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A Brief Sailor Resiliency Scale for the South African Navy

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Resilience constructs and measures in the military context are of particular interest because of their association with general performance and mental health outcomes. However, in spite of the reported advantages, the use of resilience assessment models faces two challenges: firstly, measurement and, secondly, operational application within the military environment. This article aimed to provide preliminary validation for a Brief Sailor Resiliency Scale (BSRS) for use in the South African Navy (SAN) in order to discuss its operational application for individuals and groups. The study used a sample of active-duty SAN sailors, distributed throughout the fleet. Participants (N = 1312) completed the BSRS, together with established measures of resiliency and emotional regulation, and also provided socio-demographic information. The psychometric structure of the scale was examined, firstly, through confirmatory factor analysis within structural equation modelling, and secondly socio-demographic effects and construct validity were also explored. The model yielded acceptable fit and high internal consistency. Furthermore, the results support the construct validity of the scale. The data appear to support the contention that comprehensive resilience screening measures, while still brief and time-effective, could be employed to the benefit of navy personnel. This would facilitate a 'screen-and-stream' approach which allows military mental health practitioners (1) to *screen* military personnel comprehensively and (2) to identify and *stream* quickly those whose resilience appears to be compromised for further assessment and targeted intervention by appropriate support providers.

Keywords: measurement; resilience; South Africa; screen-and-stream; ICE environments.

Introduction

The Brief Sailor Resiliency Scale (BSRS) is an instrument which aims to measure four core dimensions that are thought to contribute to a comprehensive and global measure of resilience within the military environment, namely mental, physical, social and spiritual fitness. The aim of this article is to demonstrate preliminary validity of the BSRS for local use, in order to discuss the potential operational and, in particular, occupational health applications of the BSRS beyond mere use in resilience research.

Background

Resilience is the process of adapting well in the face of adversity, trauma, tragedy or threats (American Psychological Association, 2019). A number of constructs fall under the umbrella of resilience, such as hardiness (Kobasa, 1979) and mental toughness (Clough, Earle, & Sewell, 2002). These constructs are generally conceptualised as psychological orientations that are associated with people who remain healthy and continue to perform well under a range of stressful conditions (Bartone, Roland, Picano, & Williams, 2008; Kobasa, Maddi, & Kahn, 1982).

An extensive body of research supports the idea that resilience constructs protect against the ill effects of stress on health and performance among a wide variety of civilian occupations and contexts (Bartone, 1989; Gerber et al., 2015; Giles et al., 2018; Maddi & Hess, 1992; Maddi & Kobasa, 1984). In the military, constructs such as hardiness have been shown to influence outcomes among soldiers in various training and combat environments (Bartone, 1996, 1999; Bartone, Johnsen, Eid, Laberg, & Brun, 2002; Bartone, Ursano, Wright, & Ingraham, 1989). Hardy soldiers further appear less likely to develop post-traumatic stress disorder (PTSD) and other mental health conditions after combat exposure (Bartone, 1999, 2000; Bartone, Hystad, Eid, & Brevik, 2012; Escolas, Pitts, Safer, & Bartone, 2013; Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009), and may adapt better both during and after operational deployments (Britt, Adler, & Bartone, 2001).

Resilience constructs and measures in the military context are of particular importance through their association with general performance and mental health outcomes (Lee, Sudom, &

TABLE 1: United States Air Force definitions of four fitness domains.

Fitness domain	Definition
Mental fitness	The ability to cope effectively with unique mental stressors and challenges
Physical fitness	The ability to adopt and sustain healthy behaviours needed to enhance health and well-being
Social fitness	The ability to engage in healthy social networks that promote overall well-being and optimal performance
Spiritual fitness	The ability to adhere to beliefs, principles or values needed to persevere and prevail in accomplishing missions

Source: Air Force Instruction 90-506. (2014 April 02). *Comprehensive airman fitness (CAF)*. Washington, DC: Department of the Air Force.

Zamorski, 2013). Military life is traditionally associated with exposure to challenging conditions, where enhanced degrees of personal resilience are known to facilitate positive health benefits (Simmons & Yoder, 2013) and more meaningful modes of adaptation to the demands of operational work (Morgan & Bibb, 2011). In certain operational environments, such as those typically faced by naval forces, a number of occupational groups work in isolated, confined and/or extreme (ICE) environments (e.g. on ships and in submarines), which adds an additional layer of potentially stressful environmental circumstances (Smallidge et al., 2013). Moreover, naval deployments have also been shown to give rise to peculiar operationally specific stressors and traumatic exposures, which can act as potential compromisers of sailors' resilience (Martin, Van Wijk, Hans-Arendse, & Makhaba, 2013). In both instances, enhanced styles of resilience may be particularly beneficial for naval personnel in withstanding the rigours of military work and life. In this regard, the ability to meaningfully measure resilience in military populations has increasingly become important because of the occupational and operational advantages that such research yields (Xie, Peng, Zuo, & Li, 2016). For example, it helps to identify:

- operationally at-risk individuals, in order to offer additional support
- behavioural targets for intervention
- resilience associated protective, promotive and/or compromising factors
- the effects of interventions on individual or organisational levels.

However, there are challenges when directly measuring psychological resilience by means of psychometric measures, especially in unique ICE environments. Thus, within military contexts, resilience is often assessed through proxies, such as 'adaptation, satisfaction, and other "competent functioning" indicators' (Wright, Riviere, Merrill, & Cabrera, 2013, pp. 175–176), rather than resilience per se.

As mentioned in the above definition, resilience is conceptualised as an iterative process of adaptation and adaptability. The proxies used to assess it may be considered as expressions of *resiliency*. Resiliency is conceptualised as an outcome of the resilience process, which – at least in the military – is reflected in the successful performance of important personal and military life roles (Bowen & Martin, 2011). Sailors' ability (also called readiness) to fulfil their military roles is often referred to as their fitness for duty. Fitness, in this use of the word, is a resilience resource (i.e. a resource that facilitates resiliency). The model investigated in this article provides for four fitness domains, which collate into a total fitness construct, using the United States Air Force (USAF) definitions (see Table 1) that centre on 'ability' to cope and adapt (and that are measured by behavioural outcomes, i.e. resiliency indicators). Total fitness has been reported to have a direct and positive influence on performance-based resiliency (Bowen, Jensen, & Martin, 2016a; Bowen & Martin, 2011).

In spite of the reported advantages, the use of resilience/resiliency models faces two challenges: firstly, measurement and, secondly, operational application in specific contexts.

Measuring fitness in isolated, confined and/or extreme contexts

There are a multitude of scales available in the general literature that purport to measure aspects of resilience, many of them relatively effective in predicting resilience in the face of real adversity. However, naval – and ICE – environments are often quite unique, and established measures are not always a good fit. Further, tools often measure general dispositional orientation, rather than behaviours in specific contexts. Given the naval context, a measure of behaviours and beliefs may be more useful in that it could provide sailors with a means (e.g. an action) to both measure and enhance their resilience. Thus, fitness-in-context, as a building block of resilience, may be particularly appropriate. Such a scale already exists, having been developed in the USAF context.

Bowen, Jensen and Martin (2016a, 2016b) developed a tool to assess comprehensive airman fitness (CAF), and conducted rigorous factor and multiple group comparison analyses to empirically validate a 12-item measure of the four fitness components and an overall component of comprehensive fitness. Their results verified the presence of the four distinct fitness factors (mental, physical, social and spiritual), each measured with three observed indicators, with high levels of internal consistency within factors. It also demonstrated that the four individual fitness constructs loaded onto a second-order latent construct of total fitness, thus confirming that the four fitness domains can be considered as a total measure of fitness.

Bowen et al. (2016a) further demonstrated construct validity of the CAF measure by using a self-assessed performance-based measure of military resiliency. This measure was defined as a latent factor with three observed variables (Bowen et al., 2016a), and the indicator was derived from measuring human performance within the inherently stressful conditions of military duties and service life (Bowen & Martin, 2013). Their analyses also showed that the CAF instrument was invariant across subgroups defined by military pay grade, gender, marital status and deployment

status in the past 12 months – a desirable characteristic of any assessment tool used within a diverse target population such as the military (Bowen et al., 2016b, p. 441).

Operational application of measures

Measures are typically used as markers of resilience in larger research projects, with their scores then associated with other data that are thought to reflect mental health or performance. However, there has been less discussion on how individual scores could be used to enhance resilience, and presumably mental health, in target groups or larger populations.

The need to develop contextually appropriate and comprehensive measures of resilience in military populations has in recent years become an increasingly topical matter (Adler & Sowden, 2018; Greene & Staal, 2017). This is firstly because of the increasing demand on military mental health practitioners (MMHPs) to render health support services – to large numbers of military personnel over the short periods of time that are allotted during pre-and post-deployment readiness and decompression cycles – in far more (cost-) efficient and time-effective ways (McDonald, Beckham, Morey, & Calhoun, 2009). Secondly, there is a need to timeously identify (potential) psychological casualties whose fallout may be preventable through proactive and multidimensional health interventions to enhance their overall level of resilience (Castro, Engel, & Adler, 2004; Jones, Hyams, & Wessely, 2003). In other words, the future trajectory of military resilience measures is likely to be informed by what the researchers of this study regard as a 'screen-and-stream' (or SAS) approach, which allows MMHPs: (1) to *screen* military personnel comprehensively by means of a timeously administered, scored and analysed resilience measure and (2) to quickly identify and *stream* those military personnel whose resilience appears to be compromised towards further assessment and targeted intervention by appropriate MMHPs or support providers.

Operational application in the above framework refers to the practical use of a screening tool in a specific context to support positive outcomes, for example using the BSRS in the military context to identify poor resiliency in order to provide further support and targeted interventions.

Aims

This article aimed to propose and discuss a practical application of resilience scales generally, and the BSRS in particular, supported by underlying psychometric data. It did so in two parts. Firstly, the CAF measure has been developed and validated by using data from the USAF. The current study thus aimed to provide a preliminary validation of a modified version of the measure (BSRS) for use in the South African Navy (SAN). This was done by exploring three aspects of the psychometric properties of the scale in a SAN sample, namely:

- exploring the psychometric structure of the scale by using confirmatory factor analysis (CFA) within structural equation modelling, and internal reliability analysis
- exploring socio-demographic associates, namely the effects of age, gender and experience (operationalised as years of military service, and number of operational deployments)
- exploring scale validity.

Construct validity was examined by correlating the four fitness components, and total fitness, with a resiliency measure (the Military Resiliency Scale [MRS]) to replicate the analysis of Bowen et al. (2016a). Convergent validity was further examined by correlating the four fitness components, and total fitness, with a measure of emotional self-regulation (the Brunel Mood State Scale [BRUMS]), as a proxy for psychological adaptation, in a sample of deployed sailors.

Thereafter, given the criticism of resilience scales regarding the management of individual or group specific findings in practical terms, and based on the demonstrated psychometric data, this article further aimed to propose and discuss an operational application of the BSRS beyond its limited use as a resilience marker in formal research.

Methods

Participants

The study was conducted according to the principles set out in the Declaration of Helsinki (World Medical Association, 2013), and had received prior ethical approval from Stellenbosch University. South African Navy sailors on active duty were invited to participate anonymously in the study and were briefed that completion of the measures indicated consent. A total of 1312 SAN sailors (women = 21.4%, men = 78.6%) returned completed data sets. Table 2 presents the sample composition. A subsample ($N = 275$), drawn from two warships, also completed the BRUMS during operational deployments. They indicated code numbers on the BSRS for later correlation to their BRUMS scores. All data were anonymised prior to analysis.

All participants had a minimum of 12 years of formal education, and all 11 South African official languages were spoken within the sample. The scale was administered in English, as the sample was considered to be proficient in English, which is the official command language of the SAN, and the language in which all training takes place.

Measurements

Brief Sailor Resiliency Scale: The BSRS is based on the CAF measure of Bowen et al. (2016a, 2016b), and so named to fit

TABLE 2: South African Navy sample composition ($N = 1312$).

Variable	Sample	*M*	SD	Range
Age (in years)	Full sample	31.1	7.6	20–62
	Women	29.2	5.6	21–58
	Men	31.6	8.0	20–62
Years of service	Full sample	10.1	7.3	1–42
	Women	8.3	5.6	1–38
	Men	10.5	7.7	1–42
Number of operational deployments	Full sample	2.3	3.5	0–30
	Women	1.3	1.9	0–10
	Men	2.6	3.8	0–30

M, mean; SD, standard deviation.

into the terminology framework employed by the SAN. The BSRS is a 12-item measure of the four fitness components (namely mental, physical, social and spiritual), which can be calculated to obtain a comprehensive fitness score. Each fitness component is measured by means of three indicators. Data from the USAF indicate that the scale consists of four distinct first-order factors with high levels of internal consistency within factors, and that all four factors load onto a second-order factor of comprehensive fitness. Good construct validity has been demonstrated (Bowen et al., 2016a, 2016b). All items were completed using a Likert scale format (anchored at 0 – not at all and 4 – completely). This 5-point Likert scale differed from the original CAF measure, which employed an 11-point scale; the range was chosen to be aligned to other measures used in the local SAN context, which typically uses 5-point scale formats. The 11-point range was further narrowed to accommodate second-language English speakers – who form the majority of this sample and the SAN in general. Previous experience indicated that second-language English speakers found discerning the semantic nuances in an 11-point scale challenging.

Military Resiliency Scale: The MRS is a self-assessed performance-based measure of military resiliency (Bowen et al., 2016a), consisting of three observed variables that tap human performance within military service life (Bowen & Martin, 2013). Responses are indicated on a 5-point Likert scale; support for validity indicators (Bowen & Martin, 2013), as well as an alpha coefficient of 0.81 (Bowen et al., 2016a), was reported previously.

Brunel Mood State Scale: The BRUMS is a 24-item self-report inventory that measures mood states on a 5-point Likert scale (McNair, Heuchert, & Shilony, 2003; Terry, Lane, & Fogarty, 2003). Good concurrent and criterion validity, as well as reliability, have been reported both internationally (McNair et al., 2003; Terry et al., 2003) and locally (Terry, Potgieter, & Fogarty, 2003). Among others, it has been used during military deployments to predict self-reported post-traumatic stress symptoms after maritime interdiction operations (Van Wijk, Martin & Hans-Arendse, 2013). The BRUMS is sensitive to changes in emotional regulation, and is regularly used in the SAN as an indicator of psychological adaptation during operational deployments in specific ICE contexts (Institute for Maritime Medicine, 2018). In this context, adaptation is a proxy for resiliency (i.e. an outcome of resilience), and BRUMS total scores were used for correlation to BSRS scores to examine convergent validity.

Data analysis

Descriptive analysis was conducted through score distribution and tests of normality. The psychometric structure of the scale was examined by CFA within structural equation modelling, and internal reliability analysis. Confirmatory factor analysis is a special form of factor analysis, used to test whether data fit a hypothesised measurement model (Marker, 2002). With the original factor structure of the scale established in USAF samples, CFA was employed to verify the relationships between the observed variables and their underlying latent constructs in a local SAN sample. Further information on CFA indices can be found in Appendix 1 – Table 2-A1. Socio-demographic effects were examined by using bivariate correlation coefficients (for age and experience) and independent *t*-tests (for gender). Construct validity was also examined by using bivariate correlation coefficients of BSRS scores and MRS and BRUMS scores. All analyses were conducted by means of Statistical Package for Social Sciences (SPSS version 25) and analysis of moment structures (AMOS).

Ethical consideration

The study received approval from the Health Research Ethics Committee of Stellenbosch University (protocol number: N16/04/051).

Results

Normality distribution

The total fitness score had a mean of 38.3 and a standard deviation of ± 6.4. It is graphically represented in Appendix 1, Figure 1-A1. Tests of univariate normality were conducted, and it was found that all skew index values were less than 2 and all kurtosis index values were less than 3 (Appendix 1, Table 1-A1), thus indicating that the distributions of responses were not necessarily problematic (George & Mallery, 2010).

Confirmatory factor analysis

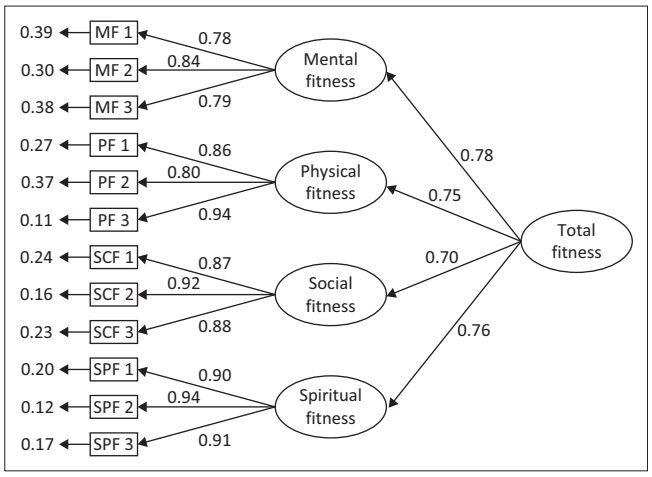
The 12-item BSRS was subjected to CFA, and the results associated with the final model are displayed in Figure 1. The model yielded acceptable fit, as indicated by the following model fit indices: χ^2 (48) = 159.59, $p < 0.001$; root mean square error of approximation (RMSEA) = 0.042 (95% confidence interval [CI]: 0.035–0.049); comparative fit index (CFI) = 0.998; goodness-of-fit index (GFI) = 0.998; and adjusted goodness-of-fit index (AGFI) = 0.995. Standardised first-order factor loadings ranged from 0.78 to 0.94, and second-order factor loadings ranged from 0.70 to 0.78. Expanded goodness-of-fit indices and factor correlations can be found in Appendix 1, Tables 2-A1 and 3-A1.

Reliability

The 12-item BSRS comprehensive fitness scale produced a Cronbach's alpha (α) of 0.874. Mental fitness (α = 0.745), physical fitness (α = 0.851), social fitness (α = 0.873) and spiritual fitness, (α = 0.892) all produced acceptable alphas. Apart from mental fitness, which differed somewhat from α = 0.90 reported in the validation studies, the rest were similar to published reports (cf. Bowen et al., 2016a, 2016b).

Socio-demographic associations

The correlations between BSRS and age, years of military service and number of operational deployments are presented



Note: Values in the left column reflect variance; other values reflect item loading.
MF, Mental fitness; PF, Physical fitness; SCF, social fitness; SPF, spiritual fitness

FIGURE 1: Final model with standardised estimated parameters.

TABLE 3: Correlations between socio-demographic variables and Brief Sailor Resiliency Scale comprehensive fitness scores.

Variable	Sample	*r*	*p*
Age (in years)	Full sample	0.19	< 0.001
	Women	0.11	0.074
	Men	0.20	< 0.001
Years of service	Full sample	0.22	< 0.001
	Women	0.13	0.027
	Men	0.22	< 0.001
Number of operational deployments	Full sample	0.13	< 0.001
	Women	0.05	0.415
	Men	0.13	< 0.001

in Table 3. Men scored higher than women ($t = 4.160$, $p < 0.001$, Cohen's $d = 0.28$, mean difference = 1.8), although the actual size of the difference was very small.

Scale validity

The correlations between the BSRS first- and second-order factors and the measure of resiliency are presented in Table 4, as are the correlations with a measure of emotional regulation. Brief Sailor Resiliency Scale's total and component scores all predicted resiliency ($p < 0.001$ for all), as well as emotional regulation (as a proxy for psychological adaptation; $p < 0.001$ for all) during an operational deployment.

Discussion

Preliminary validation of the Brief Sailor Resiliency Scale in the South African Navy context

The findings provide a preliminary validation of the BSRS for use in the SAN. The analysis confirmed the previously reported factor structure and internal reliability (Bowen et al., 2016a, 2016b). The findings support the model of four distinct fitness domains (mental, physical, social and spiritual) that can be considered to contribute towards a more global measure, namely the second-order factor of comprehensive fitness. It was noteworthy that the variables age, years of military service and number of operational deployments, all displayed similar trajectories, suggesting

TABLE 4: Brief Sailor Resiliency Scale construct validity indicators.

Variable	Resiliency (MRS)		Emotional regulation (BRUMS)	
	r	*p*	*r*	*p*
Comprehensive fitness	0.52	< 0.001	-0.48	< 0.001
Mental fitness	0.44	< 0.001	-0.52	< 0.001
Physical fitness	0.34	< 0.001	-0.47	< 0.001
Social fitness	0.40	< 0.001	-0.26	< 0.001
Spiritual fitness	0.39	< 0.001	-0.26	< 0.001

MRS, Military Resiliency Scale; BRUMS, Brunel Mood State Scale.

that all three may be tapping into the same construct, perhaps in this case 'life experience', which is generally operationalised as age. Although small variations across gender and age were observed, this could be because of the distribution of age and discrepant gender subgroups, and would likely not have practical significance in the application of the BSRS. Furthermore, the findings replicated support for the construct validity of the scale (Bowen et al., 2016a), and further extended support for its validity, in that BSRS score outcomes appeared to predict actual psychological adaptation in ICE contexts. In practice, this may mean that some indicators of problematic adaptation during ICE missions could possibly be predicted in advance with the BSRS, leading the way towards considering timely intervention.

Operational application: Towards a screen-and-stream approach

The establishment of preliminary psychometric properties sets the scene for considering the operational application of resilience scales, referring to its use in specific contexts. In this regard, the findings of this study appear to support the contention that comprehensive resilience screening measures, while brief and time-effective, such as the BSRS, hold both occupational and operational health benefits for military personnel, broadly, and naval personnel, in particular. While the BSRS appears psychometrically valid in providing an overall measure of comprehensive fitness, it demonstrates its operational application through the psychometrically sound and nuanced rendering of resiliency through subscales of mental, physical, social and spiritual fitness. The use of the BSRS therefore provides a screening measure of specific core dimensions, which underwrite the overall resilience of military personnel, and in effect aid in assessing the resilience dimension of a particular sailor's combat and operational readiness. In doing so, MMHPs who use the BSRS are provided with clear psychometric indicators concerning those sailors – be they individuals or teams – who may require further assessment and perhaps benefit from targeted resilience-enhancing interventions.

In the South African National Defence Force, much like many other militaries around the world (Firth & Smith, 2010), the occupational health and welfare of military service personnel is regarded as multifaceted and informed by physiological (e.g. biological), psychological (e.g. emotional), social (e.g. familial) and spiritual (e.g. religio-cultural belief system) determinants (South African Military Health Service, 2008). To this effect, the practice of military health support and

service provision is often circumscribed by the involvement of multi-professional teams which involve the co-participation of various health and support professionals, such as physicians, psychologists, social workers and chaplains, who work together to collectively manage, treat and proactively enhance the occupational well-being and, by extension, operational health and utility of military personnel.

While comprehensive military health support systems are necessary for sustaining the health of operationally active military personnel, such systems are also prone to laborious, time-intensive and often over-burdened and under-staffed referral channels. As a consequence, operationally at-risk individuals may 'get lost in the system' or 'fall through the cracks' because of poorly articulated or inefficient referrals for further assessment and intervention. However, the BSRS provides a concise multidimensional screening of resilience, through which specific dimensions of potentially compromised resilience can be identified and 'streamed' to the most appropriate MMHP or support professional for further assessment and intervention. In this regard, the BSRS becomes especially valuable for the MMHPs who work with the operationally active sailors of the SAN, whose military work and life is increasingly characterised by regular deployments and a high operational tempo by virtue of the leading role that the SAN plays in maritime border patrol (defenceWeb, 2019) and multinational anti-piracy operations along the southern coasts of Africa (defenceWeb, 2018).

Importantly, the SAS approach is by no means limited to naval or general military contexts, and could also be considered for translation and application in other occupational environments with exposure to challenging conditions, and which require ongoing and meaningful modes of adaptation to the operational demands placed on those personnel. Such occupational contexts may range from the South African Police Service or Emergency Medical or Rescue Services to the offshore industry that typically lives and works in ICE conditions.

Limitations and future directions

The briefness of the subscales, and the very high values of the model fit indices, may suggest some over-fitting or saturation of the BSRS model (Marker, 2002), and caution is advised when interpreting these results. Further research using different data sets may assist to resolve this concern.

The study used a limited array of markers to represent the outcome of resilience, and future studies may need to extend the measuring of psychological adaptation and mental health, as well as the measuring of actual work performance to enhance understanding of the relationship between comprehensive sailor fitness and well-being in the naval context. Further research is also required to establish the extent to which this model can be transferred to other related occupational contexts.

Another issue worth noting is the conceptualisation of spiritual fitness within the BSRS. Although the measure of spiritual fitness in this research was found to be both valid and reliable, the operationalisation of the spiritual fitness subscale and items adhered quite closely to the original CAF-based articulation of spiritual fitness in the USAF environment. To this effect, it may still be necessary to broaden the conceptualisation of spiritual fitness for SAN sailors who draw from diverse, intersecting and often competing religio-cultural, indigenous and cosmological systems which inform how they understand and sustain spiritual fitness as a facet of personal resilience within the military environment.

Conclusion

This study established the potential of the BSRS to assess for resilience outcomes among SAN sailors. It further proposes an operational application, namely a 'screen-and-stream' model, as a valid and cost-effective way to provide appropriate support to individuals and groups with potentially compromised aspects of resilience.

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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 by collecting the data, analysing the results and writing the manuscript.

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Data availability statement

The data is from a military sample, and thus not available for sharing.

Disclaimer

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Appendix 1

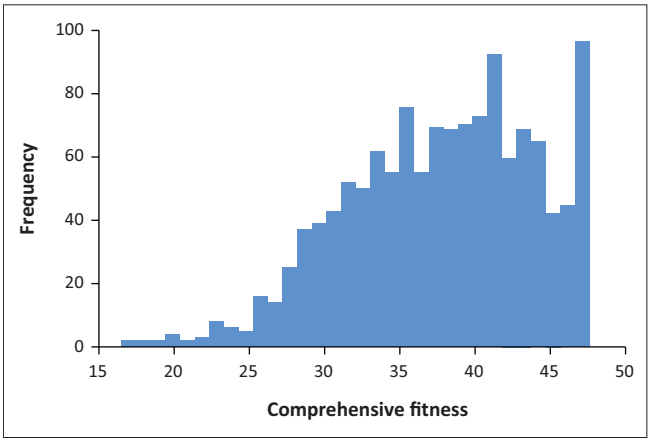

FIGURE 1-A1: Distribution of the comprehensive fitness score.

TABLE 1-A1: Normality metrics for the Brief Sailor Resiliency Scale (N = 1312).

	M	SD	Skewness	Kurtosis
Comprehensive fitness	38.30	6.4	-0.467	-0.220
Mental fitness	10.39	1.6	-0.998	1.050
MF 1	3.38	0.7	-1.036	0.768
MF 2	3.63	0.6	-1.267	1.059
MF 3	3.39	0.7	-0.793	0.478
Physical fitness	8.79	2.2	-0.354	-0.331
PF 1	2.97	0.8	-0.468	-0.127
PF 2	2.78	0.9	-0.284	-0.528
PF 3	3.04	0.8	-0.423	-0.384
Social fitness	8.99	2.7	-0.691	-0.143
SCF 1	3.18	1.0	-1.019	0.322
SCF 2	3.00	1.0	-0.727	-0.142
SCF 3	2.81	1.0	-0.518	-0.456
Spiritual fitness	10.13	2.1	-1.348	2.378
SPF 1	3.46	0.8	-1.567	2.895
SPF 2	3.35	0.8	-1.244	2.062
SPF 3	3.31	0.8	-1.282	2.122

M, mean; SD, standard deviation; MF, Mental fitness; PF, Physical fitness; SCF, social fitness; SPF, spiritual fitness.

TABLE 2-A1: Goodness-of-fit indices for the Brief Sailor Resiliency Scale.

Indices	Result	Requirement	Outcome
RMSEA	0.042	< 0.06	Acceptable fit
p-value	0.962	-	-
95% CI	0.035–0.049	-	-
χ^2	159.59	-	Questionable fit
p-value	< 0.001	> 0.05	-
df	48	ratio χ^2 to $df \leq 3$	-
CFI	0.998	>.95	Acceptable fit
GFI	0.998	>.95	Acceptable fit
AGFI	0.995	>.95	Acceptable fit
AVE			
Mental fitness	0.64	> 0.50	Acceptable
Physical fitness	0.75	-	Acceptable
Social fitness	0.74	-	Acceptable
Spiritual fitness	0.74	-	Acceptable
CR			
Mental fitness	0.84	> 0.70	Acceptable
Physical fitness	0.90	-	Acceptable
Social fitness	0.92	-	Acceptable
Spiritual fitness	0.94	-	Acceptable

RMSEA, root mean square error of approximation; CFI, comparative fit index; GFI, goodness-of-fit index; AGFI, adjusted goodness-of-fit index; AVE, average value explained; CR, critical ratio; CI, confidence interval.

TABLE 3-A1: Brief Sailor Resiliency Scale factor correlations

Domains	Mental fitness	Physical fitness	Social fitness	Spiritual fitness
Mental fitness	-	-	-	-
Physical fitness	0.69	-	-	-
Social fitness	0.51	0.41	-	-
Spiritual fitness	0.58	0.52	0.58	-