Swedish Universities Scales of Personality: Relation to Other Personality Instruments

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Objective To investigate associations between Swedish universities Scales of Personality (SSP) and scales of the following personality instruments: Structured Clinical Interview for DSM-III-R axis II screening questionnaire (SCID-II screen), revised NEO personality inventory (NEO-PI-R), revised Chapman scales (Chapman) and the psychotic traits questionnaire (STQ).

Methods Healthy individuals (n=406) completed self-report personality questionnaires including SSP and at least one more personality inventory. Correlations were calculated between the 13 different SSP subscales as well as SSP's three factors and factors and scales/subscales in SCID-II screen, NEO-PI-R, Chapman and STQ. The main factors of the various instruments were factor analysed. ICC were calculated.

Results SSP Neuroticism factor correlated with SCID-II cluster C (r=0.71), NEO Neuroticism (r=0.80) and Chapman Social anhedonia (r=0.62). SSP Extraversion factor correlated with NEO Extraversion (r=0.63) and SSP Aggressiveness factor with NEO Agreeableness (r=-0.62). Strong correlations between SSP factors and scales and scales of the other instruments were sparse, although weaker correlations were common.

Conclusion SSP is a useful investigation tool when measuring personality traits related to temperament-like features. SSP partly correlates well to especially three of the NEO-PI-R factors. The different personality inventories are not completely comparable to each other. Instead, they measure personality aspects in partly different ways. **Psychiatry Investig 2021;18(5):373-384**

Key Words Swedish universities Scales of Personality, Personality traits, SCID-II screen, NEO-PI-R, Chapman.

INTRODUCTION

Individuals differ in how they act and react in similar situations. The differences are often attributed to individual differences in certain personality traits. Personality could be explained as a characteristic set of different behaviours, cognitions and emotional patterns that evolve from learning or genetic factors.[1] There are different ways to describe personality traits. Among different personality trait theories, the big

five personality model have received more attention than other trait theories.[2] This is partly due to the fact that during the last 30 years of personality research there has been a fairly common agreement that personality traits could be summarized in five dimensions, i.e. Openness to experience, Conscientiousness, Extraversion, Agreeableness and Neuroticism, also known as the big five personality factors.[3]

When the personality characteristics are so dysfunctional and maladaptive that they result in a "clinically significant disorder or impaired function at work, social or other important aspects", the term personality pathology or more specifically personality disorder, is used.[4-6] Also, personality dysfunction severity is an important predictor of outcome in personality disorder.[7]

There is no single test or model that is able to capture the full range of human personality, instead a variety of different tests of mapping personality has been constructed. The most common method in trait measurement is the self-report in-

ventory. This study consists of five different self-report personality inventories: Swedish universities scales of personality (SSP), which intends to measure temperament-like features. SSP, which is freely available is a development of the inventory Karolinska Scales of Personality (KSP).[8,9] SSP has been factor analysed into Neuroticism, Extraversion and Aggressiveness. The screening questionnaire SCID-II screen[10,11] is an assessment tool with items investigating the personality disorders, divided into three clusters, based on odd/eccentric, dramatic/emotional/erratic and anxious behaviour (cluster A, B and C, respectively) as listed in the Diagnostic and Statistical manual of Mental disorders, third edition, revised (DSM-III-R).[5] The revised NEO personality inventory (NEO-PI-R) is a questionnaire that measures personality structure according to the five-factor model, including factors Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness.[12] The revised Chapman scales were elaborated to find symptoms predicting schizophrenia. It is a short version of several previous scales and includes the three domains Physical anhedonia, Social anhedonia and Perceptual aberration.[13-15] The STQ questionnaire measures schizotypal and borderline symptoms.[16]

We are only aware of one report, which has analysed correlations between SSP and other personality scales. Alouja et al.[17] analysed the relationship between SSP scales and NEO-PI-R factors, finding associations between SSP neuroticism-, SSP extraversion- and SSP aggressiveness-related scales and the corresponding NEO factors (neuroticism, extraversion and negative agreeableness, respectively).

Ekselius et al.[18] analysed the relationship between KSP, the ancestor of SSP and personality disorder as determined by the SCID-II screen questionnaire. These authors reported very weak to moderate significant correlations ($0.16 < r < 0.52$) between the majority (60−87%) of KSP scales and nine of the twelve personality disorders, with the exception of schizoid, histrionic and antisocial personality disorders. The most consistent finding across all personality disorders was negative associations ($0.16 < r < 0.45$) between KSP Socialization, the predecessor of SSP Embitterment and all personality disorders. When analyzing the KSP scales vs the SCID-II clusters there was a similar picture where the most consistent findings across all three clusters were moderate negative correlations ($0.41 < r < 0.48$) with KSP Socialization. The most important KSP scales for cluster A was Socialization and Suspicion, the predecessor of SSP Mistrust, for cluster B Socialization, Suspicion, Indirect aggression and Detachment and for cluster C Socialization. Suspicion, Somatic anxiety and Psychasthenia, predecessor of SSP Lack of assertiveness.

Given the complexity of the measurement of personality, it is important to compare existing personality instruments to increase the knowledge and establish a more solid basis for research in this area. In this article, SSP has been compared with NEO-PI-R, which is an instrument that relates to the five most commonly accepted personality constructs. In addition, SSP has been compared with SCID-II, the revised Chapman and the STQ scales, which measure other personality constructs including schizotypy and borderline personality.

We hypothesised that SSP Neuroticism and related scales were associated with SCID-II screen cluster C, that SSP Embitterment were associated with all, and SSP Mistrust with almost all SCID-II-screen personality disorders and clusters. We also hypothesized that SSP Neuroticism and related scales were associated with NEO factor Neuroticism and several of its facets, with STQ Schizotypal personality and with Chapman Social anhedonia. We also hypothesised that SSP Extraversion and related scales were associated with NEO Extraversion and their facets and that SSP Aggressiveness and related scales were associated with NEO Agreeableness and related scales.

Aims

The study aimed to characterize the position of the SSP-measured traits in relation to traits in other personality instruments. This study investigates how SSP relates to SCID-II screen,[5,10,19] NEO-PI-R,[12,20] the revised Chapman scales[13-15] and STQ[16] using correlations between SSP factors and subscales with domain and subscales of the other different inventories.

METHODS

Subjects

Individuals were drawn from a population register or recruited among students or hospital staff members, who had previously participated as non-psychotic controls in clinical studies investigating psychosis at the Karolinska Institutet[21-24] and were asked to participate. Also, a group of non-psychotic siblings and parents of patients with psychotic disorder was asked to be a part of the study. All subjects were given complete description of the study and participated after given informed written consent. The data from 406 participants (mean age 49.7, SD 13.8, age range 19−91 years) (186 women (mean age 51.7, SD 14.1, age range 23−91 years) and 220 men (mean age 48.1, SD 13.3, age range 19−88 years) were used in this study.

The study was conducted in accordance with the Declaration of Helsinki and approved by the Swedish Data Inspection Board (Datainspektionen) and the Stockholm Regional Ethics Committee (2015/1214-32).

Questionnaires

In connection with a research interview with a psychia-

trist, subjects filled in the different personality inventories. The different personality inventories were filled in during the same time period and the longest period between fulfilling the different inventories were 90 days.

SSP is a self-rated questionnaire. It is based on the KSP and used preferably in Sweden and other countries in Scandinavia since about 19 years. SSP is an instrument developed to measure personality traits intended to be markers for various neurobiological processes related to vulnerability to mental illness. There are some advantages with SSP compared to other personality instruments. SSP has a short format with 91 items compared to 238−240 items for the full NEO and Temperament and character inventory (TCI) questionnaires. It could also, in contrast to other personality inventories translated into Swedish (such as TCI or NEO-PI-R), be used for free in clinics. The SSP inventory has earlier been described and consist of 91 items grouped into 13 different scales.[25] For all items the patients must decide by agreeing with one of four possible answers; not true at all, does not match particularly well, agree somewhat, exactly right. Each of the 13 different scales represent relevant personality aspects and are as follow; Somatic trait anxiety (STA), Psychic trait anxiety (PsTA), Stress susceptibility (SS), Lack of assertiveness (LA), Detachment (D), Embitterment (E), Mistrust (M), Physical trait aggression (PhTA), Verbal trait aggression (VTA), Adventure seeking (AS), Impulsiveness (I), Social desirability (SD), and Trait irritability (TI). SSP has also been factor-analysed into three major dimensions, Neuroticism, Aggressiveness and Extraversion.[25,26] Four scales of the SSP assess aspects of vulnerability to anxiety. Five of the 13 scales reflect aggression and related traits. Four of the scales in SSP characterize sensation seeking, impulse control, conformity and relation to the social environment. The SSP scales are relatively stable over periods up to five years.[27]

At the investigation participants were asked to complete an extended version of the KSP (KSP-196), used during the construction of SSP and other personality instruments.[25,28] KSP-196 includes all of the 91 items contained in the SSP.

The screening questionnaire of the Structured Clinical Interview for DSM III-R, Axis II (SCID-II screen)[10] is an assessment tool with items investigating the Axis II, i.e. personality disorders (PDs) listed in DSM-III-R.[5,19] These PDs are arranged into three clusters: A with Paranoid, Schizotypal and Schizoid PDs, B including Histrionic, Borderline, Narcissistic and Antisocial PDs, and C composed of Avoidant, Dependent, Obsessive-compulsive and Passive-aggressive PDs. In addition, a separate preliminary scale, i.e. Self-defeating PD is included. The SCID-II screening questionnaire gives two options: either apply or deny presence of the proposed item.

The NEO-PI-R is a widely used self-report questionnaire that measure personality structure according to the five-factor model.[12] The questionnaire consists of 240 items and provides scores on the five personality dimensions Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. Each personality domain is composed of six facet scales and the responses are made on a 5-point Likert-type scale, from strongly agree to strongly disagree.

The Chapman scales have been used in the study of individuals at risk for later development of schizophrenia and schizophrenia-spectrum disorders.[29-31] The revised Chapman scales is a 50-item questionnaire assessing schizotypal symptoms. It is a short version of several previous scales[13-15] elaborated to find symptoms predicting schizophrenia, and is composed of three scales. The Physical anhedonia scale assesses deficits in the ability to experience pleasure from typically pleasurable physical stimuli. The revised Social anhedonia scale assesses deficits in the ability to experience pleasure from non-physical stimuli capturing social withdrawal due to lack of interest in intimacy and interaction. The Perceptual aberration scale assesses psychotic-like experiences such as unusual scenery experiences and bodily discontinuities. The questionnaire uses a 4-point Likert-type scale.

The psychotic traits questionnaire STQ is a widely used,[32] 55-item assessment tool[33] measuring schizotypal and borderline symptoms. It consists of the two scales, Schizotypal personality (STA) and Borderline personality (STB), corresponding to the distinction made in DSM-III between schizotypal personality disorder and borderline personality disorder.[16] STQ uses a true-false scale.

Statistical analysis

Based on the 91 items that are common to the SSP and KSP-196, the 13 different personality scales were calculated according to the SSP manual.

The scales in the different personality instruments were also quality tested by measuring the ability to discriminate between individuals. This was performed by using intra-class correlation (ICC), comparing the total variance with the variance within the test situation. ICC analyses were calculated using the two-way mixed method, average measures and absolute agreement.

Correlations were calculated between SSP's three factors and each of the 13 different subscales in SSP and all of the different clusters, factors and subscales of the other personality inventories described above. When labelling the strength of the association, for absolute values of r, 0.00−0.19 was regarded as very weak, 0.20−0.39 as weak, 0.40−0.59 as moderate, 0.60−0.79 as strong and 0.80−1.00 as very strong correlation.[34] SPSS version 17.0.1 for Windows, IBM software (IBM Corp., Armonk, NY, USA) was used for statistical analyses.

Exploratory factor analyses were calculated between SSP factors, NEO factors, SCID-II clusters, Chapman scales and STQ scales using the principal factor method, with a stepwise increase in the numbers of factors until the solution reproduces the correlation matrix. In addition, varimax rotation were calculated to facilitate interpretation. In order to facilitate interpretation, the number of variables was limited. In addition, a complementary principal component analysis (PCA) was calculated between SSP factors, NEO factors, SCID-II clusters, Chapman scales and STQ scales using the SPSS procedure Factor analysis, using the option Listwise deletion. Three components were extracted.

RESULTS

Intraclass correlations

To check for discriminative ability of the different factors and scales we performed intra-class correlations. The 13 SSP scales, each consisting of 7 items, displayed ICC values between 0.54 and 0.85 (10/13 had ICC values >0.7). ICC for the SSP factors varied between 0.74 and 0.91. For SCID-II screen personality disorders ICC varied between 0.44 and 0.65 (0/12 had ICC values >0.7). The 30 NEO-PI-R facets, each consisting of 6 items, showed ICCs between 0.44 and 0.78 (10/30 had ICC values >0.7). ICCs for the revised Chapman scales Physical anhedonia, Social anhedonia and Perceptual aberration were 0.68, 0.78, and 0.72, respectively. STQ scales Schizotypal personality and Borderline personal-

ity revealed ICCs of 0.70 and 0.80, respectively.

Simple correlations

SSP factors vs. clusters/factors/major scales of SCID-II screen, NEO-PI-R, Chapman and STQ

Simple correlations with one variable at time were calculated as well as the degree of the variance explained of the total SSP questionnaire using squared multiple correlation, see Table 1. SSP factor Neuroticism was strongly correlated with NEO Neuroticism (0.80), SCID-II cluster C (0.71), and Chapman Social anhedonia (0.62). SSP factor Aggressiveness correlated negatively to NEO Agreeableness (-0.62). The SSP factor Extraversion was strongly correlated with NEO Extraversion (0.63). Substantial squared multiple correlations were found for NEO Neuroticism (0.67) and NEO Extraversion (0.61) (Table 1).

SSP vs. SCID-II screen

Only two SSP-scales, i.e., Psychic trait anxiety and Embitterment correlated with SCID-II screen clusters or personality disorders (PDs) at a level of r>0.6: Psychic trait anxiety correlated with cluster C and two of its PDs (Avoidant and Dependent) and Embitterment with cluster C (Table 2). The SSP Neuroticism factor was also strongly correlated with cluster C as well as Avoidant and Dependent PDs. There were also weak to moderate correlations between SSP Neuroticism factor and its related scales and most SCID-II screen PDs

Table 1. Correlations between Swedish universities Scales of Personality (SSP) factors and clusters, factors and major scales for the personality inventories NEO-PI-R, SCID-II screen, Chapman and STQ

Cluster/factor/major scale	N	Women/men	SSP Neuroticism	SSP Extraversion	SSP Aggressiveness	R^2
NEO Neuroticism	298	141/157	0.80	-0.04	0.39	0.67
NEO Extraversion	298	141/157	-0.54	0.63	-0.08	0.61
NEO Openness	298	141/157	-0.24	0.53	0.01	0.31
NEO Agreeableness	298	141/157	-0.12	-0.14	-0.62	0.38
NEO Conscientiousness	298	141/157	-0.47	-0.06	-0.20	0.24
SCID-II Cluster A	323	145/178	0.55	-0.11	0.27	0.31
SCID-II Cluster B	323	145/178	0.35	0.43	0.46	0.42
SCID-II Cluster C	323	145/178	0.71	-0.05	0.27	0.50
SCID-II Self-defeating	323	145/178	0.56	0.03	0.24	0.32
Chapman Physical anhedonia	220	104/116	0.25	-0.33	0.05	0.14
Chapman Social anhedonia	220	104/116	0.62	-0.45	0.30	0.56
Chapman Perceptual aberration	220	104/116	0.42	-0.02	0.16	0.18
STQ Schizotypal personality	218	99/119	0.47	0.15	0.19	0.27
STQ Borderline personality	218	99/119	0.46	0.17	0.33	0.30

Squared multiple correlations were computed to assess the variance the total SSP questionnaire shared with each of the other clusters, factors and major scales. SSP: Swedish universities Scales of Personality, NEO: Revised NEO personality inventory, SCID-II: Structured Clinical Interview for DSM III-R, Axis II, STQ: Psychotic traits questionnaire, R^2: Squared multiple correlations

Table 2. Correlations between SSP and Structural Clinical Interview for DSM-III-R axis II screening questionnaire (SCID-II screen)

SSP/SCID-II screen	Para	Scht	Schi	Hist	Narc	Bord	Anti	Avoi	Dep	OC	PA	SD	Cluster A	Cluster B	Cluster C
Neuroticism	0.489	0.505	0.327	0.113	0.299	0.584	0.132	0.628	0.626	0.552	0.439	0.557	0.547	0.345	0.709
Extraversion	-0.041	0.005	-0.204	0.462	0.359	0.186	0.226	-0.207	0.000	-0.020	0.113	0.033	-0.106	0.428	-0.048
Aggressiveness	0.339	0.234	0.049	0.313	0.369	0.350	0.417	0.169	0.097	0.207	0.329	0.237	0.267	0.457	0.269
Somatic trait anxiety	0.407	0.460	0.200	0.248	0.339	0.575	0.205	0.450	0.465	0.373	0.354	0.471	0.440	0.434	0.521
Psychic trait anxiety	0.419	0.436	0.246	0.094	0.227	0.536	0.123	0.643	0.615	0.506	0.355	0.490	0.454	0.295	0.665
Stress susceptibility	0.294	0.332	0.230	0.071	0.159	0.467	0.077	0.521	0.479	0.446	0.374	0.371	0.356	0.233	0.579
Lack of assertiveness	0.184	0.222	0.320	-0.100	0.063	0.298	-0.093	0.444	0.472	0.427	0.266	0.348	0.304	0.043	0.508
Embitterment	0.453	0.475	0.272	0.217	0.378	0.561	0.259	0.484	0.539	0.461	0.419	0.498	0.497	0.443	0.602
Mistrust	0.553	0.458	0.289	0.006	0.257	0.321	0.059	0.412	0.383	0.399	0.317	0.461	0.547	0.198	0.483
Impulsiveness	0.098	0.161	0.033	0.378	0.333	0.352	0.290	0.081	0.216	0.149	0.258	0.230	0.113	0.445	0.216
Adventure seeking	0.082	0.033	-0.103	0.318	0.360	0.121	0.165	-0.106	-0.025	0.070	0.128	0.010	0.006	0.335	0.018
Detachment	0.277	0.180	0.359	-0.278	-0.050	0.071	-0.025	0.409	0.179	0.268	0.149	0.160	0.347	-0.123	0.333
Social desirability	-0.088	-0.050	0.047	-0.133	-0.160	-0.223	-0.280	-0.087	0.008	-0.090	-0.206	-0.071	-0.043	-0.237	-0.132
Trait irritability	0.369	0.291	0.139	0.301	0.373	0.451	0.327	0.311	0.287	0.348	0.390	0.321	0.339	0.459	0.430
Verbal trait aggression	0.291	0.205	0.004	0.352	0.359	0.257	0.368	0.058	0.026	0.120	0.269	0.188	0.218	0.434	0.164
Physical trait aggression	0.231	0.131	0.030	0.142	0.200	0.129	0.275	0.053	-0.019	0.061	0.131	0.115	0.166	0.230	0.082

N=323, women=145, men=178, mean age 48.9, SD 14.9, range 19−91 years. $p<0.05$ when r≥0.113, $p<0.01$ when r≥0.149, $p<0.001$ when r≥0.184. SSP: Swedish universities Scales of Personality, SCID-II screen: Structured Clinical Interview for DSM III-R, Axis II, Para: Paranoid PD, Scht: Schizoid PD, Schi: Schizotypal PD, Hist: Histrionic PD, Narc: Narcissistic PD, Bord: Borderline PD, Anti: Antisocial PD, Avoi: Avoidant PD, Dep: Dependent PD, OC: Obsessive-compulsive PD, PA: Passive-aggressive PD, SD: Self-defeating PD

with the exception of the Schizoid, Histrionic, Narcissistic and Antisocial PDs, where the correlations were very weak to weak. SSP Extraversion factor were moderately correlated with SCID-II screen Histrionic PD and SSP Aggressiveness factor with Antisocial PD. SSP Embitterment correlated with all SCID-II screen PDs, with weak correlations for Histrionic (r=0.22), Antisocial (r=0.26), Schizoid (r=0.27) and Narcissistic (r=0.38) PDs and moderate to strong correlations with the remaining eight PDs (Table 2).

SSP vs. NEO-PI-R

The SSP factor Neuroticism was strongly correlated with NEO Neuroticism (r=0.801) and its subscales NEO Anxiety (r=0.683), NEO Depression (r=0.762), NEO Self-consciousness (r=0.693) and NEO Vulnerability to stress (r=0.737) (Table 3). Among the SSP Neuroticism-related scales Somatic trait anxiety was strongly correlated with the NEO Neuroticism factor (r=0.656) as well as its facet NEO Depression (r=0.622). Also SSP Psychic trait anxiety was strongly correlated with NEO Neuroticism factor (r=0.778) and its facet Depression (r=0.716), but also with NEO Neuroticism facets NEO Anxiety (r=0.709), NEO Self-consciousness (r=0.687) and NEO Vulnerability to stress (r=0.708). The SSP scales Stress susceptibility and Embitterment strongly correlated with NEO Neuroticism factor (r=0.671 and r=0.733, respectively) and its facets NEO Depression (r=0.626 and r=0.686, respectively) and NEO Vulnerability to stress (r=0.697 and r=0.626, respectively). For the SSP Neuroticism-related scale Mistrust a strong negative correlation was found only for NEO Trust (r=-0.670), a facet of NEO Agreeableness factor (Table 3).

The SSP Extraversion factor correlated strongly with the NEO Extraversion factor and its facet NEO Excitement seeking (r=0.628 and 0.624, respectively). The SSP Extraversion-related scale Detachment correlated inversely to NEO Extraversion factor (r=-0.625) and its facet NEO Warmth (r=-0.637). SSP scale Impulsiveness correlated negatively to NEO Deliberation (r=-0.625), a facet of NEO Conscientiousness. SSP Adventure seeking, another SSP Extraversion-related scale, strongly correlated with NEO Excitement seeking (r=0.624).

For the SSP Aggressiveness factor a moderate negative correlation was noted with NEO Agreeableness factor (r=-0.545). The SSP Aggressiveness-related scales Social desirability, Trait irritability, Verbal trait aggression and Physical trait aggression correlated weakly to moderately with the NEO Agreeableness factor (Table 3).

SSP vs. Chapman

SSP Neuroticism factor were strongly correlated with the Chapman Social anhedonia scale (r=0.622). Among the SSP scales only Detachment was strongly correlated with a Chap-

man scale (Social Anhedonia; r=0.649). However, several correlations of weak to moderate strength was noted, e.g., all SSP Neuroticism related scales were moderately associated with Chapman Social anhedonia (Table 4).

SSP vs. STQ

Moderate correlations occurred between the SSP Neuroticism factor and the STQ scales Schizotypal personality and Borderline personality (r=0.474 and r=0.456, respectively). There were also moderate correlations between the SSP scales Somatic trait anxiety, Psychic trait anxiety and Embitterment and the STQ Schizotypal personality (r=0.54, r=0.44, and r=0.44, respectively) and Borderline personality scales (r=0.52, r=0.40, and r=0.48, respectively) (Table 5).

P-value for all the correlations specified above were at or below p=0.0001.

Factor analyses

SSP, NEO, SCID-II, Chapman and STQ

Varimax rotated factor analysis revealed four factors explaining 55.3% of the variance. Eigenvalues for factor 1, 2, 3, and 4 was 5.170, 2.558, 1.062, and 0.617, respectively. Overall, the loadings were very weak to moderate (Table 6). The highest loadings on factor 1 came from SSP Neuroticism (-0.25), NEO Neuroticism (-0.37), SCID-II cluster B (-0.29), SCID-II cluster C (-0.37), SCID-II Self-defeating (-0.33), STQ Schizotypal (-0.39) and STQ Borderline (-0.37). For factor 2 the strongest loadings were obtained from SSP Extraversion (-0.46), NEO Extraversion (-0.49), and Chapman Physical anhedonia (0.47). Factor 3 had substantial loadings from SSP Aggressiveness (0.61) and NEO Agreeableness (-0.68) and somewhat less from Chapman Social anhedonia (0.25). For factor 4 NEO Openness to experience (-0.45), NEO Conscientiousness (-0.43), Chapman Physical anhedonia (0.63) and STQ Schizotypal personality (-0.34) had the strongest loadings. The factor analyses did not yield informative relationships between SSP and the other instruments. Therefore, to obtain a more distinct picture we computed, in addition to simple correlations a complementary principal component analysis (Table 7) in which the first three factors explained 62.5% of the variance. The highest loadings on factor 1 came from SSP Neuroticism (0.82), SCID-II cluster A (0.72), SCID-II cluster C (0.82), SCID-II Self-defeating (0.65), Chapman Social anhedonia (0.73), STQ Schizotypal personality (0.62) and STQ Borderline personality (0.65). Factor 2 had substantial loadings from SSP Extraversion (0.75), NEO Extraversion (0.68), NEO Openness (0.74), SCID-II cluster B (0.74) and Chapman Physical anhedonia (-0.65). For factor 3 SSP Aggressiveness (-0.72) and NEO Agreeableness (0.83) had the stron-

Table 3. Correlations between SSP and NEO-PI-R

SSP/NEO-PI-R	N1	N2	N3	N4	N5	N6	E1	E2	E3	E4	E5	E6
Neuroticism	0.683	0.478	0.762	0.693	0.357	0.737	-0.360	-0.456	-0.477	-0.199	-0.218	-0.469
Extraversion	-0.199	0.053	-0.037	-0.198	0.412	-0.156	0.354	0.342	0.376	0.458	0.505	0.536
Aggressiveness	0.159	0.527	0.319	0.223	0.374	0.263	-0.388	-0.292	0.132	0.182	0.152	-0.154
Somatic trait anxiety	0.569	0.390	0.622	0.491	0.429	0.547	-0.167	-0.269	-0.276	0.015	-0.121	-0.228
Psychic trait anxiety	0.709	0.462	0.716	0.687	0.320	0.708	-0.292	-0.418	-0.502	-0.195	-0.250	-0.398
Stress susceptibility	0.572	0.353	0.626	0.592	0.263	0.697	-0.278	-0.332	-0.408	-0.294	-0.216	-0.443
Lack of assertiveness	0.443	0.119	0.521	0.580	0.137	0.551	-0.270	-0.335	-0.516	-0.299	-0.215	-0.408
Embitterment	0.569	0.528	0.686	0.546	0.463	0.626	-0.260	-0.349	-0.294	-0.099	-0.118	-0.344
Mistrust	0.379	0.427	0.468	0.404	0.100	0.396	-0.457	-0.471	-0.271	-0.091	-0.113	-0.429
Impulsiveness	0.103	0.261	0.292	0.128	0.572	0.198	0.019	-0.051	0.052	0.251	0.177	0.133
Adventure seeking	-0.240	0.064	-0.067	-0.139	0.229	-0.188	0.096	0.213	0.318	0.432	0.624	0.394
Detachment	0.252	0.211	0.283	0.390	-0.077	0.312	-0.637	-0.542	-0.395	-0.251	-0.201	-0.575
Social desirability	-0.130	-0.293	-0.255	-0.201	-0.257	-0.240	0.412	0.194	-0.053	0.028	0.006	0.155
Trait irritability	0.256	0.485	0.453	0.335	0.395	0.341	-0.332	-0.324	0.045	0.142	0.096	-0.230
Verbal trait aggression	0.078	0.464	0.181	0.115	0.373	0.173	-0.221	-0.153	0.154	0.163	0.193	0.005
Physical trait aggression	0.032	0.333	0.097	0.048	0.122	0.067	-0.245	-0.207	0.132	0.221	0.143	-0.099

	O1	O2	O3	O4	O5	O6	A1	A2	A3	A4	A5	A6
Neuroticism	-0.082	0.076	-0.105	-0.400	-0.206	-0.322	-0.475	-0.053	-0.175	-0.030	0.100	0.156
Extraversion	0.374	0.209	0.442	0.549	0.325	0.319	0.296	-0.219	0.032	-0.252	-0.362	0.046
Aggressiveness	0.124	-0.042	0.033	-0.041	0.006	-0.014	-0.328	-0.420	-0.455	-0.677	-0.310	-0.211
Somatic trait anxiety	0.016	0.103	0.079	-0.143	-0.180	-0.120	-0.353	-0.125	-0.091	-0.114	0.036	0.131
Psychic trait anxiety	-0.091	0.136	-0.060	-0.407	-0.210	-0.271	-0.309	0.019	-0.070	0.011	0.149	0.213
Stress susceptibility	-0.089	-0.009	-0.111	-0.396	-0.204	-0.316	-0.372	-0.002	-0.089	0.026	0.098	0.108
Lack of assertiveness	-0.141	-0.004	-0.260	-0.243	-0.154	-0.259	-0.219	0.145	-0.107	0.334	0.154	0.174
Embitterment	0.019	0.089	-0.013	-0.279	-0.130	-0.222	-0.355	-0.109	-0.181	-0.220	0.003	0.164
Mistrust	-0.102	0.031	-0.149	-0.342	-0.100	-0.355	-0.670	-0.186	-0.311	-0.295	-0.026	-0.053
Impulsiveness	0.224	0.058	0.201	0.205	0.041	0.079	0.014	-0.193	-0.131	-0.008	-0.222	0.028
Adventure seeking	0.302	0.173	0.237	0.483	0.340	0.212	0.089	-0.292	-0.100	0.372	-0.396	-0.122
Detachment	-0.245	-0.196	-0.490	-0.432	-0.272	-0.369	-0.523	-0.049	-0.309	-0.214	0.111	-0.214
Social desirability	-0.088	0.081	0.033	0.048	0.084	-0.032	0.284	0.272	0.380	-0.432	0.213	0.174
Trait irritability	0.062	0.004	0.018	-0.093	-0.053	-0.088	-0.320	-0.306	-0.301	-0.191	-0.225	-0.137
Verbal trait aggression	0.198	-0.014	0.096	0.023	0.097	0.024	-0.226	-0.359	-0.434	-0.677	-0.326	-0.175
Physical trait aggression	0.032	-0.049	0.006	-0.012	0.031	0.001	-0.180	-0.322	-0.280	-0.531	-0.175	-0.156

	C1	C2	C3	C4	C5	C6	N	E	O	A	C
Neuroticism	-0.441	-0.061	-0.294	-0.141	-0.529	-0.396	0.801	-0.535	-0.238	-0.123	-0.474
Extraversion	0.333	-0.184	-0.148	0.189	0.046	-0.373	-0.039	0.628	0.534	-0.138	-0.060
Aggressiveness	0.035	-0.015	-0.267	0.056	-0.168	-0.352	0.388	-0.078	0.010	-0.623	-0.195
Somatic trait anxiety	-0.242	-0.053	-0.242	-0.099	-0.396	-0.411	0.656	-0.263	-0.058	-0.141	-0.376
Psychic trait anxiety	-0.399	-0.024	-0.248	-0.074	-0.445	-0.340	0.778	-0.507	-0.205	0.001	-0.390
Stress susceptibility	-0.421	-0.083	-0.281	-0.203	-0.567	-0.306	0.671	-0.482	-0.263	-0.059	-0.471
Lack of assertiveness	-0.407	-0.168	-0.211	-0.231	-0.475	-0.274	0.515	-0.501	-0.268	0.138	-0.443
Embitterment	-0.326	-0.067	-0.327	-0.113	-0.435	-0.479	0.733	-0.359	-0.121	-0.195	-0.450
Mistrust	-0.318	0.087	-0.110	0.024	-0.228	-0.098	0.469	-0.443	-0.226	-0.299	-0.158
Impulsiveness	0.027	-0.215	-0.311	-0.053	-0.238	-0.625	0.323	0.140	0.189	-0.235	-0.382

Table 3. Correlations between SSP and NEO-PI-R (continued)

SSP/NEO-PI-R	C1	C2	C3	C4	C5	C6	N	E	O	A	C
Adventure seeking	0.261	-0.148	-0.057	0.302	0.079	-0.215	-0.083	0.519	0.430	0.432	0.038
Detachment	-0.393	0.020	-0.043	-0.111	-0.236	-0.043	0.299	-0.625	-0.478	-0.186	-0.193
Social desirability	0.117	0.023	0.318	0.124	0.188	0.302	-0.289	0.166	0.043	-0.447	0.274
Trait irritability	-0.015	-0.015	-0.221	0.056	-0.258	-0.393	0.479	-0.141	-0.036	-0.353	-0.234
Verbal trait aggression	0.097	-0.025	-0.214	0.067	-0.098	-0.275	0.282	0.046	0.098	-0.570	-0.127
Physical trait aggression	0.094	0.013	-0.098	0.118	0.004	-0.123	0.142	-0.008	-0.000	-0.430	-0.006

N=298, women=141, men=157, mean age 48.9, SD 14.4, range 19–91 years. p<0.05 when r≥0.115, p<0.01 when r≥0.149, p<0.001 when r≥0.189. SSP: Swedish universities Scales of Personality, NEO-PI-R: Revised NEO personality inventory, N1: Anxiety, N2: Hostility, N3: Depression, N4: Self-consciousness, N5: Impulsiveness, N6: Vulnerability to stress, E1: Warmth, E2: Gregariousness, E3: Assertiveness, E4: Activity, E5: Excitement seeking, E6: Positive emotion, O1: Fantasy, O2: Aesthetics, O3: Feelings, O4: Actions, O5: Ideas, O6: Values, A1: Trust, A2: Straightforwardness, A3: Altruism, A4: Compliance, A5: Modesty, A6: Tendermindedness, C1: Competence, C2: Order, C3: Dutifulness, C4: Achievement striving, C5: Self-discipline, C6: Deliberation, N: Neuroticism, E: Extraversion, O: Openness to experience, A: Agreeableness, C: Conscientiousness

Table 4. Correlations between SSP and the revised Chapman scales

SSP/Chapman scales	Physical anhedonia	Social anhedonia	Perceptual aberration
Neuroticism	0.246	0.622	0.423
Extraversion	-0.325	-0.448	-0.017
Aggressiveness	0.054	0.304	0.165
Somatic trait anxiety	0.096	0.407	0.426
Psychic trait anxiety	0.210	0.568	0.381
Stress susceptibility	0.256	0.548	0.355
Lack of assertiveness	0.191	0.423	0.170
Embitterment	0.167	0.487	0.385
Mistrust	0.261	0.539	0.304
Impulsiveness	-0.029	0.015	0.099
Adventure seeking	-0.255	-0.281	0.033
Detachment	0.372	0.649	0.171
Social desirability	-0.019	-0.191	-0.080
Trait irritability	0.126	0.389	0.227
Verbal trait aggression	-0.032	0.190	0.081
Physical trait aggression	0.044	0.148	0.099

N=220, women=104, men=116, mean age 51.0, SD 15.7, range 19–91 years. p<0.05 when r≥0.148, p<0.01 when r≥0.190, p<0.001 when r≥0.227. SSP: Swedish universities Scales of Personality

Table 5. Correlations between SSP and STQ

SSP/STQ	Schizotypal personality	Borderline personality
Neuroticism	0.474	0.456
Extraversion	0.146	0.174
Aggressiveness	0.190	0.326
Somatic trait anxiety	0.536	0.523
Psychic trait anxiety	0.442	0.400
Stress susceptibility	0.306	0.310
Lack of assertiveness	0.205	0.137
Embitterment	0.435	0.477
Mistrust	0.256	0.262
Impulsiveness	0.288	0.329
Adventure seeking	0.059	0.113
Detachment	0.024	0.064
Social desirability	-0.094	-0.180
Trait irritability	0.228	0.365
Verbal trait aggression	0.181	0.293
Physical trait aggression	0.086	0.169

N=218, women=99, men=119, mean age 49.1, SD 15.4, range 19–91 years. p<0.05 when r≥0.137, p<0.01 when r≥0.174, p<0.001 when r≥0.228. SSP: Swedish universities Scales of Personality, STQ: Psychotic traits questionnaire

gest loadings.

DISCUSSION

SSP is a valuable personality inventory when mapping personality traits. The main finding of the present study is that SSP partly correlates well to other personality forms investigated in this study.

To our knowledge no other study has investigated correlations between SSP and the Structured Clinical Interview for DSM-III-R axis II screening questionnaire (SCID-II screen).

However, relationships between KSP, the ancestor of SSP and personality disorders, as determined by the SCID-II screen questionnaire, were analysed by Ekselius et al.[18] in a sample of patients with somatization pain disorder or insomnia. When compared to this study, the present study was overall concordant in that there were significant correlations (0.17 or higher) between the majority (54–85%) of the 13 SSP scales and the twelve personality disorders, with the fewest SSP-SCID-II screen correlations in the schizoid, histrionic and antisocial personality disorders. All SSP Neuroticism-related scales were weakly to strongly correlated with the four cluster C personal-

Table 6. Varimax rotated principal factor analysis

Construct factors	Factor 1	Factor 2	Factor 3	Factor 4
SSP Neuroticism	-0.254	0.180	0.097	-0.011
SSP Extraversion	-0.048	-0.046	0.084	0.027
SSP Aggressiveness	-0.021	0.003	0.610	-0.051
NEO Neuroticism	-0.373	0.010	0.010	0.094
NEO Extraversion	0.113	-0.485	0.051	-0.148
NEO Openness	-0.024	-0.200	0.017	-0.445
NEO Agreeableness	-0.054	0.042	-0.677	-0.040
NEO Conscientiousness	0.198	0.174	0.051	-0.433
SCID-II Cluster A	-0.274	0.191	0.080	-0.196
SCID-II Cluster B	-0.293	-0.345	0.197	-0.021
SCID-II Cluster C	-0.372	0.017	-0.013	0.077
SCID-II Self-defeating	-0.327	0.004	-0.040	-0.035
Chapman Physical anhedonia	-0.006	0.046	0.012	0.625
Chapman Social anhedonia	-0.132	0.473	0.250	-0.022
Chapman Perceptual aberration	-0.175	0.000	0.012	-0.019
STQ Schizotypal personality	-0.386	0.063	-0.188	-0.344
STQ Borderline personality	-0.368	-0.248	-0.051	0.153

N=160, women=75, men=85, mean age 51.2, SD 15.7, range 19−91 years. SSP: Swedish universities Scales of Personality, NEO: Revised NEO personality inventory, SCID-II: Structured Clinical Interview for DSM III-R, Axis II, STQ: Psychotic traits questionnaire

Table 7. Principal component analysis

Construct factors	Factor 1	Factor 2	Factor 3
SSP Neuroticism	0.842	-0.080	0.160
SSP Extraversion	-0.216	0.747	-0.187
SSP Aggressiveness	0.430	0.217	-0.715
NEO Neuroticism	0.815	0.093	0.010
NEO Extraversion	-0.602	0.678	-0.043
NEO Openness	-0.271	0.737	0.167
NEO Agreeableness	-0.257	-0.157	0.829
NEO Conscientiousness	-0.464	0.084	0.163
SCID-II Cluster A	0.720	0.080	0.242
SCID-II Cluster B	0.385	0.739	-0.146
SCID-II Cluster C	0.824	0.139	0.108
SCID-II Self-defeating	0.648	0.170	0.226
Chapman Physical anhedonia	0.268	-0.649	-0.248
Chapman Social anhedonia	0.725	-0.452	-0.122
Chapman Perceptual aberration	0.503	0.181	0.028
STQ Schizotypal personality	0.624	0.413	0.330
STQ Borderline personality	0.650	0.387	0.019

N=160, women=75, men=85, mean age 51.2, SD 15.7, range 19−91 years. SSP: Swedish universities Scales of Personality, NEO: Revised NEO personality inventory, SCID-II: Structured Clinical Interview for DSM III-R, Axis II, STQ: Psychotic traits questionnaire

ity disorders. Also, SSP Embitterment, the inverse successor of KSP Socialization was similarly to the previous study[18] associated with all SCID-II personality disorders, although with usually slightly stronger correlations.

In the present study, the SSP Neuroticism factor was moderately to strongly correlated with all cluster C personality disorders (Avoidant PD, Dependent PD, Obsessive-compulsive PD, Passive aggressive PD), two of three cluster A personality disorders (Paranoid PD, Schizotypal PD), one cluster B personality disorder (Borderline PD), and also with Self-defeating PD. Neuroticism has been associated with most psychiatric disorders and it has been suggested to be an almost common marker for psychopathology, so the correlations here with the majority of personality disorders were anticipated.[35] Perhaps more interesting is the lack of substantial correlation between SSP Neuroticism factor and histrionic and antisocial personality disorders, which were associated with SSP Extraversion and SSP Aggressiveness factors. These patterns are reasonable from a clinical phenomenological point of view.

Correlations between SSP and revised NEO personality inventory (NEO-PI-R) have been investigated in an Estonian sample.[26] The study of Aluoja et al.[17] and the present study were overall concordant. The neuroticism-related SSP scales

Somatic trait anxiety, Psychic trait anxiety, Stress susceptibility, Lack of assertiveness, Embitterment and Mistrust as well as the SSP Aggressiveness-related scale Trait irritability had their strongest correlations to NEO Neuroticism in both studies. In the present study SSP Neuroticism correlated at the level 0.8 with NEO Neuroticism, suggesting a very good overall agreement between these two concepts. The SSP Extraversion-related scales Adventure seeking and inverse Detachment had their strongest correlations with NEO Extraversion, and the SSP Aggressiveness-related scales Verbal trait aggression and Physical trait aggression had their strongest negative correlations with NEO Agreeableness in both the present study and the Estonian study.[26] This suggests that SSP capture aspects of the broader personality constructs of the five factor model.

With regard to SSP Impulsiveness the strongest correlations were to NEO Deliberation, a facet of NEO Conscientiousness, closely followed by NEO Impulsivity, a facet of NEO Neuroticism. This is in agreement with the Estonian researchers, who noted the strongest correlations for SSP Impulsiveness with NEO facets Deliberation and Impulsivity, although among the overall factors the association was only present for NEO Extraversion.[26] This suggests that SSP Impulsiveness reflects lack of premeditation and urgency, as proposed

by Whiteside and Lynam in their attempt to bringing order into the concept of impulsivity.[36] Lack of premeditation has previously been observed in SSP as some of the items constituting SSP Impulsiveness, which have been correlated with low NEO Deliberation.[28]

We are not aware of any study investigating correlations between SSP and the Revised Chapman scales or SSP and the STQ questionnaire. In the present study Chapman Social anhedonia scale had its strongest correlation with SSP Detachment, but also considerable correlations with all SSP Neuroticism-related scales, suggesting that SSP covers aspects of the Chapman Social anhedonia scale but not to a greater extent its Physical anhedonia and Perceptual aberration scales. The STQ Schizotypal personality and Borderline personality scales both had their strongest correlations to three of the SSP Neuroticism-related scales, i.e. Somatic trait anxiety, Psychic trait anxiety and Embitterment and also similar, but weaker correlations with SSP Extraversion- and Aggressiveness-related scales, suggesting that the two STQ scales cannot be clearly separated in terms of SSP factors and scales.

In order to place the SSP factors in relation to the clusters, factors and major scales of the other personality instruments, we also performed an unbiased factor analysis of these higher-order constructs. The exploratory factor analysis was however difficult to interpret, with the factor explaining most of the variance showing very weak to moderate negative loadings from SSP Neuroticism, NEO Neuroticism, SCID-II cluster A, B and C, Chapman Social anhedonia, Chapman Perceptual aberration, STQ Schizotypal and STQ Borderline personality and very weak positive loadings from NEO Extraversion and NEO Conscientiousness. Also, the second and the fourth factors were not straightforward to interpret. The third factor with strong positive loadings on SSP Aggressiveness, strong negative loadings on NEO Agreeableness and weak positive loadings on Chapman Social anhedonia, could be interpreted as an aggressiveness factor. Overall, the results of the factor analysis were unexpected and may possibly mirror that not all of the personality higher constructs used was developed using classical psychometric properties. So for example, SCID-II screen questionnaire's 76 items ended up in 23 factors explaining 63% of the variance and face validity was used to fit the different factors into the three major clusters.[37] Another possibility for the unexpected results is that the different constructs measured are so diverse that there are no clear underlying common factors. To get a clearer picture of these relationships we also calculated a principal component analysis containing three overarching factors. In factor 1 of this analysis SSP Neuroticism, NEO Neuroticism, SCID-II cluster A and C, Chapman Social anhedonia and STQ Borderline and Schizotypal personality scales had their highest loadings. SSP Ex-

traversion had its highest loadings in factor 2, as did NEO Extraversion, NEO Openness, SCID-II cluster B and Chapman Physical anhedonia (negative loading), whereas SSP Aggressiveness and NEO Agreeableness loaded high in factor 3. This component analysis showed how SSP's three factors load towards anticipated higher-order factors of the other instruments. It was also concordant with relationships shown with simple correlations.

The present results should be interpreted taking the following limitations into account. The majority of the sample is composed of participants, who had agreed to take part in demanding extensive biological research, which makes them not fully representative to the general population. A limitation is also that it cannot be certain that the subgroup of participants consisting of non-psychotic siblings and parents of patients with psychotic disorder deviate in their personality ratings compared to participants without such a family history. However, we have previously compared patients with schizophrenia spectrum disorders, siblings to these patients and unrelated control subjects, and did not detect any significant SSP personality scale differences between siblings and controls.[27] Another limitation of the study is that personality data was collected from self-report instruments and that no observer ratings were provided. It should however be noted, that self-reports are by far the most common method for personality assessments and independent ratings from significant others have shown substantial concordances with self-reports.[38-41]

To conclude, SSP exhibits similarities with other personality forms, especially regarding its neuroticism-related scales, which show substantial correlations with scales from the NEO-PI-R, SCID-II screen and Chapman inventories, and its extraversion-related and aggressiveness-related scales being correlated with similar scales in NEO-PI-R. SSP is useful as a personality instrument when measuring personality traits related to temperament-like features. The different personality inventories are not completely comparable to each other. Instead, they measure personality aspects in partly different ways.

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Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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