SELF-REPORTED HEALTH STATUS PREDICTING RESILIENCE AND BURNOUT IN LONGITUDINAL STUDY

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SUMMARY

Objective: The study examined the links between health-related indicators, adult resilience, and burnout.

Method: The data were collected during two waves of the longitudinal study (in 2004–05, N = 98, and 2011–12, N = 88, respectively). Health behaviour, self-rated health (SRH), Sense of Coherence Scale (SOC), and Shirom-Melamed Burnout Measure (SMBM) were measured.

Results: The comprehensibility of SOC and physical fatigue of SMBM as measured in wave 2 were determined by SRH as measured in wave 1. In the cross-sectional part, the meaningfulness of SOC was related to SRH, and alcohol consumption in wave 1. The comprehensibility of SOC was related to SRH in wave 2.

Conclusion: SOC is well known to have effect on health. However, the results show that self-reported health had effect on the comprehensibility of SOC. Our data also support the finding that the effect of SRH on burnout is stronger than the effect of burnout on SRH.

Key words: sense of coherence, self-rated health, alcohol consumption, physical fatigue

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INTRODUCTION

Resilience is defined as a universal capacity which allows a person, group, or community to prevent, minimize or overcome the damaging effects of adversity (1).

Historically, the research on the topic of resilience in adults has originated from studies that investigated the impacts of stressful events on people (2, 3). These studies were seeking characteristics and constellations of characteristics that identify people capable of better withstanding the impact of stressful events. Such characteristics or constellations of characteristics were assumed to buffer, transfer or negate the potential harmful impact of adverse events.

Currently, resilience is investigated in the framework of the studies of stress prevention and nurturing of positive strengths in individuals. The study of resilience has emerged from the shift of focus of psychological investigations from a problem-oriented approach to seeking positive strengths in individuals. There are several determinants of resilience including neurobiological, genetic, temperament, and environmental influences (4). To the best of the authors' knowledge, little work has focused on psychophysiological and biochemical processes that enhance the resilience of an individual. The prospective longitudinal investigations are mostly focused on protective factors such as sociability, intelligence, social competence, social ties, and support by family or significant others (5). The studies addressing biological determinants of resilience are mostly conducted with animal models (6), or focus on stress response and allostatic load (7).

This study is an exploratory study addressing the possible links between psychophysiological indicators and a measure of adult resilience, represented here by the Sense of Coherence. The second question addresses the possible links between psychophysiological indicators and measures of burnout syndrome as an outcome of chronic stress. As our study is based on longitudinal data, our next question concerns the relations between early factors (premature birth, birth weight, breast feeding, education of parents) and adult resilience.

Sense of coherence is conceptualized as an ability to use one's resources. Sense of coherence is the global orientation that the world is comprehensible, manageable, and meaningful (2). Comprehensibility is the degree to which individuals perceive the world as predictable, ordered, and explicable; manageability is the degree to which individuals believe that they have the personal and social resources to handle the demands; and meaningfulness is the belief that demands are challenges which are worthy of investment and commitment. As the sense of coherence has been developed to characterise persons that had been doing well despite adversity, the questionnaire Sense of Coherence is often used as a measure of adult resilience.

Burnout is viewed as a psychological strain representing a process of the depletion of personal coping resources in reaction

to prolonged exposure to stress at work (8). The burnout syndrome emerges especially in certain professional groups as a result of a combination of factors including mainly chronic stress as well as a marked drop in motivation, interest in work and sense of satisfaction (9, 10). It has not only been an interesting and relatively serious psychological problem, but, as it impacts both the quality of life and health of people suffering from this syndrome, it also represents an important health issue (11).

The purpose of the study is to examine the links between health-related indicators and adult resilience, and to explore the relation between health-related indicators and burnout among participants of the longitudinal study.

MATERIALS AND METHODS

In the present study we used data from the project "Longitudinal monitoring of growth and mental development of a normal child in a group of individuals from the capital city of Prague since their birth" that was carried out by the Institute of Hygiene and Epidemiology (later the National Institute of Public Health) in Prague between 1956 and 1980. The rebirth of the project came with the transition process in the Czech Republic in 1994. As there was considerable time gap between rebirth in 1994 and the last survey carried out in 1980, only a part of the original sample was found. In 1994, 112 persons from 287 new-borns recruited at the beginning of the study participated.

The next survey took place in 2004–2005 (in participants aged 45 to 49 years), followed by a survey conducted in the years 2011–2012 (in participants aged 52 to 56 years), and the study continues as a study of life span development.

In the wave conducted in 2004–2005, 98 respondents participated (53 women, mean age = 45.321, SD = 2.953, and 45 men, mean age = 45.400, SD = 1.935). In the wave conducted in 2011–2012, 88 respondents participated (49 women, mean age = 53.041, SD = 2.937, 37 men, mean age = 51.676, SD = 2.249). The sample thus represented 34.1% and 29.6% of the original sample, respectively.

Participants were examined by psychological methods and by somatic and physiological measures (both waves) and selected biochemical measures (wave 2, 2011–2012). They were also administered a simple health questionnaire including issues focused on selected behavioural aspects of health.

The survey conducted in 2004–2005 (wave 1) included the measure of Sense of Coherence, somatic and physiological measures, health questionnaire and measures devoted to behavioural aspects of health. The survey conducted in 2011–2012 (wave 2) included the measure of Sense of Coherence, measure of burnout, somatic and physiological measures, selected biochemical measures, and health questionnaire focused on subjective and objective health, and selected behavioural aspects of health.

The Sense of Coherence Scale (SOC, 2) consists of 29 items, which measure three components of the construct: comprehensibility (11 items, e.g. "Do you have very mixed-up feelings and ideas?"), manageability (10 items, e.g. "Do you have the feeling that you're being treated unfairly?"), and meaningfulness (8 items, e.g. "How often do you have the feeling that there's little meaning in the things you do in your daily life?"). Respondents rated items on a seven-point Likert-type scale, yielding an overall score between 0 and 203. The higher the score, the higher is one's sense of coherence and its components. The SOC was administered in both waves.

The measure has shown respectable internal consistency and reliability in literature: according to Eriksson and Lindström (12) Cronbach's alpha ranged from 0.70 to 0.92.

Cronbach's alpha of our sample is 0.81 for manageability scale, 0.86 for meaningfulness scale, 0.83 for comprehensibility scale, and 0.93 for the whole questionnaire in the survey conducted in wave 2.

The Shirom-Melamed Burnout Measure (SMBM, 8) consists of three subscales: physical fatigue (six items, e.g. "I feel tired; I feel physically fatigued"), emotional exhaustion (three items, e.g. "I feel I am not capable of investing emotionally in co-workers and customers"), and cognitive weariness (six items, e.g. "I am too tired to think clearly; I feel that I think slowly"). Respondents are asked to rate the frequency of each feeling during their work. Items are scored on a 7-point frequency scale, ranging from 1 (almost never) to 7 (almost always). The high scores indicate high level of subscales. The reliability coefficient (Cronbach's alpha) of the Czech version is 0.92 for physical fatigue, 0.93 for cognitive weariness, and 0.76 for emotional exhaustion in the present study. The questionnaire was administered in wave 2.

Physical examinations comprised BMI, WHR, and systolic and diastolic blood pressure. The values above norm were scored 1. Normal values were scored 0.

In wave 2, selected biochemical data (total cholesterol, triglycerides, glycaemia) were collected. The values above norm were scored 1. Normal values were scored 0.

Health Questionnaire

Regular usage of medicines. Positive responses were scored 1.

Smoking (Do you smoke? If yes, how many cigarettes per day? If yes, how many years have you smoked? If not, have you ever smoked?) All respondents currently smoking were considered smokers (scored 1).

Alcohol (Do you drink alcohol? If yes, how often? If yes, how many units per week?) All respondents drinking regularly above 2 units per week obtained score 1. Others were scored 0.

Physical activity (How many kilometres per week do you cover by your own power: walking, jogging, and cycling). No physical activity was scored as 1.

Self-reported health (SRH) (In general, would you say your health in the last 12 months has been ... (circle one number)?) The scale from 1 (excellent) to 5 (poor) was provided to respondents.

Chronic health problems (Do you suffer from long term (more than 6 months) problems concerning your heart and circulatory system, breathing, nervous system, digestive system, motion, renal and urological system, liver and bladder, other problems?) Negative responses to all issues means score 0, one positive response means score 1.

Objective health was derived from the question concerning diagnoses stated to the respondent by a physician (Has your physician diagnosed you with any of the diseases listed below?) The respondent had at his/her disposal a list of possible problems: myocardial infarction, angina pectoris, IHD, stroke, high blood pressure, diabetes, cancer, gastric ulcer, bladder disease, kidney stone, asthma, illness of vertebra and/or joints. There was also the possibility to add a problem that was not on the list. Nega-

tive responses to all issues means score 0, one positive response means score 1.

Health in the family was derived from the question concerning diseases (the same list as for objective health index) diagnosed to parents, siblings, and children. Negative responses to all issues means score 0, one positive response means score 1.

Statistical Analyses

Multiple linear regression analyses were employed to process the data. Inspection of the regression diagnostics revealed no multicollinearity among the independent variables: we used Variance Inflation Factors (VIF) and no value exceeded 4. Due to explorative character of the study we used the Enter method. The data were processed with the use of Intercooled Stata 7.0 software. In the analyses, the dependent variables were the total score of SOC and its components, and the total score of SMBM and its components. Only significant results of the regression analyses were reported in the study, however, all results can be obtained from authors.

Throughout the paper, we present p-values of regression models that are considered significant at $\alpha = 0.05$ and p-values of predictors that are considered significant at the $\alpha = 0.005$ level to capture most robust predictors.

Table 1. *Predictors of Sense of Coherence comprehensibility in wave 2*

		Coef. B	SE	t	p-value	95% CI	
						Lower	Upper
Wave 1	BMI	−0.396	2.319	−0.17	0.865	−5.029	4.236
	BPS	6.675	4.601	1.45	0.152	−2.514	15.86
	BPD	6.120	5.140	1.19	0.238	−4.146	16.38
	SRH	−18.1	−3.85	4.70	<0.001	−27.51	−8.720
	Chronic problems	6.168	2.675	2.31	0.024	0.825	11.51
	Objective health	0.029	2.413	0.01	0.990	−4.790	4.850
	CVD	−4.146	6.022	−0.69	0.494	−16.17	7.880
	Overweight	−0.560	5.721	−0.10	0.922	−11.98	10.86
	Asthma	1.747	5.568	0.31	0.755	−9.372	12.86
	Smoking	−2.693	2.386	−1.13	0.263	−7.459	2.073
	Alcohol	−2.103	2.343	−0.90	0.373	−6.783	2.576
	Cons	49.11	3.008	16.33	<0.001	43.10	55.12

N = 77, F (11, 65) = 2.26, Prob > F p = 0.021, R^2 = 0.276, Adj R^2 = 0.154, Root MSE = 9.069

BMI = body mass index; BPS = systolic blood pressure; BPD = diastolic blood pressure; SRH = self-rated health; CVD = cardiovascular disease; chronic problems = reported chronic problems lasting more than 6 months; objective health = diseases diagnosed by physician

Table 2. *Regression analysis on Sense of Coherence meaningfulness in wave 1*

	Coef. B	SE	t	p-value	95% CI	
					Lower	Upper
BMI	0.3169	1.629	0.19	0.846	−2.935	3.569
BPS	−3.258	3.247	−1.00	0.319	−9.740	3.224
BPD	0.136	3.468	0.04	0.969	−6.787	7.061
SRH	−9.815	3.330	−2.95	0.004	−16.46	−3.166
Chronic problems	4.092	1.884	2.17	0.034	0.330	7.856
Objective health	−1.808	1.731	−1.04	0.300	5.265	−1.648
CVD	4.199	4.139	1.01	0.314	−4.065	12.46
Overweight	1.278	4.072	0.31	0.755	−6.853	9.409
Asthma	1.212	3.946	0.31	0.760	−6.666	9.091
Smoking	1.960	1.714	1.14	0.257	−1.462	5.383
Alcohol	−5.040	1.625	−3.10	0.003	−8.284	−1.795
Cons	42.375	2.120	19.98	<0.001	38.141	46.61

N = 78, F (11, 66) = 2.40, Prob > F p = 0.014, R^2 = 0.285, Adj R^2 = 0.166, Root MSE = 6.422

BMI = body mass index; BPS = systolic blood pressure; BPD = diastolic blood pressure; SRH = self-rated health; CVD = cardiovascular disease; chronic problems = reported chronic problems lasting more than 6 months; objective health = diseases diagnosed by physician

RESULTS

Predictors of Resilience

The comprehensibility of SOC (Table 1) as measured in wave 2 was determined by self-reported health as measured in wave 1 (negative relation, i.e. the better SRH, the higher comprehensibility).

Variables related to resilience in cross-sectional study

Wave 1, 46–49 years of age

The meaningfulness of SOC (Table 2) was related to self-rated health (negative relation), and alcohol consumption (negative relation).

*Wave 2, 52–56 years of age**

The comprehensibility of SOC (Table 3) was related to self-rated health (negative relation, the better SRH, the higher comprehensibility).

Table 3. *Regression analysis on Sense of Coherence comprehensibility in wave 2*

	Coef. B	SE	t	p-value	95% CI	
					Lower	Upper
BMI	2.945	−2.524	−1.17	0.247	−7.978	2.087
BPS	5.127	2.535	2.02	0.047	0.073	10.18
BPD	−0.499	2.590	−0.19	0.848	−5.662	4.664
SRH	−11.16	3.840	−2.91	0.005	−18.82	−3.507
Chronic problems	0.735	2.179	0.34	0.737	−3.609	5.081
Objective health	−1.501	2.774	−0.54	0.590	−7.032	4.030
CVD	7.170	2.903	2.47	0.016	1.381	12.95
Overweight	9.565	6.135	1.56	0.123	−2.664	21.79
Asthma	4.013	4.058	0.99	0.326	−4.076	12.10
Smoking	−0.381	2.339	−0.16	0.871	−5.045	4.282
Alcohol	2.926	2.745	1.07	0.290	−2.546	8.398
Cons	47.11	3.418	13.78	< 0.001	40.30	53.92

Number of obs = 85, F (12, 72) = 2.40, Prob > F p = 0.011, R^2 = 0.286, Adj R^2 = 0.167, Root MSE = 9.133
BMI = body mass index; BPS = systolic blood pressure; BPD = diastolic blood pressure; SRH = self-rated health; CVD = cardiovascular disease; chronic problems = reported chronic problems lasting more than 6 months; objective health = diseases diagnosed by physician

Table 4. *Predictors of physical fatigue of Shirom-Melamed Burnout Measure in wave 2*

	Physical fatigue	Coef. B	SE	t	p-value	95% CI	
						Lower	Upper
Wave 1	BMI	0.564	1.683	0.34	0.739	−2.799	3.927
	BPS	−0.653	3.321	−0.20	0.845	−7.289	5.983
	BPD	5.974	3.714	1.61	0.113	−1.446	13.39
	SRH	14.23	3.397	4.19	< 0.001	7.452	21.02
	Chronic problems	1.045	1.931	0.54	0.590	−2.814	4.904
	Objective health	2.154	1.775	1.21	0.230	−1.393	5. 702
	CVD	−6.082	4.352	−1.40	0.167	−14.77	2.612
	Overweight	−1.029	4.158	−0.25	0.805	9.337	−7.278
	Asthma	−1.606	4.023	−0.40	0.691	−9.645	6.431
	Smoking	1.409	1.765	0.80	0.428	−2.116	4.936
	Alcohol	2.763	1.700	1.63	0.109	−.6332	6.160
	Cons	14.18	2.171	6.53	< 0.001	9.847	18.52

N = 76, F (11, 64) = 2.62, Prob > F p = 0.008, R^2 = 0.310, Adj R^2 = 0.191, Root MSE = 6.547
BMI = body mass index; BPS = systolic blood pressure; BPD = diastolic blood pressure; SRH = self-rated health; CVD = cardiovascular disease; chronic problems = reported chronic problems lasting more than 6 months; objective health = diseases diagnosed by physician;

*In wave 2 we added some biochemical indicators; however none of them appeared to become a robust determinant of dependent variables. For that reason we performed linear regression analyses in which we entered the same indicators as in wave 1 to enable comparison of both waves.

Predictors of Burnout

Physical fatigue of the SMBM as measured in wave 2 was determined by the level of self-reported health as measured in wave 1 (Table 4).

DISCUSSION

Predictors of SOC

The determination of the comprehensibility of SOC by self-rated health is very interesting. SRH is well known as a valid and robust indicator with high predictive power concerning morbidity and mortality (13–16). It appears that an individual's view of his/her health is irreplaceable, as it likely reflects the aspects of health status that are not approachable by other measures, e.g. incipient phases of disease, the seriousness of the disease, psychological and psychophysiological resources and reserves, social and mental aspects of the disease, etc. Subjects' responses to self-rated health item maintained strong predictive power even after adjustment for functional status, depression, and co-morbidity (17).

It is well known that SOC is a health-protective (salutoprotective) characteristic (18). SOC has been the answer to the question of why some people stay well under the same conditions that make other people sick. However, from our results it follows causality of opposite direction (i.e. self-reported health predicted the level of comprehensibility).

Relations of SOC in Cross-sectional Study

The relation of alcohol consumption with SOC components in participants aged 45 years is interesting. As this part of the results is cross-sectional, it is not possible to determine the causality. In the scientific literature, we found studies supporting Antonovsky's original concept of increased alcohol consumption as a result of failed coping strategies (19, 20). However, the possibility that alcohol consumption might blunt the components of SOC cannot be excluded. Moreover, the above mentioned studies were conducted with heavy drinkers, whereas in our study we encountered moderate consumers of alcohol.

The meaningfulness of SOC was related to SRH in wave 1. The causality is not clear in case of cross-sectional results; however, our hypothesis for the future is a possible impact of SRH on the meaningfulness of SOC.

The concurrent relations in wave 2 showed that the relation of any component of SOC to alcohol consumption is not significant. T-test showed that alcohol consumption decreased significantly in wave 2 ($p = 0.006$). In the second wave, the comprehensibility of SOC is related to self-rated health, and the causality cannot be determined; however, as SRH predicted the comprehensibility 7 years later, the same causality can be hypothesized.

Predictors of Burnout

Self-rated health in 45-year olds determined physical fatigue of SMBM seven years later: the poorer the health, the higher the burnout level. It is well known that persons who suffer from burnout may suffer from headaches, dizziness, sleeping problems, stomach pain, and back pain – to name only moderate health problems (21–23).

As early as the 1980s, professional literature all over the world began to reflect possible associations between burnout and levels of cardiovascular disease (CVD) risk factors (24). This and other findings (25–29) indicate a very likely relationship between burnout syndrome and acute myocardial infarction, ischaemic heart disease, cerebral apoplexy, and sudden cardiac death. The majority of cases lead to the assumption that the burnout syndrome is more likely to precede CVD rather than emerge as a result.

The opposite relation, i.e. poor self-rated health as a determinant of later burnout, has been studied less frequently. According to Shirom (30), good health as indexed by SRH should be negatively linked to burnout because it represents a pivotal coping resource and any changes in it are likely to have an impact on one's level of burnout. Vinokur et al. (31) were able to demonstrate this in a longitudinal study: according to their findings, perceived health as measured in 2001 predicted a decrease in burnout as measured in 2004. Their data provided support for the coexisting of both types of effects, i.e. burnout predicted decrease in perceived health. According to their study, the effect of self-rated health on burnout is stronger than the effect of burnout on self-rated health. Our data thus support the finding of Vinokur et al. (2009) in a far longer time interval between predicting variable and dependent variable. Concurrent relation of SRH and physical fatigue is in agreement with relations of both variables in longitudinal view.

Study Limitations

Of course, there are some limitations to our study. The sample is not big enough according to some standards. On the other side, the sample homogeneity in the years of survey, age and birth cohort might represent an advantage. Some findings might be sample specific. It is necessary to examine the generalizability of our results.

CONCLUSIONS

The longitudinal design of the study enabled us to show predictive effects of SRH on resilience (SOC) and burnout. The cross-sectional study revealed the negative relation between alcohol consumption and resilience (SOC). Our task for the future is to seek the mechanisms explaining the described relations.

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