sup>a</sup>	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) <sup>b</sup>	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) <sup>c</sup>	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) <sup>c</sup>	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).

<sup>a</sup> The situational format used by Carver (1997b) was retained in the present research for reference purposes.

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

<sup>c</sup> 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 4<sup>th</sup>, 2010; February 22<sup>nd</sup>, 2011; June 13<sup>th</sup>, 2011; December 23<sup>rd</sup>, 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.	<b>.736</b>	.123	-.132	.167	.602
18	I look for something good in what is happening.	<b>.694</b>	.161	-.137	.079	.533
3	I try to see it in a different light.	<b>.668</b>	.101	-.109	.049	.471
2	I try to come up with a strategy about what to do.	<b>.666</b>	.199	-.102	.159	.518
1	I concentrate my efforts on doing something about the situation I'm in.	<b>.662</b>	.123	-.055	.154	.480
17	I think hard about what steps to take.	<b>.637</b>	.16	-.038	.189	.518
4	I accept the reality of the fact that it has happened.	<b>.595</b>	.055	-.121	-.075	.378
5	I make jokes about it.	<b>.562</b>	-.085	.236	-.186	.413
19	I make fun of the situation.	<b>.555</b>	-.100	.173	-.25	.411
15	I learn to live with it.	<b>.492</b>	-.096	.086	-.215	.305
9	I turn to work or other activities to take my mind off things.	<b>.335</b>	.113	.128	-.164	.169
22	I get help and advice from other people.	.128	<b>.909</b>	-.004	.025	.844
21	I get comfort and understanding from someone.	.125	<b>.892</b>	.005	.040	.812
7	I get emotional support from others.	.072	<b>.887</b>	-.043	.045	.797
8	I try to get advice or help from others.	.121	<b>.869</b>	.004	.039	.772
25	I express my negative feelings.	.129	<b>.449</b>	<b>.397</b>	.106	.387
14	I criticise myself.	-.080	-.132	<b>.698</b>	.100	.522
13	I give up trying to deal with it.	-.130	-.017	<b>.695</b>	-.108	.512
28	I blame myself for things that happened.	-.144	-.011	<b>.643</b>	.022	.435
12	I use alcohol or other drugs to make myself better.	.231	-.132	<b>.603</b>	-.228	.486
26	I use alcohol or other drugs to help me get through it.	.240	-.103	<b>.599</b>	-.246	.487
27	I give up the attempt to cope.	-.188	-.093	<b>.592</b>	.018	.394
11	I say things to let my unpleasant feelings escape.	.103	.250	<b>.549</b>	.102	.385
10	I say to myself this isn't real.	.008	.143	<b>.515</b>	.138	.304
23	I refuse to believe that it has happened.	-.121	.116	<b>.487</b>	.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	<b>.867</b>	.771
6	I try to find comfort in my religion or spiritual beliefs.	.066	.084	.098	<b>.839</b>	.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 [One factor]	6793.01	350	19.41	.300	.244	.165	.162 to .169	6905.01 [812.00]
Model 2 <sup>a</sup> [Carver, 1997b, 9 factors]	1336.14	314	4.26	.889	.866	.070	.066 to .073	1520.14 [812.00]
Model 3 <sup>b</sup> [4 factors, Knoll et al., 2005]	2372.49	203	11.69	.691	.648	.126	.121 to .131	2472.49 [506.00]
Model 4 [3 factor, Snell et al., 2011]	2721.26	249	10.93	.676	.640	.121	.117 to .126	2823.26 [600.00]
Model 5 <sup>c</sup> [4 factors, Krägeloh et al., 2012]	3919.64	344	11.39	.612	.573	.124	.121 to .128	4043.64 [812.00]
Model 6a <sup>d</sup> [5 factor (Doron et al., 2014)]	Model is not positive definite and solution is not admissible							
Model 6b <sup>d</sup> [5 factors Doron et al., 2014]	3707.41	340	10.90	.634	.593	.121	.118 to .125	3839.41 [812.00]
Model 7 [4 factors, Bose et al., 2015]	279.50	48	5.82	.902	.865	.085	.075 to .094	339.50 [156.00]
Model 8 <sup>e</sup> [Brasileiro et al., 2016, 3 factors]	2456.11	167	14.71	.583	.525	.143	.138 to .148	2542.12 [420.00]
Model 9 [11 factors, Tang et al., 2016]	871.18	295	2.95	.937	.920	.054	.050 to .058	1093.18 [812.00]
Model 10 [Kannis-Dymand et al., 2020, 4 factors]	742.81	290	2.56	.902	.890	.068	.062 to .074	864.81 [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.

<sup>a</sup> The situational format used by Carver (1997b) was retained in the present research for reference purposes.

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

<sup>c</sup> 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.

<sup>d</sup> 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).

<sup>e</sup> 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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