African Journal of Psychological Assessment
ISSN: (Online) 2617-2798, (Print) 2707-1618

Psychometric properties of the Brief Sailor Resiliency Scale in the South African Army

Authors:
David J. Schoeman[1]
Nafisa Cassimjee[1]

Affiliations:
[1]Department of Psychology, Faculty of Humanities, University of Pretoria, Pretoria, South Africa

Corresponding author:
David Schoeman,
schoemandj@gmail.com

Dates:
Received: 30 Jan. 2022
Accepted: 23 Aug. 2022
Published: 26 Oct. 2022

How to cite this article:
Schoeman, D.J., & Cassimjee, N. (2022). Psychometric properties of the Brief Sailor Resiliency Scale in the South African Army. *African Journal of Psychological Assessment*, *4*(0), a100. https://doi.org/10.4102/ajopa.v4i0.100

Serving in the military is considered one of the most stressful occupations; therefore, because of the potential mitigation effect resilience has against stressors, it has often been incorporated as a component in predeployment programmes for soldiers. Consequently, assessing, facilitating and sustaining resilience is of particular importance in military environments. The Brief Sailor Resiliency Scale (BSRS) has been utilised within the South African Navy (SAN) environment, where it yielded promising results as a measure of resilience. The aim of this article is to investigate the psychometric properties of the BSRS and the applicability thereof to the South African Army (SA Army). The study utilised a sample of SA Army soldiers ($N = 418$) that completed the BSRS along with the Brunel Mood Scale (BRUMS), Emotion Regulation Questionnaire (ERQ) and the Dispositional Resilience Scale – II (DRS-II). The psychometric properties of the BSRS were examined through confirmatory factor analysis (CFA) and structural equation modelling (SEM), together with construct validity and internal reliability. The model yielded acceptable fit, and the construct validity was supported with high internal reliability of the scales. Findings provided confirmatory evidence for the application of the BSRS as a resilience screening tool in the SA Army. The utilisation of the BSRS as a valid screening instrument, together with the aligned interventions, can potentially contribute substantially to the combat readiness of the SA Army.

Keywords: assessment; resilience; intervention; SANDF; military; measurement.

Introduction

The Brief Sailor Resiliency Scale (BSRS) (Van Wijk & Martin, 2019) assesses four domains of resilience: mental, physical, spiritual and social fitness. The BSRS has been utilised locally and specifically within the South African Navy (SAN) environment, where it yielded promising results as a measure of resilience (Van Wijk & Martin, 2019). Although the South African Army (SA Army) and SAN have different operational environments, resilience is arguably a valued attribute that could enhance individual functioning in both environments. The SA Army is routinely utilised for internal and external deployments, and combat readiness of the soldier is a key driver of performance in military environments. Therefore, it would be beneficial to adopt a resilience measurement such as the BSRS that can aid in enhancing the combat readiness of the SA Army. The aim of this article is to investigate the psychometric properties of the BSRS and the applicability thereof to the SA Army.

Resilience in the military

Resilience has often been described and defined in terms of the ability to bounce back or thrive and withstand the effects of stressful events (Connor & Davidson, 2003; Smith et al., 2008). Although there is some debate regarding the term, most definitions include two aspects: positive adaptation and adversity (Fletcher & Sarkar, 2013). Resilience has been broadly characterised as the ability to maintain healthy psychological and physiological functioning in the presence of high stress and trauma (Wu et al., 2013). Consequently, assessing, facilitating and sustaining resilience is of particular importance in military environments.

The Canadian Armed Forces (CAF) define resilience as the capacity of a soldier to recover quickly, resist and possibly even thrive in the face of direct and indirect traumatic events and adverse situations in garrison, training and operational environments (Hellewell & Cernak, 2018). The Australian Defence Force (ADF) defines resilience as the capacity of individuals, teams and organisation to adapt, recover and thrive in situations of risk, challenge, danger, complexity and adversity (Gilmore, 2016). Although similar to the CAF definition, the ADF includes teams and the organisation, thus taking a wider system perspective of the construct. It is, however,

apparent that resilience is a multifaceted construct, and the ability to not only cope but perform at the best of one's ability is emphasised.

The increased focus on performance has led to concepts such as hardiness and resilience becoming increasingly important in the development of a high-performing soldier (Krueckel et al., 2020). Hardiness is a personality style that has emerged as a composite of interrelated attitudes of commitment, control and challenge (Maddi et al., 2009). Hardiness consists of cognitions and attitudes which act as buffers against the negative effects of traumatic and severe life stressors on individual well-being (Stoppelbein et al., 2017). Research indicated that hardiness could enhance individual resilience through the protection it provides against the effects of stress on health and performance (Bartone et al., 2022). These hardy attitudes have been associated with resilience and high performance in both civilian and military samples, specifically under a range of stressful conditions (Hystad et al., 2011; Maddi et al., 2009). The increase in nontraditional military tasks regularly performed by an army's soldiers has further underlined the risky, challenging, dangerous, complex and adverse environments soldiers are exposed to (Gilmore, 2016). For military personnel to be able to cope with the stress of modern military operations and other aspects of a military career, the importance of optimal psychological resilience cannot be understated (Kamphuis et al., 2012). Resilience is argued to play a decisive role in performance outcomes, as a lack of resilience has been found to contribute to poor military results and performance (Gilmore, 2016). Van Wijk and Martin (2019) pointed out that specific operational environments as faced by SAN personnel can have deleterious effects on soldier's well-being. Consequently, enhanced resilience has been highlighted as particularly beneficial for naval personnel when withstanding the rigours of military work and life. Combat readiness of military personnel pertains to the level of preparedness, both psychologically and physically, through training and interventions aimed at enhancing an individual's capability to execute specific military tasks successfully (Shinga, 2016). Therefore, combat readiness of a soldier not only pertains to an absence of ill-health symptoms but also to a state of well-being and an overall resilient state that would empower soldiers to perform optimally in demanding situations and environments.

Evaluating mood states could provide an indication of psychological distress (Van Wijk et al., 2013), with a positive affect state being beneficial for individual resilience (Daphne, 2020). Troy and Mauss (2011) proposed that those with a higher internal emotional regulation ability are more likely to display resilience after adversity. Although numerous emotional regulation strategies exist, Troy and Mauss (2011) proposed that the utilisation of cognitive reappraisal strategies lead to more adaptive and less negative emotional responses and subsequently, higher resilience. Furthermore, cultivating positive emotions may be particularly useful to build resilience to stressful events (Tugade & Fredrickson, 2007). Reappraisers have been reported as experiencing and expressing a higher level of positive emotions and fewer negative emotions than suppressors (Gross & John, 2003). Thus, understanding emotional states and implementing interventions focused on reappraisal strategies of positive emotions may enhance resilience when an individual encounters adversity. Measures of changes in emotional regulation have proven to be a useful indicator of psychological adaptation in operational deployments (Institute for Maritime Medicine, 2018). As adaptation is an outcome of resilience (Van Wijk & Martin, 2019), measurement of mood states and emotion regulation strategies are useful indicators for determining individual resilience.

Similar to the SAN deployments that were investigated by Van Wijk and Martin (2019), the SA Army also deploys to areas that can be considered isolated, confined and extreme (ICE) environments. Internal deployments are usually of a 6-month duration, whilst external deployments are 1 year long, with the possibility of extensions depending on circumstances. Internal deployments along the country's border require soldiers' involvement with various safeguarding activities. South African National Defence Force (SANDF) members are deployed externally to various countries in a peacekeeping capacity. Although military personnel deployed in this capacity experience stressors different from those engaging in active warfare, they are vulnerable to developing stress-related symptoms (Platania et al., 2020).

Serving in the military is considered one of the most stressful occupations (De Visser et al., 2016), with major stressors reported by externally deployed soldiers related to the following themes: *support, vehicles and equipment, country-related circumstances and conditions* and *family* (Semmelink et al., 2020). Typical experiences of soldiers included a perceived lack of support, shortage of equipment or apparel, inconsistent delivery of subsistence and sustainment, exposure to the extreme country-specific environments as well as interpersonal family-related stressors such as working away from home for extended periods of time. These themes are indicative of the isolation and extremity of the environment that a soldier experiences on deployment.

Resilience development has been incorporated as part of a predeployment programme for soldiers because of the potential mitigation effect it has for certain stressors associated with health and performance outcomes (Bartone et al., 2022). Traumatic responses to events are influenced by pre-exposure resilience (Doody et al., 2019). Research has indicated that resilience is negatively associated with post-traumatic stress and serves a moderating role between post-deployment stressors and the development of post-traumatic stress symptoms amongst soldiers (Wooten, 2012). As the SA Army is routinely involved in peacekeeping missions that often place great demands on the individual because of operation-related stressors (Koopman & Van Dyk, 2012), the screening and enhancement of individual soldier resilience during the predeployment phase is likely to hold substantial benefits for individuals functioning on deployment.

Utilisation of resilience screening measures

The increased focus in the military environment on performance-related constructs such as hardiness and resilience (Krueckel et al., 2020) highlights the importance of an assessment tool that is relevant for use in the military. Ensuring the highest level of own force combat readiness is contingent on valid and reliable assessments providing accurate measures of performance-related aspects. The utilisation of accurate and psychometrically sound performance-related measurements provides potential benchmarks from which training and development can be initiated in order to empower soldiers to confront and overcome challenges that inhibit optimal performance (Madrigal et al., 2013). Van Wijk and Martin (2019) alluded to the existence of many available assessments which are relatively effective in predicting resilience in the face of adversity; however, they acknowledged that these instruments are often not a good fit because of the unique environments certain soldiers function in.

The four fitness domains of the BSRS stem from the United States Air Force definitions of the respective fitness domains (Air Force Instruction, 2014). Mental fitness relates to the individual's ability to effectively cope with mental stressors and challenges. Physical fitness pertains to the ability to adopt and sustain healthy behaviours needed to enhance individual health and well-being. Social fitness is defined as the ability to engage in healthy social networks that promote overall well-being and performance. Spiritual fitness refers to adherence to beliefs, principles or values needed to persevere and prevail in accomplishing missions. The four domains perspective of the BSRS links well with the multifaceted conceptualisation of resilience and predeployment screening and assessment of combat readiness of soldiers prior to deployment. This supports the implementation of baseline resilience interventions instituted by the applicable military mental health practitioners for those individuals who appear to be experiencing some fitness challenges in respective domain(s) (Van Wijk & Martin, 2019). Following Van Wijk and Martin's (2019) findings regarding the utility of the BSRS amongst the SAN, this article explores the psychometric properties of the BSRS as a screening instrument to assess individual soldier resilience in the SA Army. Valid screening coupled with the appropriate interventions would serve as a useful intervention to enhance individual resilience as well as the broader combat readiness status of the SA Army.

Method

Participants

A total of 418 SA Army soldiers participated in the study, with the majority of the sample categorised as infantry soldiers and the remaining participants functioning in different support capacities, such as signallers, engineers and military police. Convenience sampling was adopted in order to obtain the largest possible number of participants.

TABLE 1: Sociodemographic characteristics of participants.

Sociodemographics	*n*	%
Gender		
Male	260	62
Female	139	33
Missing	19	5
Age		
20–29	104	25
30–39	180	43
40–49	24	6
50 and above	67	16
Missing	43	10
Rank		
Private or equivalent	203	49
Noncommissioned officers	162	39
Warrant officer (all classes)	5	1
Officers	14	3
Missing	34	8
Home language		
Nguni (Zulu, Xhosa, Ndebele and Swati)	108	26
Sotho (Northern Sotho, Southern Sotho and Tswana)	165	39
Tsonga	54	13
Venda	29	7
Afrikaans	26	6
English	8	2
Missing or other	28	7

Table 1 illustrates the composition of the sample. All questionnaires were completed anonymously as personal indicators were not included, and all questionnaires were administered in English.

Measurements

Brief Sailor Resiliency Scale

The Brief Sailor Resiliency Scale BSRS (Van Wijk & Martin, 2019) is an adapted form of the Comprehensive Airman Fitness instrument developed by Bowen et al. (2016). The only adaptations were a change to a five-point Likert scale and a name change. All original items were retained in the adapted version. The instrument assesses four domains of resilience: mental, physical, spiritual and social fitness. The instrument consists of 12 items. Each respondent provides a rating on each statement and item responses range from *not at all* (0) to *completely* (4). The sum of the scores obtained for each of the four scales yields a total fitness score.

The BSRS has been utilised locally within the SAN environment and yielded satisfactory psychometric properties, with alpha coefficients ranging from 0.745 to 0.892 for the respective subscales (Van Wijk & Martin, 2019). Model fit indices of the SAN study also indicated an acceptable fit for the original developed model (Van Wijk & Martin, 2019).

Dispositional Resilience Scale – II

The Dispositional Resilience Scale – II (DRS-II) (Sinclair et al., 2003) is an 18-item questionnaire designed to measure psychological hardiness. The instrument provides results for six factors: control, powerlessness, commitment,

alienation, challenge and rigidity. The instrument incorporates the traditional three factors of hardiness (control, commitment and challenge) as well as an additional three factors. The traditional three factors (control, commitment and challenge) are referred to as the positive dimensions, where higher scores indicate a greater resource in dealing with stress. The additional three dimensions (powerlessness, alienation, rigidity), referred to as the negative dimensions, indicate a greater vulnerability to stress; thus, a lower score on these dimensions would result in a greater degree of hardiness. Respondents are provided statements and asked to indicate the extent they feel the statement is true. A five-point Likert scale is provided that ranges from *definitely false* (1) to *definitely true* (5). The DRS-II was found to be applicable for utilisation on military samples, with validity and reliability analyses showing acceptable results on different international military samples (Delahaij et al., 2010; Sinclair et al., 2003).

Brunel Mood Scale

The Brunel Mood Scale (BRUMS) (Terry et al., 1999) was developed from the Profile of Mood States (McNair et al., 1971). The BRUMS measures six identifiable mood states through a self-report inventory, with respondents rating a list of 24 adjectives. The adjectives are words that describe feelings people have. Respondents provide a rating on a five-point Likert scale of how they had been feeling the previous week. Item responses range from *not at all* (0) to *extremely* (4). The six factor-based subscales measured by the scale are: tension, depression, anger, vigour, fatigue and confusion. A total mood distress (TMD) score can also be computed by summing all the subscale scores except for the subscale vigour, which gets subtracted. Higher scores on the respective subscales are thus indicative of greater prevalence of the mood state, and a higher TMD score would also then indicate greater mood distress. The instrument has also been utilised locally and specifically within the military, with norms developed on the South African population. Reported alpha coefficients ranged from 0.66 to 0.89 for respective subscales (Van Wijk, 2011). The BRUMS provides an indication of mood changes and has been utilised in the SAN as a self-reported post-traumatic stress symptoms indicator after deployment (Van Wijk et al., 2013).

Emotion regulation questionnaire

The Emotion Regulation Questionnaire (ERQ) was developed to measure two specific aspects related to emotion control: reappraisal and suppression (Gross & John, 2003). Respondents self-report how they feel about a statement revolving around their emotional experience and expression. Respondents are provided with 10 statements and asked to indicate the extent they disagree or agree with each statement. A seven-point Likert scale is provided that ranges from *strongly disagree* (1) to *strongly agree* (7). Calculated total scores of the scales are thus indicative of the preferred strategy of emotional regulation and also provide an indication of the degree of utilisation thereof. The instrument has been utilised locally (Ginton et al., 2022; Nicholson et al., 2021) with a reported alpha coefficient of 0.85 for the instrument (Nicholson et al., 2021).

Procedure

The researcher collected most of the data by visiting respective military units across the country and administering the measurements described here. Registered psychologists staffed in the SANDF assisted the researcher with data collection when practical constraints limited accessibility. Potential participants were informed through the official command channels of the arranged dates for data collection. This procedure was followed to ensure the maximum number of available participants. All participants were briefed about the aim of the study and the voluntary nature of participation, and written consent was also obtained before commencing with the data collection.

Data analysis

Data were screened for accuracy, outliers, missing values and normality (Hair et al., 2010). Questionnaires not completed correctly were removed from the analyses. Minimum and maximum values were investigated for each item, and where discrepancies were detected, they were clarified and corrected by referring to the raw data. Missing values resulted in the removal of the participants' data for that particular instrument. Following this process, a sample of 418 participants was retained for analyses.

A confirmatory factor analysis (CFA), using structural equation modelling (SEM) with maximum likelihood estimation of the BSRS four-factor model in line with the originally developed structure, was conducted to determine model fit on the sample.

In terms of goodness-of-fit indicators for the models, the following measures (Table 2) were used to determine the overall fit of the models (Hooper et al., 2008; Hu & Bentler, 1999).

Reliability estimates (Cronbach's alpha coefficients) were computed in order to evaluate internal consistency of the instrument. Coefficients > 0.6 are generally regarded as acceptable (Field, 2005; Hair et al., 2010).

Construct validity was also assessed utilising bivariate correlations with the results from the BSRS, DRS-II, BRUMS and ERQ scores. Bivariate correlations were conducted only

TABLE 2: Goodness-of-fit indicators for the models.

Indicator	Interpretation guideline
Chi-square test statistic	Significant chi-square ($p < 0.05$) indicates bad fit
Comparative fit index (CFI)	Values ≥ 0.95 indicate good fit
Root mean square error of approximation (RMSEA)	Values < 0.06 indicate good fit yet values < 0.08 may also indicate acceptable fit
Goodness-of-fit index (GFI)	Values ≥ 0.90 indicate good fit
Standardised root mean square residual (SRMR)	Values < 0.08 indicate acceptable fit

on available data where participants completed every question across all the instruments (n = 366). Convergent validity, which indicates the degree to which two measures of the same concept are correlated (Hair et al., 2019), was investigated utilising the correlation results between the BSRS scales and applicable scores from the other assessments used in the study. The data for this study were analysed using the Statistical Package for the Social Sciences (SPSS) version 23 (IBM Corporation, Armonk, New York, United States) in combination with AMOS Graphics 22 (IBM Corporation, Armonk, New York, United States).

Ethical considerations

The study received approval from the Faculty of Humanities Postgraduate Research Ethics Committee of the University of Pretoria (reference number: HUM20190107). Approval for submission and publication of this article has been provided by Defence Intelligence (reference number: DI/DDS/R/3/7). Written informed consent was also obtained from the participants.

Results

Normality distribution

Tests of univariate normality were conducted in order to investigate the distribution of the data. Hair et al. (2010) argued that data are considered to be normal if the absolute skewness value is below 2 and absolute kurtosis value below 7; however, Kline (2011) suggested an absolute value for skewness of below 3 and absolute kurtosis value below 10. Only item 5 had values that did not meet the criteria suggested by Kline (2011) (skewness = 3.01; kurtosis = 10.83), which indicated a negatively skewed distribution. This could potentially be attributed to individuals responding in a socially desirable manner, which supports the concern highlighted by Bowen et al. (2016) that certain items lend themselves to individuals responding in a favourable or expected manner. Item 5 forms part of the mental fitness subscale. A comparison of means for this subscale with the SAN sample does not indicate an observable difference. Non-normality can have significant effects when the sample size is small (< 50); however, the impact effectively diminishes when the sample size reaches 200 or more participants (Hair et al., 2019). In consideration of the above, it would appear that the distribution of responses is within acceptable parameters.

Descriptive statistics

Descriptive statistics for the BSRS total fitness score as well as respective scales are indicated in Table 3. The mean scores and standard deviations for the SA Army sample and the SAN sample are provided in Table 3. A comparison of mean total fitness score for the SA Army (38.8) with the SAN sample (Van Wijk & Martin, 2019) yielded a very similar result with the SAN mean score (38.3), although the standard deviation of 7.8 in this sample was slightly higher when compared with the SAN sample (SAN sample s.d. = 6.4).

Confirmatory factor analysis

Confirmatory factor analysis was conducted using SEM with maximum likelihood estimation in line with the originally developed structure. An item factor loading indicates the strength of relationship between the item and the factor. All items loaded significantly on the respective factors (≥ 0.4) (Field, 2005).

In terms of the overall fit of the model, the chi-square statistic was found to be statistically significant with $x^2(50) = 150.827$, $p < 0.05$, suggesting poor fit of the hypothesised model. The chi-square statistic, however, is sensitive to sample size, with larger samples tending to yield a significant result (Bentler & Bonnet, 1980; Hair et al., 2010). Further goodness-of-fit statistics were thus also investigated in order to assess the overall fit of the hypothesised model. In contrast to the chi-square statistic, the following fit indices suggested a good fit of the hypothesised model: root mean square error of approximation (RMSEA) = 0.070; comparative fit index = 0.961; goodness-of-fit index = 0.944; standardised root mean square residual = 0.0485. Therefore, the original model was supported by the goodness-of-fit indices. The CFA verifies relationships of observed variables and their latent constructs on the SA Army sample. Figure 1 portrays the validated original structure of the BSRS of this study on the SA Army sample. Figure 1 portrays the respective subscales (mental, physical, social, spiritual) as second-order factors, which load onto a single higher-order factor (total fitness).

Reliability

Pertaining to this study, the BSRS total fitness scale produced a Cronbach's alpha of 0.886. Furthermore, all the fitness subscales (mental = 0.733; physical = 0.819; social = 0.862;

TABLE 3: Brief Sailor Resiliency Scale descriptive statistics.

Instrument	Subscale and total	*N*	Mean	Mean SAN†	Median	Standard deviation	Standard deviation SAN†	Minimum	Maximum
BSRS	Mental	418	10.9	10.4	12	1.7	1.6	0	12
	Physical	418	9.2	8.8	9	2.5	2.2	0	12
	Social	418	9.0	9.0	10	3.0	2.7	0	12
	Spiritual	418	9.7	10.1	10	2.8	2.1	0	12
	Total fitness	418	38.8	38.3	40	7.8	6.4	0	48

BSRS, Brief Sailor Resiliency Scale; SAN, South African Navy.
†, Van Wijk and Martin (2019).

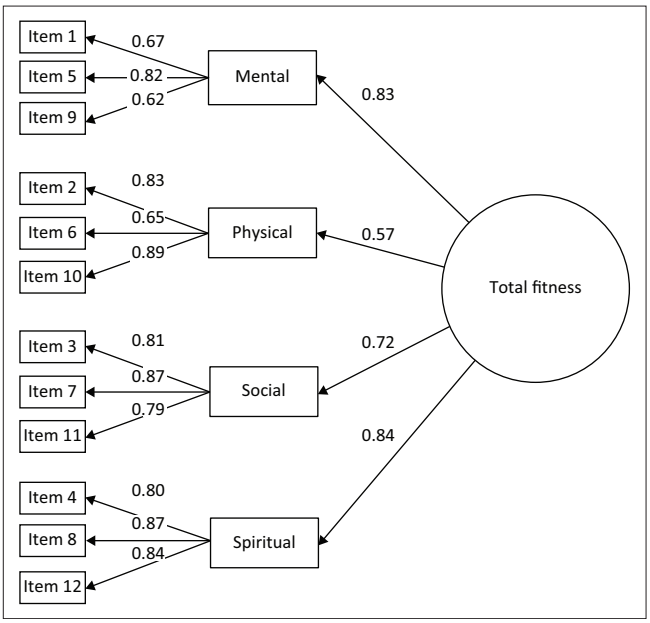

FIGURE 1: Brief Sailor Resiliency Scale factor structure.

TABLE 4: Brief Sailor Resiliency Scale reliability estimates – Cronbach's alpha coefficients.

Instrument	Subscale and total	SA Army	SAN†
BSRS	Mental	0.733	0.745
	Physical	0.819	0.851
	Social	0.862	0.873
	Spiritual	0.875	0.892
	Total fitness	0.886	0.874

BSRS, Brief Sailor Resiliency Scale; SA, South Africa; SAN, South African Navy.
†, Van Wijk and Martin (2019).

spiritual = 0.875) were found to have good internal consistency and reliability (> 0.6) (Field, 2005; Hair et al., 2010). A comparison of Cronbach's alpha coefficients with the SAN sample is provided in Table 4. Alphas were found to be very similar in comparison to the SAN sample, which is indicative of consistency of the BSRS instrument across samples. Alphas for the other instruments utilised in the study are also included in Table 5.

Construct validity

Correlations between the BSRS first- and second-order factors were all significant, in accordance with the theoretical model as depicted in Figure 1. The correlations between the BSRS with other instruments utilised in the study are presented in Table 5. The BSRS total fitness score showed a significant positive association with the emotional regulation strategy of reappraisal (r = 0.15), although no significant relationship was found between the emotional regulation strategy of suppression and total fitness. Positive hardiness factors were significantly correlated with BSRS total fitness (r = 0.36), together with all the BSRS subscales, except for the physical fitness scale. The BSRS total fitness score showed a significant negative correlation with the BRUMS-TMD (r = −0.35), as well as with the negative hardiness factors assessed (r = −0.28). These results reflect the resilience and positive emotional regulation strategies utilised by the participants.

TABLE 5: Brief Sailor Resiliency Scale construct validity coefficients and Cronbach's alphas.

BSRS	ERQ		BRUMS	DRS-II	
	Reappraisal	Suppression	TMD score	Positive hardiness	Negative hardiness
Total fitness	0.15**	-0.09	-0.35**	0.36**	-0.28**
Mental fitness	0.16**	-0.08	-0.36**	0.41**	-0.29**
Physical fitness	-0.05	-0.05	-0.32**	0.06	-0.18**
Social fitness	0.10	-0.13*	-0.25**	0.27**	-0.28**
Spiritual fitness	0.28**	-0.03	-0.21**	0.41**	-0.14**
Cronbach's alpha	0.767	0.700	0.886	0.713	0.639

BSRS, Brief Sailor Resiliency Scale; ERQ, emotion regulation questionnaire; BRUMS, Brunel Mood Scale; DRS-II, Dispositional Resilience Scale – II; TMD, total mood distress.
*, Correlation is significant at the 0.05 level (2-tailed).
**, Correlation is significant at the 0.01 level (2-tailed).

TABLE 6: Brief Sailor Resiliency Scale and Brunel Mood Scale correlations: South African Navy† and South African Army sample comparison.

BSRS subscale and total	BRUMS-TMD SA Army	BRUMS-TMD SAN†
Mental	-0.36	-0.52
Physical	-0.32	-0.47
Social	-0.25	-0.26
Spiritual	-0.21	-0.26
Total fitness score	-0.35	-0.48

BSRS, Brief Sailor Resiliency Scale; BRUMS, Brunel Mood Scale; TMD, total mood distress; SA, South Africa; SAN, South African Navy.
†, Van Wijk and Martin (2019).

A comparison of correlations between the BSRS scales and the BRUMS-TMD score pertaining to the SA Army and SAN samples indicated a similar trend, although in some cases the SA Army sample correlations were not as strong compared with the SAN sample (Table 6). In both samples, the strongest correlation manifested between the BRUMS-TMD score and the mental fitness subscale, followed by the total fitness score. The similar trend and correlations between the samples is indicative of generalisability of the instrument also to the SA Army.

Discussion

The findings of the study provide preliminary validation results for the utilisation of the BSRS in the SA Army. Furthermore, the findings provide confirmatory validation of the originally developed factor structure along with the internal reliability of the scales (Bowen et al., 2016). Findings of this study also confirmed the construct validity in accordance with results reported for the SAN (Van Wijk & Martin, 2019).

Soldiers deployed to dangerous, volatile environments confront numerous operational and performance stressors, and resilience has been established as a buffer for mitigating the stress induced by modern military operations and challenges unrelated to combat (Kamphuis et al., 2012). Resilience to the effects of stress is vital for maintaining performance and maintaining readiness for deployment (De Visser et al., 2016). De Visser et al. (2016) also argued that experienced military personnel may be able to mitigate and even utilise stress productively, which is indicative of resilience against the effect thereof. Predicting successful adaptations in arduous deployment conditions holds both

occupational and operational combat readiness benefits for soldiers (Nindl et al., 2018).

Application of the BSRS in the SANDF to assess individual resilience, coupled with appropriate interventions (if needed), could address areas of concern in a predeployment phase and be combined with a mid-deployment assessment as part of continuous monitoring, along with a post-deployment assessment in order to identify any domains for further intervention. The multifactorial nature of military stress (Beckner et al., 2021), the performance correlates of resilience (Georgoulas-Sherry & Kelly, 2019) and pre-emptive demands for evolving strategies of adaptation and adjustment to volatile environments foster a need for a multiphase dynamic assessment model.

The BSRS addresses the unique reported areas of stress a deployed SANDF soldier might experience. Major stressor themes related to deployment environments and interpersonal or family relations (Semmelink et al., 2020) align well with the BSRS scales of social and physical fitness. The mental fitness scale displays face validity of fostering the right cognitive and psychological outlook in order to deal well with unexpected challenges on deployment. Physical fitness relates to physiological health and psychological resilience (Nindl, et al., 2018). The use of the instrument in the operational environment in a screening capacity could potentially highlight areas of concern for early intervention, which may fall beyond the scope of routine psychological screenings.

As emotional regulation ability is known to influence mood and resilience, an integrative approach for resilience enhancement training is warranted (Troy & Mauss, 2011). Certain cognitive emotional regulation strategies such as *refocus on planning* and *positive reappraisal* have been found to increase resilience among individuals with mood disorders (Min et al., 2013). Therefore, resilience predeployment training could integrate the training of certain regulation techniques in order to enhance resilience, sustain optimal performance and mitigate the impact of emotional dysregulatory predictors of stress-related disorders (Platania et al., 2020). The results from this study propose a focus on developing reappraisal as an emotional regulation strategy, as a positive significant correlation was found with resilience, whereas suppression did not yield a significant correlation. Furthermore, positive hardiness factors showed stronger correlations than the negative factors with resilience and are potentially indicative of a focus point for resilience enhancement interventions. In conclusion, the BSRS provides the user with an assessment tool that can be utilised to promote and sustain resilience and contribute to the achievement and maintenance of a mission-ready force (Bowen et al., 2016).

Limitations and future research

As the BSRS displayed good psychometric properties, further research is needed on the use of the BSRS as a screening instrument in conjunction with relevant interventions and evaluation of interventions.

Although the BSRS displayed adequate psychometric properties and provides a brief and accurate evaluation of individual resilience in terms of four different facets of resilience, the researcher is of the opinion that one should apply caution when interpreting the result of the social scale. Items from the social scale pertain to family, unit or workplace members and friends, thus providing a general indication of social domain fitness. For intervention purposes, a more specific indication would perhaps be more beneficial. As *family* dynamics were reported as a major stressor on deployment, expansion of the social scale into different subcategories might especially be beneficial for application in the SANDF. An expanded scale could assist the mental health professional with a clearer picture of the area of concern for adequate intervention planning.

The utilisation of the DRS-II in this study was also a limitation, and further research with the DRS-II is proposed. To date, no published research referencing the validation of the DRS-II on a South African sample could be found by the researcher; consequently, numerous aspects were taken into consideration before the inclusion thereof. The DRS-II has been validated on other international military samples (Delahaij et al., 2010; Sinclair et al., 2003). The DRS-II results from refinements made to Bartone's Dispositional Resilience Scale (Bartone et al., 1989), which has been utilised on South African samples. Both these instruments are an adaptation of the Personal Views Survey (Hardiness Institute, 1985). Furthermore, investigation of the DRS-II's psychometric properties supported the six-factor model as proposed by the developers (Sinclair et al., 2003). In the light of these considerations, the DRS-II was included in the study. As the DRS-II yielded favourable results, it is recommended that a separate study should be conducted on larger South African samples in order to further investigate the psychometric properties of this instrument.

Following from the results derived from two arms of services from the SANDF (SAN and SA Army), psychometric properties should be further investigated on samples from the other arms of services (South African Military Health Service and South African Air Force) for potential utilisation of the BSRS across the broader SANDF.

Conclusion

The findings of the study provided preliminary confirmatory evidence for the application of the BSRS as a resilience screening tool in the SA Army and support the application of the BSRS as a tool to screen and stream individuals (Van Wijk & Martin, 2019). The utilisation across the SANDF warrants further investigation, as it has the potential to make a significant contribution to combat readiness of soldiers and the implementation of multiphase intervention strategies.

Acknowledgements

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

All authors contributed equally to this work through design and implementation of the research, as well as the preparation of the manuscript.

Funding information

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Data availability

The data supporting the findings of this study is from a South African National Defence Force sample and therefore not available.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

References

Air Force Instruction 90 – 506 (2014). *Comprehensive Airman Fitness (CAF)*. Department of the US Air Force.

Bartone, P.T., McDonald, K., Hansma, B.J., Stermac-Stein, J., Escobar, E.M.R., Stein, S.J., & Ryznar, R. (2022). Development and validation of an improved hardiness measure: The hardiness resilience gauge. *European Journal of Psychological Assessment*. https://doi.org/10.1027/1015-5759/a000709

Bartone, P., Ursano, R., Wright, K., & Ingraham, L. (1989). The impact of a military air disaster on the health of assistance workers. *The Journal of Nervous and Mental Disease, 177*(6), 317–328. https://doi.org/10.1097/00005053-198906000-00001

Beckner, M.E., Main, L., Tait, J.L., Martin, B.J., Conkright, W.R., & Nindl, B.C. (2021). Circulating biomarkers associated with performance and resilience during military operational stress. *European Journal of Sport Science, 22*(1), 72–86. https://doi.org/10.1080/17461391.2021.1962983

Bentler, P.M., & Bonett, D.G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88*(3), 588–606. https://doi.org/10.1037/0033-2909.88.3.588

Bowen, G.L., Jensen, T.M., & Martin, J.A. (2016). A measure of comprehensive airman fitness: Construct validation and invariance across air force service components. *Military Behavioral Health, 4*(2), 149–158. https://doi.org/10.1080/21635781.2015.1133345

Connor, K.M., & Davidson, J.R.T. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and Anxiety, 18*(2), 76–82. https://doi.org/10.1002/da.10113

Daphne, P. (2020). Positive affect and mindfulness as predictors of resilience amongst women leaders in higher education institutions. *South African Journal of Human Resource Management, 18*, 10. https://doi.org/10.4102/sajhrm.v18i0.1260

Delahaij, R., Gaillard, A., & Van Dam, K. (2010). Hardiness and the response to stressful situations: Investigating mediating processes. *Personality and Individual Differences, 49*(5), 386–390. https://doi.org/10.1016/j.paid.2010.04.002

De Visser, E.J., Dorfman, A., Chartrand, D., Lamon, J., Freedy, E., & Weltman, G. (2016). Building resilience with the stress resilience training system: Design validation and applications. *Work, 54*(2), 351–366. https://doi.org/10.3233/WOR-162295

Doody, C.B., Robertson, L., Uphoff, N., Bogue, J., Egan, J., & Sarma, K.M. (2019). Pre-deployment programmes for building resilience in military and frontline emergency service personnel. *The Cochrane Database of Systematic Reviews, 2019*(1), CD013242. https://doi.org/10.1002/14651858.CD013242

Field, A.P. (2005). *Discovering statistics using IBM SPSS Statistics* (2nd edn.). Sage Publications.

Fletcher, D., & Sarkar, M. (2013). Psychological resilience a review and critique of definitions, concepts, and theory. *European Psychologist, 18*(1), 12–23. https://doi.org/10.1027/1016-9040/a000124

Georgoulas-Sherry, V., & Kelly, D.R. (2019). Resilience, grit, and hardiness: Determining the relationships amongst these constructs through structural equation modeling techniques. *Journal of Positive Psychology & Wellbeing, 3*(2), 165–178. Retrieved from https://journalppw.com/index.php/jpsp/article/view/90

Gilmore, P.W. (2016). *Leading a resilient force: Insights of an Australian General*. Army Research Paper, p. 11. Retrieved from https://researchcentre.army.gov.au/sites/default/files/161107_gilmore_resilient.pdf

Ginton, L.M., Vuong, E., Lake, M.T., Nhapi, R.T., Zar, H.J., Yrttiaho, S., & Stein, D.J. (2022). Investigating pupillometry to detect emotional regulation difficulties in post-traumatic stress disorder. *The World Journal of Biological Psychiatry: The Official Journal of the World Federation of Societies of Biological Psychiatry, 23*(2), 127–135. https://doi.org/10.1080/15622975.2021.1935316

Gross, J.J., & John, O.P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*(2), 348–362. https://doi.org/10.1037/0022-3514.85.2.348

Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate data analysis* (7th edn.). Pearson Education Limited.

Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2019). *Multivariate data analysis* (8th edn.). Pearson Education Limited.

Hardiness Institute. (1985). *Personal views survey*. The Hardiness Institute.

Hellewell, S.C., & Cernak, I. (2018). Measuring resilience to operational stress in Canadian armed forces personnel. *Journal of Traumatic Stress, 31*(1), 89–101. https://doi.org/10.1002/jts.22261

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods, 6*(1), 53–60. Retrieved from https://core.ac.uk/download/pdf/297019805.pdf

Hu, L., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Hystad, S.W., Eid, J., Laberg, J.C., & Bartone, P.T. (2011). Psychological hardiness predicts admission into Norwegian military officer schools. *Military Psychology, 23*(4), 381–389. https://doi.org/10.1080/08995605.2011.589333

Institute for Maritime Medicine. (2018). *Usefulness of the BRUMS for mobilisation/demobilisation of ship-based maritime operations.* Technical report 14 December 2018. Institute for Maritime Medicine.

Kamphuis, W., Venrooij, W., & Van Den Berg, C. (2012). *A model of psychological resilience for the Netherlands armed forces.* Retrieved from https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1086.9456&rep=rep1&type=pdf

Kline, R.B. (2011). Principles and practice of structural equation modeling (5th edn.). The Guilford Press.

Koopman, R., & Van Dyk, G.A.J. (2012). Peacekeeping operations and adjustment of soldiers in Sudan: Peace in the minds and hearts of soldiers? *African Journal on Conflict Resolution, 12*(3), 53–76.

Krueckel, O., Heidler, A., Von Luedinghausen, N., Auschek, M., & Soet, M. (2020). Building resilience and hardiness in military leaders – Robustness training programs of the German army. In U. Khumar (Ed.), *The Routledge International handbook of military psychology and mental health* (pp. 151–163). Routledge.

Maddi, S.R., Harvey, R.H., Khoshaba, D.M., Fazel, M., & Resurreccion, N. (2009). The personality construct of hardiness, IV. *Journal of Humanistic Psychology, 49*(3), 292–305. https://doi.org/10.1177/0022167809331860

Madrigal, L., Hamill, S., & Gill, D. (2013). Mind over matter: The development of the mental toughness scale (mts). *The Sport Psychologist, 27*(1), 62–77. https://doi.org/10.1123/tsp.27.1.62

McNair, D.M., Lorr, M., & Droppleman, L.F. (1971). *Manual for the profile of mood states*. Educational and Industrial Testing Services.

Min, J.A., Yu, J.J., Lee, C.U., & Chae, J.H. (2013). Cognitive emotion regulation strategies contributing to resilience in patients with depression and/or anxiety disorders. *Comprehensive Psychiatry, 54*(8), 1190–1197. https://doi.org/10.1016/j.comppsych.2013.05.008

Nicholson, L.R., Lewis, R., Thomas, K.G.F., & Lipinska, G. (2021). Influence of poor emotion regulation on disrupted sleep and subsequent psychiatric symptoms in university students. *South African Journal of Psychology, 51*(1), 6–20. https://doi.org/10.1177/0081246320978527

Nindl, B.C., Billing, D.C., Drain, J.R., Beckner, M.E., Greeves, J., Groeller, H., Teien, H.K., Marcora, S., Moffitt, A., Reilly, T., Taylor, N.A.S., Young, A.J., & Friedl, K.E. (2018). Perspectives on resilience for military readiness and preparedness: Report of an international military physiology roundtable. *Journal of Science and Medicine in Sport, 21*(11), 1116–1124. https://doi.org/10.1016/j.jsams.2018.05.005

Platania, S., Castellano, S., Petralia, M.C., Digrandi, F., Coco, M., Pizzo, M., & Di Nuovo, S. (2020). The moderating effect of the dispositional resilience on the relationship between post-traumatic stress disorder and the professional quality of life of the military returning from the peacekeeping operations. *Mediterranean Journal of Clinical Psychology, 8*(3), 1–21. https://doi.org/10.6092/2282-1619/mjcp-2560

Semmelink, D.S., Matebula, T.T., & Ngwenya, M. (2020). *A post deployment investigation into the experiences of soldiers in the DRC*. Unpublished research report. Human Factor Combat Readiness Department, Military Psychological Institute.

Shinga, D.N. (2016). Factors involved in combat readiness in Africa. In G. Van Dyk (Ed.), *Military psychology for Africa* (pp. 261–287). African Sun Press. Retrieved from http://www.iamps.org/papers/Shinga_Factors%20involved%20in%20CR%20in%20Africa.pdf

Sinclair, R.R., & Oliver, C.M., Ippolito, J., & Ascalon, E. (2003). *Development and validation of a short measure of hardiness.* Portland State University. Retrieved from http://www.dtic.mil/dtic/tr/fulltext/u2/a562799.pdf

Smith, B.W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine, 15*, 194–200. https://doi.org/10.1080/10705500802222972

Stoppelbein, L., McRae, E., & Greening, L. (2017). A longitudinal study of hardiness as a buffer for posttraumatic stress symptoms in mothers of children with cancer. *Clinical Practice in Pediatric Psychology, 5*(2), 149–160. https://doi.org/10.1037/cpp0000168

Terry, P.C., Lane, A.M., Lane, H.J., & Keohane, L. (1999). Development and validation of a mood measure for adolescents. *Journal of Sports Sciences, 17*(11), 861–872. https://doi.org/10.1080/026404199365425

Troy, A.S., & Mauss, I. (2011). Resilience in the face of stress: Emotion regulation as a protective factor. In S.M. Southwick, B.T. Litz, D. Charney & M.J. Friedman (Eds.). *Resilience and mental health: Challenges across the lifespan* (pp. 30–34). Cambridge University Press.

Tugade, M.M., & Fredrickson, B.L. (2007). Regulation of positive emotions: Emotion regulation strategies that promote resilience. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being, 8*(3), 311–333. https://doi.org/10.1007/s10902-006-9015-4

Van Wijk, C.H. (2011). The Brunel mood scale: A South African norm study. *South African Journal of Psychiatry, 17*(2), 44–54. https://doi.org/10.4102/sajpsychiatry.v17i2.265

Van Wijk, C.H., & Martin, J.H. (2019). A brief sailor resilience scale for the South African Navy. *African Journal of Psychological Assesment, 1*(1), 1–8. https://doi.org/10.4102/ajopa.v1i0.12

Van Wijk, C.H., Martin, J.H., & Hans-Arendse, C. (2013). Clinical utility of the Brunel mood scale in screening for post-traumatic stress risk in a military population. *Military Medicine, 178*(4), 372–376. https://doi.org/10.7205/MILMED-D-12-00422

Wooten, N. (2012). Deployment cycle stressors and post-traumatic stress symptoms in Army National Guard women: The mediating effect of resilience. *Social Work in Health Care, 51*(9), 828–849. https://doi.org/10.1080/00981389.2012.692353

Wu, G., Feder, A., Cohen, H., Kim, J.J., Calderon, S., Charney, D.S., & Mathé, A.A. (2013). Understanding resilience. *Frontiers in Behavioral Neuroscience, 7*, 10. https://doi.org/10.3389/fnbeh.2013.00010