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Through the tunnel, to the light: Why sense of coherence covers and exceeds resilience, optimism, and self-compassion

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ABSTRACT

Sense of coherence (SOC), resilience, dispositional optimism, and self-compassion are highly related aspects of personality that promote health and well-being. We systematically compared these constructs and explored their criterion validity when predicting psychological distress. With the help of structural equation modeling, we examined SOC's factor structure and incremental validity over resilience ($N_1 = 208$) as well as over optimism and self-compassion ($N_2 = 308$) in two studies. Despite strong overlap (shared variance) SOC clearly outperformed its competitors. Neither resilience, nor optimism, nor self-compassion had significant incremental validity over SOC on a latent level. A two-factor model for SOC explained most variance in psychological distress. Results highlight the importance of salutogenic factors even in a neck-to-neck comparison with other potentially health-benefitting personality variables. Meaningfulness appears to contribute to SOC's uniqueness.

1. Introduction

The concept of resilience represents a shift of focus away from pathogenesis to a resource-orientation in health. Rather than explaining and predicting disease, resilience emphasizes aspects and characteristics that promote health and positive adaptation. Resilience represents characteristics that enable staying healthy in the face of adversities and stress. From the perspective of individual differences, a serious question is left unanswered: *which* resilience? On a marketplace full of distinctive constructs, several scales claim to assess personality aspects supposedly benefiting one's health. Among the prominent ones are *sense of coherence* (Antonovsky, 1987), *dispositional optimism* (Scheier & Carver, 1985), (simply) *resilience* (Wagnild & Young, 1993), and recently *self-compassion* (Neff, 2003). Despite different theoretical backgrounds, the empirical findings concerning these constructs are highly similar. This has generated considerable discussion concerning the mutual relationships and the uniqueness of theses constructs.

The question of theoretical distinctiveness, however, is inseparable from measurement issues. Complex and sophisticated measurement models have been developed for these constructs, yet actual empirical research more often than not neglects advanced methods and relies on simplistic mean scores instead. Consequently, scale unreliability might obscure the true relationships between constructs and criteria, leading to a misattribution of criterion validity. There is a non-negligible potential for the confusion of constructs and the development of inefficient or ineffective interventions (Cronbach, 1956). Our research will address this problem by examining scale differences in terms of criterion validity and conceptual uniqueness, taking measurement issues into account.

1.1. Sense of coherence

In a salutogenic view (Antonovsky, 1987), health is not just the absence of disease, yet resides at one end of a continuum between health and disease. Sense of coherence (SOC) helps people to move towards, or stay at, the healthy end of the continuum. Understood as an internal resistance resource, SOC promotes health when people are faced with hardships and stressful life events. It encompasses three major facets: *Comprehensibility* describes an individual's trait to perceive situations and events as clear and structured; *manageability* represents an individual's belief to hold the necessary skills for dealing with life challenges; and *meaningfulness* depicts an individual's confidence that any demands and challenges are worthy of investment and engagement. Considerable evidence links SOC to health and health-related behavior (Eriksson & Lindström, 2006), general psychological well-being (Nilsson, Leppert, Simonsson, & Starrin, 2010), depression (Haukkala et al., 2013), anxiety (Moksnes, Espnes, & Haugan, 2013), as well as reduced substance use and alcohol consumption (Mattila et al., 2011). Despite Antonovsky's claim that SOC is a volatile "orientation to life" rather than a temperamental trait, stability coefficients over up to ten years ranged between .54 to .78 (Eriksson & Lindström, 2005). Additionally, longitudinal measurement invariance was recently shown for the SOC-13 scale (Grevenstein & Bluemke, 2015b). In this study

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interindividual differences on a latent level across nine years of development through adolescence (ages 15–24) amount to $r = .59$. The proposed two-factorial structure (meaningfulness and a joint factor for other items) remained unaltered, with hardly any changes to the measurement model.

1.2. Resilience

Resilience is a disposition that moderates the negative side-effects of stress and promotes adaptation to stressful situations (Wagnild & Young, 1993; Windle, Bennett, & Noyes, 2011). Though there is no gold standard, due to its favorable psychometric properties, one of the most widely used instruments is the Resilience Scale (Wagnild & Young, 1993). It encompasses five characteristics: *equanimity*, a balanced perspective of one's life and experiences; *perseverance*, the act of persistence despite adversity or discouragement; *self-reliance*, the trust in oneself and one's capabilities; *meaningfulness*, the view that life has purpose and the valuation of one's contributions; and *existential aloneness*, the realization that each person's life path is unique. A two-factor model with the interrelated factors *personal competence* and *acceptance of self and life* best accounted for item responses. The test–retest reliabilities over periods of up to one year ranged between .70 and .84 (Girtler et al., 2009; Nygren, Randström, Lejonklou, & Lundman, 2004; Wagnild & Young, 1993). Resembling SOC, resilience has shown negative associations with depression and anxiety, but positive ones with life satisfaction (Ahern, Kiehl, Lou Sole, & Byers, 2006; Wagnild, 2009).

1.3. Dispositional optimism

Dispositional optimism reflects a generalized positive attitude towards life and its challenges, including the expectation of positive outcomes (Scheier & Carver, 1985). Optimism plays an important role in self-regulation. Optimists cope better with failure. They are more persistent in the face of challenges and engage in more adaptive and active coping with stress. Unsurprisingly, dispositional optimism was related to various positive mental as well as physical health outcomes (Carver & Scheier, 2014). Test–retest correlations over periods of up to ten years ranged from .58 to .79 (Carver, Scheier, & Segerstrom, 2010).

1.4. Self-compassion

In recent years, Eastern philosophical thought has sparked various new ways of understanding human well-being. For instance, being of genuinely Buddhist origin, self-compassion is the newest construct thought to promote well-being. Similarly, mindfulness is a non-judgmental and receptive state of mind, which fosters a clear perception of challenging situations, one's own thoughts and emotions, ultimately leading to a better mental state (Keng, Smoski, & Robins, 2011). Entailing though extending mindfulness, self-compassion is the tendency not only to be open and moved by one's own suffering, but also to confront life challenges positively (Neff, 2003). Rather than bringing harsh judgment upon oneself, self-compassion leads to feelings of caring and kindness towards oneself. Seeing your own experiences within the frame of common human experience is thought to promote feelings of connectedness. Both mindfulness and self-compassion are considered to be flexible orientations to life acquired through practice (Neff & Germer, 2013). Test–retest reliabilities over short periods of two weeks up to three months amounted to .78–.96 (Castilho, Pinto-Gouveia, & Duarte, 2015; Deniz, Kesici, & Sümer, 2008; Neff, 2003). Like other constructs, self-compassion has shown negative associations with depression and anxiety, as well as positive correlations with life satisfaction (Neff, Rude, & Kirkpatrick, 2007).

1.5. Construct overlap and construct validity

There are striking similarities between the constructs; they all describe characteristics that buffer health during times of stress and hardship: high SOC, resilience, dispositional optimism, or self-compassion is related to adaptive and effective coping. Furthermore, SOC, resilience, and self-compassion cover not only (self-perceptions of) stress-management; they seem to add a philosophical touch, that life and one's own contributions to it are valuable and meaningful. SOC and resilience refer to these aspects as "meaningfulness." Given the respective scales' theoretical relationships and item similarities, comparable criterion correlations have been found. Both SOC and resilience have shown strong associations to neuroticism (Hochwälder, 2012) and emotional stability (Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2005). Optimism has been consistently associated with neuroticism and extraversion (Sharpe, Martin, & Roth, 2011). Self-compassion has been predominantly related to neuroticism, yet also to extraversion and conscientiousness (Neff et al., 2007).

One wonders how conceptually distinct these constructs are. Despite stemming from different theoretical backgrounds, they might essentially assess the same underlying concept in disguise with some unique twists and unequal reliability. Our research addresses this issue by investigating incremental validity for psychological distress.

1.6. Study overview

Before analyzing the statistical predictions, we address measurement issues by examining reliability by means of confirmatory factor analysis (CFA). Assuming that previously advocated measurement models are replicated, we then use structural equation modeling (SEM) to model relationships on the latent level. As the factor structure of SOC has been debated, we will also test the most popular factor models against each other in the incremental validity analyses. This will help to determine which of these models is most appropriate, not only in terms of model fit, but also with regard to criterion validity. Study 1 examines incremental validity of SOC and resilience. Study 2 covers SOC, dispositional optimism, and self-compassion. We hypothesized that all the predictors would be highly correlated and similarly associated with the criteria. Given its favorable record, we expected SOC to outperform its competitors.

2. Study 1: sense of coherence versus resilience

2.1. Participants and procedure

The sample included 208 volunteers ($n = 113$ females, 54.3%) with a mean age of 22.56 ($SD = 4.24$). Most participants (91.8%) were German students of Psychology and Medicine. About 7.2% were employed persons and 1.0% were trainees. Students of Psychology received extra course credit. The remainder took part without compensation. Participants were recruited in university courses or approached directly in the city center by one of the experimenters in charge. In some cases, university teachers reserved time during class for volunteers to fill out the questionnaires. Completed questionnaires were handed back to the teacher or dropped into the researchers' mailbox anonymously. Participants without a connection to university were asked to mail back questionnaires anonymously.

Participants worked on a booklet of sociodemographic questions and questionnaires in a fixed order (psychological distress, SOC, resilience). There were some gender differences regarding psychological distress. Women reported slightly more somatization, depression, anxiety, hostility, and phobic anxiety than men (cf. Table 1). No other control variable was significantly related to any of the focal study variables.

Table 1
Sample characteristics, descriptives, statistical tests and effect sizes (Cohen's d) for gender groups.

Study 1	M (SD)	M (SD)	M (SD)	t (df)	p	d
	Total (N = 208)	Men (n = 95)	Women (n = 113)			
Sense of coherence (SOC-13)	5.15 (0.88)	5.15 (0.78)	5.14 (0.95)	0.08 (205.88)	.93	0.01
Resilience (RS-13)	5.50 (0.75)	5.53 (0.67)	5.47 (0.82)	0.59 (206)	.56	0.08
Psychological distress (SCL90-R GSI)	0.42 (0.33)	0.37 (0.28)	0.47 (0.37)	2.08 (204.57)	.04	0.30*
Somatization (SOM)	0.41 (0.35)	0.34 (0.31)	0.46 (0.36)	2.50 (206)	.01	0.36*
Obsessive–compulsive (O–C)	0.64 (0.54)	0.61 (0.49)	0.67 (0.58)	0.83 (206)	.41	0.11
Interpersonal sensitivity (I-S)	0.53 (0.45)	0.48 (0.42)	0.57 (0.47)	1.40 (206)	.16	0.20
Depression (DEP)	0.60 (0.59)	0.49 (0.50)	0.69 (0.65)	2.54 (204.72)	.01	0.34*
Anxiety (ANX)	0.35 (0.39)	0.28 (0.28)	0.40 (0.45)	2.41 (190.90)	.02	0.32*
Hostility (HOS)	0.39 (0.44)	0.31 (0.29)	0.46 (0.53)	2.52 (179.54)	.01	0.35*
Phobic anxiety (PHOB)	0.13 (0.26)	0.08 (0.17)	0.17 (0.31)	2.77 (180.07)	.01	0.36**
Paranoid ideation (PAR)	0.38 (0.42)	0.41 (0.43)	0.35 (0.41)	1.05 (206)	.30	0.14
Psychoticism (PSY)	0.22 (0.27)	0.21 (0.27)	0.22 (0.28)	0.45 (206)	.66	0.04
Study 2	Total (N = 308)	Men (n = 89)	Women (n = 219)			
Sense of coherence (SOC-13)	4.84 (0.91)	4.92 (0.89)	4.80 (0.92)	1.07 (306)	.29	0.13
Optimism (LOT-R)	3.75 (0.72)	3.79 (0.71)	3.73 (0.72)	0.68 (306)	.50	0.10
Self-compassion (SCS-D)	3.13 (0.59)	3.18 (0.51)	3.12 (0.63)	0.99 (199.80)	.32	0.10
Psychological distress (SCL90-R GSI)	0.49 (0.40)	0.42 (0.39)	0.51 (0.40)	1.79 (306)	.07	0.23†
Somatization (SOM)	0.48 (0.40)	0.41 (0.42)	0.51 (0.39)	1.89 (306)	.06	0.25†
Obsessive–compulsive (O–C)	0.75 (0.59)	0.67 (0.59)	0.78 (0.60)	1.45 (306)	.15	0.18
Interpersonal Sensitivity (I-S)	0.60 (0.56)	0.52 (0.51)	0.63 (0.57)	1.62 (306)	.11	0.20
Depression (DEP)	0.67 (0.64)	0.52 (0.52)	0.74 (0.67)	3.06 (203.44)	.01	0.37**
Anxiety (ANX)	0.42 (0.44)	0.36 (0.44)	0.44 (0.44)	1.46 (306)	.15	0.18
Hostility (HOS)	0.41 (0.40)	0.38 (0.42)	0.42 (0.39)	0.70 (306)	.49	0.10
Phobic anxiety (PHOB)	0.18 (0.33)	0.15 (0.27)	0.20 (0.35)	1.06 (306)	.29	0.16
Paranoid ideation (PAR)	0.42 (0.49)	0.44 (0.54)	0.41 (0.47)	0.45 (306)	.66	0.06
Psychoticism (PSY)	0.27 (0.38)	0.28 (0.38)	0.26 (0.39)	0.39 (306)	.70	0.05

Note: Men and women differed significantly at $^{†}p < .10$, $^{*}p < .05$, $^{**}p < .01$ (two-tailed). d is absolute |d|.

2.2. Measures

2.2.1. SOC-13: Sense of coherence

We used the 13-item adaptation of Antonovsky's original Orientation to Life scale (Schumacher, Wilz, Gunzelmann, & Brähler, 2000). It includes five comprehensibility items (e.g., "Has it happened in the past that you were surprised by the behavior of people whom you thought you knew well?"), four manageability items (e.g., "Has it happened that people whom you counted on disappointed you?"), and four meaningfulness items (e.g., "Do you have the feeling that you don't really care about what goes on around you?"). Answers were given on 7-point rating scales most of the time marked from 1 ("very often") to 7 ("very seldom or never"). Cronbach's Alpha was .83 in our sample.

2.2.2. RS-13: resilience

The 13-item adaptation of the Wagnild and Young Resilience Scale (Leppert, Koch, Brähler, & Strauß, 2008) reflects the influence of two major, interrelated factors: personal competence and acceptance of self and life. Nine items assess competence (e.g., "When I make plans I follow through with them."), and four items reflect acceptance (e.g., "It's okay if there are people who don't like me."). Answers were given on 7-point rating scales marked from 1 ("no, do not agree at all") to 7 ("yes, totally agree"). Cronbach's Alpha was .82.

2.2.3. SCL-90-R: psychopathology

Psychological distress was assessed using the Symptom Checklist-90-R (SCL-90-R; Derogatis & Fitzpatrick, 2004) as a general measure of psychopathology. We used the German version by Franke (2002). Ninety items comprise the nine different subscales Somatization (SOM), Obsessive–Compulsive (O–C), Interpersonal Sensitivity (I-S), Depression (DEP), Anxiety (ANX), Hostility (HOS), Phobic Anxiety (PHOB), Paranoid Ideation (PAR), and Psychoticism (PSY). Additionally, the Global Severity Index (GSI) can be computed as a mean score over all items representing a measure of overall psychological distress. Participants were asked how much they suffered from various symptoms. Answers were given on 5-point scales marked 0 ("not at all"), 1 ("a bit"), 2 ("considerably"), 3 ("much"), and 4 ("very much"). Reliabilities for subscales ranged from .65 (Psychoticism) to .90 (Depression). Cronbach's Alpha for the whole scale was .96.

2.3. Statistical analysis

Statistical analyses were carried out using SPSS22 and Mplus 7.11 (Muthén & Muthén, 1998-2012). We inspected scale reliabilities and purported factor structures (measurement models), except for SCL-90-R, which forms a non-causal index (enumeration) of possibly unrelated symptoms. In the absence of essential tau-equivalence and strict unidimensionality, Cronbach's Alpha is inappropriate and possibly underestimates reliability (Bollen, 1989). Once accepting a measurement model, we instead report the construct reliability (CR or Ω) and the average variance extracted (AVE; Bacon, Sauer, & Young, 1995; Fornell & Larcker, 1981).

Second, to examine incremental validity we modeled SOC and resilience as simultaneous predictors of psychological distress on a latent level, similar to regression analysis. Incremental validity is evident when a predictive path from a predictor to a criterion variable—reflecting unique semi-partial regression weights—is significant. Full Information Maximum Likelihood with robust standard errors (MLR) was used for parameter estimation and the handling of missing data (a total of only 0.34% of all cells). The goodness-of-fit of the models was evaluated by (1) ideally non-significant χ^2-tests (Bentler & Bonett, 1980); (2) the comparative fit index (CFI) with values of .95 and above indicating good model fit (Hu & Bentler, 1999); (3) the root mean square error of approximation (RMSEA) with values lower than .08 indicating good model fit (Browne & Cudeck, 1993); and (4) the standardized root mean square residual (SRMR) with values lower than .08 reflecting good model fit (Hu & Bentler, 1999). The Bayesian Information Criterion (BIC) allows comparing competing models of the same data set, with differences greater than +/− 10 providing strong evidence for better accuracy-parsimony trade-off (Raftery, 1995).

2.4. Results

2.4.1. Descriptive data analysis

Means and standard deviations are presented in Table 1. As expected, all variables were highly correlated (Table 2). Both higher SOC and higher resilience were associated with fewer psychological symptoms.

2.4.2. Confirmatory factor analyses of sense of coherence and resilience

2.4.2.1. SOC-13. The factor structure of the SOC-13 scale has been debated in the past. The theoretically derived three-factorial-structure has been recovered (Feldt, Leskinen, Kinnunen, & Ruoppila, 2003; Stein, Lee, & Jones, 2006), yet other researchers have concluded that a two-factor model better represents the empirical data (Grevenstein & Bluemke, 2015b; Zimprich, Allemand, & Hornung, 2006). The factors for comprehensibility and manageability have generally shown a very high overlap ($r > .90$). A recent study even reported a correlation of $r = .99$ on a latent level (Moksnes & Haugan, 2014). One joint factor for both is more parsimonious; meaningfulness constitutes a second factor. Reflecting Antonovsky's conception of SOC as a unitary construct, Hittner (2007) even fitted a single factor model. Substantial improvement in model fit has been achieved repeatedly by letting the residuals of items #2 and #3 correlate (Feldt et al., 2003; Moksnes & Haugan, 2014; Richardson, Ratner, & Zumbo, 2007). The common source for the two items (#2 "… were you surprised by the behavior of people who you thought you knew well?"; #3 "… have people you counted on disappointed you?") reflects interpersonal trust (Frenz, Carey, & Jorgensen, 1993).

The three-factor-model with correlated residuals between items #2 and #3 fitted the data well, $\chi^2(61) = 87.15$, $p = .02$, RMSEA = .045 [$CI_{90} = .020$–.066], CFI = .956, SRMR = .049, BIC = 9360, CR = .86, AVE = .35. The latent variables for comprehensibility and manageability correlated strongly ($r = .95$), thus a two-factor-model with correlated residuals between items #2 and #3 fitted the data as well, $\chi^2(63) = 90.59$, $p = .01$, RMSEA = .046 [$CI_{90} = .022$–.066], CFI = .954, SRMR = .051, BIC = 9354, CR = .86, AVE = .34. A single factor model fitted the data noticeably worse, $\chi^2(64) = 128.38$, $p < .001$, RMSEA = .070 [$CI_{90} = .052$–.087], CFI = .892, SRMR = .062, BIC = 9390, CR = .83, AVE = .29.

2.4.2.2. RS-13. The Resilience Scale is constituted by two major, interrelated factors, personal competence and acceptance of self and life. The goodness-of-fit indices showed good fit, $\chi^2(62) = 95.74$, $p < .01$, RMSEA = .051 [$CI_{90} = .029$–.071], CFI = .932, SRMR = .056. The scale was reliable, CR = .85 and AVE = .32.

2.4.3. Incremental validity

For the incremental validity analyses (cf. Table 3), we combined the measurement models for sense of coherence and resilience into several larger models, including the manifest variables representing psychological distress. For each construct a global (hierarchical second order) factor was introduced to explain the respective first order factors. For model identification the path of the first item (or subfactor) to a latent variable was fixed to 1. Global SOC and resilience, which were allowed to correlate if they were both present in a given model, predicted psychological distress. All models presented in Table 3 were computed twice; once with all SCL-90-R subscales as dependent variables and once with only the SCL-90-R mean score GSI. We will focus our interpretation on the more detailed models. An attentive reader will notice that the explained variance was generally larger for the mean SCL-90-R (GSI) score than for all subscales combined. This can be attributed to the increased reliability of the whole SCL-90-R scale compared to the subscales.

We started with evaluating the three SOC factor models (M1, M2, M3). Model M2 represented the two-factor model and explained more variance of the SCL-90-R subscales ($R^2 = .45$) than both the single-factor (M1; $R^2 = .40$) and the three-factor (M3; $R^2 = .42$) model. Resilience alone (M4) also predicted psychological distress, yet explained less variance in the criteria ($R^2 = .24$) than any of the SOC factor models. To examine incremental validity, we let both SOC and resilience predict psychological distress simultaneously (M5-M7). The incremental validity of SOC was evident for all three SOC factor models, yet the two-factor model (M6) showed the greatest advantage of SOC over resilience. Estimates of standardized regression parameters are displayed in Fig. 1. According to M6, SOC and resilience predicted both criteria ($R^2 = .46$), yet SOC had substantial incremental validity over resilience. Unlike the pattern at the level of zero-order correlations, resilience did not significantly add to the explanation of psychological symptoms. This result was not even specific to certain SCL-90-R subscales, but held across all domains of psychological distress. We inspected if our results might be affected by multicollinearity by computing the tolerance measure and the variance inflation factor (VIF). For Model M6, both predictors had a VIF of 2.11; substantially lower than a commonly accepted problematic VIF > 10.

2.5. Discussion

The resilience scale reflected the proposed two-factor structure, and SOC scores reflected the theoretically derived three-factor-structure, though a two-factor model allowed a more parsimonious explanation, also replicating model amendments from previous independent samples (Grevenstein & Bluemke, 2015b; Moksnes & Haugan, 2014; Zimprich et al., 2006). The two-factor model explained most variance in psychological distress.

Table 2

Zero-order correlations in Study 1(below diagonal; $N = 208$) and Study 2 (above diagonal; $N = 308$) between means of study measures.

	SOC	Res	Opt	Comp	GSI	SOM	O-C	I-S	DEP	ANX	HOS	PHOB	PAR	PSY
Sense of coherence (SOC)	–		.57	.64	−.69	−.38	−.63	−.67	−.67	−.56	−.55	−.44	−.59	−.56
Resilience (Res)	.53	–												
Optimism (Opt)			–	.65	−.50	−.28	−.43	−.46	−.52	−.44	−.40	−.30	−.41	−.35
Self-compassion (Comp)				–	−.55	−.33	−.50	−.54	−.56	−.47	−.44	−.31	−.39	−.39
SCL-90-R GSI	−.73	−.49			–	.71	.88	.86	.92	.88	.71	.72	.76	.83
Somatization (SOM)	−.35	−.28			.63	–	.53	.44	.58	.62	.44	.53	.41	.50
Obsessive–compulsive (O–C)	−.65	−.48			.87	.49	–	.75	.84	.73	.56	.56	.60	.70
Interpersonal sensitivity (I-S)	−.63	−.41			.83	.38	.68	–	.78	.71	.66	.59	.75	.72
Depression (DEP)	−.72	−.51			.91	.49	.81	.72	–	.76	.58	.60	.64	.70
Anxiety (ANX)	−.57	−.31			.84	.51	.61	.62	.73	–	.59	.64	.63	.70
Hostility (HOS)	−.47	−.28			.74	.45	.62	.57	.65	.67	–	.43	.62	.55
Phobic anxiety (PHOB)	−.40	−.34			.61	.27	.42	.55	.47	.61	.36	–	.55	.69
Paranoid ideation (PAR)	−.55	−.27			.71	.25	.56	.70	.55	.63	.48	.50	–	.68
Psychoticism (PSY)	−.63	−.38			.78	.38	.65	.68	.67	.65	.45	.50	.63	–

Note: All correlations are significant at $p < .01$.

Table 3
Prediction of psychological distress and incremental validity analyses.

Model	Predictor	GSI	SOM	O-C	I-S	DEP	ANX	HOS	PHOB	PAR	PSY	CFI	RMSEA	SRMR	Mean R^2
Study 1															
M1	SOC1F	−.81***	−.39***	−.71***	−.70***	−.82***	−.64***	−.55***	−.45***	−.59***	−.70***	.888	.077	.059	.397
M2	SOC2F	−.85***	−.41***	−.77***	−.74***	−.88***	−.68***	−.57***	−.48***	−.62***	−.75***	.930	.062	.053	.452
M3	SOC3F	−.83***	−.40***	−.72***	−.71***	−.84***	−.66***	−.58***	−.47***	−.61***	−.72***	.931	.062	.052	.416
M4	Resilience	−.64***	−.35***	−.58***	−.56***	−.69***	−.45***	−.41***	−.44***	−.35***	−.49***	.925	.059	.060	.242
M5	SOC1F	−.70***	−.29*	−.59***	−.59***	−.66***	−.63***	−.51***	−.28**	−.66***	−.68***	.839	.065	.071	.411
	Resilience	−.16	−.16	−.19	−.15	−.24	−.02	−.07	.10	−.03	−.03				
M6	SOC2F	−.83***	−.34*	−.76***	−.74***	−.84***	−.77***	−.60***	−.35*	−.81***	−.86***	.867	.059	.068	.463
	Resilience	−.04	−.10	−.02	.00	−.07	.12	.04	−.19	.25	.14				
M7	SOC3F	−.75***	−.31***	−.61***	−.63***	−.71***	−.68***	−.57***	−.31*	−.71***	−.73***	.868	.059	.069	.428
	Resilience	−.12	−.14	−.16	−.11	−.19	.03	−.01	−.23	.15	.01				
Study 2															
M1	SOC1F	−.76***	−.43***	−.69***	−.73***	−.74***	−.62***	−.60***	−.49***	−.63***	−.62***	.916	.069	.052	.390
M2	SOC2F	−.82***	−.46***	−.75***	−.79***	−.81***	−.67***	−.64***	−.53***	−.67***	−.67***	.935	.061	.049	.452
M3	SOC3F	−.76***	−.43***	−.69***	−.73***	−.74***	−.62***	−.61***	−.49***	−.64***	−.63***	.933	.063	.050	.393
M4	Optimism	−.59***	−.33***	−.52***	−.56***	−.61***	−.52***	−.48***	−.36***	−.49***	−.43***	.982	.048	.040	.234
M5	Self-comp	−.55***	−.33***	−.50***	−.54***	−.56***	−.47***	−.44***	−.31***	−.39***	−.39***	1.000	.000	.000	.198
M6	SOC1F	−.71***	−.39***	−.70***	−.70***	−.63***	−.52***	−.55***	−.52***	−.65***	−.71***	.912	.061	.054	.399
	Optimism	−.09	.02	.02	−.01	−.15	−.13	−.06	−.04	−.12	.05				
	Self-comp	.02	−.07	−.02	.00	.00	−.01	−.01	.08	.16	.07				
M7	SOC2F	−1.09***	−.64**	−1.16***	−1.13***	−1.00***	−.82***	−.91***	−.80***	−1.05***	−1.14***	.928	.055	.052	.501
	Optimism	.16	.18	.32	.27	.08	.06	.19	.29	.15	.33				
	Self-comp	.17	.02	.15	.15	.15	.11	.12	.21	.30*	.23				
M8	SOC3F	−.74***	−.41**	−.72***	−.74***	−.65***	−.54***	−.60***	−.54***	−.72***	−.77***	.925	.056	.053	.408
	Optimism	−.07	.03	.04	.02	−.14	−.11	.03	−.02	−.08	.08				
	Self-comp	.03	−.06	−.01	−.02	.00	.00	.01	.09	.18	.09				

Note: Fit indices reflect the detailed models with SCL-90-R subscales. *Beta* weights are significant at $*p < 0.05$, $**p < .01$, $***p < .001$.

SOC and resilience are conceptually highly related. Sharing more than 50% of their variance on a latent level, one might be tempted to infer that they are interchangeable. With regard to Cronbach's Alpha as well as SEM-based reliability estimates, SOC and resilience were almost on par. Still, the psychometric measurement models explained little over 30% of the variance in SOC and resilience items. Yet SOC had clear incremental validity over resilience when predicting psychological symptoms in the full model, with SOC being the only significant predictor with unique variance.

SOC's apparent advantage over resilience is surprising, considering the initially presented similarities between both scales and constructs. The
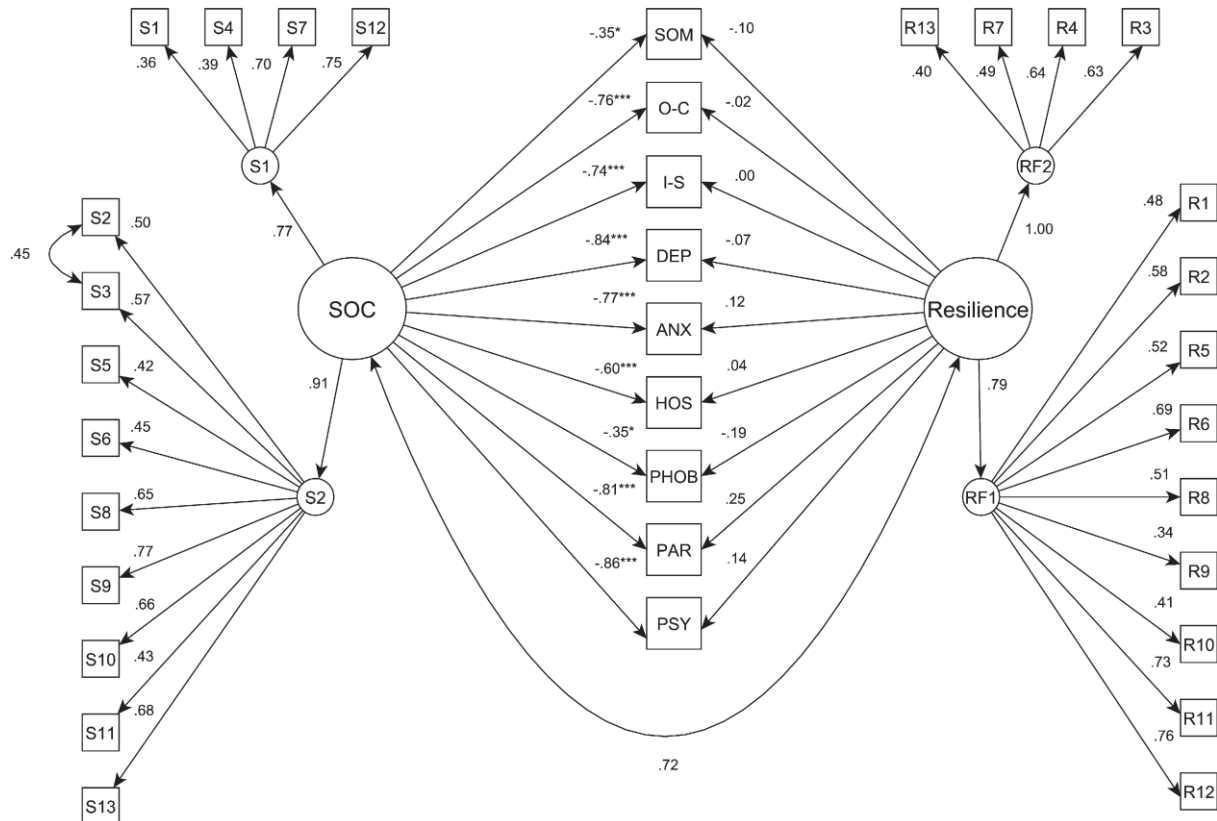

Fig. 1. Incremental validity model (M6) of sense of coherence (SOC) and resilience for psychological symptoms (SCL-90-R subscales) in Study 1. The regression paths indicating validity are significant at $*p < 0.05$, $**p < .01$, $***p < .001$.
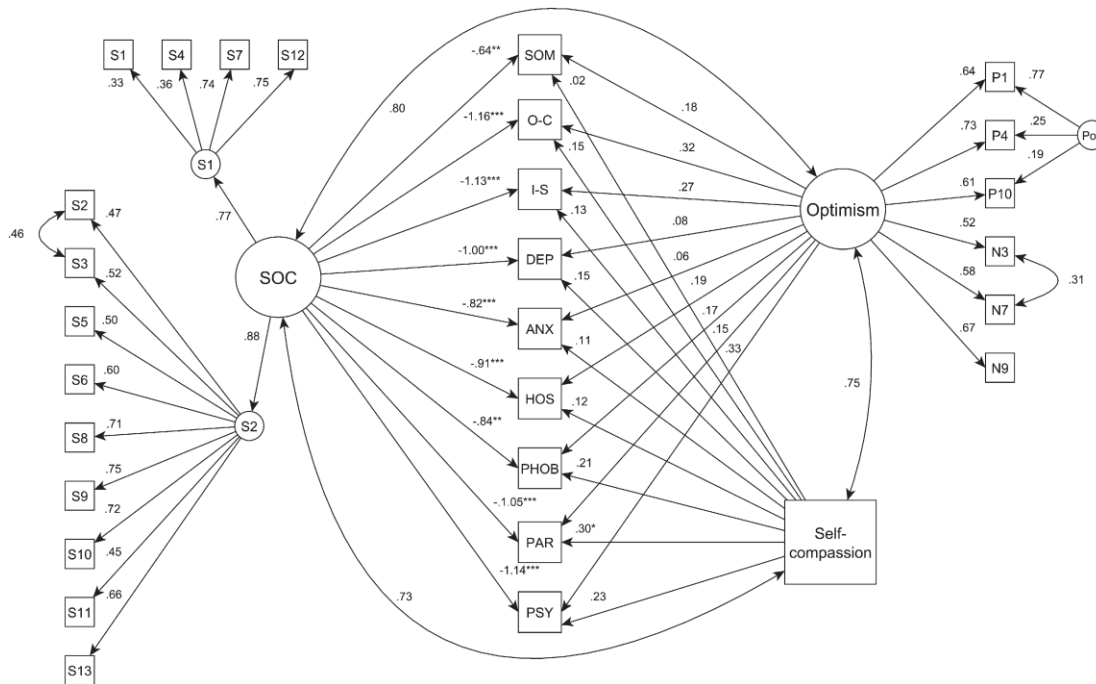
Fig. 2. Incremental validity model (M7) of sense of coherence (SOC), optimism, and self-compassion for psychological symptoms (SCL-90-R subscales) in Study 2. The regression paths indicating validity are significant at *$p < 0.05$, **$p < .01$, ***$p < .001$.

three RS-13 items with the highest factor loadings (#6, #11, and #12) all describe one's personal *competence*. By contrast, the three SOC-13 items with the highest factor loadings (#7, #9, and #12) all relate to one's *emotional state*. This suggests that SOC more closely covers aspects of emotional health, rather than personal competencies, which may not be as relevant for successful coping as some have assumed. Irrespective of actual coping, an individual's positive feeling (or perception or interpretation) about coping possibilities seems crucial for dealing with adverse situations and buffering against psychological symptoms. This is not to deny that this feeling can flourish when coping competence truly exists. Though only cross-sectional in nature, our data are compatible with the idea that (unjustified) *over*confidence in one's competence may even be more fruitful than simply having this competence but evaluating it realistically. At the same time underestimating one's true competence levels is not helpful either, as this strategy would undermine the psychological buffer of positive expectations in the face of hard times.

Personal competence is but one aspect of SOC. Based on the results of study 1, we next focused on other aspects of inner strength, dispositional optimism and self-compassion. Given that SOC apparently captures more than competence, we examined if the advantage of SOC is simply due to SOC being the more "positive" construct, as might be implied by SOC's high association with depression. Both optimism and self-compassion go beyond competence by covering positive expectancies about future outcomes and the emotional core of self-evaluation.

3. Study 2: sense of coherence vs. dispositional optimism vs. self-compassion

3.1. Participants and procedure

Participants were 308 volunteers ($n = 219$ females, 71.1%) with a mean age of 24.36 ($SD = 9.47$; $n = 4$ participants did not state their age), most of whom filled out questionnaires without compensation. The majority were university students (84.7%). Students of Psychology took part in exchange for extra course credit. The remainder of the sample were volunteering employees (10.7%), high school students (1.0%), unemployed persons (1.0%), trainees (0.3%), or individuals reporting "other" occupations (2.3%). Comparable to study 1, there were some gender differences. Women scored higher than men on the SCL-90-R Depression subscale (cf. Table 1). Participants worked on a booklet that contained several questions on socio-demographic background and questionnaires on the competing constructs in the following order: psychological distress, SOC, optimism, self-compassion.

3.2. Measures

3.2.1. SOC-13 and SCL-90-R

The scales were the same as in Study 1. Cronbach's Alpha amounted to .85 for SOC and .97 for mean psychological distress (GSI). Reliabilities for SCL-90-R subscales ranged from .60 (Hostility) to .91 (Depression).

3.2.2. LOT-R: dispositional optimism

Optimism was measured using a German adaption of the revised life-orientation-test with ten items (Glaesmer, Hoyer, Klotsche, & Herzberg, 2008). Three of them are positively worded (#1, #4, #10), three are negatively framed (#3, #7, #9). The remaining four are filler items. In line with Carver and Scheier's (2014) view of optimism as a unidimensional construct, negative items are to be recoded prior to computing the mean score across the six items. Answers were given on 5-point Likert scales marked from 1 ("completely true") to 5 ("completely not true"). The scale yielded an Alpha of .82.

3.2.3. SCS-D: self-compassion

We used a German adaptation (Hupfeld & Ruffieux, 2011) of Neff's original self-compassion scale (Neff, 2003). The scale includes 26 items measuring the six dimensions *self-kindness, self-judgment, common humanity, isolation, mindfulness*, and *over-identification*. Generally, a global self-compassion score is computed by first computing mean scores for each subscale. Negatively scored subscales are recoded before aggregating across subscales. This global self-compassion score is

almost unanimously used with the SCS (MacBeth & Gumley, 2012). Answers were provided on 5-point Likert scales marked from 1 ("very rarely") to 5 ("very often"). Alpha for the whole scale amounted to .89.

3.3. Results

3.3.1. Descriptive data analysis

Means and standard deviations of all measures are displayed in Table 1. All variables were highly correlated (cf. Table 2). As expected, higher SOC, optimism, and self-compassion all indicated lower psychological distress across all SCL-90-R subscales.

3.3.2. Confirmatory factor analyses of sense of coherence, optimism, and self-compassion

3.3.2.1. SOC-13. As in Study 1, the three-factor-model fitted the data well, $\chi^2(61) = 136.23$, $p < .001$, RMSEA = .063 [CI_{90} = .049–.078], CFI = .927, SRMR = .048, BIC = 13,792, CR = .87, AVE = .36, yet the factors for comprehensibility and manageability were very highly correlated (r = .98), so that for reasons of parsimony, we again preferred the two-factor-model, $\chi^2(63) = 136.89$, $p < .001$, RMSEA = .062 [CI_{90} = .048–.076], CFI = .928, SRMR = .049, BIC = 13,782, CR = .87, AVE = .36. A single-factor model fitted the data least, $\chi^2(64) = 194.94$, $p < .001$, RMSEA = .082 [CI_{90} = .069–.095], CFI = .872, SRMR = .060, BIC = 13,842, CR = .85, AVE = .31.

3.3.2.2. LOT-R. According to its authors, the life-orientation-test is a unidimensional measure of optimism (Scheier, Carver, & Bridges, 1994). In recent years, a model with one dominant optimism factor complemented by an orthogonal method factor reflecting socially desirable answering on positively framed items was advanced for the LOT-R (Alessandri et al., 2010; Monzani, Steca, & Greco, 2014; Rauch, Schweizer, & Moosbrugger, 2007). This model fitted the data reasonably well, $\chi 2(6) = 29.45$, $p < .001$, RMSEA = .113 [CI_{90} = .074–.155], CFI = .944, SRMR = .043, BIC = 4726. Most indices denoted good model fit, with the exception of RMSEA. As too low a sample size could hardly be held responsible for this outcome on such a brief scale, we examined modification indices, which suggested correlated residuals between items #3 and #7. Model fit improved tremendously, $\chi 2(5) = 8.70$, $p = .24$, RMSEA = .049 [CI_{90} = .000–.102], CFI = .991, SRMR = .019, BIC = 4706. This modification has been reported for the German LOT-R before, supporting the validity of our approach (Rauch et al., 2007). In sum, the LOT-R appears to be an "essentially" unidimensional measure of optimism (Segerstrom, Evans, & Eisenlohr-Moul, 2011), with good reliability, CR = .78 for the dominant optimism factor and AVE = .50.

3.3.2.3. SCS-D. Neff (2003) reported that a six-factor model with a global second order factor fitted the self-compassion scale "marginally well" (NNFI = .88; CFI = .90), and it was a better explanation of the empirical data than alternatively tested models. The German adaptation fared no better. Hupfeld and Ruffieux (2011) did not find acceptable model fit (RMSEA = .077; CFI = .83). When we reevaluated this model with our own data, it similarly did not reach acceptable fit, $\chi^2(293) = 823.84$, $p < .001$, RMSEA = .077 [CI_{90} = .071–.083], CFI = .804, SRMR = .111. We tried to improve model fit by relaxing parameters as indicated by modification indices, yet encountered convergence errors. Despite efforts, we were unable to establish a suitable measurement model, mirroring a recent psychometric investigation of the SCS by Williams, Dalgleish, Karl, and Kuyken (2014). In line with prior research (MacBeth & Gumley, 2012), we instead used the scale mean.[1]

3.3.3. Incremental validity

We again combined the previously established measurement models, with self-compassion and psychological distress being represented by their observed mean scores. Generally, global SOC, optimism, and self-compassion predicted psychological symptoms. All exogenous variables were allowed to correlate. We first compared the three different SOC factor models. Model M2 yielded a small negative residual variance for the second order SOC factor, which we had to fix by changing the model identification. We subsequently identified the model by fixing the variance of the second order factor to 1 and letting the regression paths be estimated freely. The two-factor model (M2) once again explained more variance in psychological distress (R^2 = .45) than both the single-factor model (M1; R^2 = .39) and the three-factor model (M3; R^2 = .39). Contrasting that, optimism (M4; R^2 = .23) and self-compassion (M5; R^2 = .20) exhibited substantially less explained variance.

For the incremental validity analyses, we again combined all predictors into common models to test structural relationships. Model M8 resulted in a small and non-significant negative residual variance for the SOC manageability factor (ε = −0.014, p = .70), which we fixed to 0. Irrespective whether we used a single-factor (M6), two-factor (M7), or three-factor (M8) model, SOC always had substantial incremental validity over both optimism and self-compassion. The two-factor model for SOC showed the highest explained variance (R^2 = .50) and the largest negative regression weights for SOC (See Fig. 2). Across the whole range of symptoms SOC was the only predictor with substantial incremental validity. For the SCL-90-R subscale Paranoid Ideation, self-compassion had a small positive and significant beta (β = .30). It has to be noted that this model yielded extremely large betas for SOC, sometimes exceeding −1.00. Different from bivariate relationships, the semi-partial regression weights denote unique predictive influence of variables expressed in standardized units, so scores exceeding the typical range [−1; +1] do not pose a fundamental problem. To examine potential problems with multicollinearity, we computed variance inflation factors (VIF) for the predictors. All VIFs (SOC: VIF = 2.29; optimism: VIF = 2.40; self-compassion: VIF = 2.74) were well within conventionally accepted limits. Nonetheless, one has to be careful in interpreting the absolute value of the betas due to the multiple regression approach.[2] The models with single predictors (M2, M4, M5) provide a better estimation of the absolute predictive power of the constructs.

In sum, most of the variance responsible for criterion validity of both optimism and self-compassion existed in SOC, too. We found no increments for competitors, but strong support for incremental validity of SOC over competing health-benefitting variables.

3.4. Discussion

Our data supported the previously advanced two-factor model for SOC (Grevenstein & Bluemke, 2015b; Zimprich et al., 2006). Despite its drawbacks (e.g., correlated item uniqueness), the model is fairly robust across samples. Additionally, the two-factor model again explained more variance in the criteria than both alternative SOC models. Similarly, for the optimism scale (LOT-R) the hypothesized unidimensional model with a method factor for positively framed items was recovered (Rauch et al., 2007). Previously documented issues of the self-compassion scale (Hupfeld & Ruffieux, 2011) resurfaced in our study, preventing the use of latent variables and necessitating the use of an unweighted (equally weighted) linear aggregate of item scores.

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[1] We also tried to use the poorly fitting factor model suggested by Neff (2003) and Hupfeld and Ruffieux (2011) for incremental validity analyses. Unfortunately, using this 6-factor model yielded convergence errors when combined with the other constructs, thereby precluding its use.
[2] The large overlap in shared variance and the complexity of the model may have resulted in spurious suppression effects. Less complex models behaved as expected and resulted in perfectly interpretable regression weights. The difference in explained variance between the full incremental validity model (M7) and SOC predicting psychological distress all by itself (M2) was less than ΔR^2 = .05; less than the difference between a single (M1) or three-factor (M3) model and the two-factor (M2) SOC model.

We investigated the unique predictive validity of sense of coherence, dispositional optimism, and self-compassion when explaining variance in psychological distress. SOC turned out to be the predictor with the strongest increment over competing variables, leaving almost no unique predictive influence to the other constructs.

4. General discussion

Two studies showed that SOC was the strongest health-relevant predictor and that competing constructs did not show unique increments beyond SOC. This was valid for all domains of psychological distress. The advantage of SOC can therefore not be attributed to a strong overlap with depression as was argued in the past (Geyer, 1997). In the light of recent research on health-related personality factors this finding is surprising, especially since the predictors are all highly regarded and convergently valid. We targeted the latent level so as to get a clear view on criterion validity at the structural level, free from measurement error. SOC's advantage could not be attributed to deficient assessment of its competitors, though establishing a measurement model for self-compassion requires further attention in the future.

What exactly makes SOC stand out then? An attempted answer is that SOC predicts psychological distress so effectively, because it covers specific cognitive aspects with specific emotional consequences. Even though optimism and SOC overlap, optimism has a distinct quality as noted by Carver and Scheier (2014, p. 293): "The fact that optimism is a facet of personality that is inherently cognitive in nature […] may make it especially appealing." Not denying the advantages of a purely cognitive conception of a construct, Carver and Scheier (2014) themselves wondered "Under what circumstances might it be bad to be too optimistic?" Empirical findings speak volumes about the advantages of high optimism; and yet, researchers are increasingly aware of the downsides of *unrealistic* optimism (Berlant, 2011; Bortolotti & Antrobus, 2015; Tenney, Logg, & Moore, 2015). For instance, optimism and self-regulatory competence do not go hand in hand (Carver, 2014). If a person lacks coping capability without realizing it, or if optimists attach to unattainable ideals without ever changing or escaping cruel circumstances, then maladaptive behavior might undermine a monotonic relationship between dispositional optimism and health-related outcomes.

If this reasoning is correct, then the specific utility of SOC most likely is that (1) it is nourished by a relatively realistic view of one's resistance resources, based on long-term experiences; (2) it fosters adjustment while flexibly drawing on diverse strategies such as cognitive restructuring, emotion regulation, and situationally appropriate behaviors; and (3), above all, it uniquely reflects *purpose* — something untamed optimism may not provide.

Recent research has demonstrated that SOC possesses a large variance overlap with measures of meaning in life. Piedmont, Magyar-Russell, DiLella, and Matter (2014) found that once they controlled for meaning in life as well as self-actualization, SOC's predictive validity for various outcomes including life satisfaction, well-being, and affect was attenuated. Our own results mirror the importance of meaning as we compared different factor models of the SOC scale with regard to their criterion validity. A two-factor model with a joint factor for comprehensibility/manageability and meaningfulness as the second factor, showed noticeably higher criterion validity than both a single-factor model and the theoretically derived three-factor model. These results not only indicated that it makes sense to treat meaningfulness as a separate factor. It is important to view meaningfulness as a distinct aspect that improves SOC's criterion validity. A two-factor model was not only more parsimonious, but also outperformed the three-factor model in terms of predictive validity.

We draw a similar conclusion about SOC and resilience. The criterion validity of resilience has been questioned. For instance, its predictive validity for health and social adaptation among adolescents was lower than that of the broad Big Five personality traits (Waaktaar & Torgersen, 2010). In contrast, SOC had substantial increments over the Big Five when predicting psychological symptoms and life satisfaction (Grevenstein & Bluemke, 2015a). Although meaning (in life) was intended by Wagnild and Young (1993) to form a relevant resilience component, in the RS-13 scale only two factors, personal competence (e.g., "I have enough energy to do what I have to do") and acceptance of self and life (e.g., "I take things one day at a time"), prevail. Again, it is evident that neither competence nor merely accepting things represent appropriate responses under all life circumstances. One can easily fathom that *changing*, rather than accepting, is adaptive in specific situations. Self-acceptance might be promoted by purpose and meaning in life, yet the reverse does not hold. Thus, the incremental validity of SOC over resilience underscores the importance of envisioning one's environment as imbued with meaning.

Our results showed less-than-ideal psychometric qualities and insufficient fit of the measurement model for the German version of the self-compassion scale and were comparable to the original German publication (Hupfeld & Ruffieux, 2011) as well as later international investigations (Williams et al., 2014). Of course, the complexity of the six-factor structure of the self-compassion scale poses a disadvantage. When using scale means instead – despite strong zero-order correlations with the two criteria – self-compassion did not show any signs of incremental validity over SOC. Once more, self-compassion may be stimulated by meaning in life, yet self-compassion does not instill purpose if it is lacking.

We conclude that SOC works in the manner originally professed by Antonovsky (1987). Of all three characteristics – comprehensibility, manageability, and meaningfulness – he considered meaningfulness to be essential. Without meaningfulness, the likelihood to comprehend times of hardship and manage the respective adversities decreases. As the fog surrounding the utility of general resistance resources begins to lift, the visionary legacy of Frankl (1988/2014) becomes translucent again: The "*will to meaning*" indeed has the strongest bearing on humans' ability to persist in the face of harsh conditions. The less a measure captures such purpose, the less predictive utility it appears to have for psychological distress.

To wrap it up, SOC, resilience, optimism, and self-compassion cannot simply be equated. We derive tentative recommendations from our data: It appears efficient to use SOC when future health-related outcomes are at stake. Theoretical questions surrounding a construct other than SOC may require the use of a more tailored measure.

4.1. Limitations and future research

Whereas for some constructs measurement models existed, for others we had to use mean scores. To model structural relationships on a latent level, the use of mean scores is not optimal. Reversely worded, given that SOC and optimism are "essentially" unidimensional, manifest means might be just "good enough" for ad hoc models. In any case, future studies should devote attention to identify the latent variables underlying self-compassion.

The lack of longitudinal data precludes identifying the causal nature of the structural relationships. A plausible alternative explanation for the predictive power of SOC is that its bidirectional relationships are stronger than those of the other constructs. However, SOC is thought to be malleable in youth, but relative stable from the age of 30 onward; and even during the developmental phase, SOC is not easily shaped by outside factors (Grevenstein, Bluemke, Nagy, Wippermann, & Kroeninger-Jungaberle, 2014; Honkinen et al., 2008). In contrast, optimism and self-compassion are supposed to be malleable and shaped by training (Carver et al., 2010; Neff & Germer, 2013). Despite the high popularity of salutogenic reasoning, we are not aware of any psychotherapeutic approaches to specifically increase SOC. Taken together, we think it is the durable nature of SOC that contributes to its strong incremental validity. The future may shed more light on if, and how, salutogenic resources can be improved.

In the past it was argued that SOC could be a mere confound of health, an outcome, rather than a reasonable predictor (Geyer, 1997). Nonetheless a recent study showed that SOC had incremental validity beyond neuroticism, extraversion, and general self-efficacy in a longitudinal design (Grevenstein, Bluemke, & Kroeninger-Jungaberle, 2016). SOC could not only predict initial psychological distress, but SOC was the only personality construct that could additionally predict future development of mental health three years later, even controlling for initial health status.

The present research was limited to investigating a selected set of constructs. Future studies should expand the current investigation since a number of other personality characteristics might also compete for criterion validity. For example dispositional hope (Snyder et al., 1991) or hardiness (Kobasa, 1979) are also a prime candidates that can explain variance in psychological distress.

All of our results were based on self-report measures. This introduces a potential for bias as establishing convergent validity generally requires two independent assessments of the same trait (monotrait-heteromethod; Campbell & Fiske, 1959). Podsakoff, MacKenzie, Lee, and Podsakoff (2003) highlighted that aspects such as response styles, need for consistency, implicit theories, social desirability, or mood can all affect participants' self-reports. The absolute strengths of the associations we estimated might have been inflated by the systematic bias introduced by self-presentation and the limitations of introspection. Yet we do not think it likely that SOC has been unduly favored by self-reporting biases.

Finally, we have advanced a two-factor model for the SOC scale. Initial exploratory factor analyses suggested that a single factor adequately represents the SOC scale, yet confirmatory factor analyses have necessitated more factors and, indeed, repeatedly supported the validity of both two-factor and three-factor models. Future research will have to look at the strengths of two-factor vs. three-factor models for SOC, not only in light of model fit, but also regarding their specific criterion validity indices.

4.2. Conclusion

Our research highlights the importance of specific salutogenetic factors beyond other general resistance resources and beneficial outflows of personality: *purpose and meaning in life*. Should we continue to conceptualize general resistance resources as constructs that exist independent of individuals' worldviews—and thereby exclude the very essence of their effectiveness?

Acknowledgment

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