

VALIDATION OF CONNOR-DAVIDSON RESILIENCE SCALE ON INDIAN MILITARY SOLDIERS

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ABSTRACT

The Connor-Davidson Resilience Scale (CD-RISC) is one of the best-known measures of resilience. The study aims to translate CD-RISC-25 to Hindi and establish its psychometric properties on male Indian Military Soldiers (IMS). The translated version was validated on two samples of $n=267$ and $n=186$ male IMS respectively. Multidimensional Scale of Perceived Social Support (MSPSS) and Ryff Scale of Psychological Well-being (RSPWB) were used for predictive validity. Confirmatory Factor Analysis revealed a three-factor solution of CD-RISC. The final version of the scale consists of 17 items and 3 factors (Determination and Faith, Adaptability and Support, and Hardiness). Hindi adaptation of CD-RISC has sound psychometric properties and might be used for people who are otherwise not comfortable in taking tests in English.

Keywords: Resilience, Connor-Davidson Scale, Hindi, Indian Military Soldiers.

INTRODUCTION

In the present times of increasing demands and challenges, stress is unavoidable (Bhargava & Trivedi, 2018). A person's subjective experience of stress is determined by his cognitive processes and availability of resources in times of need (Lazarus & Folkman, 1984; Palmer, Cooper, & Thomas, 2003). Depending upon a person's perception of the event, stress can either be detrimental or enhancing (Dhabhar, 2009). Researchers have found that certain personality traits and types cause stress (Kobasa, Maddi, & Zola, 1983; Friedman, 1996; Dumitru & Cozman, 2012; Leger, Charles, Turiano, & Almeida, 2016). The type-H personality, which is known to be stress resistant, is determined by characteristics of commitment, control and challenge (Kobasa, 1979). Resilience is one such feature that helps a person thrive despite difficulties in life (Baratta, Rozeske, & Maier, 2013).

Connor and Davidson (2003) define resilience as the ability to thrive in the face of difficulty. Research interest on resilience has increased over past few decades (Haskett, Nears, Ward, & McPherson, 2006) but the concept is still a subject of debate (Windle, 2011). Majority of definitions of resilience are centered on the concepts of adversity and positive adaptations (Fletcher & Sarkar, 2013). Though there are controversies about nature of resilience as either a trait or process, it is widely accepted as a process (Masten, 1994).

Resilience reflects one's firmness to bounce back to prior levels of functioning despite all odds. Resilience is a multidimensional characteristic that differs with time, context, age, gender, culture and individual experiences (Garmezy, 1985; Garmezy & Rutter, 1985; Rutter, 1985; Werner & Smith, 1992; Csikszentmihalyi, & Seligman, 2000). It has been conceptualized as adapting to life stressors and the changes associated primarily with waning health (Lamond et

al., 2008). In some situations, adaptations are ineffective which results in disturbance of homeostasis. People working in extreme conditions generally face higher levels of stress (Useche, Cendales, Montoro, & Esteban, 2018). For instance, the circumstances under which military personnel work are extremely stressful and can have a tremendous effect on their physical and emotional health (Pflanz & Sonnek, 2002). The nature of work has also been found to affect their family and personal relationships and result in higher job-related stress (Bray, Camlin, Fairbank, Dunteman, & Wheelless, 2001). Continued combat operations and frequent deployments could increase the risk of Post-traumatic Stress Disorder (PTSD) and concerns like substance abuse (Fear et al., 2010). Resilience is not about not developing problems (Yehuda & Flory, 2007), it is about the ability to recover (Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014).

While several measures have been developed over time to assess resilience, the Connor-Davidson Resilience Scale (CD-RISC) is one of the most commonly used measure (González, Sierra, Martínez, Martínez-Molina, & Ponce, 2015) that arose as a result of extensive understanding in treating patients with PTSD (Connor & Davidson, 2003). It has relative success in addressing the limitations of its predecessors including its additional relevance in clinical practice, treatment outcome and biological research (Connor & Davidson, 2003); increasing cross-cultural generalizability and a wide range of behaviours evaluating resilience (González et al., 2015).

The test is available in three forms: the original 25 item version and short 10 item and 2 item versions. Items in CD-RISC-10 and CD-RISC-2 have been derived from CD-RISC-25. For the present study, the 25 item version assessing five dimensions of resilience was selected. The measurement content of the scale has been extracted from various sources like works of Kobasa (1979), Rutter (1985), Lyon (1992) and Alexander (1998). CD-RISC is efficient for use with non-clinical as well as clinical populations. The scale showed adequate internal consistency ($\alpha > .80$) in both Connor and Davidson's original research (Connor & Davidson, 2003), and in later work carried out by several researchers (Jørgensen, & Seedat, 2008; Kararmak, 2010; Asante, & Meyer-Weitz, 2014; Ayala, & Manzano, 2014; Fernandez, Fehon, Treloar, Ng, & Sledge, 2015; Jeong et al., 2015; Ni et al., 2016). The scale reported to have better psychometric properties with good reliability and validity compared to other tests. Therefore, it appears to be one of the most widely used resilience measures (Goins, Gregg, & Fiske, 2013)

CD-RISC has been translated to many languages for administering to wide range of population (Wang, Shi, Zhang, & Zhang, 2010; Gucciardi, Jackson, Coulter, & Mallett, 2011). The scale has been validated in India (Singh & Yu, 2010), Iran (Jowkar, Friborg, & Hjemdal, 2010), Pakistan (Murtaza et al., 2016), China (Yu & Zhang, 2007), Brazil (Solano et al., 2016), Portugal (Solano et al., 2016) and Spain (Notario-Pacheco, Solera-Martínez, Serrano-Parra, Bartolomé-Gutiérrez, García-Campayo, & Martínez-Vizcaíno, 2011). Recently, the scale has been translated in Hindi (Singh, Junnagar, & Mitra, 2018) and was found to be a valid measure. The scale has been used in studies relating to teenagers (Jørgensen & Seedat, 2008); earthquake survivors (Kararmak, 2010); graduate students (Singh & Yu, 2010); young adults, young women, nurses (Gillespie, Chaboyer, Wallis, & Grimbeek, 2007; Clauss-Ehlers, 2008; Burns & Anstey, 2010) elderly (Zhong et al., 2016; Levasseur et al., 2017) and general population as a whole (Yu & Zhang, 2007). Its usage in military population has been successfully extended to combat veterans (Morey et al., 2009), guard soldiers (Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009), war veterans (Elbogen et al., 2012; Youssef, Green, Beckham, & Elbogen, 2013; Brancu et al., 2017), military couples during various deployment stages (Cox, 2012), air force and army recruits (Bezdjian, Schneider, Burchett, Baker, & Garb, 2017),

combat veteran couples (Melvin, Gross, Hayat, Jennings, & Campbell, 2012), veterans with clinical symptoms (Wingo et al., 2017), male soldiers (Schäfer et al., 2015) and Community military population (Green et al., 2014).

The original five-factor structure of the scale has been supported in few studies (Yu, Lau, Mak, Zhang, & Lui, 2011; Jung et al., 2012). However, many studies have not established the original structure (Sexton, Byrd, & von Kluge, 2010). In a study conducted on Spanish entrepreneurs (Manzano-García, & Calvo, 2013), responses on CD-RISC were telephonically obtained from 783 entrepreneurs and Principal Component analysis revealed only 3 factors. The three-factor model has also been widely accepted and confirmed by several other researches (Mealer, Schmiede, & Meek, 2016). A three-factor solution was found in Turkish (Kararımak, 2010) and Chinese samples (Yu & Zhang, 2007). This was also supported by a French translation of the scale (Guihard et al., 2018). In another Spanish study on vulnerable Columbian teenagers, the researchers confirmed a Uni-dimensional model (Guzmán, Martín, Falcón, & Sierra, 2019). The item-total correlations of the scale ranged from .29 to .75 and Cronbach's alpha was reported as .88. The researchers suggested that the 10-item version was more appropriate, with a very good model fit (Guzmán, Martín, Falcón, & Sierra, 2019). Some of the studies on CD-RISC have reported a four-factor solution (Khoshouei, 2009; Bitsika, Sharpley, & Peters, 2010). Lamond et al., (2008) reported a four-factor structure on a sample of community-dwelling older women in California. Another study conducted on Chinese employees also confirmed a four factor structure (Wu, Tan & Liu, 2017). The test-retest reliability of the scale with an interval of 3 months was reported to be .68 and Cronbach's alpha was found to be .75. The scale also yielded high predictive and discriminant validity (Wu, Tan & Liu, 2017).

In an attempt to examine the psychometric properties of CDRISC on Chinese military sample, a group of researchers confirmed a three-factor model (Xie, Peng, Zuo, & 2016). The test-retest reliability across two month interval was found to be .66 and alpha values ranged from .81 to .94. The test also showed high concurrent validity with self-esteem and positive affect. In another study, psychometric properties of CD-RISC were analyzed on 256 Indian college going students. Exploratory factor analysis did not confirm five factors and further, a four factor solution namely, Hardiness, Optimism, Resourcefulness and Purpose were found suitable. The coefficient alpha was reported as .89 with high concurrent validity (Singh & Yu, 2010). In another Indian study, researchers rejected five and four factor models and suggested better factorial validity of uni-dimensional CD-RISC-10 (Rehman & Shahnawaz, 2019).

The above review suggests that despite being one of the most widely used scale to measure resilience, there is no satisfactory evidence on factor structure of CD-RISC (Catalano, Hawkins, & Toumbourou, 2008; Baek, Lee, Joo, Lee, & Choi, 2010). Campbell-Sills and Stein (2007) critically evaluated CD-RISC-25 while noticing many methodological issues; they presented a shorter 10 item version that yielded good model fit indices. This version has also been validated across cultures (Aloba, Olabisi, & Aloba, 2016; Gonzalez, Moore, Newton, & Galli, 2016; Hébert, Parent, Simard, & Laverdière, 2018; Shin et al., 2018; Blanco, Guisande, Sánchez, Otero, & Vázquez, 2019) and yielded good results (Windle, Bennett, & Noyes, 2011).

It is recommended that choice of measure should be meaningful for the concerned population (Windle et al., 2011). The present study aimed to validate CD-RISC-25 on the population of Indian Military Soldiers (IMS). Due to broad range of behaviours being covered, the 25 item version was felt contextually better suited for the study. However, it seems imperative that suitability of CD-RISC-25 for the present population be examined since Indian army is diverse in cultural and linguistic aspects. Since a greater proportion (nearly 43.63%) of Indian Military

Soldiers can speak and understand Hindi as compared to any other language, the researchers aimed to translate the scale into Hindi. The translation was carried out with special focus upon the dialect and words that are common to the soldiers. Hence, the already existing Hindi versions could not be used. Majority of researches conducted in past have failed to replicate the original five-factor model. They have commonly reported three (Karaimak, 2010; Manzano-García & Calvo, 2013; Yu & Zhang, 2017) or four factor (Lamond et. al., 2008; Khoshouei, 2009; Singh & Yu, 2010) solutions of CD-RISC. Based on thorough review of literature, in the present study, two competing models of CD-RISC were tested for establishing its psychometric properties on IMS and empirically choosing the best solution; a three factor model with 25 items, and a three factor model with 17 items.

METHODOLOGY

Participants

The sample comprised two groups of male Indian Military Soldiers. The participants were selected from three military commands—the northern command (22%), the western command (26%) and southern command (52%) using convenience sampling. The first sample comprised N=267 soldiers between 21-42 years (Mean=34.19, SD=6.06) and was drawn specifically for establishing construct validity. The second sample comprised N=186 soldiers between the age range 21-42 years (Mean=32.89, SD=5.21) for reliability and validity purposes. Participants' reported level of education revealed that 67.82% of them had completed higher secondary, 16.24% undergone vocational training and 15.94% had a college or university degree. The samples were representative of the population of Indian Army in terms of age, geographical locations and education, according to the latest available information.

Additionally power analysis was performed to estimate the size of participants needed for the study. G*Power 3.1.9.2 program was used for calculation of estimated sample size. The existing literature did not provide for the criterion of power analysis except for one study whose effect size ranged from .23 to .80 (Notario-Pacheco et al., 2011). Hence the researchers relied upon the previously published bivariate correlations. The expected effect size was medium ($f^2 = .20$), in line with Cohen's (1992) effect size classification. With an $\alpha = .05$ and the desired power of .95, the required sample size was approximately 314. Since the final sample size was 453, it exceeded the minimum required to achieve satisfactory statistical power. Hence, the authors believe that the results can be considered valid and robust.

Measures

Study measures included demographic data form, Hindi version of the CD-RISC, Ryff Scale of Psychological Well-being and The Multidimensional Scale of Perceived Social Support.

The Connor-Davidson Resilience Scale (CD-RISC-25): The initial Hindi version of CDRISC contained 25 items to be rated on a five point scale from 0 (not true at all) to 4 (true nearly all the time) with total range of scores ranging from 0-100. The items were spread over 5 dimensions namely, Personal Competence (PC), Tolerance (TOL), Acceptance of Change and Secure Relationships (CSR), Control (CONT) and Spiritual Relationship (SPR).

Ryff Scale of Psychological Well-being (RSPWB): The medium form of RSPWB developed by Ryff and Keyes (1995) consists of 54 items, spread over 6 dimensions namely, Autonomy, Environmental Mastery, Personal Growth, Purpose in Life, Positive Relations with Others and Self-acceptance. The items are rated on a likert-type scale from 1 (strong disagreement) to 6 (strong agreement). The test is highly reliable with internal consistency coefficients ranging

between .86-.93 and test-retest reliability coefficients ranging between .81-.88. It was also reported to have good validity.

The Multi-Dimensional Scale of Perceived Social Support (MSPSS): It was developed by Zimet, Dahlem, Ziment, & Farley (1988) and is a brief self-report measure of subjective evaluation of social support. The scale consists of 12 items rated on a 7 point Likert-type rating scale. The scale measures three major sources of support i.e. Family (FA), Friends (FR) and Significant Others (SO). The test-retest reliability of the scale ranged from .72-.85 with good validity.

Procedure

For the present study, approval was obtained through mail from the authors/publishers of the scales by the first author. The Institutional Ethics Committee of Defence Institute of Psychological Research, DRDO, Delhi granted approval for conduction of the study. The standard procedure of forward and backward translation was applied to translate English version of CD-RISC-25 to Hindi (Meadows, 1997). Emphasis was on language that is commonly used and easily comprehensible by IMS. The translated questionnaire was evaluated by a panel of experts consisting of translators, researchers and Hindi language experts (N=7). After consensus of expert members, the Hindi version was finalized for pre-testing. Preliminary trial of the Hindi version was done on 35 IMS who were representative of study sample. Participants were asked to describe the meaning of each item and then the items were translated back to English. Feedback obtained was used to improve the readability and ease of item understanding. Written consent was obtained from the participants of the study in accordance with the ICMR Guidelines. After giving a brief outline about the study, the researchers administered the paper-pencil questionnaires in small groups of 25 to 30 participants.

Statistical Analysis

Confirmatory factor analysis (CFA) was performed to arrive at the final underlying factor structure (n=267). To assess the structural relationship and test the goodness of fit for the present population of IMS, the Structural Equation Modelling (SEM) was employed. Reliability was established in terms of test-retest and internal consistency coefficients along with concurrent and predictive validities (n=186). All the data were analyzed using SPSS v 21 and AMOS v 21.

RESULTS

Descriptive Statistics

Descriptive statistics were computed for both the samples. The mean of Sample-1 (25 items, n=267) was found to be 71.17 with SD of 13.57 and the mean of Sample-2(17 items, n=186) was found to be 69.14 with SD of 13.81. Small Standard Error of Mean indicated that both the sample means were relatively close to the population mean. Both the distributions were normal as the Skewness and kurtosis values for Sample-1 (*Skewness*=-.58,*Kurt*=.22) and Sample-2 (*Skewness*=-.65,*Kurt*=.20) were within the acceptable range of ± 2 (see Table-1).

Table 1: Descriptive Statistics, Skewness and Kurtosis

N	Mean \pm SD	SE	Minimum	Maximum	Skewness	Std. Error	Kurtosis	Std. Error
267	71.63 \pm 12.37	1.19	24.00	95.00	-.58	.18	.22	.32
186	69.14 \pm 13.81	1.06	22.00	97.00	-.65	.17	.20	.31

Construct Validity

The findings of earlier studies on psychometric properties of CD-RISC-25 suggest variations in factor structure with respect to different populations. Majority of studies do not replicate the original five-factor model based on American samples. Researches on Psychometric properties of CD-RISC on military population have suggested a three-factor solution (Xie et al., 2015). The researchers wished to test the model fitness and structural relationships of various factors of CD-RISC on a sample of IMS using SEM (n=267). Hence, a 25-item three-factor model was tested on the present population of IMS. For this model, $\chi^2/df=8.35, p=.00, CFI=.73, TLI=.69, RMSEA=.16$ and $SRMR=.14$ were not found to be fulfilling the acceptability criteria (Hu & Bentler, 1999; Schuster & Von Eye, 2000; Yu, 2002; Bentler, 2007; Hooper, Coughlan, Mullen, 2008). The goodness of fit indices of this model and relatively high value of $AIC=14929.81$ indicate that the model is structurally not a good fit for the present population (see Table 2).

Table 2: Goodness of Fit Indices

Models	χ^2	df	χ^2/df	p	CFI	TLI	RMSEA	AIC	SRMR
Three factor model with 25 items	2212.93	265	8.35	.00	.73	.69	.16	14929.81	.14
Three Factor model with 17 items	186.43	114	1.63	.00	.97	.96	.05	7348.332	.08

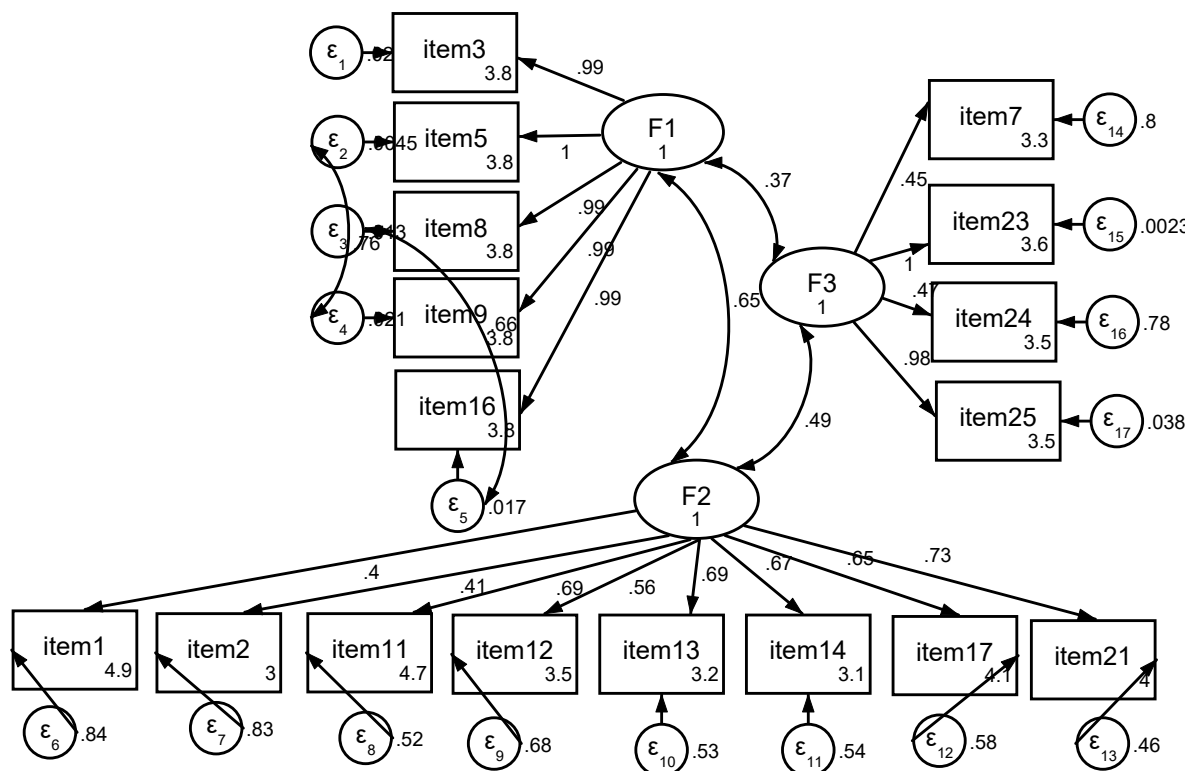
Note: Residual error terms were not correlated. CFI=Comparative Fit Index, TLI=Tucker Lewis Index, RMSEA=Root Mean Square Error of Approximation, AIC=Akaike's Information Criterion, SRMR= Standardized Root Mean Square Residual.

Furthermore, in order to achieve structural fit, it was decided to retain items having factor loading indices well above .40 and discard those that displayed cross-loadings with more than one factor. Similarly, to avoid over-estimation, minimum 3 items per factor was considered for reasonable extraction of factors (Gorsuch, 1997). Hence, 8 poor performing items (factor loadings below .40) were deleted from the 25-item three factor model. The items deleted were: item 4, 6, 10, 15, 18, 19, 20 and 22. After this, a 17-item, three-factor model was tested. For this model, the value of $\chi^2/df=1.63, CFI=.97$ and $TLI=.96$ were found to be well within the level of acceptance and indicated good structural fit of the model. The values of $RMSEA=.05$ and $SRMR=.08$ were also within the range of acceptance. The value of $AIC=7348.33$ was comparatively much lower than the above two models and indicated better fit of the 17-item three-factor model with respect to the population of Indian Military soldiers (see Table-2). The three factors were found to be representing the dimensions of *Determination and Faith (5 items)*, *Adaptability and Support (8 items)* and *Hardiness (4 items)*. The regression weights and item loadings of this model are presented in Table-3 and the graphical representation of CFA Structure is shown in Figure-1.

Table 3 : Factor Loadings of three-factor model (found better fit for Indian military population)

Items	Factor 1	Factor 2	Factor 3
3	.98		
5	.99		
8	.99		
9	.98		
16	.98		
1		.54	
2		.57	
11		.57	
12		.53	
13		.59	
14		.82	
17		.45	
21		.79	
7			.43
23			1.04
24			.41
25			1.04

Figure 1: Factor Structure of the 17-Item Three-factor Model Suitable for Indian Military Soldiers



Note: F1= Determination and Faith, F2= Adaptability and Support, F3= Hardiness

Reliability and Validity

After discarding 8 items from the original 25 item version, (4, 6, 10, 15, 18, 19, 20 and 22), reliability and validity analysis were performed on n=186 IMS. For internal consistency, the

Cronbach's α coefficient ($n=186$) was reported as $\alpha=.92$. Item-total correlations ranged from .41 to .84 (see Table 4). The Test-retest reliability of the scale ($n=186$) with a week's interval was found to be .84. Correlations were also computed with the original English version ($n=186$) that yielded a strong correlation coefficient ($r=.74$). Concurrent validity was established with the Multidimensional Scale of Perceived Social Support. Moderate positive correlation ($r=.67$) was found with MSPSS.

Table 4: Item-total Correlations (Internal Consistency)

Item	N	Sign	Item-test correlation	Item-rest correlation	Average inter-item correlation	α
Item1	267	+	0.42	0.34	0.41	0.92
Item2	267	+	0.41	0.33	0.42	0.92
Item3	267	+	0.83	0.80	0.38	0.91
Item5	267	+	0.84	0.81	0.38	0.91
Item7	267	+	0.46	0.39	0.41	0.92
Item8	267	+	0.83	0.80	0.38	0.90
Item9	267	+	0.83	0.80	0.38	0.91
Item11	267	+	0.66	0.60	0.39	0.91
Item12	267	+	0.57	0.50	0.40	0.91
Item13	267	+	0.66	0.61	0.39	0.91
Item14	267	+	0.61	0.55	0.40	0.91
Item16	267	+	0.84	0.80	0.38	0.91
Item17	267	+	0.64	0.58	0.40	0.91
Item21	267	+	0.70	0.65	0.39	0.91
Item23	267	+	0.64	0.58	0.40	0.91
Item24	267	+	0.58	0.52	0.40	0.91
Item25	267	+	0.63	0.57	0.40	0.91
Total scale					0.39	0.92

Predictive Validity

Predictive validity of CDRISC-17 was established against dimensions of Multidimensional Scale of Perceived Social Support and Ryff Scale of Psychological Well-being-54. Multiple regression analysis was computed to test if resilience significantly predicted the dimensions of perceived social support ($n=186$). The results of regression indicated that the three factors of resilience explained 13.4% of variance in Significant Others dimension of MSPSS ($R^2=.134$, $F(5,185)=7.82$, $p<.001$). It was further found that Determination and Faith significantly predicted perceived social support from Significant others ($\beta=-2.94$, $p<.005$), as did Adaptability and Support ($\beta=5.86$, $p<.001$) and Hardiness ($\beta=-4.17$, $p<.001$). Perceived support from Significant others increased by .53 units with unit increase in Adaptability and Support. The results of regression also indicated that the three dimensions of CDRISC-21 significantly explained 27.2% of variance in Family dimension of MSPSS ($R^2=.272$, $F(5,185)=2.87$, $p<.05$). The dimension of Hardiness significantly predicted perceived social support from Family ($\beta=-.58$, $p<.05$). Perceived support from Family increased by .26 and .49 units with unit increase in Determination and Faith and Adaptability and Support respectively. Furthermore, the dimensions of CDRISC-17 explained 20.2% of variance in Friends dimension of MSPSS, ($R^2=.202$, $F(5,185)=2.08$, $p>.05$). The variance predicted was however not significant. Multiple

regression analysis was also carried out to test if the dimensions of resilience significantly predicted overall Perceived Social Support. Results indicated that the three predictors significantly explained 9.3% of variance in overall Perceived Social Support ($R^2=.093$, $F(5,185)=3.75$, $p<.05$). Adaptability and Support ($\beta=3.02$, $p<.05$) and Hardiness ($\beta=-1.56$, $p<.05$) significantly predicted overall perceived social support where Perceived Social Support increased by .76 units with unit increase in Adaptability and Support.

Multiple regression analysis was also performed to test if resilience significantly predicted Psychological Well-being ($n=186$). The three dimensions of CD-RISC explained 3.6% of variance ($R^2=.036$, $F(6,187)=.47$, $p>.05$) in Autonomy; 2.4% of variance ($R^2=.024$, $F(6,187)=1.21$, $p>.05$) in Environmental Mastery, 2.9% of variance ($R^2=.029$, $F(6,187)=.52$, $p>.05$) in Personal Growth; 3.1% of variance ($R^2=.031$, $F(6,187)=.56$, $p>.05$) in Positive Relations with Others, 1.8% of variance ($R^2=.018$, $F(6,187)=.38$, $p>.05$) in Purpose in Life and 2.1% of variance ($R^2=.021$, $F(6,187)=.30$, $p>.05$) in Self-Acceptance respectively. None of these values were found to be significant.

DISCUSSION

CD-RISC is one of the most widely validated scales in resilience literature (Campbell-Sills & Stein, 2007). The aim of this study was to evaluate the psychometric properties of CD-RISC on Indian Military Soldiers. It is a large population-based study which included soldiers from various Infantry Units of the Indian Army. It is the first Indian study to validate CD-RISC on military population. The research intends to establish empirical evidence for factorial validation of CD-RISC in Hindi. Results of CFA did not support five-factor structure of the original CD-RISC scale. Item no. 4, 6, 10, 15, 18, 19, 20 and 22 of CD-RISC-25 were discarded for attaining good model fit and a three-factor model seemed to be a better solution for Indian military population. Thus, a total of 17 items were retained for the Hindi adaptation of CD-RISC, covering three factors. Factor-I consists of 5 items, Factor-II has 8 items and Factor-III has 4 items. The three factor solution is as follows:

Factor-I = Items 3, 5, 8, 9 and 16 (5 Items)

Factor-II = Items 1, 2, 11, 12, 13, 14, 17 and 21 (8 Items)

Factor-III = Items 7, 23, 24 and 25 (4 Items)

The items in the three factors were pertaining to '*Determination and Faith*', '*Adaptability and Support*' and '*Hardiness*' respectively.

While the original five-factor structure of the scale has been supported in some studies (Yu et al., 2011; Jung et al., 2012) in line with many studies around the world, the present study did not confirm the five-factor model (Sexton et al., 2010; Mealer, Schmiede, & Meek, 2016). An Indian study on $N=256$ IIT graduate and post-graduate students confirmed a four-factor solution (Singh & Yu, 2010). Another Indian study on $N=1339$ university graduate and post-graduate students rejected both five and four factor models of CD-RISC-25 and suggested a uni-dimensional model of CD-RISC-10 with better model fit indices (Rehman & Shah Nawaz, 2019). In a study, researchers investigated CD-RISC-25 with a non-clinical sample of Spanish adults using Rasch-Andrich Rating Scale Model. The study confirmed 22 items and uni-dimensional structure (González, et al., 2015). A Swedish research on non-clinical sample of 2599 participants suggested a 22-item Uni-dimensional model of CD-RISC (Velickovic et al., 2020). A study on Chinese Military Population also confirmed these findings (Xie, Peng, Zuo, & Li, 2016). Another study on 1,981 U.S. military veterans supported a fourteen-item two-factor model (Green et al., 2014). Depending on the nature of the population— age, culture,

experience, economic status, vulnerability to stress, high pressured environments and clinical cases, studies have revealed a varied number of stable factors that seem contextually relevant. The researchers tested two subsequent models- 23 item three-factor model and 17 item three-factor model using CFA. The 17-item three-factor model revealed high goodness of fit on IMS. The three-factor structure of CD-RISC has also been supported by various other studies (Guihard et al., 2018; Xie, Peng, Zuo, & Li, 2016; Anjos, dos Santos, Ribeiro, & Moreira, 2019). In a study conducted on Chinese Military population, the researchers confirmed a three-factor solution of CD-RISC and retained 19 items from the original version (Xie et al., 2016). However, the factor composition of the 17 item model was found to be distinct from other studies suggesting a three-factor solution. The results of the present study failed to replicate previous findings on the scale with respect to Indian population (Singh & Yu, 2010; Rehman & Shah Nawaz, 2019). A probable reason could be the difference between characteristics of the samples. In previous researches, the sample comprised of Engineering students and students from other faculties of discipline. However, in the present study, the sample comprised of Infantry Soldiers who have greater stress-experience due to exposure to adverse conditions. The Hindi adaptation of CD-RISC for Indian Military Soldiers has specifically been designed keeping in mind the general educational qualification of infantry soldiers and easily comprehensible language. For instance, the item 'I work to attain my goals no matter what roadblocks I encounter along the way' has been translated as 'मैं अपने लक्ष्य को प्राप्त करने के लिए काम करता हूँ, चाहे मुझे किसी भी कठिनाई का सामना करना पड़े'. Here, instead of literal Hindi translation of 'Roadblocks', the word 'कठिनाई' has been used, meaning 'difficulties', for better understanding of the target population. In another item, 'I take pride in my 'achievements'; the word 'achievement' is used as it is to add clarity to the item. The Hindi scale has been attached in supplementary files as Appendix 'A'.

The results of current study support the use of 17 item and three-factor Hindi adaptation of CD-RISC for target population. It has been found reliable with good Internal Consistency and Test-retest reliability coefficients and is a valid measure. These results are supported by several other cross-cultural studies (Xie et al., 2016; Guihard et al., 2018; Anjos et al., 2019). The test yielded strong correlations with the original English version by Connor and Davidson (2003) and moderate concurrent validity with the Multidimensional Scale of Perceived Social Support. The results revealed good predictive validity of CD-RISC-17 with the Multidimensional Scale of Perceived Social Support but the present scale did not predict scores on Ryff Scale of Psychological Well-being. The dimensions of CD-RISC-17 significantly explained variance in support from Significant others, Family and overall MSPSS scores. The results suggest that the higher ability of Indian Military Soldiers to bounce back after stressful experience might be due to adequate personal and social resources. At the same time, extreme working and living conditions might have a negative impact on the overall well-being of soldiers.

Limitations

Despite its merits, the study has a few shortcomings. The findings of the study are quite specific as participants were purposively selected. The sample was taken from three units of the Indian Army to investigate factorial structure of CD-RISC. Furthermore, the effect sizes were not large, and it is possible that shared variance with other scales could drive the association. It is also crucial to measure the real-life experiences of resilience in relation to psychological well-being and perceived social support.

Directions for Future Research

Future research should incorporate real-life experience of resilience in relation to other related variables. The study can also be extended to validate other measures on the Indian Army Units

and extend its applicability to clinical and non-clinical Hindi speaking populations in order to ensure increased generalizability. It can also be used to screen high-risk individuals and investigate adaptive and maladaptive methods of coping. Studies should also try to examine the related factors of resilience and its relation to common mental health concerns in military services like depression, anxiety and trauma, PTSD and support and strengthen programs that address these initiatives within the system. It can also be extended to officers of various ranks and other wings of the Indian Army.

CONCLUSIONS

Despite certain limitations, the findings from the present study make an important contribution to the theory and research on resilience and its application to the military population. The findings of the study support that the Hindi adaptation of CD-RISC for IMS can be efficiently used as it reports sound psychometric properties. It can be used as a reliable and valid measure, especially to assess resilience among the Hindi speaking population within the military services. The final scale for Indian Military Soldiers comprises 17 items covering three factors.

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ETHICS APPROVAL

The study was approved by the Ethics Committee of the Defence Institute of Psychological Research, DRDO, Delhi.

CONFLICT OF INTERESTS

The authors have no conflicts of interest.

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