



## Psychometric Evaluation of the Connor-Davidson Resilience Scale (CD-RISC) in a Sample of Indian Students

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**KEYWORDS** Resilience, Personality, Life Satisfaction, Positive and Negative Affect, Psychological Test Adaptation

**ABSTRACT:** Resilience refers to an individual's ability to thrive despite adversity. The current study examined the psychometric properties of the Connor–Davidson Resilience Scale (CD-RISC) in the Indian context. The sample comprised of 256 students (age  $M = 22.75$ ,  $SD = 1.36$  years) who completed questionnaire measures of trait resilience (CD-RISC), Big Five Inventory (BFI), Positive and Negative Affect Schedule (PANAS) and life satisfaction (Satisfaction with Life Scale). Original five factor solution did not get confirmation and further a four factor solution, through exploratory factor analysis, was selected as being the most suitable, namely, hardiness, optimism, resourcefulness and purpose. The CD-RISC appeared to be a reliable ( $\alpha = 0.89$ ) and valid measure. The concurrent validity results supported hypotheses regarding the relationship of resilience to personality dimensions and life satisfaction and positive and negative affects. Resilience was negatively associated with neuroticism, negative affects and positively related to all other variables of the study.

### I. INTRODUCTION

Positive psychology is a flourishing field of psychology, which encompasses the study of positive personality traits. Resilience, which is one of those traits, is defined as the ability to 'rebound' and regain original shape following trauma or shock (Oxford 1989); and the promotion of positive adaptation under stress and adversity (Wagnild 2003). Tugade and Fredrickson (2004) stated that psychological resilience refers to effective coping and adaptation although faced with loss, hardship, or adversity. Carle and Chassin (2004) reported that individuals with high levels of self-reported resilience are particularly likely to use positive emotions to "bounce back" from adverse experiences. Empirical evidence suggests that resilience is grounded in a diverse array of genetic (Caspi et al. 2003; Tannenbaum and Anisman 2003), biological (Charney 2004; Morgan et al. 2002), psychological (Campbell-Sills et al. 2006; Tugade and Fredrickson 2004), and environmental factors (Haskett et al. 2006; King et al. 1998). Hence, resilience is a multidimensional construct that varies with context, time, age, and life circumstances (Connor Davidson and Lee 2003; Garmezy 1993; Masten 1994; Richardson 2002; Wagnild 2003; Werner 1993).

Several resilience measures have contributed to understanding the concept and helping to find ways of intervention to enhance the individual's resilience in the real-life environment (Bosworth and Earthman 2002; Rak and Patterson 1996;

Yu and Zhang 2005). Among these instruments, a newly developed scale – Connor-Davidson Resilience Scale (CD-RISC; Connor and Davidson 2003) has earned widespread attention from researchers for its established psychometric properties. Connor and Davidson's (2003) scale found reliable and valid instrument in various conditions; improvement of patients suffering from posttraumatic stress disorder (PTSD) after receiving treatment, (Davidson Baldwin et al. 2006) and more resilient survivors of violent trauma exhibited better health and lower severity of PTSD symptoms than did those who were less resilient (Connor Davidson and Lee 2003).

In the initial report of the scale, factor analysis of the 25 items of CD-RISC resulted in 5 factors. The first factor was named as personal competence, high standards, and tenacity, endorsing one's strong sense of power and adherence to one's goal when facing setback situations. The second factor was labeled as trust in one's instincts, tolerance of negative affect, and strengthening effects of stress. This factor focused on one's calmness, decision, and promptness when coping with stress. The third factor measured positive acceptance of change and secure relationships with others. The factor was mainly related to one's adaptability. The fourth factor, named as control, implied control of achieving one's own goal and the ability to access assistance from others (social support). The last factor, named as spiritual influences, assessed one's faith in God or in fate (Connor and Davidson 2003). This 5-factor structure would have broad

applications in psychiatric and psychological interventions, and even in educational practices to nurture children with high resilience. The CD-RISC is made up of items reflecting several aspects of resilience including a sense of personal competence, tolerance of negative affect, positive acceptance of change, trust in one's instincts, sense of social support, spiritual faith, and an action-oriented approach to problem solving. Initial work suggests that the CD-RISC is a promising measure for use with adult psychiatric and normal population (Connor and Davidson 2003; Connor et al. 2003).

The CD-RISC is reliable and valid in the West and in the East as well, although its factor structure has varied according to setting. For instance, the original five factors have been supported in one Australian study of nurses (Gillespie et al. 2007). However, in a US sample of community-dwelling older women, a four factor solution was observed as factor 1 (9 items), which included items related to goal orientation, tenacity, and personal control. Factor 2 (10 items) involved tolerance for negative affect and adaptability. Factor 3 (4 items) included items on leadership and acting on a hunch; and factor 4 (2 items) involved spiritual orientation, (Lamond et al. 2008). Additionally, a Chinese study of the CD-RISC failed to verify the original factor structure through confirmatory factor analysis and reported three factor solution through exploratory factor analysis: Tenacity, Strength, and Optimism. However, Campbell-Sills and Stein (2007) described four factors on the basis of explanatory factor analysis of two samples *viz.*, hardiness, social support/purpose, faith, and persistence.

In addition, the measures of the big five factor of personality, life-satisfaction and positive and negative affects are also used in the present study as validity indicators. Since there is strong evidence in the literature showing that of resilience would be correlated negatively with neuroticism (Bienvenu and Stein 2003; Brown et al. 1998; Costa and McCrae 1992; Campbell-Sills et al. 2006), and positively with extraversion, openness, agreeableness and conscientiousness (Jacelon 1997; Werner 1995; Campbell-Sills et al. 2006; Yu and Zhang 2007); positively correlated with the factors life satisfaction (Wagnild and Young 1993; Yu and Zhang 2007); and positive affect ((Bonanno 2004; Luthar et al. 2000; Tugade and Fredrickson 2004) and negatively

with the negative effect (Ong et al. 2006; Shira et al. 2008).

Different studies have revealed a range of different factor structures, therefore, one objective of the present study was to evaluate psychometric properties of Connor-Davidson Resilience Scale in a sample of Indian students. The second purpose of the study was to investigate the concurrent validity of the CD-RISC by testing the relationships of CD-RISC with five factors of personality, life satisfaction and positive affect and negative affect measures.

## 2. METHOD

### 2.1 Participants

The sample consisted of 256 (167 male and 89 females) volunteer students pursuing their undergraduate and postgraduate degrees at the Indian Institute of Technology, Delhi (IITD). Age ranged was from 17 to 27 years; with a mean of 22.75 (S.D. = 1.36 years). Students were approached in their respective hostels for collecting the data. After getting their informed consent, a booklet containing all information were handed over to them, with a request to return the completed questionnaires within a week. Out of 265, 256 volunteer students' data were submitted with all entries, 9 students were excluded due to incomplete data entries.

### 2.2 Measures

A booklet containing a covering page of demographic questions, and several scales including the Connor-Davidson Resilience Scale (CD-RISC), Big Five Inventory (BFI), Satisfaction with Life Scale and Positive and Negative Affect Scales (PANAS) were prepared.

#### 2.2.1 Connor-Davidson Resilience Scale (CD-RISC; Connor and Davidson 2003)

The CD-RISC is a 25-item scale that measures the ability to cope with stress and adversity. Respondents rate items on a scale from 0 ("not true at all") to 4 ("true nearly all the time"). Range is 0-100 and high score lead to high resilience. Alpha reliability was observed as for factor 1,  $\alpha=0.80$ , factor 2,  $\alpha=0.75$ , factor 3,  $\alpha=0.74$ , factor 4,  $\alpha=0.69$ , and overall  $\alpha=0.89$  in the present study.

### 2.2.2 Big Five Inventory (BFI)

The inventory having big five factors of personality developed by John et al. (1991); John and Srivastava (1999). The inventory contains 44 items that are rated on the 5-point scale ranging from *not agree at all* (1) to *absolutely agree* (5). The items are the basis for scoring five BFI scales: extraversion, agreeableness, conscientiousness, neuroticism, and openness. Alpha reliability in present study was observed as for extraversion  $\alpha=0.67$ ; agreeableness  $\alpha=0.64$ ; conscientiousness  $\alpha=0.52$ , Emotional Stability/neuroticism  $\alpha=0.54$ , and openness  $\alpha=0.54$ .

### 2.2.3 Satisfaction with Life Scale

To measure satisfaction with life, the Satisfaction with Life Scale developed by Diener et al. (1985) was used. It consists five items on a 7-point rating scale (from 1 = strongly disagree to 7 = strongly agree). Alpha reliability in the present study was  $\alpha=0.77$ .

### 2.2.4 PANAS

Positive and Negative Affect Schedule (PANAS), constructed by Watson et al. (1988), which treats both variables, Positive affect scale (PAS; 10 items) and Negative affect scale (NAS; 10 items), as separate dimensions rather than bipolar ends of the same scale. Participants used a 5-point scale (1 = very slightly or not at all, 5 = extremely) to indicate the extent of generally feeling the respective mood state. In the present study, Alpha reliability was reported as for PAS  $\alpha=0.81$  and for NAS  $\alpha=0.80$ ,

## 3. RESULTS

Data were analysed by using LISREL 8.8 and SPSS Version 15.0 (SPSS Inc., Chicago, IL, USA). CFA with Linear Structural Relationships using correlation matrix (LISREL version 8.80) (Jöreskog and Sörbom 2006) was applied to the data, to examine the goodness of fitness of the original 5-factor among Indian students. Goodness of model fit was assessed by using several indices; RMSEA close to 0.06 and GFI, AGFI and CFI close to 0.95 or above are regarded acceptable (von Eye and Schuster 2000).

CFA for confirming the original factor solu-

tion; descriptive statistics to measure of variable dispersion across the sample; principal component analysis (PCA) to assess the construct validity of the scale; Cronbach's  $\alpha$  to determine scale dimensionality and correlation with variables of interest, were analyzed. It is hypothesized that resilience would show positive correlation with extraversion, agreeableness, conscientiousness, openness, life satisfaction and positive affect and negatively with neuroticism and negative affect.

### Confirmatory Factor Analysis

To examine the goodness of fitness of the original 5-factor solution in American samples, CFA was applied to the data. Goodness of fitness was assessed by using several indices and found that  $\chi^2(265)=932.03$ ,  $p=0.000$ ; RMSEA=0.10, GFI=0.77, AGFI=0.72, CFI=0.91. Results suggested that the data failed to replicate the 5-factor model obtained among American samples.

Mean range of each item score in the present study is 2.18-2.73 with SD range 0.81 -1.10 on 5 point scale. Item-total correlations ranged from 0.29 to 0.65, with almost all of the correlation coefficients exceeding 0.33 except one item, (see Table 1).

### 3.1 Exploratory Factor Analysis

The factor analysis yielded 6 factors with an eigenvalue greater than 1.00. Both the 5 and 6 factor solutions contained factors with no more than 2 or 3 items or several items which exhibited split loadings. We accordingly chose to eliminate the 5 and 6 factor solutions in favor of either a 3 or 4 factor solutions. Inspection of the factor content reveals that the 4 factor solution is easier to interpret, while the 3 factor solution contains similar factors; each one is contaminated with other items that fit less well. Hence, 4 factor solutions (see Table 2) was firmed up with factor 1 corresponding more clearly to features of hardiness-toughness, and factor 4 corresponding to goal-directedness, achievement, purpose, all of which might be equated to autonomy and purpose in the well-being schema of Ryff and Singer (1996). Factor 2 contains elements of optimism/view of a benevolent world, (items 12, 20, 6, 10), as well as adaptability (item 8), mental toughness/active coping (item 15), cognitive focus/control (item 14). Identification of a single

**Table 1: Descriptive statistics [Means and standard deviations (SD)] and Item-total correlation for the CD-RISC items in the current study**

| <i>Item no.</i> | <i>Abbreviated item</i>                               | <i>Mean*</i> | <i>SD</i> | <i>Item-total correlation</i> |
|-----------------|---|--------------|-----------|-------------------------------|
| 1               | Able to adapt to change                               | 2.38         | 0.89      | 0.65                          |
| 2               | Close and secure relationships                        | 2.26         | 1.08      | 0.42                          |
| 3               | Sometimes fate and God can help                       | 2.25         | 1.09      | 0.37                          |
| 4               | Can deal with whatever comes                          | 2.32         | 0.88      | 0.60                          |
| 5               | Past success gives confidence for new challenge       | 2.63         | 0.96      | 0.59                          |
| 6               | See the humorous side of things                       | 2.30         | 1.03      | 0.43                          |
| 7               | Coping with stress make stronger                      | 2.31         | 0.93      | 0.63                          |
| 8               | Tend to bounce back after illness, injury or hardship | 2.32         | 0.90      | 0.54                          |
| 9               | Things happen for a reason                            | 2.70         | 0.99      | 0.52                          |
| 10              | Best effort no matter what                            | 2.50         | 0.97      | 0.47                          |
| 11              | One can achieve one's goals                           | 2.64         | 0.99      | 0.63                          |
| 12              | When things look hopeless, I don't give up            | 2.43         | 0.93      | 0.49                          |
| 13              | Know where to get help                                | 2.20         | 0.98      | 0.29                          |
| 14              | Under pressure, focus and think clearly               | 2.24         | 0.86      | 0.43                          |
| 15              | Prefer to take the lead in problem solving            | 2.41         | 0.95      | 0.54                          |
| 16              | Not easily discouraged by failure                     | 2.22         | 0.88      | 0.52                          |
| 17              | Think of self as strong person                        | 2.50         | 0.81      | 0.58                          |
| 18              | Make unpopular or difficult decisions                 | 2.18         | 1.10      | 0.37                          |
| 19              | Can handle unpleasant feelings                        | 2.35         | 0.86      | 0.34                          |
| 20              | Have to act on a hunch, without knowing why           | 2.34         | 0.85      | 0.33                          |
| 21              | Strong sense of purpose in life                       | 2.50         | 0.90      | 0.38                          |
| 22              | In control of my life                                 | 2.54         | 0.83      | 0.38                          |
| 23              | I like challenge                                      | 2.52         | 0.90      | 0.38                          |
| 24              | One works to attain one's goals                       | 2.47         | 0.83      | 0.50                          |
| 25              | Pride in my achievements                              | 2.73         | 0.86      | 0.44                          |

**Table 2: Exploratory factor analysis of CD-RISC in Indian students' sample**

| <i>Item no.</i>    | <i>Abbreviated item</i>                               | <i>Component*</i>             |                              |  |   |
|--------------------|---|-------------------------------|------------------------------|--|---|
|                    |   | <i>Factor 1<br/>hardiness</i> | <i>Factor 2<br/>optimism</i> | <i>Factor 3-<br/>resource-<br/>fulness</i> | <i>Factor 4<br/>purpose<br/>fulness</i> |
| 19                 | Can handle unpleasant feelings                        | .74                           |                              |  |   |
| 4                  | Can deal with whatever comes                          | .64                           |                              |  |   |
| 16                 | Not easily discouraged by failure                     | .59                           |                              |  |   |
| 7                  | Coping with stress strengthens                        | .58                           |                              |  |   |
| 11                 | One can achieve one's goals                           | .52                           |                              |  |   |
| 18                 | Make unpopular or difficult decisions                 | .51                           |                              |  |   |
| 17                 | Think of self as strong person                        | .50                           |                              |  |   |
| 12                 | When things look hopeless, I don't give up            |                               | .65                          |  |   |
| 14                 | Under pressure, focus and think clearly               |                               | .64                          |  |   |
| 20                 | Have to act on a hunch, without knowing why           |                               | .58                          |  |   |
| 8                  | Tend to bounce back after illness, injury or hardship |                               | .57                          |  |   |
| 6                  | See the humorous side of things                       |                               | .53                          |  |   |
| 10                 | Best effort no matter what the outcome may be         |                               | .52                          |  |   |
| 15                 | Prefer to take the lead in problem solving            |                               | .42                          |  |   |
| 3                  | Sometimes fate and God can help                       |                               |                              | .67  |   |
| 9                  | Things happen for a reason                            |                               |                              | .65  |   |
| 2                  | Close and secure relationships                        |                               |                              | .60  |   |
| 5                  | Past success gives confidence for new challenge       |                               |                              | .53  |   |
| 1                  | Able to adapt to change                               | .48**                         |                              | .52  |   |
| 13                 | During times of stress know where to get help         |                               |                              | .49  |   |
| 21                 | Strong sense of purpose in life                       |                               |                              |  | .70                                     |
| 24                 | One works to attain one's goals                       |                               |                              |  | .62                                     |
| 22                 | In control of my life                                 |                               |                              |  | .61                                     |
| 23                 | I like challenge                                      |                               |                              |  | .59                                     |
| 25                 | Pride in my achievements                              |                               |                              |  | .52                                     |
| Eigen Value        |   | 7.30                          | 1.57                         | 1.55                                       | 1.43                                    |
| Variance Explained |   | 29.20                         | 6.28                         | 6.20                                       | 5.70                                    |

**Table 3: Internal consistencies and inter-factor correlation among resilience factors**

|            | <i>Factor 1<br/>Hardiness</i> | <i>Factor 2<br/>Optimism</i> | <i>Factor 3<br/>Resourcefulness</i> | <i>Factor 4<br/>Purpose</i> | <i>Alpha<br/>Reliability</i> |
|------------|-------------------------------|------------------------------|-------------------------------------|-----------------------------|------------------------------|
| F1         | 1                             |                              |                                     |                             | .80                          |
| F2         | .57**                         | 1                            |                                     |                             | .75                          |
| F3         | .58**                         | .55**                        | 1                                   |                             | .74                          |
| F4         | .51**                         | .47**                        | .40**                               | 1                           | .69                          |
| RISC Total | .85**                         | .82**                        | .80**                               | .70**                       | .89                          |

\*\* Correlation is significant at the 0.01 level

characterization of this factor is more challenging, but the predominant, though not exclusive nature of the items is most compatible with optimism/meaning. Factor 3 consists of 6 items which reflect resourcefulness (items 13, 2, 1), trust/purpose (items 3, 9) and self-efficacy (item 5). Item no. 1 “Able to adapt to change” has secondary loading on factor1, (Hardiness) also. Similar to factor 2, no single characteristic emerges, but the greatest numbers of items suggest resourcefulness. The 4 factor solution accounts for 47% of the total variance.

**3.2 Internal Consistencies and Inter-factor Correlation**

The reliability coefficient in the Indian context of the CD-RISC was 0.89, The internal consistency alpha values of the 4 factors were:  $\alpha=0.80$  for factor 1,  $\alpha=0.75$  for factor 2,  $\alpha=0.74$  for factor 3 and  $\alpha=0.69$  for factor 4. The reliability coefficient of factor 4 was not as high as first three factors, but it was acceptable in terms of the number of items. It had only five items, which may explain this. Furthermore, all factors are significantly highly correlated (see table 3) with each other and with total resilience score.

**3.3 Concurrent Validity**

Table 4 listed the correlation matrix formed between the factors as well as total score of the CD-RISC one side and the variables of, life satisfaction, and 5 personality subscales, positive affect and negative affect on the other side. It is evident from the table that the total score of

resilience and its factors were positively correlated with life-satisfaction, extroversion, openness, agreeableness, consciousness, and positive affects. But a negative correlation with neuroticism factor and negative affects. The correlation pattern confirms the hypotheses of the present study, and therefore provides convincing evidence for the validity of the CDRISC among Indian students.

**4. DISCUSSIONS**

The current study evaluated psychometric properties of CD-RISC among Indian students and also supported the hypothesized relationships between resilience and certain personality traits, life satisfaction and positive and negative affects. There have now been several reports of the psychometric properties of the CD-RISC from a variety of countries, including China, (Yu and Zhang 2007) South Africa, (Jorgensen and Seedat 2008), Iran, USA, Australia and Brazil, in populations which include university students, youth and senior citizens( Campbell-Sills and Stein 2007), the general population and specific professional groups, such as surgical nurses or caregivers (Gillespie et al. 2007, Connor and Davidson 2003). Consistent with the present study, all studies have found strong psychometric properties for the instrument, but the factor structure has varied considerably. Given the marked differences in age, sampling (general population vs. patients vs. healthy controls), culture, ethnicity and country, this is hardly surprising. A potentially important observation on the role of culture is given by Yu and Zhang

**Table 4: Correlation of resilience with the big five, positive and negative affect and life satisfaction**

| <i>Construct</i> | <i>LS</i> | <i>E</i> | <i>A</i> | <i>C</i> | <i>N</i> | <i>O</i> | <i>PA</i> | <i>NA</i> |
|------------------|-----------|----------|----------|----------|----------|----------|-----------|-----------|
| RISC Total       | .23**     | .19**    | .35**    | .20**    | -.16**   | .39**    | .67**     | -.26**    |

*Abbreviations:* LS- life satisfaction, E- extroversion, A- agreeableness, C- consciousness, N- neuroticism, O -openness, PA- positive affects, - NA negative affects

\*\*Correlation is significant at the 0.01 level (2-tailed)



(2007) who note that Chinese people are much less religious than those in many other societies and, as a result, the CD-RISC items reflecting spirituality/faith in God failed to load as a separate factor. They also opine that less emphasis is placed on changing the external environment than on accommodating internally to the world around them. As a result, constructs such as autonomy/control/self-efficacy may need to interpret differently. Perhaps more emphasis needs to place on harmony as a component of resiliency, or successful adaptation to adversity. However, spirituality does not observe independent factor in this study like original trend but item no. 3, "Sometimes fate and God can help" item no 9 "Things happen for a reason" have highest loading on factor three, showed that significant for resilience but unique trend in Indian culture.

Two clear factors (1 and 4) did emerge, which correspond to hardiness (mental toughness) and achievement/self-efficacy/goal directedness. They do bear some similarity to factors in the reports of Gillespie et al. (2007) and Lamond et al. (2008). It was interesting that items 21-25 coalesced as one factor in all (i.e. 3, 4, 5 and 6) the possible factor solutions, and would seem to be relatively robust.

The reliability coefficient in the Indian context of the CD-RISC was 0.89, consistent with Connor and Davidson's study ( $\alpha=0.89$ ), and also Lamond et al. (2008), who observed  $\alpha=0.92$ . Consistent with the study hypotheses, CD-RISC scores manifested statistically significant and salient relationships with the five factor model personality constructs. These correlations indicate that resilience demonstrates a strong inverse relationship with neuroticism, a construct that encompasses proneness to negative emotions, poor coping, and difficulty controlling impulses (Costa and McCrea 1992; Campbell-Sills et al. 2006; Jacelon 1997; Werner, 1995; Yu and Zhang 2007) and strong positive relationships with other big five factors. Being highly correlated with neuroticism, negative affect has obviously negative correlation with resilience. Consisted with present research findings correlation of overall resilience with extraversion and positive affect reflects the benefits of positive affective style, capacity for interpersonal closeness, and high levels of social interaction and activity. In particular, positive affect has been shown to help individuals

rebound subjectively and physiologically from stressful experiences (Tugade and Fredrickson 2004). Fredrickson (2001) hypothesizes that positive emotions contribute to resilience because they broaden the "thought action repertoires" that are available to individuals under stress, having more flexible thinking and expanded behavioral options as a result of positive affect may increase the personal resources of extraverted individuals during times of adversity. Furthermore, the tendency of extraverted individuals to build strong networks of social support may allow them access to this important protective factor during stressful situations (Rutter 1985; Campbell-Sills et al. 2006; Yu and Zhang 2007).

Correlation of conscientious and resilience varies in degree with different groups of people. For example, among American students, this correlation was found to be 0.59 for the ethnic minority group, while it was 0.29 for the Caucasian group (Campbell-Sills et al. 2006); 0.64 in Chinese group (Yu and Zhang 2007) and 0.20 in the present study. Dimensions of personality traits (e.g. C) may ostensibly make people of different cultures resilient to trauma and difficulties at different levels and the hard-working style of conscientious individuals may contribute to resilience (Bonanno et al. 2004). Furthermore, significant correlation of openness (0.39) and agreeableness (0.35) with resilience is supported by a Chinese study getting same trend as openness (0.27) and agreeableness (0.36) correlated with resilience (Yu and Zhang 2007). Correlation of life satisfaction with resilience has also aligned with different findings (Wagnild and Young 1993; Yu and Zhang 2007).

The present study has provided more evidence of the need for cross-cultural comparison of an imported construct and its measurement from the West to the East, by showing that the resilience construct, defined by the CD-RISC (Connor and Davidson 2003), may be understood differently in western and eastern cultures.

The current study has several limitations that are worth noting. First, the sample for this study was comprised entirely of college students, which limits the variation of age and education level. Results may not generalize to adults in middle or older age, or to individuals who have lower or higher educational achievement. On the other hand, the CD-RISC had not previously been examined in college students in India, so the cur-

rent study adds to the literature on this measure by examining its validity in another demographic group. To date, since it is first study in Indian context with this scale, it would contribute notably about resilience.

### ACKNOWLEDGEMENTS

The authors wish to thank Jonathan Davidson for their comments on an earlier draft of this manuscript. We also thank Anurag Srivastava, Atul Aggarwal, Neelanshu Gupta and Tripti Awasthi for coordinating data collection and management.

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