

Linköping University Post Print

DOES TWO-YEAR STABILITY FOR SCALE SCORES OF PSYCHOSOCIAL FACTORS DIFFER BY SOCIOECONOMIC POSITION?

Johanna Lundberg, Nadine Karlsson and Margareta Kristenson

N.B.: When citing this work, cite the original article.

Original Publication:

Johanna Lundberg, Nadine Karlsson and Margareta Kristenson, DOES TWO-YEAR STABILITY FOR SCALE SCORES OF PSYCHOSOCIAL FACTORS DIFFER BY SOCIOECONOMIC POSITION?, 2009, PSYCHOLOGICAL REPORTS, (105), 3, 1009-1022.

<http://dx.doi.org/10.2466/PR0.105.F.1009-1022>

Copyright: Perceptual and Motor Skills

<http://www.ammonsscientific.com/>

Postprint available at: Linköping University Electronic Press

<http://urn.kb.se/resolve?urn=urn:nbn:se:liu:diva-54391>

Running head: TWO-YEAR STABILITY OF PSYCHOSOCIAL FACTORS

**Does 2-year stability for scale scores of psychosocial factors
differ by socioeconomic position?**

Johanna Lundberg

Nadine Karlsson

Margareta Kristenson

Department of Medical and Health Sciences

Division of Community Medicine

Linköping University

Summary

Previous longitudinal studies have demonstrated the importance of measuring stability of risk factors over time, in order to correct for attenuation bias. The present aim was to assess the stability of scores for eight psychometric scales over a 2-year period, and whether stability differed by socioeconomic position. Baseline data were collected during 2003–2004 from 1007 men and women aged 45–69 years. Follow-up data were collected in 2006 from a total of 795 men and women. Analysis showed that stability over 2 years was moderate and tended to be lower in groups of low socioeconomic position. It is suggested that correction of attenuation bias is relevant in longitudinal studies for psychosocial factors, especially for groups of low socioeconomic position.

There is today rich evidence for the impact of psychosocial factors on health. Thus, measures of depression, vital exhaustion and hopelessness have been shown to predict morbidity and mortality, while measures of self-esteem, mastery, perceived control and sense of coherence have been shown to predict reduced risk of poor health (Barefoot, Dodge, Peterson, Dahlstrom, & Williams, 1989, Appels & Otten, 1992; Berkman, 1995; Penninx, van Tilburg, Boeke, Deeg, Kriegsman & van Eijk 1998; Rosengren, Orth-Gomér & Wilhelmsen, 1998). Moreover, people of low socioeconomic position have poorer health prospects and they have also, in general, less favourable levels of psychosocial factors (Baum, Garofalo, & Yali, 1999; Taylor & Seeman, 1999; Kristenson, Kucinskiene, Bergdahl & Orth-Gomér, 2001). Imbalance between exposure to psychosocial stressors and availability of psychosocial resources may be one mediating mechanism of the social gradient in health (Adler & Ostrove, 1999; Marmot & Wilkinson, 2000).

Importance of follow-up studies

The present study is part of a planned larger prospective study designed to test whether psychosocial factors and psychobiological mechanisms could explain socioeconomic differences in health. Previous longitudinal studies on traditional risk factors, such as serum lipids and blood pressure levels, have demonstrated the importance of panel studies to measure the stability of risk factors over time (Clarke, Shipley, Lewington, Youngman, Collins, Marmot, Peto 1999). Based on this information, correction of attenuation bias can be made, thereby increasing the accuracy of risk estimates (Winne & Belfry, 1982; Muchinsky, 1996;). However, we found few studies of this kind which focused on measurement of psychosocial factors by psychometric scales. To our knowledge, no study have yet estimated the stability of several psychometric scales over time at one occasion, neither has stability of scales in relation

to different indicators of socioeconomic position been assessed. The main aim of this study was therefore to assess the stability of eight psychometric scales (self-esteem, mastery, perceived control, sense of coherence, cynicism, hopelessness, vital exhaustion and depression) over a 2-year period. A second aim was to analyze whether the stability of each psychometric scale differed by socioeconomic position.

Method

Participants

This study is based on data from the Life conditions, Stress and Health (LSH) study, which is a longitudinal study targeting social differences in the incidence of coronary heart disease in a normal population of men and women (non-patients) drawn from a region in the southeast of Sweden. Baseline data were collected during 2003–2004 with a follow-up in 2006. Participants were 1007 men and women aged 45–69 years in 2003, stratified by 5-year age groups and belonging to any of the catchments areas of 10 primary health care centres in the southeast of Sweden (response rate 62%). Participants fulfilling these requirements were randomly selected via the National Population Register. Exclusion criteria were serious disease and difficulties in understanding the language. Data collection at baseline included self-reported data via postal questionnaires, and measures of blood pressure, anthropometrics assessment and blood sampling during a visit to a primary health care centre. Follow-up data were collected by a questionnaire in 2006 from a total of 795 men and women (response rate 80%) of whom 300 were randomly selected to go to a primary health care centre for clinical measures. Comparison with national data (Statistics Sweden 2003) suggested that the respondents recruited at baseline were reasonably representative for the Swedish population in terms of age, sex, civil status, and education.

Measures

Self-reported data were collected from a postal questionnaire for the following eight scales.

Number of items, score range and reliability coefficients (Cronbach alpha) at baseline and after 2 years are presented for each scale in Table 1.

Coping ability is a cognitive appraisal of a certain situation, where resources to meet with a challenge are mobilized (Kurtz, Kurtz, Given, & Given, 2008). The Mastery scale by Pearlin and Schooler (Pearlin & Schooler, 1978) was used. It aims at capturing the ability to cope with potential stressors in everyday life and addresses the extent to which one regards one's life chances as being under one's own control. The scale is constructed of 7 items with 4 answer categories on a Likert scale, resulting in a sum score range of 7-28 where 7 is considered "no mastery" and 28 is "high mastery". *Self-esteem* is usually regarded as a personality trait (Kurtz et al. 2008) and measures the positiveness of one's attitude towards oneself. The self-esteem subscale from Pearlin and Schooler (Pearlin & Schooler, 1978) was used. The scale is constructed of 10 items with 4 answer categories on a Likert scale anchored by 10: low self-esteem to 40: high self-esteem.

Perceived control measures the extent to which an agent perceives that he/she can intentionally produce desired outcomes and prevent undesired ones (Skinner, 1996). This is usually described as a trait, however open to social influence (Cassidy & Davies, 2003). The construct by Bobak, Pikhart, Hertzman, Rose, & Marmot (1998) was administered. The scale is constructed by 11 items with 5 answer categories on a Likert scale anchored by 0: no control to 55: high control.

The three dimensions of the *sense of coherence* concept cover the (cognitive) ability to define life events as less stressful (comprehensibility), to mobilize resources to deal with encountered stressors (manageability) and motivation, desire, and commitment to cope (meaningfulness).

Sense of coherence is supposed to be a stable trait, manifested by the end of young adulthood

and thereafter showing only minor fluctuations (Antonovsky, 1993). The 13-item questionnaire by Antonovsky (1984) was used anchored by 13: low sense of coherence, to 91: high sense of coherence. *Cynicism* is the cognitive component of hostile affect and is, as such, generally considered a trait. It reflects a negative view of humankind, depicting others as unworthy, deceitful, and selfish. Items are statements about the respondent's interpretation of others' behaviour in general. The subscale of cynicism (Cynical Distrust) developed by Barefoot, Dodge, Peterson, Dahlstrom, & Williams (1989) from the Hostility scale was used. Response alternatives are given on a 5-step Likert scale with a sum score range of 12-60 where 12 is considered low cynicism and 60 is high cynicism.

While the constructs above could be seen as measuring traits or cognitions, the three scales below were designed to measure emotional states, hence, the stability of these could be anticipated to vary more. *Hopelessness* describes negative attitudes and feelings toward the self and the future, and is measured by the two items developed by Everson, Goldberg, Kaplan, Cohen, Pukkala, Tuomilehto, Salonen (1996): "I feel that it is impossible to reach the goals I would like to strive for" and "The future seems to me to be hopeless, and I can't believe that things are changing for the better." Response alternatives are given on a 5-step Likert-scale anchored by 0: high hopelessness and 8: low hopelessness.

Depression includes negative affect as a primary component and was measured according to the Centre for Epidemiologic Studies Depression scale (CES-D)(Radloff, 1977). Response alternatives were on a 4-step Likert scale with a score range of 0-60, where 60 signals severe depression.

Vital exhaustion is a state measured by a battery of 19 items derived from the original 21-item questionnaire developed by Appels & Otten (1992). The questionnaire includes questions on fatigue, irritability, depressed affect, and personal accomplishment, and a typical item is "I sometimes feel that my body is like a battery that is losing its power". The item subset used in

the Life conditions, Stress, and Health study has been validated by Koertge, Al-Khalili, Ahnve, Janszky, Svane, & Schenck-Gustafsson (2002). Response alternatives were on a 3-step Likert scale with a sum score range of 19-57 where 57 is considered complete exhaustion.

Education was measured by number of years in school: 9 years or less, 10 or 11 years, 12 or 13 years, and 14 years or more. The dichotomized measure was coded as low education (9-11 years) and high education (12-14 years).

Occupational position was measured according to the Swedish SEI-coding system (Statistics Sweden, 2003) where unique codes are assigned each occupational group, depending on the educational requirements for that particular occupational position. Each group was referred to one of four categories, resulting in unqualified manual workers, qualified manual workers, unqualified non-manual workers, and qualified non-manual workers including managerial. The dichotomized measure was coded as low occupation (all manual workers) and high occupation (all non-manual workers).

Procedure

The statistical analysis was performed separately for each of the eight psychometric scales. All analyses were based exclusively on those participants who answered the questionnaire at both time points. For descriptive purposes, mean values, standard deviations (SD) and changes over time (delta change) with 95% confidence intervals (CI) were calculated. The stability of the psychological scales over a 2-year period was estimated by test-retest Pearson correlation coefficients adjusted for age. In order to test the significance of the difference between correlation coefficients in low vs high socioeconomic position, the correlation coefficients were converted using Fischer's r-to-z transformation. For each psychometric scale, a repeated measures analysis of variance adjusted for age was applied to examine whether there were any mean changes between the two groups of different socioeconomic position between time point I and II. This 2 (group) x 2 (time) analysis used socioeconomic position as a between-group

variable and time as a repeated measure, enabling the investigation of (a) differences in mean scores of the psychometric scales between groups of high and low socioeconomic position (b) differences in mean scores on psychometric scales between time point I and II and (c) the interaction of these effects. For all analyses, a difference was considered statistically significant at $p < 0.05$.

Table 1. Properties of eight psychometric scales:

Number of items, score range and reliability coefficients (Cronbach alpha) at baseline and after 2 years.

Psychometric scale	No. of items	Score range	Cronbach α LSH I / LSH II
Coping	7	7-28	0.76 / 0.76
Self-esteem	10	10-40	0.86 / 0.88
Perceived control	11	11-66	0.69 / 0.72
Sense of coherence	13	13-91	0.82 / 0.84
Cynicism	12	12-60	0.86 / 0.89
Hopelessness	2	0-8	0.70 / 0.68
Depression	20	0-60	0.87 / 0.87
Vital exhaustion	19	19-57	0.94 / 0.94

Table 2. Mean scores for psychometric scales. Standard deviations, delta change and Pearson test-retest correlation adjusted for age with 95% confidence intervals.

Psychometric scale	(n)	LSH I		LSH II		Δ change (CI 95%)	Pearson correl. (CI 95%)
		M	SD	M	SD		
Coping	744	22.69	(3.42)	22.74	(3.43)	0.04 (-0.16;0.24)	.67 (0.63;0.71)
Self-esteem	739	32.36	(4.78)	32.51	(4.74)	0.15 (-0.11;0.41)	.72 (0.68;0.75)
Perceived control	708	51.29	(7.42)	51.43	(7.72)	0.14 (-0.36;0.65)	.58 (0.53;0.63)
Sense of coherence	755	68.71	(10.31)	69.00	(10.78)	0.29 (-0.27;0.86)	.72 (0.68;0.75)
Cynicism	743	30.89	(7.72)	29.67	(8.20)	-1.21 (-1.70;-0.72)	.64 (0.59;0.68)
Hopelessness	748	2.14	(1.98)	2.04	(1.87)	-0.10 (-0.24;0.03)	.52 (0.46;0.57)
Depression	743	8.48	(7.57)	8.03	(7.77)	-0.45 (-0.93;0.03)	.63 (0.58;0.67)
Vital exhaustion	757	29.84	(7.39)	29.19	(7.67)	-0.64 (-1.03;-0.25)	.74 (0.70;0.77)

Table 3. Mean scores for psychometric scales. Standard deviations, delta change and Pearson test-retest correlation adjusted for age stratified by education, with 95% confidence intervals.

Psychometric scale	Education	(n)	LSH I M SD	LSH II Mean SD	Δ change (CI 95%)	Pearson correl. (CI 95%)	Fisher's r-to-z test
Coping	high	266	22.87 (3.56)	22.99 (3.43)	0.11 (-0.21;0.43)	.71 (0.65;0.77)	0.09
	low	470	22.60 (3.34)	22.60 (3.42)	0.01 (-0.25;0.27)	.64 (0.59;0.69)	
Self-esteem	high	266	33.17 (4.96)	33.42 (4.76)	0.25 (-0.14;0.63)	.79 (0.74;0.83)	p<0.001
	low	465	31.92 (4.58)	32.04 (4.61)	0.12 (-0.22;0.47)	.66 (0.61;0.71)	
Perceived control	high	257	53.49 (6.62)	53.36 (6.96)	-0.13 (-0.84;0.58)	.64 (0.56;0.70)	0.04
	low	443	50.08 (7.53)	50.41 (7.87)	0.33 (-0.37;1.02)	.53 (0.46;0.59)	
Sense of coherence	high	268	68.84 (10.03)	69.84 (10.14)	1.00 (0.10;1.9)	.73 (0.67;0.78)	0.42
	low	479	68.75 (10.38)	68.64 (10.98)	-0.11 (-0.84;0.63)	.70 (0.65;0.74)	
Cynicism	high	264	29.43 (7.53)	28.19 (8.00)	-1.23 (-2.01;-0.46)	.66 (0.58;0.72)	0.37
	low	471	31.65 (7.74)	30.53 (8.16)	-1.12 (-1.75;-0.50)	.62 (0.57;0.68)	
Hopelessness	high	263	1.65 (1.80)	1.60 (1.76)	-0.05 (-0.26;0.15)	.55 (0.46;0.63)	0.16
	low	478	2.41 (2.03)	2.28 (1.88)	-0.13 (-0.31;0.05)	.47 (0.40;0.54)	
Depression	high	265	8.27 (7.24)	7.34 (7.57)	-0.89 (-1.67;-0.10)	.61 (0.53;0.68)	0.67
	low	469	8.52 (7.70)	8.32 (7.82)	-0.20 (-0.80;0.40)	.63 (0.58;0.68)	
Vital exhaustion	high	267	30.12 (7.46)	29.11 (7.74)	-1.01 (-1.65;-0.37)	.75 (0.69;0.80)	0.56
	low	481	29.63 (7.39)	29.18 (7.64)	-0.45 (-0.95;0.04)	.73 (0.68;0.77)	

Table 4. Mean scores for psychometric scales. Standard deviations, delta change and Pearson test-retest correlation adjusted for age stratified by occupation, with 95% confidence intervals.

Psychometric scale	Occupation	(n)	LSH I		LSH II		Δ change (CI 95%)	Pearson correl. (CI 95%)	Fisher's r-to-z test
			M	SD	M	SD			
Coping	high	359	22.58 (3.51)		22.73 (3.41)		0.15 (-0.14;0.44)	.68 (0.62;0.73)	0.27
	low	278	22.45 (3.27)		22.55 (3.39)		0.10 (-0.24;0.43)	.63 (0.56;0.70)	
Self-esteem	high	360	32.64 (4.84)		32.84 (4.78)		0.19 (-0.17;0.56)	.73 (0.68;0.77)	0.44
	low	274	31.67 (4.63)		32.02 (4.50)		0.35 (-0.07;0.77)	.70 (0.64;0.76)	
Perceived control	high	338	52.41 (7.34)		52.60 (7.15)		0.18 (-0.52;0.89)	.58 (0.51;0.65)	0.16
	low	260	49.49 (7.21)		49.57 (8.19)		0.08 (-0.85;1.00)	.51 (0.42;0.59)	
Sense of coherence	high	363	68.64 (9.94)		69.44 (10.47)		0.80 (0.00;1.61)	.71 (0.65;0.75)	0.80
	low	282	68.24 (10.49)		68.13 (10.93)		-0.07 (-0.88;1.03)	.71 (0.65;0.76)	
Cynicism	high	359	29.60 (7.45)		28.49 (7.99)		-1.10 (-1.73;-0.49)	.70 (0.65;0.75)	0.003
	low	280	32.0 (7.96)		30.71 (8.18)		-1.29 (-2.19;-0.40)	.56 (0.47;0.63)	
Hopelessness	high	362	1.83 (1.83)		1.89 (1.82)		0.06* (-0.12;0.24)	.53 (0.45;0.60)	0.31
	low	281	2.74 (2.08)		2.43 (1.91)		-0.31* (-0.55;-0.07)	.47 (0.37;0.56)	
Depression	high	362	8.38 (7.38)		7.79 (7.86)		-0.60 (-1.30;0.11)	.60 (0.53;0.66)	0.84
	low	273	8.86 (7.64)		8.56 (7.57)		-0.30 (-1.12;0.51)	.59 (0.51;0.67)	
Vital exhaustion	high	365	30.15 (7.59)		29.28 (7.68)		-0.87 (-1.38;-0.27)	.75 (0.70;0.79)	0.42
	low	284	29.92 (7.26)		29.56 (7.67)		-0.36 (-1.03;0.31)	.71 (0.64;0.76)	

**significant change in means over time between high/low occupation; hopelessness scores have decreased among those with low occupational status while they have increased slightly among those with high occupational status (p=0.014)*

Results

Stability of correlation coefficients

The test-retest correlation coefficients ranged between .52 - .74 with the highest values noted for self-esteem, sense of coherence and vital exhaustion which were all over .70 while the lowest values were noted for hopelessness and perceived control; .52 and .58 respectively (Table 2). Test-retest coefficients tended to be higher in groups of higher socioeconomic position. Significant differences in test-retest coefficients between groups with high and low socioeconomic position were noted: for education, significant differences in stability were found for self-esteem (.79/.66; $p < 0.001$) and perceived control (.64/.53; $p = 0.04$) (Table 3). Among occupational groups, a significant difference in stability was found for cynicism (.70/.56, $p = 0.003$) (Table 4).

Changes in mean values over time

Comparisons of means between baseline and follow-up (delta change) within subgroups of respective measure of socioeconomic position showed very few significant changes. However, significant differences in mean scores at baseline between subgroups of socioeconomic position were noted for self-esteem and perceived control (lower scores in low-status groups; $p < 0.05$) and for cynicism and hopelessness (higher score levels in low-status groups; $p < 0.05$). As for changes in means over time between subgroups of respective measure of socioeconomic position, only hopelessness showed a significant difference, as scores on hopelessness decreased among those in the lower occupational status category, while they increased slightly in the high-status group.

Discussion

Stability over 2 years

Our main aim was to estimate the stability in responding to eight psychometric scales over two years and also to assess whether these measures differed by socioeconomic position. The observed test-retest correlations coefficients ranged from .58 to .74, with tendencies for all scales to have higher stability among groups of high socioeconomic position. While for most scales few previous studies were available for comparison, the scale measuring sense of coherence has been carefully studied. Test-retest correlations have shown a stability ranging from .69 to .78 (1 year), .64 (3 years), .42 to .45 (4 years), .59 to .67 (5 years) to .54 (10 years) (Antonovsky, 1993). The present 2-year coefficient of .72 can also be compared with Swedish data from a 5-year stability study in a general population aged 25-74 years, where Nilsson, Holmgren, Stegmayr and Westman (2003) reported a Pearson correlation coefficient of .57 ($p < 0.01$). For the other scales tested in our study, only short-term based test-retest correlation coefficients have been reported; for self-esteem a coefficient of .85 was reported from a test of 28 students over a 2-week interval (Bowling, 2001) and for depression, correlation coefficients ranged from .51-.59 depending on length of time passed (from 2 weeks up to 8 weeks) (Radloff, 1977). No previous test-retest studies of coping, cynicism, hopelessness, perceived control, or vital exhaustion were found.

Stability in groups of high and low socioeconomic position

A more general question is if corrections need to be done separately for people of high and low socioeconomic position. This led us to the second aim; to compare the profiles of the psychological scales for groups of high and low socioeconomic position. Coefficients differed significantly for self-esteem and perceived control among high and low status groups of education, and for cynicism among groups of high and low occupation. It is interesting to note

that significant differences in stability between high-status and low-status individuals were seen mainly for traits, but also for scales where people of high socioeconomic position had healthier baseline values (i.e. higher scores on self-esteem and sense of coherence, and lower scores on cynicism). This is in line with previous research showing that high-status people in general have better resources to cope with stressful challenges, and adding to this, that these resources are distinguished as more persistent and cognitive rather than affective (Gallo & Matthews, 2003). As some of the scales are designed to measure current mood states, which are most likely to be cyclic and aperiodic (Radloff, 1977), these scales are also expected to be less stable than trait measures, hereby generating lower correlation coefficients (about .10) than for tests measuring more stable traits (Streiner & Norman, 1995). Notably, while some of the tests measuring affect had low test-retest coefficients, e.g. hopelessness ($r = .52$), the pattern was not complete as vital exhaustion had one of the highest estimates ($r = .74$). However, measures of stability are dependent also on psychometric properties in terms of reliability, which was measured by Cronbach alpha.

Reliability and measurement error

Internal consistency was generally high for all scales, with Cronbach alphas ranging from .70-.94, with the majority of instruments around 0.85. This meets with references to recommended acceptable levels found in the literature (Bowling, 2001; Streiner & Norman, 1995). Our data correspond well with results from previous studies. For sense of coherence, we noted Cronbach's alpha to .82-.84, while Nilsson et al. (2003) reported an alpha of .79 at baseline and .81 at follow-up. In a review of 5 published studies using the SOC 13-instrument, Antonovsky ((1993) reported an average alpha of .82 (range .74-.91). As for coping, our results (.76) corresponds well to earlier reported alphas of .71-.75 by Schieman, Nguyen and Elliott (2003) while for perceived control, alpha in our study was .69/.72 as compared to .65 (Bobak, Pikhart,

Rose, Hertzman, & Marmot, 2000). Cronbach's alpha for cynicism was .86/.89 in our study, which is in line with earlier studies; .84 (Greenglass & Julkunen, 1991) .81 (Everson, Kaplan, Goldberg, Salonen, & Salonen, 1997) .80 (Julkunen & Ahlstrom, 2006) .84 (Haukkala & Uutela, 2000). Cronbach alpha for depression was .87 in our study, which is in line with earlier findings of .85 and .90 (Radloff, 1977) and .88 (Knight, Williams, McGee, & Olaman, 1997). Vital exhaustion in our data generated an alpha of .94 which also corresponds to earlier findings for this instrument: .87 (Raikkonen, Hautanen, & Keltikangas-Jarvinen, 1994) and .93 (Koertge et al., 2002).

A corrected estimate of stability

For scales with very few items, reliability is expected to be low. To assess a potential way of further refining the estimate of stability, the correlation coefficients were corrected for variance explained by magnitude of reliability. Thus the Pearson correlation coefficients was divided by the integrated measure of reliability, yielding a correlation between the error-free scores which was calculated according to the formula: $r = r/\sqrt{c_1c_2}$ (Fleiss, 1986) (*data not shown*). The corrected correlation coefficients gave higher estimates than the uncorrected coefficients and ranged between .82-.88 for psychosocial resources (coping, self-esteem, perceived control and sense of coherence) and between .72-.78 for psychosocial risk factors (cynicism, hopelessness, depression and vital exhaustion). The pattern which emerges after dividing stability measures with reliability measures, resulting in higher stability estimates for traits than for states, is in line with what could be expected from psychometric theory (Streiner & Norman, 1995) and thus speaks in support for the validity of this procedure.

Bowling (2001) emphasize that researchers need to show some caution in making firm recommendations on how high coefficients of reliability should be, as these will invariably be

dependent on the type of population sample studied. Also, if the true variation for a psychosocial factor is small (if the sample is homogeneous) the relative importance of measurement error will become greater. Hence, both reliability and stability coefficients will be lower than if the sample was more heterogeneous. One way to assess the homogeneity of variance is by comparing the standard deviations. In our sample, the standard deviation for a scale was similar at baseline and follow-up, indicating homogeneity of variance between the two occasions.

Relevance of test-retest stability studies

Stability measures for psychometric scales over a 2-year period will allow for correction of estimates in further prospective studies. This need for correction is emphasized by previous research which has underlined the impact of time on the magnitude of regression dilution ratios for blood pressure and blood cholesterol (Clarke et al., 1999). Analyses have shown that uncorrected associations of disease risk with baseline measurements may underestimate the strength of the actual associations with these risk factors during the first decade of exposure by about one-third, the second decade by about one-half, and the third decade by about two-thirds. To correct for regression dilution, repeated measurement of risk factors over an interval may be required after baseline for a sample of participants (Clarke et al., 1999).

Further, it is of importance to note that as reliability is a property of the scores on a particular test for a given group of respondents, consistency and correlation coefficients cannot simply be assured to apply to another study unless the sample is similar in composition and variability to the group from which the original values were drawn, as in the case of “reliability induction” (Vassar, Jason & Hill, 2008). Antonovsky (1993) also pointed to the importance of acknowledging the intimate link between reliability coefficients and the population to which

the test is applied - “reliability is relative” (Streiner & Norman, 1995). The same issue should hold for stability estimates. However, for the majority of the psychometric scales studied here, stability estimates over time have so far not been explored, making comparison difficult. In this study, data are presented which indicate what can be expected for a normal, middle-age Western population including equal proportions of men and women. These data might be useful to other researchers as well.

The 2-year stability of eight psychometric scales was examined in a middle-age Swedish normal population. Stability for psychosocial factors over 2 years were moderate and tended to be lower in groups of low socioeconomic position. Data suggest that correction of attenuation bias is relevant in longitudinal studies also for psychosocial factors, and this may be especially important for studies including people of low socioeconomic position.

References

- Adler, N. E., & Ostrove, J. M. (1999). Socioeconomic status and health: what we know and what we don't. *Annals of the New York Academy of Science*, 896, 3-15.
- Antonovsky, A. (1984). A call for a new question - salutogenesis - and a proposed answer - the sense of coherence. *Journal of Preventive Psychology*, 1-13.
- Antonovsky, A. (1993). The structure and properties of the sense of coherence scale. *Social Science and Medicine*, 36, 725-733.
- Appels, A., & Otten, F. (1992). Exhaustion as precursor of cardiac death. *British Journal of Clinical Psychology*, 31, 351-356.
- Barefoot, J. C., Dodge, K. A., Peterson, B. L., Dahlstrom, W. G., & Williams, R. B., Jr. (1989). The Cook-Medley hostility scale: item content and ability to predict survival. *Psychosomatic Medicine*, 51, 46-57.
- Baum A, Garofalo JP, & Yali AM. (1999). Socioeconomic status and chronic stress. Does stress account for SES effects on health? *Annals of the New York Academy of Science*, 896, 131-144.
- Berkman, L. F. (1995). The role of social relations in health promotion. *Psychosomatic Medicine*, 57, 245-254.
- Bobak, M., Pikhart, H., Hertzman, C., Rose, R., & Marmot, M. (1998). Socioeconomic factors, perceived control and self-reported health in Russia. A cross-sectional survey. *Social Science and Medicine*, 47, 269-279.
- Bobak, M., Pikhart, H., Rose, R., Hertzman, C., & Marmot, M. (2000). Socioeconomic factors, material inequalities, and perceived control in self-rated health: cross-sectional data from seven post-communist countries. *Social Science and Medicine*, 51, 1343-1350.
- Bowling, A. (2001). Measuring disease. *Open University Press, Philadelphia* (2nd ed.).

- Cassidy, G. L., & Davies, L. (2003). Explaining Gender Differences in Mastery among Married Parents. *Social Psychology Quarterly*, *66*, 48-61.
- Clarke, R., Shipley, M., Lewington, S., Youngman, L., Collins, R., Marmot, M., Peto, R. (1999). Underestimation of risk associations due to regression dilution in long-term follow-up of prospective studies. *American Journal of Epidemiology*, *150*, 341-353.
- Everson, S. A., Goldberg, D.E., Kaplan, G.A., Cohen, R.D., Pukkala, E., Tuomilehto, J., Salonen, J.T. (1996). Hopelessness and risk of mortality and incidence of myocardial infarction and cancer. *Psychosomatic Medicine*, *58*, 113-121.
- Everson, S. A., Kaplan, G. A., Goldberg, D. E., Salonen, R., & Salonen, J. T. (1997). Hopelessness and 4-year progression of carotid atherosclerosis. The Kuopio Ischemic Heart Disease Risk Factor Study. *Arteriosclerosis, Thrombosis and Vascular Biology*, *17*, 1490-1495.
- Fleiss, J. L. (1986). The design and analysis of clinical experiments. *New York: Wiley and Sons*.
- Gallo, L. C., & Matthews, K. A. (2003). Understanding the association between socioeconomic status and physical health: do negative emotions play a role? *Psychological Bulletin*, *129*, 10-51.
- Greenglass, E. R., & Julkunen, J. (1991). Cook-Medley hostility, anger, and the Type A behavior pattern in Finland. *Psychological Reports*, *68*, 1059-1066.
- Haukkala, A., & Uutela, A. (2000). Cynical hostility, depression, and obesity: the moderating role of education and gender. *International Journal of Eating Disorders*, *27*, 106-109.
- Julkunen, J., & Ahlstrom, R. (2006). Hostility, anger, and sense of coherence as predictors of health-related quality of life. Results of an ASCOT substudy. *Journal of Psychosomatic Research*, *61*, 33-39.

- Knight, R. G., Williams, S., McGee, R., & Olaman, S. (1997). Psychometric properties of the Centre for Epidemiologic Studies Depression Scale (CES-D) in a sample of women in middle life. *Behavior Research and Therapy*, *35*, 373-380.
- Koertge, J., Al-Khalili, F., Ahnve, S., Janszky, I., Svane, B., & Schenck-Gustafsson, K. (2002). Cortisol and vital exhaustion in relation to significant coronary artery stenosis in middle-aged women with acute coronary syndrome. *Psychoneuroendocrinology*, *27*, 893-906.
- Kristenson M, Kucinskiene Z, Bergdahl B, & Orth-Gomer K. (2001). Risk factors for ischemic heart disease in different socioeconomic groups of Lithuania and Sweden: the LiVicordia study. *Scandinavian Journal of Public Health*, *29*, 140-150.
- Kurtz, M. E., Kurtz, J. C., Given, C. W., & Given, B. A. (2008). Patient Optimism and Mastery-Do They Play a Role in Cancer Patients' Management of Pain and Fatigue? *Journal of Pain and Symptom Management*, *36*, 1-10.
- Marmot, M., Wilkinson, R. (2000). *Social determinants of health*. New York: Oxford University Press.
- Muchinsky, P. M. (1996). The correction for attenuation. *Educational & Psychological Measurement* *56*, 63-75.
- Nilsson, B., Holmgren, L., Stegmayr, B., & Westman, G. (2003). Sense of coherence--stability over time and relation to health, disease, and psychosocial changes in a general population: a longitudinal study. *Scandinavian Journal of Public Health*, *31*, 297-304.
- Pearlin, L. I., Schooler, C. (1978). The structure of coping. *Journal of Health and Social Behavior*, *19*, 2-21.
- Penninx, B. W., van Tilburg, T., Boeke, A. J., Deeg, D. J., Kriegsman, D. M., & van Eijk, J. T. (1998). Effects of social support and personal coping resources on depressive symptoms: different for various chronic diseases? *Health Psychology*, *17*, 551-558.

- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401.
- Raikkonen, K., Hautanen, A., & Keltikangas-Jarvinen, L. (1994). Association of stress and depression with regional fat distribution in healthy middle-aged men. *Journal of Behavioral Medicine, 17*, 605-616.
- Rosengren, A., Orth-Gomer, K., & Wilhelmsen, L. (1998). Socioeconomic differences in health indices, social networks and mortality among Swedish men. A study of men born in 1933. *Scandinavian Journal of Social Medicine, 26*, 272-280.
- Schieman, S., Nguyen, K., & Elliott, D. (2003). Religiosity, Socioeconomic Status, and the Sense of Mastery. *Social Psychology Quarterly, 66*, 202-221.
- Skinner EA. (1996). A guide to constructs of control. *Journal of Personality and Social Psychology, 71*, 549-570.
- Statistics Sweden: [www.scb.se] 2003
- treiner, D. L., & Norman, G. R. (1995). *Health Measurement Scales. A practical guide to their development and use.* (4th ed.) OUP Oxford, Oxford.
- Taylor SE, & Seeman TE. (1999). Psychosocial resources and the SES-health relationship. *Annals of the New York Academy of Science, 896*, 2110-2125.
- Vassar, M. R., Jason W; Hill, Aaron D. (2008). Inducing Score Reliability from Previous Reports: An Examination of Life Satisfaction Studies. *Social Indicators Research, 87*, 27-45.
- Winne, P., & Belfry, M. (1982). Interpretive problems when correcting for attenuation. *Journal of Educational Measurement 19*, 125-134.