

First steps in the development of a resilience measure

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The demands faced by those who work within a military context require individuals to cope with difficult and challenging circumstances – physically, cognitively, emotionally and socially. Thus the understanding and measurement of resilience – with associated other terms such as mental hardiness, grit, etc. – has been identified as an important construct to consider within military selection and placement processes. New items targeting the construct of resilience were developed and included in a research project involving operational forces applicants. Inclusion of 40 new items was aimed at obtaining preliminary data for the first steps in the potential development of a new measure of resilience.

A sample of 251 participants who had applied to participate in the South African Operational Forces selection process was used for this research. Various other self-report positive psychology measures (of hardiness, sense of coherence, locus of control and self-efficacy) were also administered to the same group over a period four days. Both classical test theory (CTT) and Rasch data analysis methods were used. Exploratory factor analysis showed a two-factor model solution that best satisfied statistical and theoretical considerations. Rasch analysis allowed for further exploration of the items and identified factors and was also used to conduct differential item functioning for race group comparisons to eliminate biased items. Coefficient alpha internal consistency reliability of .793 and .751 were shown for the two factors. Correlations between the identified two dimensions and existing positive psychology constructs showed construct validity with hardiness, sense of coherence and self-efficacy.

1. Introduction

Positive psychology refers to a large and growing body of knowledge consisting of theories and research in which emphasis is placed on normal to optimal individual functioning. Good general coping resources are particularly important in the military environment and constructs such as hardiness, resilience, grit and coping have been explored in research to try and address the recruitment, training, selection and retention challenges specific to the military milieu (Maddi, 2013; Skomorovsky, 2013). The understanding and measurement of resilience has been identified as an important construct to consider within military selection and placement processes.

2. Literature review

Narayanan (2008) described resilience as the capacity of individuals to cope with stress and catastrophe. According to Lee, Sudom and McCreary (2011) there is still no universally accepted definition of psychological resilience. Related terms and constructs such as mental hardiness, mental toughness, grit, coping, courage etc. have been used and researched within the military context. These constructs are relevant for members serving in the military who are required to function in stressful contexts associated with the military. Based on theoretical and empirical considerations, 40 new items targeting the construct of resilience were developed to be included in a research project involving operational forces applicants as first steps in the development of a new measure of resilience. In particular the element of tolerance for boredom and repetitive activities referred to by Maddi (2013) was of interest to the researchers. Other positive psychology variables included in the current study were used for evaluating the construct validity of the prospective new measure. These include hardiness, sense of coherence, locus of control and self-efficacy.

Hardiness

Maddi (2013) emphasised the relevance of hardiness (Figure 1) for selection and preparation of candidates who are required to function in stressful contexts such as the military.

Hardiness

Research conducted in the Illinois Bell Telephone (IBT) company over a 12-year period between 1975 to 1987 showed that resilient employees showed hardy attitudes which could be described in three sub-dimensions:

- Commitment** : remaining involved despite stressful circumstances – as that is the meaningful thing to do – as opposed to pulling back into isolation or alienation;
- Control** : maintaining the struggle to have influence on the outcomes – however hard it seems – as opposed to sinking into passivity and powerlessness; and
- Challenge** : seeing changes as an opportunity to learn and gain wisdom – as opposed to wishing for easy comfort and security (Maddi, 2013).

Figure 1

Sense-of-coherence

The sense-of-coherence concept (Figure 2) focuses on coping with adversity and stress by using cognition (comprehensibility), emotion (manageability) and personal motivation (meaningfulness) to cope with and better manage stressors (Antonovsky, 1987).

Sense of Coherence

Sense-of-coherence refers to a global orientation – expressed as a pervasive, enduring and dynamic confidence that stimuli and demands are structured and make cognitive sense; that resources are available so that stressors and demands are perceived as manageable and that the demands are worthy of investing in or engaging with in a meaningful manner. Three sub-dimensions are identified:

- **Comprehensibility** – being able to make cognitive sense of stressors ;
- **Manageability** – perceiving resources as available to cope with the demands of the environment ; and
- **Meaningfulness** – believing challenges to be worthy of investment and engagement and being able to emotionally identify and commit effort to the handling of these demands (Antonovsky, 1987).

Figure 2

Locus of Control

The construct of locus of control (Figure 3) explains personal motivation with a distinction made between the external and internal motivational orientation of individuals (Rotter, 1989).

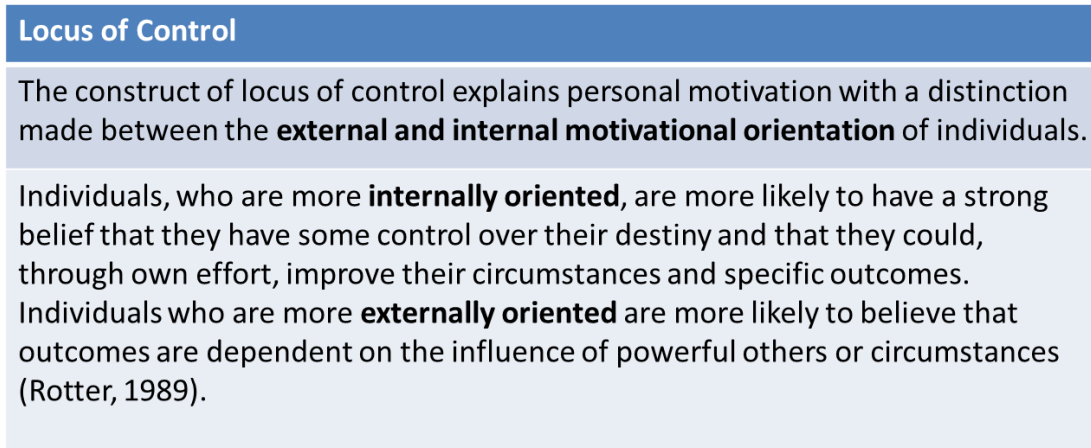


Figure 3

Self-efficacy

Self-efficacy (Figure 4) points to the belief of having the resources and capabilities to meet various demands. Gruber et al. (2009) investigated the effect of social support and self-efficacy on soldiers' completion of a physically challenging military programme. The results showed that self-efficacy was statistically significantly and positively related to completion of the programme

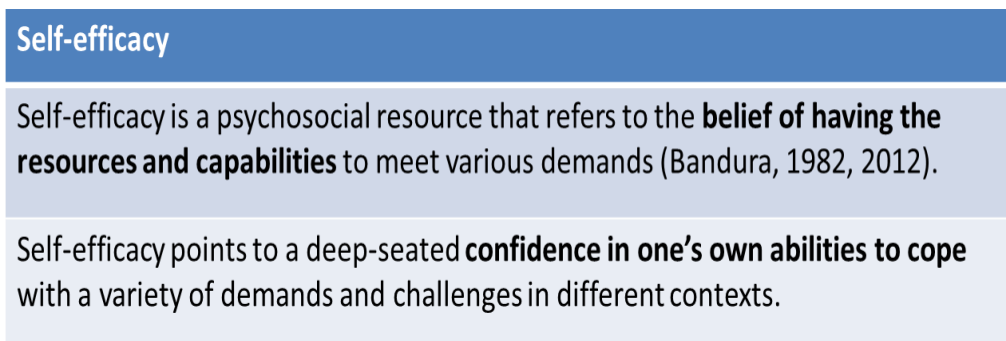


Figure 4

3. Aim

The aim of this component of the study was to commence a process of development of a new measure of resilience. New items were piloted as part of an ongoing approved research project. Data was also gathered on other positive psychology construct measures (hardiness, sense of coherence, locus of control and self-efficacy) for the same participants. In South Africa, the

Employment Equity Act (1998) prescribes that psychological testing and similar assessments are prohibited, unless the test is scientifically shown to be valid and reliable, can be applied fairly to all employees, and is not biased against any employee or group.

Steps in developing a measure include:

1. Specifying the aim of the measure
2. Defining the content
3. Test specifications
4. Writing the items
5. Reviewing the items
6. Assembling and pretesting of the measure
7. Item analysis (difficulty-value, discrimination-value, item bias)
8. Selecting items for the final version
9. Administration to standardization sample
10. Establish norms
11. Compiling the test manual
12. Submitting the measure for classification
13. Publishing and marketing the measure
14. Ongoing revision and refinement

4. Research Design

A convergent, parallel, mixed-method, cross-sectional survey research design was used for the gathering of quantitative and qualitative data in the larger umbrella project. This project was focused on the first steps in the development of a new measure of resilience.

5. Sample

The sample (n=251) consisted of individuals who presented themselves for the pre-selection preparation for the Operational Forces selection process in the SANDF. Only one female participated along with 250 males. The mean age of the sample was 25.41 years with ages ranging between 20 and 34 years. The culture group composition of the sample group was 223 African (88.8%), 15 mixed race (6%), 1 Indian (0.4%) and 12 Caucasian (4.8%). The majority (87%) had completed a secondary school qualification (the minimum requirement) and the

remainder (13%) held a tertiary level qualification. Research on specialist military roles has focused on a variety of aspects such as resilience (Bartone, 2006), hardiness (Kelly et al., 2014; Maddi, 2013) and coping (Jensen & Wrisberg, 2014). The culture group composition of the sample group was 223 African (88.8%), 15 mixed race (6%), 1 Indian (0.4%) and 12 Caucasian (4.8%). In terms of first languages, the sample group could be considered reasonably representative of the 11 language groups (Afrikaans 10.2%, English 24.8%, isiNdebele 4.2%, isiZulu 11.42%, isiXhosa 15.4%, Sepedi 10.2%, Sesotho 7.7%, Setswana 14.2%, Siswati 1.2%, Tshivenda 1.2%, Xitsonga 1.2%). The average number of languages that participants are fluent in is 3.8 (ranging between 1 and 9), which attests to the multicultural and multilingual South African environment. Of the 251 participants who participated in the research and in the preparation phase, 75 went through to participate in the selection process and 26 of them were successful in the selection.

6. Measuring Instruments

Hardiness

The 50-question Personal Values Scale (Kobasa, 1979) comprising three different sub-dimensions, namely commitment, control and challenge was used.

Sense of Coherence

The 29-question Orientation to Life questionnaire is based on the salutogenic model of Antonovsky (1987) with three sub-dimensions, namely comprehensibility, manageability and meaningfulness.

Locus of Control

The 29-question Locus of Control questionnaire (Rotter, 1989) was used.

Self-efficacy

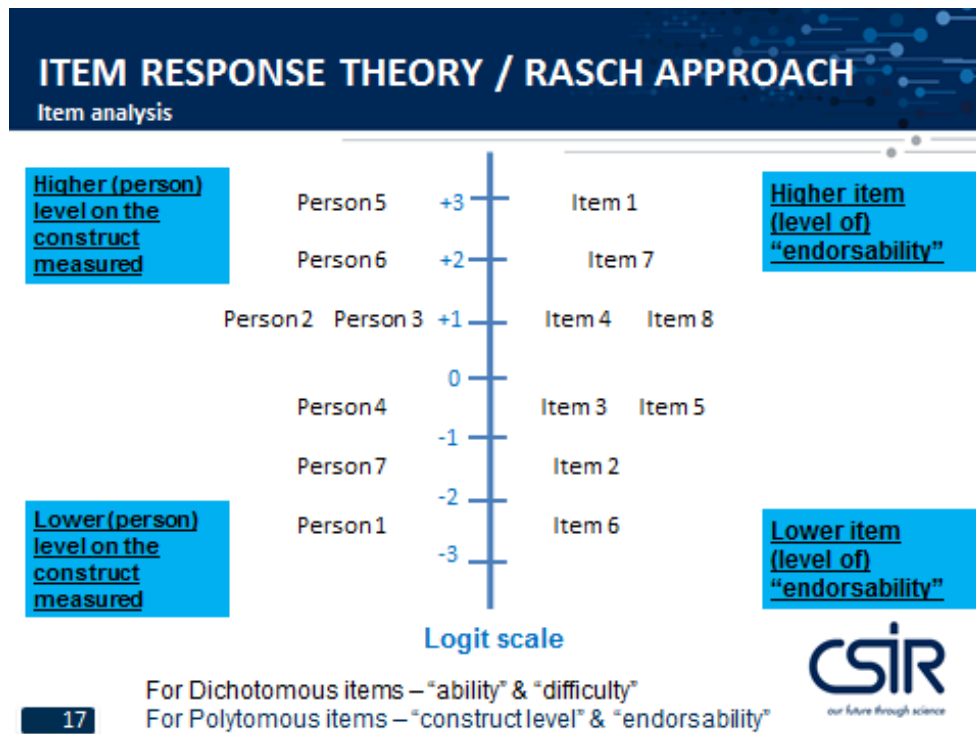
Both the 8-question New General Self-Efficacy (NGSE) and the 10-question General Self-Efficacy (GSE) scales were used to measure self-efficacy (Rimm & Jerusalem, 1999).

7. New resilience items

A total of 40 new questions - using a 5-point Likert scale format - were developed and administered (Figure 5). From the literature as well as contextual interview data, the following domain areas were identified as relevant for the measurement of general coping or resilience:

Conceptual sub-dimensions	Example items
General coping (psychological & physical endurance)	“I feel better quickly after being criticised.” “I can cope with physical discomfort without complaining.”
Maturity (groundedness)	“I know what my strengths and weaknesses are.” “Others would describe me as mature.”
Patience (boredom tolerance)	“I can find meaning in routine activities.” “I don’t mind performing repetitive tasks.”
Interpersonally adaptable (easygoing)	“Others will describe me as easy to get along with.” “I take things as they come. “

Figure 5



8. Ethical Considerations

An approved ongoing research project allowed for the assessment of a group of Operational Forces applicants to obtain further profile data within this domain. Ethical approval for the project was obtained and commanding officers were included in the arrangements for the particular assessments. The process was overseen by a psychologist who was available for any questions by the participants during the assessment.

9. Purpose

The purpose of the study, voluntary participation and informed consent were explained to participants as part of the ethical research requirements.

10. Procedure

The different measures and new items were administered over a four-day period. A dedicated venue for the assessment was prepared and a schedule compiled for groups of participants to complete the assessments. Participants were informed of the purpose of the study and were assured that their information would be kept secure and fully confidential and that participation was voluntary. Participants completed and signed consent forms for their results to be used for research.

11. Development Process

1. Phase 1: Construct identification – resilience
2. Phase 2: Item writing according to conceptual framework (face & content validity)
3. Phase 3: Factor analysis – exploring the underlying structure (qualitative-quantitative-theoretical process)
4. Phase 4: Item analysis (CTT and Rasch analysis)
5. Phase 5: Reliability
6. Phase 6: Construct validity
7. Phase 7: Predictive validity

12. Data Analysis

CTT Measure

- Descriptive statistics – data cleaning
- Recoding (reverse scoring some items)
- Factor analysis
- Factor identification, naming, reliability, scoring, distribution
- Correlation analysis (convergent, discriminant, construct & predictive validity)
- Comparison of groups

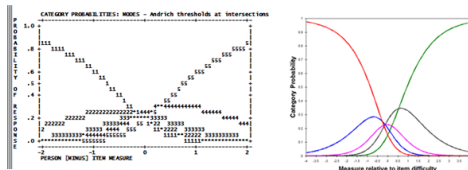
Rasch Analysis

- Polarity
- Rating scale analysis
- Item location
- Item-person map
- Reliability
- Differential item functioning analysis

Rasch analysis

Factor 1 - Adaptability

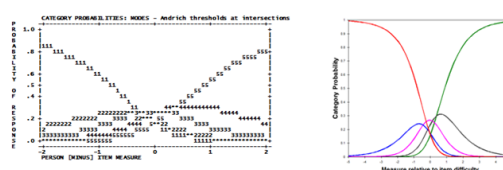
- Polarity check
- Rating scale structure & category fit (monotonically increasing thresholds & category averages, category infit/outfit)



- Cronbach Alpha = .72 / .78

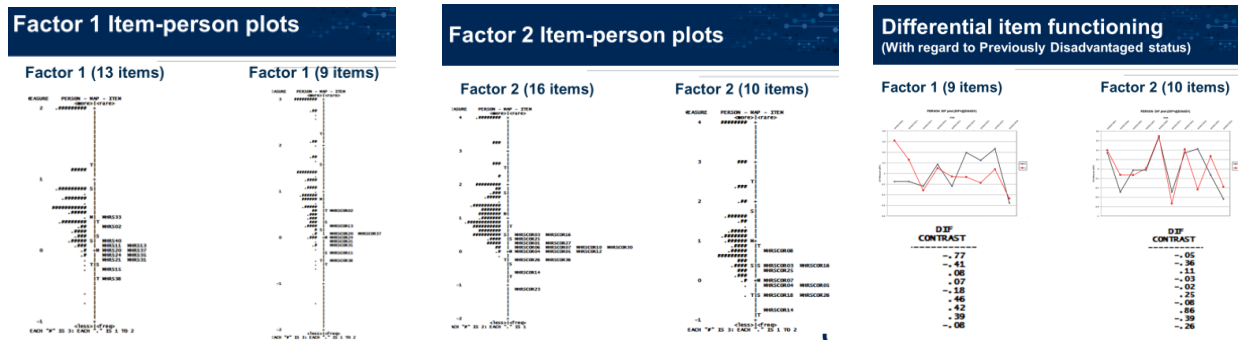
Factor 2 – General coping

- Polarity check
- Rating scale structure & category fit (monotonically increasing thresholds & category averages)



- Cronbach Alpha = .80 / .75

Figure 13



13. Construct validity

Construct validity was evaluated by means of correlations of scores on the separate factors and a total score with various positive psychology constructs.

	Hardiness	SOC	LOC_internal	NGSE	GSE
Factor 1	$r=.491^{**}$	$r=.536^{**}$	$r=.428^{**}$	$r=.414^{**}$	$r=.425^{**}$
Factor 2	$r=.309^{**}$	$r=.426^{**}$	$r=.292^{**}$	$r=.432^{**}$	$r=.450^{**}$
TOTAL	$r=.474^{**}$	$r=.556^*$	$r=.421^{**}$	$r=.487^{**}$	$r=.506^{**}$
Factor 1 vs Factor 2	$r=.500^{**}$				

Figure 14

14. Comparison of groups (based on selection status)

The mean scores of selected and not-selected candidates on hardiness, sense of coherence, locus of control, self-efficacy and the two factors of the new resilience measure were compared. The Kolmogorov-Smirnoff test of normality was performed (Field, 2009) to determine the appropriate statistical analysis methods to use for comparing the group that was selected (n=26) with the group that was not selected (n=225). A mixture of results with some variables normally distributed, but the majority not, led to the Mann-Whitney U-test being used to compare the mean scores of the selected and not-selected groups. Based on the Mann-Whitney test the mean scores

of the successful candidates (n=26) differed significantly from those that were not successful in the selection (n=225) for only one variable. Mean scores for the selected group was significantly higher on the meaningfulness sub-dimension of the sense-of-coherence construct compared to the mean score of group that was not selected ($U=1917.50$, $z=1.988$, $p=0.047$). The ability to interpret stressors and difficulties in a way that was meaningful to the individual concerned seems to be a factor that distinguished those who were successful in the Operational Forces selection process from those who were not successful. The mean scores for the new resilience factor scores did not differ significantly for the selected and not-selected groups.

15. Discussion

The two identified factors (adaptability and general coping) that emerged from the data show some similarity to the factors identified by Simmons and Yoder (2013) - adaptive coping, personal control, hardiness - as attributes that characterize psychological resilience in a military context.

The data analysis shows some support for the psychometric properties of the prospective new measure (generally acceptable reliability and construct validity and diff results).

Both classical test theory (CTT) and Rasch analysis provided evidence in support of the resilience measure.

16. Limitations

The sample of candidates were tested within a selection context, and some degree of social desirability or motivational distortion (self-report halo effect) seems evident.

The item-person alignment between the items and the sample group was somewhat skewed. Some revision with regard to the wording of items could improve this aspect.

The empirical factor analysis results did not provide support for the intended conceptual sub-dimensions. Further clarification and clear empirical support would be required for a new measure to be considered practically useful.

17. Recommendations

While the results do show reasonable psychometric properties for the developed items and prospective new measure, further clarification and explication of the construct of resilience seems to be required (conceptually, theoretically and empirically).

Qualitative and quantitative data could help to inform a clearer understanding of the construct – in particular within the military context.

Additional empirical research would be required to provide evidence for the practical utility of such a construct for predicting selection outcomes, training results and performance within the military and operational forces contexts.

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