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APPLIED PSYCHOLOGY | RESEARCH ARTICLE

The protective factors for resilience scale (PFRS): Development of the scale

Craig Harms¹, Julie Ann Pooley^{1*} and Lynne Cohen²

Abstract: The present paper outlines the development of the Protective Factors for Resilience Scale (PFRS). To address limitations in the literature related to measuring psychological resilience this paper outlines a two stage process in developing the PFRS. After an initial exploratory factor analysis (Stage 1: $N = 413$ adults), the result of confirmatory factor analysis (Stage 2: $N = 240$ adults) supported the proposed model where a single second-order factor explained the degree of association between three lower order factors (Personal Resources, Social Resources Family and Social Resources Peers, each indicated by 5 items per factor). Other evidence of the construct validity for the PFRS was observed in stage 2 as the expected associations between the PFRS and measures of self-esteem, coping styles (except for problem-focused coping) and life satisfaction were observed. Although future testing of the PFRS with other populations is needed, the results of the present study provide initial evidence to support the view that the PFRS is a psychometrically sound, brief and broad measure of three protective factors associated with resilience.

Subjects: Health Psychology; Applied Social Psychology; Mental Health

Keywords: internal and external protective resilience factors; factor analysis; convergent validity

1. Introduction

Understanding, and more recently measuring, resilience has been the focus of researchers for some time. Whether in an education (Turner, Holdsworth, & Scott-Young, 2016), sport (Fletcher &

ABOUT THE AUTHORS

The authors have all worked in the areas of Psychology and Education for a few decades. Craig Harms is a clinical psychologist and an academic; Julie Ann Pooley is an associate dean of Psychology and Criminology and has a background in community psychology, and Lynne Cohen was a secondary teacher, also went on to do community psychology, and is currently the dean of Education. All work in different schools at Edith Cowan University where they have been working in various aspects of psychology and education and shared a mutual interest in the concept and use of resilience. Their experience in the literature and measurement has led to the development of this scale, the Protective Factors for Resilience Scale (PFRS).

PUBLIC INTEREST STATEMENT

Resilience is a topic many people are interested in. We hear the word talked about in the media all the time. Generally, we think we understand what the word means but when you look at the literature about what resilience is, only then can we understand how to build it or even how it is measured complicated it gets. The focus of this article is to understand what has been written about resilience and how others have tried to measure it psychologically and then come up with a brief and easy way of breaking down resilience and measure the protective factors of resilience. This measurement tool can be used with adults and possibly adolescents as an addition to other factors that are often measured alongside resilience, factors like coping and self-esteem. It would be a great measurement tool for programs aimed at increasing resilience.

Sarkar, 2016) or health (Dooley, Slavich, Moreno, & Bower, 2017) researchers are centred around understanding how resilience can predict, support or promote better outcomes for individuals. Resilience measures have only really been in existence for a few decades in the literature; however, two reviews have demonstrated that a number of resilience scales have been developed mostly for adolescents and adults. Windle, Bennett, and Noyes (2011) reviewed 15 measures and 13 scales were reviewed by Pangallo, Zibarras, Lewis, and Flaxman (2015). These measures conceptualise resilience as “...the protective factors, processes and mechanisms that contribute to good outcome despite experiences with stressors shown to carry significant risk for developing psychopathology” (Hjemdal, Friborg, Stiles, Rosenvinge, & Martinussen, 2006, p. 195).

Reviews by Windle et al. (2011) and Pangallo et al. (2015) have noted most measures of resilience focus heavily on personal traits, attributes or characteristics associated with being resilient. This finding is not surprising given the development for most of these measures where the results of Exploratory Factor Analysis (EFA) suggest that broad personal qualities associated with resilience are indicated by multiple items. For example, after developing 25 items for the CD-RISC from their review of the literature, Connor and Davidson (2003) labelled the broad personal qualities associated with resilience that emerged from the EFA as: Personal Competence, high standards and tenacity (8 items); Trust in one’s instincts, tolerance of negative effects and strengthening effects of stress (7 items); Positive acceptance of change and secure relationships (5 items); Control (3 items); and Spiritual influences (2 items). Similar multi-item sub-factor structures have been proposed for 25 item Resilience Scale (RS; Wagnild & Young, 1993).

However, measures of resilience like the CD-RISC and the RS are relatively lengthy for what is intended to be measured. For example, if the initial factor structure was accepted, a component of the CD-RISC could be shortened, from 3 to 8 items, if single items were developed to measure personal competence, high standards and tenacity. While the Brief Resilience Scale (BRS; Smith et al., 2008) is shorter (6 items) than other resilience measures, only one personal quality associated with resilience—personal experiences of bouncing back from adversity and stressful events—is operationalised in this scale and not the other personal protective factors measured by the CD-RISC and RS.

A further problem with measures of resilience that focus on personal qualities associated with resilience is the lack of modelling support for the summing of the items as a single score. As Brown (2006) reminds us, the summing of items as a total scale score is justified when unidimensionality is observed. Brown also notes that the summing of items as a total score is justified when there is good evidence to support second-order factor model (and not just a correlated factors model) when a multidimensional scale is proposed. While evidence for unidimensionality has been found for the 10-item version of the CD-RISC (Burns & Anstey, 2010; Campbell-Sills & Stein, 2007; Gucciardi, Jackson, Coulter, & Mallett, 2011) and the 18- (Ruiz-Parraga and Lopez-Martinez, 2015) and 11- (von Eisenhart Rothe et al., 2013) item versions of the RS, problems with the factor structure of the original versions of the CD-RISC (Burns & Anstey, 2010; Campbell-Sills & Stein, 2007; Gucciardi et al., 2011) and the RS (Resnuik & Inguito, 2011) have been reported.

As noted by Windle et al. (2011) and Pangallo et al. (2015), the RSA (Hjemdal, 2007) stands in contrast to other measures of resilience as the RSA contains multiple items that assess two broader external protective factors—Family Cohesion and Social Resources—associated with resilience. However, the RSA is similar to measures such as the CD-RISC and RS in that four of the six multi-item sub-scales of the RSA assess broad personal qualities associated with resilience. Outcomes of current research on the RSA does not strongly support the summing of the RSA items as a single score. The 1-factor model has been rejected as a satisfactory model for the 33 items of the RSA (Hjemdal et al., 2011). Although not explicitly tested, some evidence supporting a second-order model for the 5-factor model of the RSA has been reported (Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2005), and a second-order model for the 6-factor model for the RSA has yet to be examined. Finally, including scores for the Structured style sub-scale in the overall score for the RSA appears problematic given findings that the correlations between this sub-scale and other sub-scales of the RSA are

very low (Hjemdal et al., 2006, 2011). Finally, of the seven items associated with the Social Resources sub-scale, four do not distinguish between the role of family and peers in the item stems. Results from a number of studies indicate that the experiences associated with peers represent a socio-environmental protective factor that uniquely impacts on the psychological health of an individual (Alvord & Grados, 2005; Cohen, Ferguson, Harms, Pooley, & Tomlinson, 2011) and particularly when the connection to family has been severed or damaged (McMahon & Curtin, 2013).

In summary, measures of resilience tend to place a significant emphasis on the items proposed to measure personal qualities associated with resilience, and the results of CFA do not justify summing the items as a single score. Although proposed as a multidimensional measure, wording of some of the items has reduced the conceptual clarity of the Social Resources and Family Cohesion sub-scales of the RSA. The overall purpose of the present study was to report on the initial development of a new measure—Protective Factors for Resilience Scale (PFRS)—that was developed to more succinctly measure the personal protective factors for resilience, is multidimensional in nature but more clearly delineated the separate roles of family and peers as protective factors associated with resilience and where CFA findings support the summing of the items as an overall score. Such a measure would provide researchers and practitioners greater certainty regarding findings of research or interventions. The initial development and psychometric properties of the PFRS are outlined in Stage 1. The re-examination of the psychometric properties of the PFRS, using confirmatory factor analysis, preliminary evidence for the construct validity of the PFRS is reported in Stage 2.

1.1. Stage 1: Initial development of the protective factors for resilience scale (PFRS)

The aim of stage 1 was to report on the development and initial psychometric properties of the PFRS, using exploratory factor analysis, based on the responses of a sample of university students. Pooley and Cohen (2010) have argued that resilience includes “...the potential to exhibit resourcefulness by using available internal and external recourses in response to different contextual and developmental challenges” (p. 30). The view that protective factors as resources was used as a conceptual framework for the development of the PFRS as previous definitions in the field have not articulated the nature of factors to promote resilience in the face of adversity. The idea of resources connotes that individuals can access these resources in times of adversity and that practitioners may help clients with making choices that will develop resources or learn how to call upon these resources during times of adversity. In order to reduce the number of items associated with the personal resources component of the PFRS, single items were developed to assess broad personal qualities associated with resilience. Following the approach taken by Noar (2003), these items were then subject to an EFA to identify the 5 items with the largest factor loadings and the best performing items regarding skew and kurtosis (using values of skew divided by the standard error as well as kurtosis divided by the standard error).

2. Method

2.1. Initial item pool

Following the suggestions by Clark and Watson (1995), 40 items were developed. Twenty items for the personal resources (PR) component of the scale were modelled on (but were different to) items and associated factors with the CD-RISC, BRS, RS and the RSA as previous reviews (Pangallo et al., 2015; Windle et al., 2011) identified these scales as the most psychometrically sound measures. Items for the peer and family component of the scale (10 items each) were modelled (but were different to) on items from the social resources and family cohesion factors of the RSA, research associated with family resilience (Black & Lobo, 2008; McCubbin & McCubbin, 1988; Walsh, 1996) and research associated with the role of peers in resilience (Alvord & Grados, 2005; Cohen et al., 2011).

After feedback from 30 university students and responses by 276 university students to an early version of the PFRS, 20 items (10 items for the personal resources sub-scale and 5 items each for the social resources peers [SR-P] and social resources family [SR-F] sub-scales) were chosen (see Appendix 1 and Table 1a). A seven-point Likert format (1 = Strongly Disagree; 7 = Strongly Agree)

Table 1a. Results of the exploratory factor analysis of the 15 items of the protective factors for resilience scale (PFRS)

	Factor			<i>h</i> ²
	1	2	3	
1. I can deal with whatever challenges come my way.	-.08	.06	.76	.56
2. I achieve what I set out to do.	-.09	.07	.78	.58
3. I feel that that I belong with my friends.	-.02	.69	.16	.56
4. My family are a source of strength for me.	.78	-.03	.00	.59
5. I believe in myself.	.09	-.08	.77	.62
6. I follow through on plans to achieve my goals.	-.04	-.05	.84	.65
7. My friends treat me fairly.	.02	.72	.10	.60
8. I feel accepted by my family.	.82	.03	.08	.76
11. My friends look after me.	-.02	.83	-.07	.64
12. I know that my family would help me if I needed help.	.77	.08	-.06	.61
15. My friends are a great source of support.	.05	.89	-.07	.78
16. I feel comfortable around my family.	.93	-.05	.02	.84
17. When I think about my future, I feel positive.	.22	.03	.59	.53
19. I can rely on my friends for help if I needed it.	.00	.90	-.05	.79
20. I feel safe within my family.	.93	.00	-.06	.82

Note: the above table is the pattern matrix output. Convergence was achieved after 5 iterations. *h*² = communalities.

Table 1b. Factor correlations for the 3 factors extracted from the 15 items of the PFRS

Factor	1	2	3
Personal resources	1		
S-R peers	.42	1	
S-R family	.46	.33	1

was chosen for the PFRS. The items were developed such that it was thought they would be suitable for individuals across the lifespan with a minimum reading age of upper primary school (i.e. 11 years of age).

2.2. Participants and procedure

Data for the first stage was obtained from students (*N* = 413, 78.7% female, *M*_{age} = 23.07 ± 11.94 years) that attended a university situated in Australia. The participants completed the PFRS via an online survey tool (Qualtrics). The University Human Research Ethics Committee approved this research protocol. Participants actively consented to participate in the study prior to completing the items.

2.3. Data analysis

No missing data was observed as all data was collected using an online survey. An Exploratory Factor Analysis was conducted using SPSS (Version 20). Principal Axis Factoring (PAF) with Promax rotation was used because it was expected that the factors of the PFRS would be correlated (Costello & Osborne, 2005; Fabrigar, Wegener, MacCallum, & Strahan, 1999). Items were retained if the factor loading for the item were > .40 and no cross-loadings > .30 were observed.

3. Results and discussion

3.1. Exploratory factor analysis (EFA)

The five items retained for the PR scale (see Appendix 2 for the outcomes of preliminary EFA for the 10 items developed for the PR scale across both studies 1 and 2) as well as the 10 items developed

to assess the social resources associated with peers and family (5 items each) were subjected to an EFA, the results of which appear in Tables 1a and 1b. All indices indicated PAF was an acceptable procedure for the data (Bartlett's Test of Sphericity was significant, ($\chi^2 = 4324.61$, $df = 105$, $p < .001$; Kaiser–Meyer–Olkin statistic was .88). Based on an initial eigen value of greater than 1 and observations of the scree plot, a 3-factor solution explained a total of 66.13% of the total variance. Factor 1 explained 40.57% of the variance; factor 2 explained an additional 14.19% of the variance; and factor 3 explained an additional 11.37% of the variance. With regard to the 3-factor solution, all items developed to assess the SR-F and SR-P factors loaded onto Factors 1 and 2, respectively. All of the items proposed to measure the PR factor loaded clearly onto Factor 3. All factor loadings for this model were greater than .40 and all cross loadings were minor.

3.2. Stage 2: Confirmation of the factor structure and construct validity

The aims of stage 2 were to re-examine, from responses of a second sample of participants, the psychometric properties of the PFRS, using confirmatory factor analysis, and to provide preliminary evidence for the construct validity of the PFRS by examining the association between the PFRS measure and measures of psycho-social functioning such as coping style, self-esteem and life satisfaction. Based on the results of a recent meta-analysis by Lee et al. (2013), it was expected that the correlations between scores on PFRS and measures of self-esteem as well as life satisfaction should be positive and large.

Researchers have found that scores on resilience scales tend to be positively correlated with problem-focused coping (defined as instrumental support, active coping and planning: Catalano, Chan, Wilson, Chiu, & Muller, 2011); problem solving (Garity, 1997; Gillespie et al., 2007); approach coping (defined as problem-solving, positive reappraisal, logical analysis and seeking guidance: Ng, Ang, & Ho, 2012); and active coping (defined as seeking social support and problem solving: Sexton, Byrd, & von Kluge, 2010). Conversely, scores on resilience scales have been found to be negatively related to some emotion-focused strategies (such as wishful thinking: Garity, 1997; keeping to oneself, self-blame and wishful thinking: McGarry et al., 2013). Thus, it was expected that higher scores on the PFRS would be positively associated with adaptive problem-focused coping (e.g. problem solving, active coping and reappraisal of the stressor), adaptive re-appraisal of problems (positive re-appraisal) and social support (e.g. seeking of social as well as instrumental support); and negatively associated with maladaptive emotion-focused coping (e.g. wishful thinking and denial of the problem). The associations between resilience and other measure of coping such as substance use, use of humour to cope with problems and religion have yet to be examined.

4. Method

4.1. Participants and procedure

The participants ($N = 240$, 58.6% female, M age = 35.34 ± 11.32 years) for the second stage were recruited using Mechanical Turk (MTurk). MTurk is an online participant tool (Paolacci & Chandler, 2014) was utilised as an opportunity method to access an international sample of some 500 000 participants from over 190 countries. The participant pool therefore is more diverse than university students.

All participants were at least 18 years of age, identified themselves as living in United States of America or Canada and reported that they spoke fluent English. Researchers (Shapiro, Chandler, & Mueller, 2013) have found that MTurk responders tend to be similar to other university undergraduates with respect to psychological health (i.e. symptoms of anxiety and depression as well as exposure to trauma). Participants were paid US \$2 for their involvement in the study. MTurk workers choose to undertake any kind of task on offer for the fee offered. At the time of data collection a \$2 fee was representative of the kind of task and time MTurk workers were offered, indicating the current survey collection task was at about the average amount offered for this kind of task in the marketplace. The participants completed the PFRS and provided relevant demographic information using an online format (Qualtrics). The University Human Research Ethics Committee approved this research protocol, and participants actively consented to participate in the study prior to completing the items.

4.2. Measures

In addition to completing the 20 items of the PFRS, the participants completed the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985), the Rosenberg Self Esteem Scale (Rosenberg, 1965) and the Brief COPE (Carver, 1997).

4.2.1. Satisfaction with life scale (SWLS)

Participants responded to items intended to measure life satisfaction on a seven-point Likert scale (1 = Strongly disagree: 7 = Strongly agree). Scores are summed to arrive at an overall score where higher scores indicate greater life satisfaction. Initial development indicated that the internal reliability for this scale was reasonable ($\alpha = .87$: Diener et al., 1985).

4.2.2. Rosenberg's self-esteem scale (RSE)

Participants responded to 10 items designed to assess the self-esteem of a person on a four-point Likert scale (0 = Strongly agree: 3 = Strongly Disagree). The responses to items 1, 2, 4, 6 and 7 are reverse scored so that higher scores on the overall scale indicate higher self-esteem. Initial development indicated that the internal reliability for SES was reasonable (α between .85 and .88: Rosenberg, 1965).

4.2.3. Brief COPE

Participants responded to 28 questions regarding how they typically respond to stressful events on a four-point Likert scale (1 = I usually don't do this at all: 4 = I usually do this a lot). The items from the Brief COPE assess 14 different coping styles: emotional support, instrumental support, venting, self-blame, self-distraction, denial, active coping, positive reframing, planning, acceptance, substance use, behavioural disengagement, humour and religion. Higher scores on each scale indicated greater use of the coping strategy when typically responding to stressors. Cronbach's alpha associated with the initial development of the scales from the Brief COPE ranged from .54 to .90 (Carver, 1997).

An EFA (Principal Axis Factoring with Promax rotation) was conducted on the items of the Brief COPE because Carver (2007, 2013) recommends that researchers examine the factor structure of the Brief COPE with the study sample and Cronbach's alpha for several of the scales—venting (.42), self-distraction (.41), denial (.40) and acceptance (.58)—were well below what is commonly accepted as reasonable scale reliability (i.e. $\alpha > .70$). An 8-factor solution (see Appendices 3a and 3b for details) explained 57.15% of the variance in the 28 items of the scale. The items for the venting (items 9 and 21) and denial (items 3 and 8) scales as well as one of the items from the acceptance scale (item 20) were removed because the factor loading associated with the expected factor was $< .40$ or a cross-loading of $> .30$ was observed. Each factor was named as described by Carver (1997): planning and active coping (4 items), emotional and instrumental support (4 items), self-blame and distraction (4 items), substance use (2 items), humour (2 items), behavioural disengagement (2 items), religion (2 items) and reframing and acceptance (3 items).

4.3. Data analysis

No missing data were observed as all data was collected using online surveys. As the PFRS was specified as being made up of a multidimensional but correlated scale, analysis of One-factor Congeneric Models (OCMs) for each of the sub-scales of the PFRS was conducted. Confirmatory Factor Analysis (CFA) of the 15 items for 5 models was then conducted (see Noar, 2003): the null (independence) model, 1-factor model, 3-uncorrelated factors model, 3-correlated factors model and 1-second-order 3-factor model.

Robust Maximum Likelihood estimation method was used (because many of the items of the PFRS were observed to be not normally distributed) and Satorra-Bentler (SB) χ^2 (Satorra & Bentler, 1994) was reported, with $p > .05$ indicating exact model fit. CFA analyses were conducted using LISREL 8.80 (Jöreskog & Sörbom, 2006). Models were accepted as correctly specified if model fit was reasonable using guidelines suggested by Hu and Bentler (1999): Root Mean Square Error of Approximation (RMSEA) $< .06$ (90% CI's were also reported), Comparative Fit Index (CFI) $> .95$ and Standardised Root

Mean Square Residual (SRMR) < .08. Browne and Cudeck (1993) note that RMSEA values > .10 indicate problematic model fit. Values of the Goodness of Fit (GFI) index indicated that the extent to which the model explained the variability in the observed covariance matrix. Standardised factor loadings (either first or second order) of at least .60 (Marsh & Hau, 1999) were considered desirable. Differences in model fit between nested models was examined by S-B scaled χ^2 difference test ($\Delta SB \chi^2$) using modifications for LISREL 8.80 suggested by Bryant and Satorra, (2012). Bivariate correlations were reported between scores on the PFRS and the measures of self-esteem the EFA-derived coping styles. Descriptive statistics (*M*, *SD*) and Cronbach's alpha were calculated using SPSS (version 20).

5. Results and discussion

5.1. One-factor congeneric models (OCMs) and confirmatory factor analysis (CFA) for the PFRS

The results of the analyses appear in Tables 2a and 2b. The factor loadings for all models reported in Table 2a appears in Table 3. Regarding the OCMs, model fit was observed to be excellent for the S-R Peers factor and acceptable for the PR as well as the S-R Family factors. Regarding the CFA for the PFRS, the 3 correlated factors and second-order 3-factor models were accepted as correctly specified and all factor loadings were greater than .60. In contrast, the 1-factor as well as the 3-uncorrelated factors models was rejected as being correctly specified. Further, the 1-factor ($\Delta SB \chi^2 = 380.18$, $\Delta df = 3$, $p < .01$) and the 3-uncorrelated factors ($\Delta SB \chi^2 = 316.80$, $\Delta df = 3$, $p < .01$) models were found to be a worse fit of the data than the 3-correlated factors model. The difference in model fit between the 3-correlated factors and second-order 3-factor models was not statistically significant, $\Delta SB \chi^2 = 1.94$, $\Delta df = 1$, $p = .16$. Further, the factor loadings (FLs) for the second-order 3-factor model and the 3-correlated factors models were all greater than .70 whereas the 10 of the FLs for the 1-factor model were observed to be less than .60. The second-order 3-factor model was preferred to the 3-correlated factors model on the grounds of model parsimony, the second-order model was consistent with the Pooley and Cohen (2010) view of resilience as a multidimensional but related construct, the second-order 3-factor model was not a worse fit of the data than the 3-correlated factors model and the second-order factor loadings were greater than .60.

Table 2a. Results of the one-factor congeneric models and confirmatory factor analyses for the 15 item protective factors for resilience scale (PFRS)

Model	Model fit and observations
Personal resources	* $\chi^2 = 17.81$, $S-B\chi^2 = 11.54$, $df = 5$, $p = .04$; RMSEA = .074, RMSEA 90% CI = .013-.130; CFI = .99; SRMR = .02, GFI = .97.
S-R peers	* $\chi^2 = 9.08$, $S-B\chi^2 = 5.68$, $df = 5$, $p = .34$; RMSEA = .024, RMSEA 90% CI = .000-.010; CFI = 1.00; SRMR = .01; GFI = .99.
S-R family	* $\chi^2 = 23.90$, $S-B\chi^2 = 13.36$, $df = 5$, $p = .02$; RMSEA = .084; RMSEA 90% CI = .300-.140; CFI = .99; SRMR = .02; GFI = .96.
Null model	$\chi^2 = 6498.52$, $df = 105$.
One-factor	* $\chi^2 = 1679.73$, $S-B\chi^2 = 1897.37$, $df = 90$, $p = .00$; RMSEA = .290, RMSEA 90% CI = .280-.300; CFI = .72; SRMR = .22; GFI = .39.
3-uncorrelated factors	* $\chi^2 = 399.10$, $S-B\chi^2 = 260.33$, $df = 90$, $p = .00$; RMSEA = .089. RMSEA 90% CI = .076-.100; CFI = .97; SRMR = .29; GFI = .83.
3-correlated factors	* $\chi^2 = 203.50$, $S-B\chi^2 = 151.31$, $df = 87$, $p = .00$; RMSEA = .056, RMSEA 90% CI = .040-.070; CFI = .99; SRMR = .05; GFI = .89.
1-second-order factor ^a	* $\chi^2 = 214.04$, $S-B\chi^2 = 156.32$, $df = 88$, $p = .00$; RMSEA = .057, RMSEA 90% CI = .042-.071; CFI = .99; SRMR = .10; GFI = .89. Second-order factor loadings: PR = .64, SR-p = .73 and SR-F = .66.

Notes: LVR = Latent variable correlation. RMSEA = Root mean square error of approximation. CFI = Comparative fit index. SRMR = Standardised root mean square residual. GFI = Goodness of fit index.

*C1 in LISREL.

^aThe indicators for the SR-F and SR-P factors were constrained to be equal in order to over-identify the higher order part of the model.

Table 2b. Latent-factor correlations for the 3-correlated factors model of the PFRS

Factor	1	2	3
1. Personal resources	1		
2. S-R peers	.53(.88/.15/6.05)	1	
3. S-R family	.37(.72/.15/4.94)	.51(1.17/.19/6.22)	1

Note: In parentheses: Unstandardised coefficient/Standard error/Wald statistic.

Table 3. Factor loadings associated with the one-factor Congeneric models, 1-factor, 3-correlated factors and second-order factor models for the protective factors for resilience scale (PFRS)

	OCMs			1-factor	3-correlated factors			Second-order		
	PR	S-R P	S-R F		PR	S-R P	S-R F	PR	S-R P	S-R F
1. I can deal with whatever challenges come my way.	.81			.31	.80			.80		
2. I achieve what I set out to do.	.87			.39	.87			.86		
5. I believe in myself.	.85			.43	.85			.85		
6. I follow through on plans to achieve my goals.	.87			.41	.87			.87		
17. When I think about my future, I feel positive.	.75			.51	.76			.76		
3. I feel that that I belong with my friends.		.86		.57		.86			.83	
7. My friends treat me fairly.		.79		.56		.80			.76	
11. My friends look after me.		.80		.50		.80			.76	
15. My friends are a great source of support.		.92		.55		.92			.90	
19. I can rely on my friends for help if I needed it.		.92		.56		.92			.90	
4. My family are a source of strength for me.			.87	.87			.87			.87
8. I feel accepted by my family.			.91	.91			.91			.91
12. I know that my family would help me if I needed help.			.88	.84			.87			.88
16. I feel comfortable around my family.			.93	.91			.93			.93
20. I feel safe within my family.			.95	.92			.95			.95

Overall, the results of stage 2 supported the plausibility of modelling the 15 items of the PFRS as being explained by three sub-factors—personal resources, social resources peers and social resources family and that the degree of association between the sub-factors of the PFRS was explained by an overall factor. As such, the 15 items of the PFRS were summed as a total score for the remaining analyses.

5.2. Construct validity of the PFRS

Descriptive data and the correlations between the coping styles, life satisfaction and scores on the PFRS were reported in Table 4. The bivariate correlation between the participants scores for self-esteem and well was life satisfaction and scores on the PFRS were large and positive, which was consistent with the results of the meta-analysis reported Lee et al. (2013).

The participants who reported making greater use adaptive emotion-focused coping (e.g. greater use of emotional and instrumental support as well as reframing and accepting stressors) reported higher scores on the PFRS. These findings are consistent with findings of Catalano et al. (2011), Ng et al. (2012) and Sexton et al. (2010). Participants who reported greater use of maladaptive emotion-focused coping (self-blame and distraction as well as disengagement when coping with stressors) reported lower scores on the PFRS. These findings are consistent with the findings of Garity (1997) and McGarry et al. (2013).

Unexpectedly, the scores on the PFRS were not strongly positively associated with planning and active coping. The unique associations between problem solving and active coping with other measures of resilience noted in previous studies (Catalano et al., 2011; Ng et al., 2012; Sexton et al., 2010) may have been over-estimated as other coping styles (e.g. emotional and instrumental support) positively associated with measures of resilience were included as components of problem-focused coping in these studies. The associations between religion (positive), greater substance (negative) and humour (close to zero) and the PFRS have not been reported previously.

Table 4. Correlations between coping styles and scores on the protective factors for resilience scale (PFRS)

	1	2	3	4	5	6	7	8	9	10	11
1. PFRS	1										
2. Planning and active coping	.11	1									
3. Emotional and instrumental support	.35**	.35**	1								
4. Self-blame and distraction	-.40**	.16*	-.11	1							
5. Reframe and acceptance	.27**	.51**	.37**	.06	1						
6. Substance use	-.19**	-.07	-.02	.20**	.00	1					
7. Behavioural disengagement	-.37**	-.11	-.08	.43**	-.11	.25**	1				
8. Humour	.06	.20**	.11	.18**	.41**	.15*	.08	1			
9. Religion	.26**	.21**	.31**	-.10	.27**	-.18**	-.11	-.02	1		
10. Satisfaction with life	.58**	.04	.28**	-.49**	.16*	-.18**	-.34**	-.05	.17**	1	
11. Self Esteem	.57**	.07	.20**	-.53**	.16*	-.17**	-.49	.00	.17*	.66**	1
Minimum	15	1	1	1	1	2	2	2	2	5	10
Maximum	105	4	4	4	4	8	8	8	8	35	40
M	78.90	2.86	1.25	2.17	2.58	2.83	2.81	3.80	3.46	21.52	21.43
SD	15.98	.72	.61	.70	.72	1.45	1.19	1.69	1.94	7.86	5.83
α	.93	.84	.86	.72	.70	.96	.74	.84	.94	.94	.94
Skew/SE	-4.33	-2.08	4.43	2.03	-.38	11.36	12.59	4.67	7.05	-2.26	-3.64
Kurtosis/SE	1.14	-.86	-.50	-1.52	-1.89	8.14	14.83	-.59	-.13	-2.90	.41

*indicates $p < .05$.

**indicates $p < .01$.

6. Overall discussion

The findings from the present study provide good support for the initial psychometric properties of the Protective Factors for Resilience Scale (PFRS). The factor structure for the 15-item measure PFRS was developed and then confirmed using separate samples. The findings of the present study support the plausibility of a model where (following the definition proposed by Pooley & Cohen, [2010]), a model where 15 items were explained by a single personal and two external (family and peers) factors; and that an overarching construct explained the degree of associations between these three major protective factors. Compared to other scales such as the CD-RISC, RSA and RS, the results of the present study provide substantial support for the proposition that the degree of association between separate dimensions of psychological resilience—personal resources, social resources associated with one’s peers and social resources associated with one’s family—can be explained by second-order construct and that these findings justify summing the 1 items of the PFRS as an overall score. The pattern of associations between the scores on the PFRS, various coping styles, self-esteem and life satisfaction provided good initial evidence regarding the construct validity of the PFRS.

Some limitations with respect to the present study are noted. The present study was conducted based on the responses of Australian university students and North American adults. The current research represents the first step in the development of the PFRS, and further research will need to focus on examining the validity and reliability of the PFRS across different ages, cultural backgrounds and time as well as between males and females. Translating the scale into different languages will further enhance our understanding of the definition and measurement of resilience. Finally, validity studies within clinical populations would enable the testing of the efficacy of the measure for psychological interventions.

While acknowledging this limitations, the results of the present study represent a significant step forward in the measurement of resilience compared with other similar scales because the PFRS succinctly measures personal protective factors for resilience, the PFRS multidimensional in nature and more clearly delineated the separate roles of family and peers as protective factors associated with resilience and the results of CFA findings support the summing of the items as an overall score. Further, the PFRS is substantially shorter than the other resilience scales reviewed by Windle et al. (2011) and Pangallo et al. (2015). The development of a shorter measure of important individual and external protective factors associated with resilience would also reduce the load for participants.

It is suggested the PFRS can be used as an alternative to other scales developed to measure protective factors associated with resilience because the PFRS is much shorter than the majority of these scales and (because of the strength of the results from the CFA) the observed effects are less likely to be adversely impacted by measurement error. The brevity of the PFRS will make it an attractive measure across a number of settings including practitioners working in health settings who want to use a strengths-based approach (as advocated by Bird et al., 2012) to augment the care they provide to the patients, or practitioners assessing a community’s preparedness to cope with adversities such as natural disasters.

Although further research will need to be conducted, the development of the PFRS as a psychometrically sound and brief measure of the psycho-social resources thought to promote resilience should help researchers and practitioners to confidently assess psycho-social resources when understanding and helping individuals adapt resiliently to adversity.

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Competing Interests

The authors declare no competing interest.

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Appendix 1

PFRS

Age _____(years of age) Gender (please circle) Female Male

Instructions: To what extent do you agree or disagree with these statements (please circle your answer)

		Strongly Disagree			Strongly Agree			
1.	I can deal with whatever challenges come my way.	1	2	3	4	5	6	7
2.	I achieve what I set out to do.	1	2	3	4	5	6	7
3.	I feel that that I belong with my friends.	1	2	3	4	5	6	7
4.	My family are a source of strength for me.	1	2	3	4	5	6	7
5.	I believe in myself.	1	2	3	4	5	6	7
6.	I follow through on plans to achieve my goals.	1	2	3	4	5	6	7
7.	My friends treat me fairly.	1	2	3	4	5	6	7
8.	I feel accepted by my family.	1	2	3	4	5	6	7
9.	I can look after myself.	1	2	3	4	5	6	7
10.	My friends look after me.	1	2	3	4	5	6	7
11.	I know that my family would help me if I needed help.	1	2	3	4	5	6	7
12.	I feel that I can influence what happens to me.	1	2	3	4	5	6	7
13.	I can rely on myself to be ready for what I need to do each day.	1	2	3	4	5	6	7
14.	My friends are a great source of support.	1	2	3	4	5	6	7
15.	I feel comfortable around my family.	1	2	3	4	5	6	7
16.	When I think about my future, I feel positive.	1	2	3	4	5	6	7
17.	I really try hard in the things that I do.	1	2	3	4	5	6	7
18.	I can rely on my friends for help if I needed it.	1	2	3	4	5	6	7
19.	I feel safe within my family.	1	2	3	4	5	6	7
20.	I know what I want to do with my life.	1	2	3	4	5	6	7

Appendix 2

Factor analysis of the initial 10 Personal Resources items for study 1

	Factor Matrix	Communalities		Skew/SE	Kurtosis/SE
		Initial	Extraction		
2. I achieve what I set out to do.	.72	.58	.52	-6.08	1.00
5. I believe in myself.	.77	.61	.60	-9.16	5.39
6. I follow through on plans to achieve my goals.	.80	.66	.64	-5.87	.69
17. When I think about my future, I feel positive.	.74	.54	.54	9.64	4.81
1. I can deal with whatever challenges come my way.	.70	.53	.49	-8.13	1.97
14. I can rely on myself to be ready for what I need to do each day.	.68	.47	.46	-10.29	7.74
18. I really try hard in the things that I do.	.64	.46	.41	9.70	4.96
20. I know what I want to do with my life.	.60	.39	.35	-9.10	4.12
13. I feel that I can influence what happens to me.	.58	.37	.34	-7.99	2.64
10. I can look after myself.	.57	.34	.32	-14.70	17.11

Note: retained items in Bold.

Factor analysis of the initial 10 Personal Resources items for study 2

	Factor Matrix	Communalities		Skew/SE	Kurtosis/SE
		Initial	Extraction		
5. I believe in myself	.86	.70	.74	-6.74	3.41
6. I follow through on plans to achieve my goals	.84	.73	.71	-4.87	1.50
2. I achieve what I set out to do	.84	.71	.70	-4.05	.65
17. When I think about my future I feel positive	.80	.65	.64	-5.05	-.32
1. I can deal with whatever challenges come my way	.79	.61	.62	-6.46	3.84
14. I can rely on myself to be ready for what I need to do each day	.78	.63	.61	-6.30	4.11
20. I know what I want to do with my life	.77	.63	.60	-5.09	-.35
10. I can look after myself	.71	.56	.51	-9.20	7.65
18. I really try hard in the things that I do	.67	.48	.45	-6.28	2.44
13. I feel that I can influence what happens to me	.58	.37	.33	-5.32	3.37

Note: retained items in Bold.

Appendix 3a

Results of the Exploratory Factor Analysis of the 28-item Brief COPE

	Factor								h ²
	1	2	3	4	5	6	7	8	
1. I've been turning to work or other activities to take my mind off things.			.42						.27
2. I've been concentrating my efforts on doing something about it.	.64								.42
3. I've been saying to myself "this isn't real".							.22		.12
4. I've been using alcohol or other drugs to make myself feel better.				.95					.91
5. I've been getting emotional support from others.		.88							.67
6. I've been giving up trying to deal with it.							.76		.70
7. I've been taking action to try to make the situation better.	.76								.69
8. I've been refusing to believe that it has happened.	.28						.43	-.38	.27
9. I've been saying things to let my unpleasant feelings escape.								.26	.27
10. I've been getting help and advice from other people.		.75							.61
11. I've been using alcohol or other drugs to help me get through it.				.97					.94
12. I've been trying to see it in a different light to make it seem positive.								.46	.50
13. I've been criticising myself.			.85						.69
14. I've been trying to come up with a strategy about what to do.	.77								.67
15. I've been getting comfort and understanding from someone.		.80							.66
16. I've been giving up the attempt to cope.							.67		.48
17. I've been looking for something good in what is happening.			-.23			.27		.42	.61
18. I've been making jokes about it.						.83			.76
19. I've been doing something to think about it less such as going to movies, watching TV, daydreaming, sleeping or shopping.			.41						.23
20. I've been accepting the reality of the fact that it has happened.	.32							.51	.41
21. I've been expressing my negative feelings.		.30	.30					.23	.26
22. I've been trying to find comfort in my religion or spiritual beliefs.					.99				.93
23. I've been trying to get advice or help from other people about what to do.		.72							.68
24. I've been learning to live with it.								.63	.38
25. I've been thinking hard about what steps to take.	.78								.67
26. I've been blaming myself for things that happened.			.75						.63
27. I've been praying or meditating.					.92				.84
28. I've been making fun of the situation.						.89			.79

Note: Convergence was achieved after 8 iterations. Factor loadings > .2 were suppressed. h² = communalities. Factor 1 = planning and active coping (4 items), Factor 2 = emotional and instrumental support (4 items), Factor 3 = self-blame and distraction (4 items), Factor 4 = substance use (2 items), Factor 5 = humour (2 items), Factor 6 = behavioural disengagement (2 items), Factor 7 = religion (2 items) and Factor 8 = reframing and acceptance (3 items).

Appendix 3b

Factor correlations for the 8 factors extracted from the 28 items of the Brief COPE

Factor	1	2	3	4	5	6	7	8
1. Planning and active coping	1							
2. Emotional and instrumental support	.38	1						
3. Self-blame and distraction	.03	-.14	1					
4. Substance use	-.09	.03	.26	1				
5. Humour	.26	.33	-.22	-.18	1			
6. Behavioural disengagement	.28	.21	.03	.10	.12	1		
7. Religion	-.01	.06	.55	.31	-.07	.07	1	
8. Reframing and acceptance	.50	.38	-.02	.12	.29	.47	.09	1



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