

How is resilience associated with anxiety and depression? Analysis of factor score interactions within a homogeneous sample

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Abstract

***Aim:** To explore the ways in which resilience is associated with anxiety and depression within a homogenous sample.*

***Methods:** 401 Australian university students completed the Connor-Davidson Resilience Scale and the Zung Self-rating Anxiety and Depression Scales. Factor scores from the resilience scale were regressed against total anxiety and depression scores, combined anxiety-depression scores and the underlying factors of the combined anxiety-depression construct.*

***Results:** Self-confidence and optimism were most strongly negatively associated with anxiety and depression, followed by being decisive and solution-focussed and seeking challenges, having a strong purpose and being persistent, although different combinations of factors predicted anxiety than did depression. Spiritual beliefs did not appear to buffer against anxiety or depression in this sample.*

***Conclusion:** Enhancement of resilience, self-confidence and optimism appear to be major potential targets for therapy intervention with this age and occupation group (German J Psychiatry 2010; 13: 9-16).*

Keywords: Resilience, anxiety, depression, optimism, self-confidence

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Introduction

Elevated levels of anxiety and depression have been shown to increase physical disease, relationship problems and cognitive difficulties (Nutt, 2004). About 31% of the USA population experience an anxiety disorder (Kessler et al., 2005) and about 17% have a major depressive episode sometime in their lives (Kessler et al., 1994). European data collected in 2001 indicated that 14% of respondents had experienced an anxiety disorder and 13% major depression (Alonso et al., 2004). As well as having some overlap in their symptomatology (APA, 2000; Zinbarg

et al., 1994), anxiety and depression may also be considered as causally linked, with elevated anxiety increasing the risk of developing depression later in life (Marra, 2004). Depression is the leading contributor to the total disease burden in the USA (Ustun et al., 2004) and has been predicted to become the second leading cause of mental illness by 2020 (Murray et al., 1997; WHO, 2001).

One of the strongest predictors of anxiety and depression is stress (Mirescu et al. 2006), which may take the form of demanding work challenges across a variety of areas. One such instance of work-based challenge is undertaking tertiary study, which presents new demands concerned with academic pressure, finances, social and sexual challenges and sleep deprivation (Scott et al., 1993). University students of any age have higher levels of anxiety and depression than the general community (McLennan, 1992) and the pressures of

university study are at least partially responsible for this (Tanaka et al., 1987). Anxiety and depression among university students can adversely affect their academic performance (Dyrbye et al., 2006) and contribute to learning difficulties, thereby compounding the stress experienced. A recent study of the incidence of depression among college students in the USA (Alloy et al., 2006) reported rates of up to 16% for major depression and 45% for minor depression during the first three years of study among students who had no prior history of depression, perhaps explaining the increased incidence of more serious emotional and mental health difficulties noted in students by university counsellors during the last 30 years (DeStefano et al., 2001; Gallagher et al., 2000). Kitzrow (2003) found that 28% of freshmen reported being overwhelmed and 8% were depressed and Tjia et al. (2005) reported that, of the 15% of students in a medical school who were depressed and the 20% who reported suicidal ideation, only 27% had received treatment for their mental state.

However, not all people (including university students) who undergo major stress also develop clinical anxiety and depression (Bear et al., 2007), underlining the role of genetic and behavioral factors in determining an individual's vulnerability to these disorders (Hettema et al., 2006; Lopez-Leon et al., 2007). The genetic predisposition to develop anxiety and depression probably works via hyperactivation of the Hypothalamic-Pituitary-Adrenal axis (Fiocco et al., 2006) and malfunctions of the glutamate and GABA systems (Sanacora et al., 2000) which reduce serotonin (Muller et al., 2007) and dopamine (Chowdary et al., 2005). Behavioral factors that have been associated with anxiety and depression include: negative self-evaluation, depressive attributional style, distorted cognitive processing, deficiencies in social skills, avoidance behaviors (Hopko et al., 2007) and ineffective problem-solving (Nezu, 2004). Conversely, holding strong self-beliefs and commitment to those beliefs may be a "buffer" against the development of anxiety and depression when the individual is experiencing major stress (Lazarus et al., 1984). One of the most powerful of these so-called buffers against mental illness is the individual's belief in their personal control of how they will cope with adverse circumstances (Rutter, 1985). This belief has more recently been conceptualised as "resilience" in the face of major stressors (Rutter, 2006). Resilience has been defined as a measure of stress coping ability (Connor et al., 2003; Masten, 2001) which encompasses personal competence, trust in one's instincts, positive acceptance of change, control and spiritual influences (Connor et al., 2003).

Several recent studies have reported on the association between resilience and anxiety and depression among people experiencing major stressors (e.g., Beasley et al., 2003; Hoge et al., 2007; Southwick et al., 2005). However, most studies to date have used total scores obtained from resilience, anxiety and depression inventories. While valuable in establishing the presence of a relationship between resilience and anxiety/depression, analysis of total score data does not provide an in-depth understanding of what aspects of resilience are particularly associated with anxiety and depression in the stressed individual. One method of obtaining this information is by examining the underlying factor structures of resilience, anxiety and depression data from standardised

tests. Further, because anxiety and depression often overlap in terms of symptomatology (Zinbarg et al., 1994), they should be examined both separately and combined.

Therefore, the present study was designed to explore the relationship between resilience and anxiety and depression via examination of the underlying factor structures of resilience, anxiety and depression as well as by total scores. Because of the relatively consistent nature of the stressors which these participants faced, data were collected from a sample of students in an Australian university.

Materials and Methods

Subjects

Two-hundred and eight male and 193 female undergraduate students from Bond University volunteered to participate in the study (age range = 17-54 years, $M = 23.6$, $SD = 7.24$). Participants represented all faculties of the university (Humanities/Social Sciences/Education = 55%, Law = 12%, Health & Medicine = 5%, Business and IT = 28%).

Instruments

Background data on age, gender and degree studied were obtained via brief questions. Anxiety was assessed by the Zung Self-Rating Anxiety Scale (SAS) (Zung, 1971), depression was measured by the Zung Self-Rating Depression Scale (SDS) (Zung, 1965) and Resilience was assessed by the Connor-Davidson Resilience Scale (CD-RISC) (Connor & Davidson, 2003).

Self-Rating Anxiety Scale (Zung, 1971) (SAS): The 20-item SAS is based on DSM (APA, 2000) definitions of anxiety and drawn from "the most commonly found characteristics of an anxiety disorder" (Zung, 1971, p. 371). Positively- and negatively-worded items reduce response bias and reversed items act as a lie scale. Respondents are asked to indicate how they have felt during the last week according to: "None or a little of the time" (scored as 1), "Some of the time" (2), "Most of the time" (3) or "All of the time" (4). Total raw scores range from 20 to 80, with higher scores indicative of greater anxiety. The SAS correlates .75 with the Hamilton Anxiety Scale (Zung, 1971) and significantly discriminates between normal adults and patients with anxiety disorders (Zung, 1971). Reliability data are .71 (split half: (Zung, 1971)) and .79 (coefficient alpha) in an Australian sample of 552 non-cancer participants (Sharpley & Rogers, 1985) and between .74 and .77 for two samples of Australian prostate cancer patients ($n = 195, 150$) (Sharpley et al., 2007; Sharpley et al., 2009). Zung stated that raw scores above 36 indicated that participants had "clinically significant" anxiety (Zung, 1980, p. 18).

Self-Rating Depression Scale (Zung, 1973) (SDS): The SDS has 20 items that were identified in factor analytic studies of the syndrome of depression and which underly the DSM

definition (APA, 2000). Positively- and negatively-worded items reduce response bias, plus several reversed items act as lie scales. Respondents are asked to use the same four criteria as described above for the SAS. Raw scores range from 20 to 80, with higher scores indicative of more severe depression. The SDS has split-half reliability of .81 (Zung, 1973), .79 (DeJonge et al., 1989) and .94 (Gabrys et al., 1985). Internal consistency (alpha) has been reported as .88 for depressed patients and .93 for non-depressed patients (Schaefer et al., 1985), and as .84 and .83 for previous Australian prostate cancer patients (Sharpley et al., 2007; Sharpley et al., 2009). The SDS has been shown to be superior to the MMPI Depression Scale and the Beck Depression Inventory for assessing depression in male psychiatric inpatients (Schaefer et al., 1985). Zung (1973) recommended a cutoff score of 40, above which respondents could be described as having “clinically significant depression” (p. 335). SDS and SAS raw scores were used in this study.

The CD-RISC (Connor et al., 2003) consists of 25 items designed to assess the definition of resilience given above from Connor et al. (2003). Participants are required to respond to each item by selecting how often it applies to them on a five-point scale. Internal consistency has been reported as .9 (Connor et al., 2003) and .9 (Yu et al., 2007) and test-retest reliability at .9 (Connor et al., 2003). Discriminant validity has been reported for anxiety-disordered patients compared to non-disordered participants (Connor et al., 2003).

Procedure

Following recruitment during lectures and via informal advertisements placed in the University, participants completed the survey questionnaires either in class or privately in an office on university premises dedicated to this process. Once completed, the questionnaires were stored in a secure location before coding for subsequent data analysis. Ethical approval was obtained from the Bond University Human Research Ethics Committee.

Results

Mean SAS score was 35.3 (SD = 8.9), ranging from 20 to 66/80. The 5% trimmed mean was 34.8, only 0.6 below the sample mean, indicating negligible effects from outliers. The mean score for the SDS was 37.9 (SD = 3.5), range = 21 to 75/80 and the 5% trimmed mean was 37.7. CD-RISC mean score was 69.1 (SD = 13.4), ranging from 0 to 100/100, with a trimmed mean of 69.708. The Kolmogorov-Smirnov statistics were significant ($p < .001$), skewness and kurtosis were minor, and inspection of the Boxplot, the Normal Q-Q Plot, the Detrended Normal Q-Q Plot, plus the histograms for the SAS, SDS and CD-RISC indicated that data from all three scales satisfied normality requirements. Cronbach alpha values were: SAS = .9, SDS = .9, CD-RISC = .9, justifying further analysis of these data. There were no significant differences in SAS, SDS or CD-RISC scores according to gender, allowing combination of males' and females' data for further analyses.

SAS and SDS total scores were significantly and positively correlated ($r = .728$, $p < .001$). There was a significant negative correlation between SAS total score and CD-RISC total score ($r = -.401$, $p < .01$). The correlation between SDS total score and CD-RISC total score was also significant and inverse ($r = -.498$, $p < .01$). When the SAS and SDS scores were combined, there was a significant negative correlation between CD-RISC and this variable ($r = -.485$, $p < .01$).

When classified according to Zung's (1980) cutoff for the presence of clinically significant anxiety, those participants who fell into this category ($n = 177$) had significantly lower CD-RISC scores ($M = 64.3$) than participants who did not meet the criterion for clinically significant anxiety ($n = 225$, $M = 72.9$) ($F(1,401) = 44.432$, $p < .01$). Participants with clinically significant SDS scores (Zung, 1973) ($n = 177$) also showed significantly lower CD-RISC scores ($M = 62.6$) than participants who did not fall into this category ($n = 225$) ($M = 74.3$) ($F = 93.099$, $p < .01$). (Although the same number of participants were clinically anxious as were clinically depressed, these were not the same participants, as indicated by the correlation of .56 between these two sets of scores.)

Table 1: Factor Structure and Items for Connor-Davidson Resilience Scale (CD-RISC)

Factor	Items	Item loading
Challenge-seeking, strong purpose, persistence	I give my best effort no matter what	.887
	I work to attain my goals	.727
	I am in control of my life	.679
	I can achieve my goals	.676
	I have a strong sense of purpose	.645
	I know where to turn for help	.560
	I have pride in my achievements	.535
	When things look hopeless I do not give up	.525
	I like challenges	.485
	I think of myself as a strong person	.455
	I have close and secure relationships	.435
	I am not easily discouraged by failure.	.435
	Decisive and solution focused	I make unpopular or difficult decisions
I have to act on a hunch		.761
I prefer to take the lead in problem-solving		.406
Spiritual beliefs	Sometimes fate or God can help me	.816
	Things happen for a reason	.771
Self-confidence and Optimism	I can see the humorous side of things	.777
	I believe that coping with stress strengthens me	.742
	I am able to adapt to change	.729
	I can deal with whatever comes.	.591
	I tend to bounce back after illness or hardship	.562
	Past success gives me confidence for new challenges.	.508
	I can handle unpleasant feelings	.412
When I am under pressure I can focus and think clearly	.401	

While these results indicate that higher resilience was significantly associated with lower anxiety and depression, they do not explore the nature of that relationship. In order to determine what aspects of resilience were most powerfully associated with anxiety and depression, factor analysis was performed on the CD-RISC scale. With over 400 participants, the ratio of cases to CD-RISC items ($n = 25$) was 16:1, well in excess of the 5:1 ratio recommended (Tabachnik & Fidell, 1996). In addition, there were many inter-item correlations of .3 or greater. The Kaiser-Meyer-Olkin measure of sampling adequacy was .9 (in excess of the 0.6 value recommended by Kaiser (1970) and Bartlett's test of sphericity was significant ($p < .001$), justifying factor analysis with these data. Examination of the eigenvalues, the scree plot and parallel analysis suggested a four-factor solution and this was then rotated via Oblimin methods. The four factors accounted for 53.0% of the variance: Factor 1 = 35.7%; Factor 2 = 6.8%; Factor 3 = 5.3%; and Factor 4 = 5.2%. The Oblimin rotation showed that 12 CD-RISC items loaded on Factor 1 (labeled as "Challenge-seeking, purposeful and persistent"), three items on Factor 2 ("Decisive and solution-focused"), two items on Factor 3 ("Spiritual beliefs") and eight items on Factor 4 ("Self-confident and optimistic"), thus accounting for all 25 CD-RISC items (Table 1).

Multiple regression was used to investigate the relative contribution that each of these CD-RISC factors had to anxiety and depression. First, using SAS total score as the dependent variable, R square was .3 ($F(4, 397) = 35.168, p < .001$). Examination of the Beta weights (standardised coefficients) showed that SAS total score was most strongly predicted by

CD-RISC Factor 4 ($\beta = .449, t = 6.854, p < .001$), followed by CD-RISC Factor 2 ($\beta = .236, t = 4.796, p < .001$) and CD-RISC Factor 1 ($\beta = .170, t = 2.596, p < .001$). CD-RISC Factor 3 did not significantly predict SAS total scores. For the SDS, the R square was .3 ($F = 42.900, p < .001$), and Beta weights indicated that CD-RISC Factor 4 ($\beta = .356, t = 5.575, p < .001$), CD-RISC Factor 1 ($\beta = .295, t = 4.644, p < .001$) and CD-RISC Factor 2 ($\beta = .136, t = 2.844, p < .01$) were significant predictors of SDS total scores (CD-RISC Factor 3 was not). Similar relationships were found between the three CD-RISC Factors and the combined SAS-SDS Total score. Examination of the Normal Probability Plot (P-P) and the Scatterplot confirmed that the assumptions of multicollinearity, normality, linearity, homoscedasticity and independence of residuals were met.

Finally, to investigate the relationship between the underlying structures of the CD-RISC scale and the Total SAS-SDS scores, factor analysis of the SAS-SDS total scores was conducted. All assumptions were met, many item-item correlations greater than .3 were present, the Kaiser-Meyer-Olkin measure of sampling adequacy was .9 and Bartlett's test of sphericity was significant ($p < .001$). Using the same criteria as above, a four-factor solution emerged from Oblimin Rotation, accounting for 44.8% of the variance: Factor 1 = 27.0%; Factor 2 = 9.2%; Factor 3 = 4.8%; and Factor 4 = 3.8%. Twelve SAS-SDS items loaded on Factor 1, which was identified as "Physiological arousal"; 13 items loaded on Factor 2 ("(Lack of) sense of purpose, optimism and physical well-being"); four items loaded on Factor 3 ("Fear and pessimism"); and eight items loaded on Factor 4 ("Sadness,

Table 2: Regression Coefficients for Connor-Davidson Resilience Scale (CD-RISC) and Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS)

SAS-SDS Factor	CD-RISC Factor	Beta weights	t values	RESILIENCE
1. Physiological arousal	4.	-.351	5.046 ***	
	2.	.216	4.125***	
2. (Lack of) sense of purpose, optimism and physical well-being	1.	-.150	-2.894**	
	4.	-.311	-4.778***	
	2.	.154	3.154**	
3. Fear and pessimism	4.	-.358	-5.257***	
	2.	.235	4.582***	
	1.	-.197	2.894**	
4. Sadness, tension and fatigue	4.	-.436	-6.490***	
	2.	.111	2.208*	

* $p < .05$
 ** $p < .01$
 *** $p < .001$

tension and fatigue”), thus accounting for 37 of the 40 items from the SAS-SDS.

Using Multiple Regression with each of the four SAS-SDS factors separately (all assumptions were met and significant models were derived for each regression equation), CD-RISC Factors 1, 2 and 4 were the only significant predictors of SAS-SDS. Table 2 shows the Beta weights, t values and significance of each CD-RISC factor for each SAS-SDS factor in order of magnitude, and indicates the dominance of CD-RISC factor 4 as a consistent predictor of each of these four SAS-SDS factors. CD-RISC factor 2 also significantly predicted each of the four SAS-SDS factors and CD-RISC factor 1 predicted SAS-SDS factors 1, 2, and 3 but not SAS-SDS factor 4. Although CD-RISC factor 2 was a more powerful predictor of SAS-SDS factors 1, 3 and 4, CD-RISC factor 1 was more powerful than CD-RISC factor 2 in predicting SAS-SDS factor 2. CD-RISC factor 3 did not significantly predict any of the SAS-SDS factors.

Discussion

The finding that the CD-RISC had four factors with this sample rather than five as reported by Connor et al. (2003) may be due to the fact that they performed their factor analysis with the 577 “non help-seeking” participants (p. 78) in their norming sample and did not include any of the other five groups of participants, all of whom had some diagnosed disorder. Data regarding the incidence of help-seeking within the current sample were not collected for ethical reasons but, with 39.1% of the total sample having SAS scores above Zung’s (1980) recommended cutoff for clinically significant anxiety and 39.6% reaching the cutoff for clinically significant depression (Zung, 1973), it would be unlikely that none of these 177 anxious and 177 depressed participants (not the same subset of the sample) were seeking help for their mental state. Therefore, the factor structure reported herein is more likely to be representative of that from a mixed (i.e., anxious, depressed, not disordered) sample, more closely representing the general population of university students who, according to previous research reported above (Alloy et al., 2006; Dyrbye et al., 2006; Kitzrow, 2003; McLennan, 1992; Tanaka et al., 1987; Tjia et al., 2005) have elevated

levels of anxiety and depression compared to the wider community. In addition, Connor et al.’s (2003) sample had a mean age of 43.8 years compared to 23.6 years in the current sample. Therefore, the CD-RISC factor structure reported here may be discussed as representative of Australian university students who were facing a set of stressors which were relatively homogenous compared to those faced by the wider community. Another study recently conducted with a non-USA sample also failed to confirm Connor et al.’s (2003) five-factor solution, instead finding three factors for Chinese participants (Yu et al., 2007).

Overall, and as previously reported, participants with higher CD-RISC scores had significantly lower anxiety and depression than participants with lower resilience. Further, those participants who showed clinically significant anxiety or depression also had significantly lower resilience scores than their non-clinically significant anxious and depressed colleagues. These findings replicate and extend those from previous studies (e.g., Beasley et al., 2003; Hoge et al., 2007; Southwick et al., 2005) and confirm the general association between resilience and these two psychological disorders.

However, the major contribution of this study was in clarifying the underlying relationships between resilience factors and anxiety and depression. The four CD-RISC factors found here reflect the general definitions of resilience by including Connor and Davidson’s (2003) major factors of personal competence (CD-RISC factor 4: self-confidence and optimism), trust in one’s instincts (CD-RISC 2: decisive and solution focussed), positive acceptance of change (CD-RISC factor 1: challenge-seeking, strong purpose and persistence), control (CD-RISC factors 1 and 2); and spiritual influences (CD-RISC factor 3: spiritual belief). Therefore, it may be accepted that these four factors represent the original construct defined by Rutter (2006), Masten (2001) and Connor et al., (2003) and that the regression of these factors against anxiety and depression is a valid test of the relationships between resilience and those disorders.

The dominance of CD-RISC factor 4 (self-confidence and optimism) as a predictor of both SAS and SDS total scores provides some initial support for the place of optimism as a buffer against those disorders (Seligman, 1998) and fits neatly with the DSM-IV-TR criteria for anxiety and depression, which include pessimism or apprehensive expectation about the future and lack of confidence in self as diagnostic criteria (APA, 2000). Taking the reverse of the CD-RISC factor descriptions, anxiety was best predicted by lack of self-confidence and being pessimistic (factor 4), being indecisive and not focussed upon solutions (factor 2), and avoiding challenges, lacking a strong purpose and failure to persist (factor 1). Depression was best predicted by lack of self-confidence and being pessimistic (factor 4), avoiding challenges, lacking a strong purpose and failure to persist (factor 1), and being indecisive and not focussed upon solutions (factor 2). While these predictors are obviously almost identical, the juxtaposition of CD-RISC factors 1 and 2 across anxiety and depression suggests that, after self-confidence and optimism, anxiety and depression have slightly different antecedents in terms of resilience. These differences are minimal but may support a theoretical model of these disorders in which (after self-confidence and optimism) taking

decisions that are focussed upon solutions may help to buffer against anxiety better than seeking challenges, having a strong purpose and persisting. This could be because the underlying symptomatology of anxiety is concerned with dysregulated elevated sympathetic nervous system activity (APA, 2000; Forsyth et al., 1998) and the individual who is already highly physiologically aroused is less likely to seek new challenges which would exacerbate their elevated physiological state. By contrast, avoiding depression may be best attained (after being self-confident and optimistic) by seeking challenges, having a strong purpose and persisting ahead of taking decisions that are focussed upon solutions, maybe because depression has been defined by a withdrawal behaviour pattern (Bolling et al., 1999). Therefore, seeking out and committing to new challenges may reduce the social withdrawal which is characteristic of much depressive symptomatology (APS, 2000).

The general similarity in resilience predictors of anxiety and depression total scores emphasises the overlap in symptomatology between these two disorders, and supports their further investigation as a combined variable (Zinbarg et al., 1994). Lack of self-confidence and being pessimistic was the most powerful predictor of all the four SAS-SDS factors, with being indecisive and failing to take solution-focussed decisions next most powerful in predicting physiological arousal, fear and pessimism and sadness, tension and fatigue. As might be expected from the factor labels, the SAS-SDS factor "Lack of sense of purpose, optimism and physical well-being" was more strongly predicted (after lack of self-confidence and being pessimistic) by CD-RISC avoidance of challenges, lacking a strong purpose and failing to persist, than by being indecisive and failing to take decisions that are focused upon solutions. Although the differences in resilience predictors across these four SAS-SDS factors are minimal and based solely upon the relative predictive power of CD-RISC factors 1 and 2 (with some overlap between the SAS-SDS factors and those from the CD-RISC), the predominant finding was that self-confidence combined with optimism appears to be least associated with anxiety, depression and all the four factors which comprise a combined anxiety-depression construct within this sample. Spiritual beliefs were not associated with lower anxiety and depression within this sample.

These findings may be applied to therapy interventions in several ways. First, anxiety and depression may be best avoided or reduced in university student populations by building self-confidence and a sense of optimism in students before they enter this phase of their lives. For example, this might be accomplished by the kinds of activities recommended by Seligman (1998), Gillham et al., (2008) and Gillham et al., (2006), which focus upon developing resilience among adolescents, and which may prepare them for the transition to university study and the stressors they will encounter there. Secondly, teaching students how to formulate decision-making practices that are oriented towards solving their problems rather than (say) ruminating about them may help to reduce their vulnerability to anxiety and depression which might arise from the challenges of university study. Both building self-confidence and optimism and being solution-focussed may represent challenges for a young adult population that is experiencing its first truly independent

living and working environment, and which may find the financial, academic and social challenges significantly greater than those they met during their school years when they may have been living in a more supportive situation. Developing the self-confidence and optimism to accurately perceive problems and then find solutions for them is not a challenge restricted to people such as those sampled herein. It may be that the depth of skills in these areas that is required by the university environment is a parallel to that which faces people when they enter the workforce.

Limitations of this study include the sample obtained (which was restricted to a single university in Australia), the instruments used (while they reflect the DSM-based symptomatology of anxiety and depression, the SAS and SDS are not as valid indicators of clinical anxiety and depression as are the Structured Clinical Interviews recommended by the DSM-IV-TR: APA, 2000), and the fact that the sample received a single measure of anxiety and depression at one point in time, whereas there may be variations in students' anxiety and depression over the course of their studies and coinciding with particularly stressful periods (e.g., exams). Although statistically significant associations have been found between resilience and lower anxiety or depression, these data do not allow drawing conclusions of cause and effect. Therefore, although the current findings fit with those previously published and mentioned in the Introduction to this paper, the conclusion that resilience "buffers" against anxiety and depression probably requires a different kind of (intervention) study.

Overall, the previously-reported associations between resilience, anxiety and depression are supported by these data, and extended to a further understanding of the ways in which these relationships are constructed. The relative power of the self-confidence and optimism factor of the CD-RISC may suggest that measurement of these attributes is more relevant to determining how resilience can help people avoid anxiety and depression, at least within this sample.

References

- Alloy LB, Abramson LY, Whitehouse WG, Hogan ME, Panzarella C, Rose DT. Prospective incidence of first onsets and recurrences of depression in individuals at high and low cognitive risk for depression. *J Abnormal Psychology* 2006; 115:145-156.
- Alonso J, Angermeyer MC, Bernert S, Bruffaerts R, Brugha TS, Bryson H., et al. Prevalence of mental disorders in Europe: Results from the European Study of Epidemiology of Mental Disorders (ESEMeD) project. *Acta Psychiatrica Scandinavia* 2004; 109 (suppl.):21-27.
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. Ed. 2. Washington, DC: American Psychiatric Association 1968.
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. Ed. 4-Text Revision. Washington, DC: American Psychiatric Association 2000.

- Bear MF, Connors BW, Paradiso MA. 2007, *Neuroscience: Exploring the brain* (3rd ed.). Baltimore: Lippincott, Williams & Wilkins 2007.
- Beasley M, Thompson T, Davidson J. Resilience in response to life stress: The effects of coping style and cognitive hardiness, Personality and Individual Differences 2002; 34:77-95.
- Beck AT. *Depression: Causes and Treatment*, Philadelphia: University of Pennsylvania Press 1972.
- Bolling MY, Kolenberg RJ, Parker CR. Behavior analysis and depression. In: Dougher, MJ (ed) *Clinical behavior analysis*. Reno, Nevada; 1999: 127-153.
- Choudary PV, Molnar M, Evans SJ, Tomita H, Li JZ, Vawter MF, et al. Altered cortical glutamatergic and GABAergic signal transmission with glial involvement in depression, *Proceedings of the National Academy of Sciences* 2005; 102: 15653, 15658.
- Connor K, Davidson JRT. Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC), *Depression and Anxiety* 2003; 18: 76-82.
- DeStefano TJ, Mellot RN, Petersen JD. A preliminary assessment of the impact of counselling on student adjustment to college. *J College Counselling* 2001; 4:113-121.
- Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Academic Medicine* 2006; 81: 354-373.
- Fiocco AJ, Wan N, Weekes N, Pim H, Lupien SJ. Diurnal cycle of salivary cortisol in older adult men and women with subjective complaints of memory deficits and/or depressive symptoms: Relation to cognitive functioning, *Stress* 2006; 9: 143-152.
- Forsyth JP, Eifert GH. Phobic anxiety and panic: An integrative behavioral account of their origin and treatment. In: Plaud J, Eifert GH (eds). *From Behavior Theory to Behavior Therapy*, Boston: Allyn & Bacon; 1998: 40-67.
- Gallagher R, Gill A, Sysko H. *National survey of counselling center directors*. Alexandria, VA: International Association of Counselling Services 2000.
- Gillham JE, Chaplin TM, Reivich KJ, Hamilton J. Preventing depression in early adolescent girls: The Penn Resiliency and Girls Transition Programs. In: LeRoy C, & J. Mann J (eds) *Handbook of Prevention and Intervention Programs for Adolescent Girls*. Hoboken NJ: Wiley; 2008: 123-161.
- Gillham JE, Hamilton J, Freres DR, Patton K, Gallop R. Preventing depression among early adolescents in the primary-care setting: A randomized controlled study of the Penn Resiliency Program. *J Abnormal Child Psychology* 2006; 34:203-219.
- Hettema JM, An SS, Neale MC, Bukszar J, van den Oord EJ, Kendler KS, Chen X. 2006. Association between glutamic acid decarboxylase genes and anxiety disorders, major depression and neuroticism, *Molecular Psychiatry* 2006; 11: 752-762.
- Hoge EA, Austin ED, Pollack MH. Resilience: Research evidence and conceptual considerations for post-traumatic stress disorder, *Depression and Anxiety* 2007; 24:139-152.
- Hopko DR, Hopko SD, Lejuez CW. Mood Disorders. In: Sturme P (ed) *The Handbook of Functional Analysis and Clinical Psychology*. New York: Elsevier Press; 2007: 307-334.
- Kaiser H. A second generation Little Jiffy. *Psychometrika*; 1970: 35:401-415.
- Kessler RC, Berglund P, Borges G, Nock M, Wang PS. Trends in suicide ideation, plans, gestures, and attempts in the United States. *J American Medical Association* 2005; 293: 2488-2495
- Kessler RC, McGonagle KA, Shanyang Z, Nelson CB, Hughes M, Eshleman S, et al. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: Results from the National Comorbidity Survey. *Archives of General Psychiatry* 1994: 51: 8-19.
- Kitzrow MA. The mental health needs of today's college student: Challenges and recommendations. *NASPA J* 2003; 41: 167-181.
- Lazarus RS, Folkman S. *Stress, appraisal & coping*. NY: Springer 1984.
- Lopez-Leon S, Janssen ACJW, Gonzalez-Zuloeta Ladd AM, Del-Favero J, Claes SJ, Oostra BA, van Duijn CM. Meta-analyses of genetic studies on major depressive disorder, *Molecular Psychiatry* 2008; 13: 772-785.
- Lovibond PF, Lovibond SH. The structure of negative emotional states: comparison of the depression anxiety stress scales (DASS) with the Beck depression and anxiety inventories. *Behaviour Research & Therapy* 1995; 33:335-343.
- Marra T. *Depressed and anxious: The dialectical behavior therapy workbook for overcoming depression and anxiety*. Oakland: New Harbinger Publications 2004.
- Masten AS. Ordinary magic: Resilience processes in development. *American Psychologist* 2001; 56: 227-238.
- McLennan J. 'University Blues': Depression among tertiary students during an academic year. *British J Guidance and Counselling* 1992; 20: 186-192.
- Mirescu C, Gould E. Stress and adult neurogenesis. *Hippocampus* 2006; 16: 233-238.
- Muller, N, Schwartz MJ. The immune-mediated alteration of serotonin and glutamate: Towards an integrated view of depression, *Molecular Psychiatry* 2007; 12: 988-1000.
- Murray CJ, Lopez AD. Alternative projections of mortality and disability by cause 1990-2020: Global burden of disease study. *Lancet* 1997; 349: 1498-1504.
- Nezu, AM. (2004). Problem solving and behavior therapy revisited, *Behavior Therapy* 2004; 35: 1-33.
- Nutt D. Anxiety and depression: Individual entities or two sides of the same coin? *International J Psychiatry in Clinical Practice* 2004; 8: 19-24.
- Rutter M. Resilience in the face of adversity: Protective factors and resistance to psychiatric disorder. *British J Psychiatry* 1985; 147: 598-611.
- Rutter M. The promotion of resilience in the face of adversity. In: Clarke-Stewart A, Dunn J (eds) *Families count*. London: Cambridge University Press; 2006: 15-55.
- Sanacora G, Mason GF, Krystal JH. Impairment of GABAergic transmission in depression: New insights

- from neuroimaging studies, *Critical Reviews in Neurobiology* 2000; 14: 23-45.
- Schaefer A, Brown J, Watson C, Plenel D, DeMotts J, Howard M, Petrik N, Ballweg B. Comparison of the validities of the Beck, Zung and MMPI depression scales. *J Consulting and Clinical Psychology* 1985; 53: 415-418.
- Scott L, O'Hara MW. Self-discrepancies in clinically anxious and depressed university students. *J Abnormal Psychology* 1993; 102: 282-287.
- Seligman ME. *Learned optimism*. Milsons Point, NSW: Random House, Australia, 1998.
- Sharpley CF, Christie DRH. An analysis of the psychometric structure and frequency of anxiety and depression in Australian men with prostate cancer. *Psycho-Oncology* 2007; 16: 660-667.
- Sharpley CF, Bitsika V, Christie DRH. Understanding the causes of depression among prostate cancer patients: Development of the Effects of Prostate Cancer on Lifestyle Questionnaire, *Psycho-Oncology* 2009; 18: 162-168.
- Sharpley CF, Rogers HJ. Naïve versus sophisticated item-writers for the assessment of anxiety. *J Clinical Psychology* 1985; 41: 58-62.
- Southwick SM, Vythilingam M, Charney DS. The psychobiology of depression and resilience to stress: Implications for prevention and treatment. *Annual Review of Clinical Psychology* 2005; 1: 255-291.
- Tabachnick BG, Fidell LS. *Using multivariate statistics*. (3rd ed.). NY: Harper Collins 1996.
- Tanaka JS, Huba GJ. Assessing the stability of depression in college students. *Multivariate Behavioural Research* 1987; 22: 5-19.
- Tjia J, Givens JL, Shea JA. Factors associated with under-treatment of medical student depression. *J American College Health* 2005; 53: 219-224.
- Ustun TB, Ayuso-Mateos JL, Chatterji S, Mathers C, Murray CJL. Global burden of depressive disorders in the year 2000. *British J Psychiatry* 2004; 184: 386-392.
- World Health Organisation. Cross-national comparisons of the prevalences and correlates of mental disorders. WHO International Consortium in Psychiatric Epidemiology. *Bulletin of the World Health Organisation* 2000; 78: 413- 426.
- Yu X, Zhang J. Factor analysis and psychometric evaluation of the Connor-Davidson Resilience Scale (CD-RISC) with Chinese people. *Social Behavior and Personality* 2007; 35: 19-30.
- Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavia* 1983; 67: 361-370.
- Zinbarg RE, Barlow DH, Liebowitz M, Street L, Broadhead E, Katon W. The DSM-IV field trial for mixed anxiety depression. *American J Psychiatry* 1994; 151: 1153-62.
- Zung W. A self-rating depression scale. *Archives of General Psychiatry* 1965; 12: 63-70.
- Zung W. A rating instrument for anxiety disorders. *Psychosomatics* 1971; 12: 371-379.
- Zung W. From art to science: The diagnosis and treatment of depression. *Archives of General Psychiatry* 1973; 29: 328-337.
- Zung W. *How normal is anxiety? Current concepts*. (entire edition). Durham, NC: Upjohn 1980.