Validating Measures of Psychological Well-being by Contrasting Samples Employed in Hazardous and Less Hazardous Work

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The study investigated whether differences between contrasting groups reflect significant differences in psychological well-being scores. Membership of hazardous vs. less hazardous occupations in the same profession served as proxy measures of well-being. Antonovsky's Sense of Coherence (SOC), Block & Kremen's Ego-resiliency, and Goldberg's Emotional Stability scales were validated. Study 1 compared mine rescue team members and ordinary miners ($n = 34, 41$) and Study 2 police special task force members and regular officers ($n = 43, 41$). In Study 1, SOC and job satisfaction predicted group membership. In Study 2, satisfaction with life and extraversion scales predicted group membership, as did SOC in a secondary analysis. The SOC scale could predict psychological well-being in hazardous work settings.

Keywords: ego-resiliency, emotional stability, mine rescue, police special task force, sense of coherence

All work is demanding to a greater or lesser degree, but hazardous work is excessively demanding. Although specific types of hazards differ across occupations, varying combinations of fatality, injury, and psychological demands are involved, with the latter being of special concern here. The extent to which persons resile the psychological demands of hazardous occupations reflects their psychological well-being. The purpose of the two present studies was to validate three self-report measures that were, on theoretical grounds, considered to be related to psychological well-being. Membership of a hazardous occupation vs. membership of a less hazardous occupation in the same profession was used as a proxy measure of psychological well-being, and as the criterion in these studies. The studies were unusual in studying infrequently investigated hazardous occupational groups in relation to psychological health. Validation in terms of hard criteria is necessary in view of findings, reviewed by Eriksson and Lindström (2006), and Flensburg-Madsen, Ventegodt and Merrick (2005), from which they concluded that criteria based on perceptions which include behavioural aspects, may be dubious for purposes of validating at least one of the measures used in the present studies.

Hazardous Occupations

Two kinds of hazardous deployment provided the substance for two studies, viz., the work of mine rescue teams and the work of police special task forces. Although the kinds of work are widely different, there is similarity too. Scharf et al. (2001) proposed that the key feature in a range of "dynamic and hazardous" work environments is that the environments are under constant change. They wrote that:

the requirement to continually adapt and respond to a dynamic and hazardous work environment places workers in these jobs at high risk, regardless of the specifics of the hazards. The constantly changing hazards require a skilled and vigilant workforce that can quickly adapt to the new hazards and changing risks (p. 1829).

Mining context. With respect to mining disasters, forces of the earth are fundamentally uncontrollable and only predictable within wide margins. There is great variety among mine disaster situations and different parts of a disaster scene may change without warning. Disaster areas are usually degraded and hazards may be obscured by cluttered ground or unstable, unsupported structures. Mine rescue teams attend at mines throughout emergencies that call for technical expertise and specialized equipment. When lives are at stake, the team responds on a moment's notice, and sometimes with little regard to their own safety. Throughout, members are facing life threatening risks, for instance, further incidents of whatever caused the disaster: explosions, fire, or collapsing tunnels or supports. Constant informed vigilance is thus required. Time pressure is extreme, particularly in saving trapped and injured miners; occasionally, the persons they assist are friends and associates. During South African deep mine disasters rescue teams work where the virgin rock at 3-4 km underground can reach temperatures of 60+°C, where humidity at 100% prevents body cooling. Ventilation is usually collapsed or minimal, necessitating breathing equipment. Illumination is often minimal. The rescue teams frequently handle severely injured miners, as well as mangled remains, sometimes decayed at those temperatures. Complications could arise when hazards interact and overlap.

Policing context. Special Task Force (STF) members handle high risk operations that cannot be dealt with by other police units. Their tasks require a high level of expertise, as well as motivation and ability to tolerate demands so inordinate that most police officers are unwilling to face them. They have to function efficiently in rapidly changing immediate circumstances. Psychologically stressful activities and conditions are typical, such as exposure to danger, time pressure, long and unusual working hours, and emotionally disconcerting. STF face challenging interpersonal situations, like dealing with, and showing empathy with persons of diverse frames of reference, as well as facing complaints and criticism from the public. Typically, their activities are physically demanding and exhausting. Their working conditions require super-fitness. Operations have to be faultless. They are also in constant training and development for new tasks and technologies. In the kind of situations that they have to face, behavioural and social forces are often uncontrollable and unpredictable, with great variability, instability, and both human and physical clutter. Here too, complications could arise when hazards interact and overlap.

Both mine rescue team and STF members sometimes have to face a sense of personal disappointment and failure, although there are also the exceptional psychological and social rewards of a mission accomplished successfully.

Comparison groups. Samples of regular members of the same professions, viz. ordinary miners and officers performing usual police duties, served as comparison groups in the present studies. In the case of the miners, the level of hazard was clearly a matter of degree, since mining is overall a hazardous occupation. However, the industry typically emphasizes continuous risk assessment and exerts as much engineering control over hazards as current technology allows (cf. Scharf et al., 2001) – assuming that the available controls and the human controllers are functioning properly. In the case of regular police officers, their work often entails monotonous, routine patrol or investigation activities, and much administration – although this in no way implies that they are lacking. Members of particular units, too, may be in roles that expose them to critical incidents. It was, nevertheless, assumed that ordinary miners and police regulars are typically in less demanding and less hazardous employment than rescue team and STF members.

In the present studies these “experimental” and control samples provided hard criteria for the validation of measures of psychological well-being.

Personality Constructs

Sense of Coherence (SOC)

The SOC, Antonovsky's (1979, 1987) key resource construct, is presumed to buffer distress by affecting cognitive and emotional appraisal. Antonovsky described the SOC as a “generalized way of looking at the world” (1979, p. 124); it seems to colour one's perception of demanding events, but in a subliminal way, without one's conscious awareness (Amirkhan & Greaves, 2003). He theorized that individuals have an array of resistance resources for coping with stress-producing experiences. When they experience frequent availability of these resources during their personal development, a strong SOC develops. Individuals with a strong SOC feel confident that the world is comprehensible (cognitive), that they have resources available within themselves and from legitimate others to meet demands (instrumental), and that the demands are challenges worthy of engagement (motivational). In terms of McAdams and

Pals' (2006) three-level structure of personality, the SOC fits into their “characteristic adaptations”, which provide information that specifies particular conditions and a particular context; they provide answers to the question: “Who is this person?”

Ego-resiliency

This construct is prominent in Block's (starting with Block & Block, 1980) theory of human adaptability. It is viewed as predisposing an individual to positive engagement with the world, manifested by openness to experience and positive affectivity. It, too, could be considered as a characteristic adaptation.

Emotional Stability

This is a Five-Factor personality trait, with neuroticism as its opposite pole. In the McAdams and Pals (2006) model personality traits provide the dispositional signature and constitute the most stable and recognizable aspect of psychological individuality. Traits provide a first, rough outline of individuality, yet a “recognizable signature” which tends to be observable in a range of situations, even though not all the time. Traits provide answers to the question: “What kind of person is this?”

Research Question

In both studies the research question was whether the differences between the two contrasting groups would be reflected in significant differences between their scores on the three measures of psychological well-being. In both studies, the first samples consisted of persons functioning effectively in an occupation that necessitates stringent selection, training, and continuing development, all for inordinately demanding work. Hypothetically, these samples would score higher on these measures than control samples doing related but regular work. Such findings would support the construct and predictive validity of the measures concerned.

Study 1

Method

Participants. An all-male sample of mine rescue team members and a sample of ordinary miners were studied; females were not participating in these forms of mining. Mine rescue teams are known as “proto-teams”, as was the first such team in the United Kingdom on account of their using equipment for recycling air, branded “Proto”. These teams consist of miners who serve as volunteers, continuing otherwise with their usual jobs. Selection is in terms of biographical data, work experience, and qualitative impressions. Prospective members undergo a medical examination, a heat tolerance examination, and a work load test, followed by a week of intensive training, and subsequent quarterly training in simulated conditions. The selection ratio is very small. Addition of measures of psychological well-being might strengthen this selection process. Proto-team members were considered as likely, on average, to present greater psychological well-being than miners not similarly selected, trained, and experienced.

Measures

Antonovsky's (1987) SOC scale. The 29-item form was used but the imbedded 13-item form (SOC-13) was also scored, since it is often used when the longer form is too time-consuming. A difference between the SOC-29 and the SOC-13 exists in their time facets: the long form covers all time facets: past, present and future; the SOC-13 does not contain the future facet. Due to its brevity, the SOC-13 tends to show somewhat lower

coefficients α than the SOC-29 (*cf.* Eriksson & Lindström, 2005, Tables 2 and 3). The items cover three components, viz. comprehensibility (e.g., "When you face a difficult problem, the choice of a solution is: always confusing and hard to find... always completely clear"), manageability (e.g., "Do you think there will *always* be people whom you will be able to count on in future?"), and meaningfulness (e.g., "When you think about life, you very often: feel how good it is to be alive... ask yourself why you exist at all"). Antonovsky (1993) was outspoken that the components should not be considered as sub-scales; however, attempts at factor analytic confirmation produced inconclusive results (confirming: e.g., Frenz, Carey, & Jorgensen, 1993, for SOC-29; Feldt & Rasku, 1998, for SOC-13; disconfirming: e.g., Fiorentino & Pomazal, 1994, for SOC-29; Feldt, Leskinen, Kinnunen, & Mauno, 2000; Larsson & Kallenberg, 1999, both for SOC-13). In view of the sample sizes, a unitary scoring was used regardless. High internal consistencies have been reported for both the SOC-29 and the SOC-13, for a wide variety of samples in various countries (e.g., Antonovsky, 1993; Eriksson & Lindström, 2005; Kivimäki, Kalimo, & Toppinen, 1998; McSherry & Holm, 1994; Strümpfer & Wissing, 1998; but see Smith, Breslin, & Beaton, 2003).

Block and Kremen's (1996) Ego-resiliency Scale. It contains 14 items, (e.g., "My daily life is full of things that keep me interested"); responses are on a 4-point scale, from 1 = *does not apply at all* to 4 = *applies very strongly*. Coefficients α ranging from 0.68 to 0.81 have been reported (Block & Kremen, 1996; Fredrickson, Tugade, Waugh & Larkin, 2003; Letzring, Block & Funder, 2005; Tugade & Fredrickson, 2004). In a prospective study after September 11, 2001, Fredrickson et al. (2003) reported that persons scoring high on this scale showed low neuroticism, high extraversion, and high openness, all predisposing them to more positive affectivity subsequent to the attacks, than low-scoring persons; it was associated with increases in life satisfaction, optimism, and tranquillity, as well as less development of depression in the aftermath of the crisis. Tugade and Fredrickson (2004) reported significant positive correlations between this scale and various composite indices of positive emotionality, as well as negative correlation with duration of cardiovascular reactivity.

Goldberg's (1992) Emotional Stability Scale. It is a 10-item, transparent, bi-polar adjective measure (e.g., "unstable... stable"; "insecure... secure"). Responses are on 9-point semantic differentials, described as *very* at Points 1 and 9, as *moderately* at Points 2, 3, and 4, as well as at Points 6, 7 and 8, and as *neither* at Point 5. Goldberg reported a coefficient α of 0.88 for this scale. Two meta-analyses found the trait of emotional stability (measured by various scales) to be significantly related to job performance (Hurtz & Donovan, 2000; Salgado, 1997); another meta-analysis found neuroticism significantly negatively related to job satisfaction (Judge, Heller & Mount, 2002). In a study on police officers various indicators of performance were found significantly negatively related to neuroticism (Cortina, Doherty, Schmitt, Kaufman & Smith, 1992).

Judge, Locke, Durham, and Kluger's (1998) Job Satisfaction scale. It consists of five items from the Brayfield and Rothe (1951) scale. Its authors used a 10-point response format but in the present form the original 5-point format was retained to simplify responding.

Procedure

Participants were 34 Proto-team members and 41 non-Proto-team mine personnel ("Miners"). The Proto-team

sample was tested (by JSP) in groups attending refresher training. The Miners were chosen to approximate the age and educational level of the other sample; they were tested individually or in small groups by human resource managers at various mines.

Results

Table 1 shows the descriptive statistics and coefficients α (which were all considered acceptable). As a first observation, for all of the psychological variables the means of the Proto-team sample were higher than the means of the Miners sample. The only mean scores in Table 1 for which there are meaningful South African bases of comparison, are the two SOC scales; means of about 137 ($SD \pm 20$) for the SOC-29 and of 62 ($SD \pm 10$) for the SOC-13 were suggested by Strümpfer and Wissing (1998). The SOC-29 mean of the Proto-team sample was approximately one standard deviation higher than this mean, and the SOC-13 mean not quite as much higher. Those of the Miners sample were, on the other hand, in the vicinity of a standard deviation lower than the means suggested by those authors. Table 2 shows the inter-correlations of the variables for both samples.

For both samples the correlation between SOC-29 and SOC-13 approached unity, consistent with Strümpfer, Gouws and Viviers (1998) and Strümpfer and Mlonzi (2001). Since these are part-whole correlations, their size is not surprising; in view of the fact that SOC-13 does not contain the future facet, their high correlation is reassuring with respect to their interchangeability. The SOC-29 correlated significantly with Ego-resiliency for both samples but with Emotional Stability only in the Miners sample. Feldt, Metsäpelto, Kinnunen, and Pulkkinen (2007) found correlations of -0.78 and -0.73 for females and males between the SOC-13 and an FFM Neuroticism scale; Strümpfer et al. (1998) reported correlations of 0.69 and 0.64 between a 5-item form of Goldberg's Emotional Stability scale with, respectively the SOC-29 and SOC-13. SOC-29 and Job Satisfaction correlated significantly in both samples, in line with the more general finding by Strümpfer and de Bruin (2009). Similar patterns but, in general, lower coefficients were evidenced for the SOC-13. Ego-resiliency and Emotional Stability correlated significantly in the Miners sample but non-significantly in the Proto-team sample. Emotional Stability did not correlate significantly with Job Satisfaction.

The null-hypotheses of equal population means were rejected for age (95% $CI = -7.08, -1.2$) and educational accomplishment (95% $CI = -2.635, -0.82$), with the means higher in both cases for the Miners; in these respects the samples were poorly matched. The null-hypotheses of equal population means were rejected for the SOC-29 (95% $CI = 19.11, 40$), SOC-13 (95% $CI = (9.35, 19.23)$), and Job Satisfaction (95% $CI = 0.44, 3.98$), with the means for the Proto-team higher.

Correct classification of Proto-team members and Miners was investigated by step-wise binary logistic regression (forward selection, Wald method). Since the SOC-13 is a selection of SOC-29 items, two models were fitted: Model I with the SOC-29 and Job Satisfaction as independent variables, and Model II with SOC-13 and Job Satisfaction as independent variables, i.e., where significant mean differences between the two groups had been observed. In both cases, group membership (Proto-team/Miner) was the dependent variable.

For Model I (Table 3), both the SOC-29 and Job Satisfaction contributed significantly towards the prediction of group membership ($p < .01$ and $.05$, respectively). The odds of being a

Table 1

Descriptive Statistics and Coefficients α for the Proto-team and Miners Samples in Study 1

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	α
<i>Proto Team</i>						
Age	34	35.62	5.45	23	48	—
Years Mining	33	14.48	5.02	6	25	—
Education	34	12.88	1.82	10	17	—
SOC-29	33	157.7	20.53	117	191	0.85
SOC-13	33	68.24	10.99	45	91	0.77
Ego-resiliency	34	45.56	6.58	22	56	0.83
Emotional Stability	31	65.18	12.58	33	89	0.73
Job Satisfaction	34	20.24	3.76	9	25	0.74
<i>Miners</i>						
Age	41	39.76	7.02	25	62	—
Years Mining	41	14.02	6.06	1	26	—
Education	41	14.61	2.02	10	17	—
SOC-29	40	128.15	23.6	82	165	0.92
SOC-13	40	53.95	10.15	29	71	0.86
Ego-resiliency	41	43.02	6.23	33	53	0.84
Emotional Stability	41	63.8	11.1	33	82	0.88
Job Satisfaction	41	18.02	3.88	11	24	0.85

Note. Years Mining = Number of years working in mining industry; Education = Number of years of formal education completed; Abbreviations: SOC-29 = Sense of Coherence, 29-item form; SOC-13 = Sense of Coherence, 13-item form

Table 2

Statistically Significant Pearson Product-Moment Correlation Coefficients for the Proto-team and Miners Samples in Study 1

Variable	SOC-13	Ego-resiliency	Emotional Stability	Job Satisfaction
<i>Proto-team</i>				
SOC-29	0.93**	0.56**		0.54**
SOC-13		0.42*	0.38*	0.42*
Ego-resiliency				0.38*
<i>Miners</i>				
SOC-29	0.88**	0.75**	0.68**	0.35*
SOC-13		0.45**	0.56**	
Ego-resiliency			0.61**	

Note. * Correlation significant at .05 level; ** Correlation significant at .01 level

Proto-team member rather than a Miner increased when either the SOC-29 or the Job Satisfaction scores increased. The model classified 76.7% cases correctly: 72.7% of the Proto-team members and 80% of the Miners. Pseudo-*R*-squared values, 0.36 (Cox & Snell *R*²) and 0.48 (Nagelkerke *R*²), provided further evidence of the model fit. For Model II the findings were similar to those for Model I (Table 3); overall, 78.1% of cases were correctly classified: 69.7% of Proto-team members and 85% of Miners.

Two *secondary* logistic regression analyses were performed, so as to consider the well-being scales only. For Models III and IV (Table 3), Job Satisfaction was thus not considered as a predictor. In Model III only the SOC-29 entered the equation, classifying correctly 63.3% of the Proto-team members, 75.6% of the Miners, and 70.7% overall. For Model IV (Table 3) only the SOC-13 entered the equation, classifying 60.0% of the Proto-team members, 82.2% of the Miners, and 73.3% overall, thus predicting marginally better than the SOC-29. The

odds of being classified as a Proto-team member rather than a Miner increased when, respectively, the SOC-29 and the SOC-13 increased.

Study 2

Method

Procedure. Members of the STF of the South African Police Service and a sample of regular police officers ("Police") were compared. Selection of STF members includes medical examination and psychological assessment, tests of physical fitness and strength, followed by rigorous training which results in further selection. The selection ratio is extremely small. Regular refresher courses also maintain standards. Participants were 43 members of the STF, tested in small groups (by DM), and 41 members of various other units (all males, to increase homogeneity), tested at police stations and other offices by Psychological Services staff. An attempt was made to match the control

Table 3

Results of the Logistic Regression Model for Models I, II, III and IV of Study 1

Variable	B	SE	Wald	df	p	Exp(B)
<i>Model I</i>						
SOC-29	.05	.02	7.57	1	.006	1.05
Job Satisfaction	.24	.11	5.40	1	.020	1.29
Constant	-11.20	2.75	16.60	1	.000	.00
<i>Model II</i>						
SOC-13	.10	.04	8.47	1	.004	1.11
Job Satisfaction	.24	.10	5.60	1	.018	1.29
Constant	-10.72	2.53	18.00	1	.000	.00
<i>Model III</i>						
SOC-29	.07	.02	15.33	1	.000	1.07
Constant	- 9.77	2.49	15.45	1	.000	.00
<i>Model IV</i>						
SOC-13	.14	.03	16.40	1	.000	1.15
Constant	- 9.02	2.20	16.74	1	.000	.00

sample to the STF sample in terms of age, educational level and rank.

Measures

The three main measures used in Study 1, namely the Sense of Coherence (SOC-29 and SOC-13), Ego-resiliency and Emotional Stability were used again. Measures were added for the purpose of examining convergent validation.

Five Factor Scales. In addition to the Emotional Stability Scale, the remaining marker scales of Goldberg's (1992) bi-polar Five Factor Model (FFM) measure were used, viz. *Introversion-Extraversion* (Goldberg called it *Surgency*; e.g., "silent... talkative", "timid... bold"), *Agreeableness* (e.g., "selfish... unselfish", "rude... polite"); *Conscientiousness* (e.g., "negligent... conscientious", "lazy... hardworking"), and *Intellect* (e.g., "simple... complex", "ignorant... knowledgeable"). These scales are, in all respects, similar to the Emotional Stability scale described above. Goldberg reported coefficients α , respectively of 0.87, 0.87, 0.84 and 0.76 for these scales. The FFM measures were also included since the relation of several FFM measures to work performance had been demonstrated (e.g., Barrick, Stewart & Piotrowski, 2002; Witt, Burke, Barrick, & Mount, 2002). Inspection of the job specifications for the STF also showed that many of these could be classified in terms of the Five-Factor model, with Agreeableness and Conscientiousness providing the longest lists.

Satisfaction with Life Scale (SWLS; Pavot & Diener, 1993). It is a 5-item scale that represents the cognitive component of subjective well-being. Example items are: "In most ways my life is close to my ideal", and "I am satisfied with my life"; the 7-point response scale is from 1 = *strongly disagree* to 7 = *strongly agree*. The five items have shown a single-factor structure. High coefficients α have typically been reported, even above 0.9 (Suh, Diener, & Fujita, 1996).

Job Satisfaction. It was measured by three items widely separated within the questionnaire. Two items: "All things considered, are you satisfied or dissatisfied with your job?" and "How satisfied are you with your job in general? (1 = *very dissatisfied*, to 5 = *very satisfied*)" came from Scarpello and Campbell (1983, p. 584); the third: "On average, what percentage of time are you satisfied with your job?" came from Judge, Boudreau

and Bretz (1994, p. 771). Strümpfer and Mlonzi (2001) reported that the three items correlated 0.66, 0.68 and 0.66 with each other; and showed a coefficient α of 0.86. Scores for each item were standardized and the three sets of scores were summed to create a scale.

General Health. This was measured by two graphic rating scales, a 9-step ladder and a 7-faces scale, both from Andrews and Withey (1976, pp. 375–376). On both items, participants were requested to rate their general health "nowadays" compared with persons of the same gender and age.

Results

Table 4 presents descriptive statistics and coefficients α , all of which were acceptably high, except the 0.66 for Ego-resiliency, which Clark and Watson (1995) would still accept. The samples did not differ significantly with respect to the biographical measures. With the STF means higher throughout, significant differences between the two groups were found for SOC-29 (95% *CI* = -24.37, -5.52), SOC-13 (95% *CI* = -11.92, -2.14), Emotional Stability (95% *CI* = -10.7, -1.32), Extraversion (95% *CI* = -13.48, -2.83), General Health (95% *CI* = -1.85, -0.25), and SWLS (95% *CI* = -7.12, -2.15).

The correlations between the constructs measured in Study 2 are shown in Table 5. As for Study 1, the correlations between SOC-29 and SOC-13 were close to unity in both samples. For the STF sample, Ego-resiliency and Emotional Stability both correlated significantly with the SOC scales but not with each other. For the Police sample, Ego-resiliency and Emotional Stability correlated significantly with one another and with the SOC-29, while Emotional Stability but not Ego-resiliency correlated significantly with the SOC-13. SWLS correlated significantly with the two SOC scales but with neither Emotional Stability nor Ego-resiliency. General Health correlated significantly with the SOC scales and Emotional Stability for the STF, but in the Police only with Ego-resiliency. SWLS correlated significantly with Job Satisfaction in both samples and also with General Health in the Police sample. SWLS showed low but significant correlations with all of the Goldberg scales in the STF sample, but with none of them in the Police sample. Clearly, this finding, as well as those in Study 1 about the well-being measures and General Health, point to differences in *patterns* of re-

relationships between the two samples; without cross-validation, explanation remains open.

Correct classification of members of the STF and Police was investigated by fitting two step-wise logistic regression models (Model I SOC-29, Model II SOC-13 as independent variables). Both models also included the other measures where significant differences between the groups had been found. For Model I, SWLS ($p < .01$) and Extraversion ($p < .05$) contributed significantly towards prediction of group membership. The odds of being a STF member (Table 6), rather than a Police officer, improved when either SWLS or Extraversion increased; 70% of the participants were classified correctly: 76.9% of the STF and 61.3% of the Police. The pseudo- R^2 values of 0.22 (Cox & Snell) and 0.3 (Nagelkerke R^2) provided further evidence that the model fit was only moderate. Unlike Study 1, the SOC-29 did not enter this model. For Model II, all findings were similar to those of Model I (Table 6). In *secondary* logistic regression analyses, Model III and Model IV (Table 6), Extraversion and SWLS were excluded as predictors, to consider the well-being scales, namely SOC-29 (Model III) and SOC-13 (Model IV), Emotional Stability and Ego-resiliency only. Only the SOC-29 entered the model, classifying correctly 70.3% of the STF members, 48.5% of the Police group, and 60.0% overall. The odds of

being classified as an STF member rather than a Police officer increased when the SOC-29 increased.

Summary and Discussion

In two validation studies groups doing hazardous work and groups doing regular work, were compared with respect to both the long and short forms of the Antonovsky (1987) SOC scale, the Block and Kremen (1996) Ego-resiliency scale, and the Goldberg (1992) Emotional Stability scale, all presumed to be measures of psychological well-being. A Proto-team group did underground rescue work after mine disasters, and a Special Task Force group extraordinary policing, both occupations that are frequently hazardous. They were contrasted to groups of ordinary mine workers and regular police, both occupations viewed as, on average, less hazardous. Membership of the mine rescue sample vs. ordinary miner membership, and membership of the STF vs. membership of the regular police, were used as proxy measures of psychosocial well-being, and as the criterion against which the various self-report measures of psychosocial well-being were validated in these studies.

The SOC mean of the rescue team (158) and that of the STF group (151) were among the highest reported (cf., e.g., Antonovsky, 1993; Strümpfer & Wissing, 1998).¹

Table 4

Descriptive Statistics and Coefficients Alpha for Special Task Force and Police Samples in Study 2

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	α
<i>Special Task Force</i>						
Age	45	29.71	4.12	24	44	—
Education	45	14.46	1.38	12	15	—
Years Service	45	10.64	4.17	6	25	—
SOC-29	42	150.62	20.89	103	190	.88
SOC-13	43	64.93	11.18	42	85	.82
Ego-resiliency	44	46.59	4.30	37	54	.66
Emotional Stability	42	72.26	8.64	53	87	.75
Extraversion	43	70.05	10.23	46	87	.83
Agreeableness	44	73.39	8.22	47	90	.83
Conscientiousness	41	77.71	6.77	58	90	.78
Intellect	42	71.55	7.85	57	90	.72
Satisfaction with Life	45	26.73	4.70	12	35	.74
Job Satisfaction	41	.41	2.44	-5.05	3.81	.85
General Health	43	.47	1.77	-7.05	2.48	.89
<i>Regular Police</i>						
Age	41	31.12	5.64	23	53	—
Education	41	13.15	1.44	10	15	—
Years Service	41	11.80	6.25	6	35	—
SOC-29	40	135.68	22.01	84	170	.85
SOC-13	41	57.90	11.34	33	78	.70
Ego-resiliency	41	45.07	5.34	31	56	.76
Emotional Stability	38	66.26	12.22	35	90	.84
Extraversion	37	61.89	13.81	30	85	.90
Agreeableness	39	71.54	12.39	30	89	.87
Conscientiousness	39	76.69	9.23	41	90	.88
Intellect	38	72.16	9.72	38	86	.83
Satisfaction with Life	40	22.10	6.74	10	34	.87
Job Satisfaction	37	-.19	2.67	-6.70	3.81	.81
General Health	36	-.58	1.78	-7.05	2.48	.71

Note. Abbreviations: SOC-29 = Sense of Coherence, 29-item form; SOC-13 = Sense of Coherence, 13-item form.

Table 5

Statistically Significant Pearson Product Moment Correlation Coefficients for the Regular Police and Special Task Force Samples in Study 2

Variable	Soc-13	Ego-resil.	Emot. stabil.	Agreeable	Consc.	Intellect	SWLS	Job Sat.	General Health
<i>Police</i>									
SOC-29	.92**	.45**	.52**				.56**	.61**	
SOC-13			.50**				.43**	.46**	
Ego-resiliency			.42**				.55**		.37*
Emotional Stability							.40*		
Extraversion				.66**					
Agreeability					.42**	.43**			.35*
Conscientiousness						.78**			
SWLS								.37*	.46**
<i>Special Task Force</i>									
SOC-29	.95**	.47**	.54**				.40**		.44**
SOC-13		.41**	.51**				.43**	.32*	.40**
Ego-resiliency				.32*		.42**	.55**		
Emotional Stability					.39*	.38*			
Extraversion									.32*
Agreeableness					.51**	.53**	.44**		
Conscientiousness						.44**			
Intellect							.32*		
SWLS								.41**	

Note. Abbreviation: SWLS = Satisfaction with Life Scale

* Correlation significant at .05 level; ** Correlation significant at .01 level

In contrasting Proto-team members and Miners, the means of the two SOC scales, but not those of Ego-resiliency and Emotional Stability, differed statistically significantly; similarly in binary logistic regression analyses, the SOC scales, but not the other two, contributed significantly to the correct classification of members in the appropriate group. Contrasting the STF and Police samples, the two SOC scales differentiated statistically significantly between the two groups but did not contribute significantly to prediction of group membership in the primary logistic

regression analyses; in two secondary logistic regressions, though, the SOC-29 and the SOC-13 showed that each by itself could also predict group membership.

These findings tended to support the research assumptions that the Proto-team and STF members would, on average, score higher on the psychological well-being measures than the control groups. In general, the findings suggested that (pending cross-validation and other validation studies) the SOC scales might contribute to identifying potential Proto-team and STF

Table 6

Results of Logistic Regression for Models I, II, III, and IV of Study 2

Model I	B	SE	Wald	df	p	Exp(B)
SWLS	.136	.05	7.09	1	.008	1.150
Extraversion	.057	.02	5.40	1	.020	1.060
Constant	-6.860	2.02	11.50	1	.001	.001
<i>Model II</i>						
SWLS	.142	.05	7.85	1	.005	1.150
Extraversion	.059	.03	5.69	1	.017	1.060
Constant	-7.100	2.01	12.46	1	.000	.001
<i>Model III</i>						
SOC-29	.036	.012	9.15	1	.002	1.040
Constant	-5.110	1.740	8.68	1	.003	.006
<i>Model IV</i>						
SOC-13	.060	.022	7.78	1	.005	1.062
Constant	-3.610	1.340	7.22	1	.007	.027

Note. Abbreviation: SWLS = Satisfaction with Life Scale

members. On the basis of both internal consistency and the high correlation with SOC-29, the SOC-13 could substitute for the SOC-29 when a shorter measure is desirable. However, the Ego-resiliency and Emotional Stability scales cannot be considered for the same purpose.

In Study 2, among all the measures the SWLS contributed most significantly to prediction of group membership in the logistic regression analyses. Additionally, it tended to correlate significantly with most other variables. On average, the STF members experienced greater life satisfaction (and/or used different criteria for appraising it) than the Police officers, a finding that begs cross-validation but is a promising lead. SWLS correlated significantly with Job Satisfaction (as in Judge et al., 1998) in both police samples and also with General Health in the Police sample.

In Study 1, *Job Satisfaction* was significantly higher among the Proto-team members than among the ordinary miners, which could perhaps be related to humane and moral qualities of their work. In Study 2, Job Satisfaction (measured differently) was the only outcome measure on which the two police samples did *not* differ significantly.

In Study 2, *Extraversion* differentiated second best between the two samples. This finding could not be related to Gray's (1991) theory of a behavioural approach system since there is too large a sociability component of Goldberg's Extraversion scale.

Conclusions

In both forms, the SOC scale holds promise as a predictor of such psychological well-being as is required by hazardous work. The present samples provided hard criteria that cannot be obtained through self-reports or assessments—it is only being a representative member of one of the groups that matters. These findings based on hard membership criteria are important in view of findings reviewed by Eriksson and Lindström (2006), and Flensburg-Madsen et al. (2005); they suggested that criteria based on perceptions that include behavioural aspects, are dubious for purposes of validating the SOC. The SWLS and extraversion (employing facet scales too) also warrant further exploration.

Since the kinds of persons in the samples doing hazardous work are not readily available in large numbers, there were serious limitations on enlarging them. For that reason the present studies were done on relatively small samples and have not been replicated, so that their generalizability begs further study. An additional consequence of the small sample sizes was that possible interactions between age, educational level, and the psychological variables were not investigated. The best conclusion is that the findings hold promise. A next research step would be to validate these measures against criteria in a recruitment and selection environment too. They could also prove to be useful in a coaching context.

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Footnotes

¹ To our knowledge, the three highest SOC-29 means reported previously in South Africa were 153.79 ($SD = 21.95$) for a sample of life insurance consultants (Strümpfer et al., 1998), 156.12 ($SD = 20.05$) for a random sample of males (Wissing et al., 1992), and 162.3 for a sample of senior university administrators (range = 109–196; M.P. Wissing, personal communication, October 15, 2009). Eriksson and Lindström (2005) reported 43 SOC-29 means of 151 and above, out of 244 samples (5.7%), the highest being 164.50 ($SD = 17.10$).