The Connor–Davidson Resilience Scale (CD-RISC): Testing the invariance of a uni-dimensional resilience measure that is independent of positive and negative affect

R.A. Burns *, K.J. Anstey

Ageing Research Unit, Centre for Mental Health Research, Australian National University, Canberra 0200, ACT, Australia

A B S T R A C T

Resilience comprises cognitive and behavioural tendencies that reflect dispositional character traits and patterns of behaviour that develop through life experience. Resilience is associated with positive mental and physical health outcomes although debate over its function as a predictor and/or outcome of successful stressful life conditions exists. Findings are confounded by a range of operational definitions. This study tested the factorial structure of the Connor and Davidson Resilience Scale (CD-RISC) and assessed its independence of two broad affective constructs, positive and negative affect. Participants ($n = 1775$) comprised the youngest adult cohort from the PATH study from Canberra, Australia. Results supported a uni-dimensional CD-RISC measure that was independent of affect at an item level, but supported strong associations between resilience and affect factors. Comparable Goodness of Fit Indices supported strict invariance between genders on an oblique 3-factor model of resilience and affect.

© 2009 Elsevier Ltd. All rights reserved.

1. Introduction

Resilience is a multi-dimensional construct that comprises a network of favourable attitudes and behaviours that enable adaptive coping strategies to acute and chronic stressful life events (Lamond et al., 2008; Rutter, 1985). Resilient people are typically characterised by internal locus of control, positive self-image and optimism (e.g. Cederblad, 1996; Werner & Smith, 1992). These resilient and hardy characteristics are associated with better physical and mental health outcomes (Connor & Davidson, 2003), more positive adaptive behaviours to negative life events (Aspinall & MacNamara, 2005) and are protective against the onset of Post-Traumatic Stress Disorder (King, King, Fairbank, Keane, & Adams, 1998). In line with proponents of positive psychology (e.g. Ryan & Deci, 2001), resilience is indicative of positive mental health (Maddi & Khoshaba, 1994).

Despite the consensus over the characteristics and correlates of resilience, agreement relating to its temporal stability has been less unanimous. Evidence that purports a heritable component of resilience, as indicated by biological markers such as higher levels of dopamine, neuropeptide Y, testosterone, and increased functionality of 5-HT$_{1A}$ and benzodiazepine receptors (Charney, 2004; Gervai et al., 2005), supports temporal stability and suggests resilience incorporates a set of temporally-stable psychological resources available to the individual throughout the lifespan (Vaishnavi, Connor, & Davidson, 2007). This is also supported by longitudinal survey data (e.g. Cederblad, 1996; Werner & Smith, 1992). In contrast, notions of resilience as behavioural and cognitive responses to a specific event have been proffered (e.g. Lamond et al., 2008) and one's capacity for resilience appears shaped by age and life experience (e.g. Gillespie, Chaboyer, & Wallis, in press). Consequently, resilience is described as either a set of heritable traits, an outcome of stressful life transactions, or as a process-construct reflecting an interaction between trait attitudes and behaviours with life experiences (Ahern, Kiehl, Sole, & Byers, 2006).

Resilience measures commonly comprise self-report, have not been extensively validated, nor has their application been widely documented (Ahern et al., 2006). Yet, growing recognition of the impact of positive psychological states for individual and social well-being (Huppert, 2008), suggests an evaluation of available measures of resilience and their underlying factor structure and comparability at different stages of the life course, is needed. Similar positive well-being measures are now widely incorporated into national health surveys including the Health and Retirement Survey and the National Survey of Midlife Development (e.g. Ryff, Keyes, & Hughes, 2004), and the German Socioeconomic Panel (e.g. Van Landeghem, 2008).

Well-being research typically delineates between related cognitive and affective psychological constructs (Ryan & Deci, 2001). As a cognitive psychological resource, resilience may function to optimise subjective well-being by increasing positive and decreasing

---

* Corresponding author. Tel.: +61 02 6125 3132.
E-mail address: richard.burns@anu.edu.au (R.A. Burns).

negative affectivity, but since measures of resilience frequently comprise self-report assessments, indices of resilience may simply reflect affect. However, Burns and Machin (2009) have differentiated between cognitive and affective well-being dimensions at the item level, whilst still moderately related at a higher-order factor level. It is important to determine a similar finding in respect to resilience and affect.

A number of resilience measures have been developed and include the Resilience Scale (RS; Wagnild & Young, 1993), which assesses two factors, personal competence and acceptance of self and life; the Resilience Scale for Adults (RSA; Friborg, Hjemdal, Rosenvinge, & Martinussen, 2003), which measures five factors: personal competence, social competence, family coherence, social support and personal structure; and the Connor–Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003). The CD-RISC has been used with clinical and non-clinical populations (Connor & Davidson, 2003), as a measure of psychological resources in moderating childhood maltreatment and adult psychiatric symptoms (Campbell-Sills, Cohan, & Stein, 2006), and as an indicator for successful resilience training (Davidson et al. 2005). Only one large scale validation of the CD-RISC within a general population has been reported (Lamond et al., 2008).

The CD-RISC authors and others typically compute a total CD-RISC score (e.g. Campbell-Sills et al., 2006; Lamond et al., 2008), yet post hoc analysis in the initial review (Connor & Davidson, 2003) indicated a five-factor structure that reflected a multi-dimensional resilience scale. However, the methods employed in the initial report (Connor & Davidson, 2003), and subsequent analyses (e.g. Campbell-Sills & Stein, 2007; Vaishnavi et al., 2007) of the CD-RISC's psychometric properties, reveal several limitations to the proposed multi-dimensional nature of the CD-RISC. For example, Lamond et al. (2008) reported using a Principal Components extraction and orthogonal rotation method which is not appropriate for identifying a correlated factor structure (Burns & Machin, 2009). Although using a Principal Axis Factoring method, Connor and Davidson (2003) also reported an orthogonal rotation method in their initial analysis which assumes that the resilience components are unrelated when a multi-dimensional resilience model should comprise oblique factors. Many of the initial factor loadings (Connor & Davidson, 2003) revealed several moderately cross-loading items and suggest that investigation of a more parsimonious structure is warranted. For example, Campbell-Sills and Stein (2007) used Exploratory Factor Analysis (EFA) with an oblique Promax rotation to identify a refined 10-item uni-dimensional model.

1.1. Aim

Consequently, we seek to test the structural validity of the a priori five-factor model of the CD-RISC measure (Connor & Davidson, 2003) in a large population-based sample of young-adults and subsequently test its independence from a measure of positive and negative affect.

2. Method

2.1. Study design and participants

The sample came from the PATH Through Life Project, a large community survey concerned with the health and well-being of randomly selected individuals from electoral rolls of Canberra or Queanbeyan, Australia, and where voting is compulsory (see Anstey, Dear, Christensen, & Jorm, 2005). Results presented here concern the youngest cohort aged 20–24 years at wave 1. Of 2404 commencing participants, 1978 were contactable at wave 3 in 2007/8, when data on resilience were collected. As an exploratory

investigation missing data was not imputed and only participants who provided full data (N = 1775; 45.9% = males) for all measures were included. Participants had a mean education level of 15 years, and 88.3% rated their health as good, very good or excellent. Participants were mostly assessed in their homes and asked to complete a questionnaire under the supervision of a professional interviewer. Basic physical and cognitive tests were also carried out (e.g. blood pressure, grip strength, reaction time). Participants received a full description of the study and provided informed consent. The study was approved by the Human Research Ethics Committee at the Australian National University.

2.2. Measures

The Connor–Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003) comprises 25 items that measure resilience or capacity to change and cope with adversity. Respondents indicated their response on a 5-point Likert scale with higher scores indicating greater resilience. The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) is a 20 item self-report measure of positive and negative affect (10 items per construct), that reflects both trait and state measures of affect, depending on the time reference included in the item operative. Individuals indicated their response on a 5-point Likert scale, with higher scores indicating greater well-being on that dimension. Due to an administrative oversight, two negative affect items were excluded from the questionnaire.

2.3. Statistical analysis

Confirmatory Factor Analysis (CFA) tested the a priori five-factor CD-RISC model (Connor & Davidson, 2003) in AMOS v17 using Maximum Likelihood Estimation (MLE). Further model specification was undertaken with Exploratory Factor Analysis (EFA) in SPSS v17, using Principal Axis Factoring (PAF) and an oblique Direct Oblimin rotation (delta = 0) since separate CD-RISC factors should reflect related resilience characteristics. We used Parallel Analysis (PA) to guide our EFA extraction. PA is a sample-based approach to estimating the number of factors and appears more highly robust than Kaiser's Rule or the Scree plot (Hayton, Allen, & Scarpello, 2004). Goodness of Fit Indices (GFI) of the extracted EFA model were computed using AMOS v17 and compared to a priori five-factor model and a revised ten-item uni-dimensional model (Campbell-Sills & Stein, 2007). CFA of the CD-RISC and PANAS tested the discriminant validity of the CD-RISC measure by evaluating the independence of resilience items from positive and negative affect. Factorial invariance between gender was tested using the Multi-Groups Function in AMOS v17.

3. Results

3.1. Testing the structural validity of the RISC

CFA of the a priori five-factor model (Connor & Davidson, 2003) revealed a number of large Modification Indices (MI; >20) and items that did not discriminate the proposed factors. Several very high correlations indicate considerable overlap between four of the five latent variables (Table 1). In addition, GFI revealed poor fit (Table 2) for this model. Consequently, with debate over the extent to which the CD-RISC reflects a multidimensional (Connor & Davidson, 2003) or uni-dimensional model (Campbell-Sills & Stein, 2007), we used EFA to further explore the nature of the CDRISC. Results of a PA did not support an extraction of five factors, but indicated one factor with a raw eigenvalue greater than 95% of the PA, with three more eigenvalues greater than their corresponding