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The relationships of personal resources with symptom severity and psychosocial functioning in persons with schizophrenia: results from the Italian Network for Research on Psychoses study

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Abstract

The relationships of personal resources with symptom severity and psychosocial functioning have never been tested systematically in a large sample of people with schizophrenia. We applied structural equation models to a sample of 921 patients with schizophrenia collected in a nationwide Italian study, with the aim to identify, among a large set of personal resources, those that may have an association with symptom severity or psychosocial functioning. Several relevant demographic and clinical variables were considered concurrently. Poor service engagement and poor recovery style, as well as older age and younger age at onset, were related to greater symptom severity and poorer social functioning. Higher resilience and higher education were related to better social functioning only. Poor problem-focused coping and internalized stigma, as well as male gender and depression, were related to symptom severity only. The explored variables showed distinctive and partially independent associations with symptom severity and psychosocial functioning. A deeper understanding of these relationships may inform treatment decisions.

Keywords

Schizophrenia, Personal resources, Symptom severity, Psychosocial functioning, Structural equation models

Introduction

Schizophrenia is a mental disorder often associated with poor functioning in several domains, including occupational and social functioning and independent living [1–4]. Symptom reduction and social functioning improvement are regarded as the two most important outcomes in schizophrenia [3, 5, 6], but variations in one domain do not necessarily correspond to a parallel variation in the other domain [7]. Studies investigating the relationship between psychopathology and psychosocial functioning reported stronger correlations for negative symptoms than for positive symptoms, with depressive symptoms having a non-trivial role [6, 8, 9]. Personal resources such as recovery styles, resilience, service engagement [10, 11], coping styles [11, 12], internalized stigma [13] and self-esteem [14] have been reported to interfere with both symptom reduction and social functioning.

Two distinct recovery styles, i.e., ‘integration’ and ‘sealing over,’ have been defined [15–17]. Patients who employ the ‘sealing-over’ recovery style make significantly more negative self-evaluations and perceive their parents as significantly less caring than those with the ‘integration’ style [11]. This latter style seems to favor recovery [16]. Resilience is a construct whose exploration in schizophrenia is relatively recent. It is possibly related to functioning and to the transition from an at-risk state to psychosis [18], because it encompasses several aspects of personal, family and social resources. It has been defined as a personal trait protecting against mental disorders and as a dynamic process of adaptation to challenging life conditions [19, 20]. Coping styles also influence the outcome of persons with severe mental illnesses, such as schizophrenia [21]. Emotion-focused coping is more strongly and directly associated with symptom severity and poor quality of life than problem-focused coping [12]. Internalized stigma and poor self-esteem have also been reported to exert an unfavorable influence on real-life functioning and quality of life [22, 23], with implications for treatment.

Aim of the study

The aim of our study was to identify, among a set of personal resources in a large sample of patients with schizophrenia, those that may have an association with symptom severity and/or with psychosocial functioning and that can inform and orient the treatment approach.

Materials and methods

Subjects

In the study of the Italian Network for Research on Psychoses [24], participants were recruited from patients living in the community and consecutively seen at the outpatient units of 26 Italian university psychiatric clinics and/or mental health departments. Inclusion criteria were a diagnosis of schizophrenia according to DSM-IV, confirmed with the Structured Clinical Interview for DSM-IV—Patient version (SCID-I-P), and an age between 18 and 66 years. Exclusion criteria were: a history of head trauma with loss of consciousness; a history of moderate to severe mental retardation or of neurological diseases; a history of alcohol and/or substance abuse in the last 6 months; current pregnancy or lactation; inability to provide an informed consent; and treatment modifications and/or hospitalization due to symptom exacerbation in the last 3 months.

All patients signed a written informed consent to participate after receiving a comprehensive explanation of the study procedures and goals. Approval of the study protocol was obtained from the local ethics committees of each participating center.

Procedures

Recruitment took place from March 2012 to September 2013. A clinical form was filled in with data on age of onset of the first psychotic episode, course of the disease and treatments, using all available sources of information (patient, family, medical records and mental health workers).

Study variables

Psychotic symptoms were assessed by means of the Positive and Negative Syndrome Scale (PANSS) 30-item rating scale [25]. Because several PANSS scores demonstrated a different pattern of correlation with measures of functioning, we adopted a new measure of global symptom severity, derived from the PANSS items selected by the Remission in Schizophrenia Working Group (RSWG) to define remission in schizophrenia [26]. We obtained this measure by summing the scores of the following eight items: delusions (P1), conceptual disorganization (P2), hallucinatory behavior (P3), blunted affect (N1), social withdrawal (N4), lack of spontaneity (N6), manning/posturing (G5) and unusual thought content (G9). These items were chosen by the RSWG because they represent the three dimensions of psychopathology identified by factor analyses and the five criteria for schizophrenia specified in DSM-IV [26]. This variable was named PANSS Severity score (PANSS-Ss) and was considered as a continuous proxy measure of remission/non-remission status. The original dichotomous formulation of RSWG symptomatic remission [26] was maintained only to analyze its relationship with psychosocial functioning and antipsychotic treatment.

Psychosocial functioning was measured using the Personal and Social Performance (PSP) scale [27]. Ratings are based on the assessment of four indicators: (1) socially useful activities, including work and study; (2)

personal and social relationships; (3) self-care; and (4) disturbing and aggressive behaviors, rated on a six-point scale. The interviewer assigned a global score based upon information obtained during the interview regarding the four main areas of functioning and upon any additionally available source of information. The total score is usually divided into three levels: 71–100 (mild or no functioning difficulties); 31–70 (varying degrees of difficulties); and 0–30 (functioning so poor that the patient needs intensive support and supervision) [5, 28].

Resilience was assessed using the Resilience Scale for Adults (RSA) [29, 30]. This self-administered instrument includes 33 items that examine intra- and inter-personal protective factors thought to facilitate adaptation when facing psychosocial adversity. Items are organized into six factors: perception of self, perception of the future, structured style, social competence, family cohesion and social resources. RSA total score was used as a global index of resilience with higher scores reflecting higher resilience.

The Service Engagement Scale (SES) [10] was used to explore patients' relationship with mental health services. SES includes 14 items, rated on a 4-point Likert scale (with higher scores reflecting greater levels of difficulty engaging with services), which are grouped into four subscales: availability, cooperation, help seeking and adherence to treatment. In the present paper, we used the total score.

The Internalized Stigma of Mental Illness (ISMI) [31] was used to evaluate the experience of stigma and internalized self-rejection. It includes 29 items and 5 subscales for self-assessment of subjective experience of stigma. Each item is rated on a 4-level Likert scale, where higher scores indicate greater levels of internalized stigma.

Recovery style was measured with the Recovery Style Questionnaire (RSQ) [17] a 39-item self-report measure, designed to reflect categories consistent with those developed by McGlashan et al. [15]. Thirteen scales were computed, with higher scores representing 'integration', i.e., a recovery style associated with better outcome, less depression and better self-evaluation, as compared to a 'sealing-over' style [32].

The Self-Esteem Rating Scale (SERS) [14] was used to assess self-esteem. It consists of 40 items rated on a 7-point Likert scale, 20 scored positively and 20 negatively, with total scores ranging from –120 to +120. The SERS taps into multiple aspects of self-evaluation such as overall self-worth, social competence, problem-solving ability, intellectual ability, self-competence and worth compared with others. Higher scores represent higher self-esteem.

The extension of patients' social network was assessed with the Social Network Questionnaire (SNQ). The questionnaire consists of 15 items exploring different aspects of social interactions which may be grouped into four factors representing social contacts, practical support, affective support and supporting partner [33]. Higher scores represent larger networks.

The Brief Cope, an abridged version of the Cope [34], is a self-report 14-subscale/28-item questionnaire that demonstrated good psychometric properties in the assessment of dispositional as well as situational coping efforts. The 14 subscales are composed of two items each with a higher score indicating greater use of the specific coping strategy. Problem-focused versus emotion-focused coping strategies were considered [35, 36].

Depressive symptoms were evaluated using the Calgary Depression Scale for Schizophrenia (CDSS), a rating scale designed to assess the level of depression in people with schizophrenia [37]. Higher scores represent higher levels of depression.

Statistical analyses

Continuous variables were summarized using mean and standard deviation (SD) and categorical variables as relative frequencies. Bivariate associations were analyzed between PSP and PANSS-Ss and between PANSS-Ss and PANSS subscales using correlation. Chi-square tests were used to evaluate the association between remission, levels of psychosocial functioning and antipsychotic treatment.

The relationship of symptom severity (PANSS-Ss) and psychosocial functioning (PSP) with a set of independent variables was analyzed using a structural equation model (SEM). The SEM framework has several advantages over the more traditional multiple linear regression: First, estimating a multivariate regression with two outcomes by a SEM instead than running two separate multiple regressions leads to estimates that are more accurate, because the correlation between the outcomes may be accounted for. Independent variables can easily be identified as associated with a single outcome or with both outcomes by examining the graphical representation of SEM. The accuracy of the estimates can be improved by defining PSP as a latent variable underlying the four PSP subscales, thus reducing the measurement error.

An initial full model including the relationships of all the independent variables with both outcomes was first tested. The final model was obtained by trimming one at a time, in decreasing order of p value, all nonsignificant relationships ($p > 0.05$) and removing variables which were unrelated to each of the outcomes. Removed variables may be either unrelated to the outcomes or highly correlated with at least another independent variable. Standardized coefficients were reported to allow the comparison of relationships pointing to the same dependent variable.

Stata 13.1 was used for descriptive statistics and Mplus 7.4 was used for SEM analysis.

Results

Out of 1691 screened patients, 1180 were eligible; of these, 202 refused to participate, 57 dropped out before completing the procedures, and 921 were included.

Descriptive statistics of demographic and clinical variables and of the outcomes are provided in **Table 1**.

Patients with symptomatic remission were 21.8 % of the study population. Of these patients, 11.8 % had no functioning difficulties, 78.3 % intermediate functioning and 9.9 % low functioning. Remission was significantly associated with no functioning difficulties ($\chi^2 = 101.1$; $p < 0.001$); 73.4 % of the samples were non-remitters with low functioning, 7.0 % were remitters with no functioning difficulties, 14.8 % remitters with low functioning and 4.8 % non-remitters with no functioning difficulties.

Among patients with 71–100 PSP score, 13.8 % were on second-generation antipsychotics (SGA), while 6.1 % were on first-generation antipsychotics (FGA). Patients with 0–30 PSP score were for 7.9 % on SGA and for 19.2 % on FGA.

The association between type of antipsychotics and PSP was statistically significant ($\chi^2 = 30.20$; $p < 0.0001$). Among remitters, 16.5 % were on SGA and 0.9 % on FGA, while non-remitters 59.1 % were on SGA and 13.3 % were on FGA. The remaining patients were on both SGA and FGA or off ($\chi^2 = 13.81$, $p = 0.003$).

Correlations of PANSS-Ss with PANSS total score were $r = 0.923$, with PANSS positive $r = 0.774$; with PANSS negative $r = 0.800$.

PSP correlation with PANSS positive was $r = -0.391$, with PANSS negative $r = -0.485$ and with PANSS total $r = -0.515$.

Relationships of personal resources with psychosocial functioning and symptom severity

The initial SEM model, including all the relationships between the independent variables and the two dependent variables, is depicted in **Fig. 1**. All the four PSP scales had significant loadings on the latent PSP factor ($p < 0.001$), ranging from 0.409 to 0.685. Significant correlations were found between the latent PSP and symptom severity ($r = -0.514$, $p < 0.001$) and between PSP activities and PSP relationships ($r = 0.311$, $p < 0.001$) and were added to the model. This model proved to have a satisfactory goodness of fit to the data: RMSEA = 0.043, CFI = 0.948, TLI = 0.909.

The final SEM model is shown in **Fig. 2**. Emotion-focused coping, SERS and SNQ were unrelated to both outcomes and were removed from the model.

Of the remaining variables, RSQ and SES, as well as age and age at onset, were related to both outcomes; problem-focused coping and ISMI, as well as gender and CDSS, were related only to symptom severity; and education and RSA were related only to PSP (**Table 2**). The variables with the strongest association with higher symptom severity were lower service engagement ($b = 0.202$, $p < 0.001$) and younger age at onset ($b = -0.180$, $p < 0.001$). Other significant associations were found with higher internalized stigma, less effective recovery style, less problem-focused coping, more severe depression, older age and male gender. A better psychosocial functioning was associated with lower service engagement ($b = -0.267$, $p < 0.001$), younger age ($b = -0.304$, $p < 0.001$), older age at onset ($b = 0.277$, $p < 0.001$), higher resilience, higher levels of education and a more effective recovery style. Three PSP scales, i.e., PSP activities, PSP relationships and PSP self-care, showed high loadings on the latent factor PSP (from 0.600 to 0.676), while PSP aggressive behavior scale loading was 0.418. Significant correlations were confirmed between symptom severity and PSP ($r = -0.517$, $p < 0.001$) and between PSP activities and PSP relationships ($r = 0.329$, $p < 0.001$). Only six estimated correlations between pairs of predictors were above 0.2, namely those between ISMI and RSA ($r = 0.499$), age and age at onset ($r = 0.349$), problem-focused coping and RSA ($r = 0.309$), ISMI and CDSS ($r = 0.296$), RSA and CDSS ($r = -0.285$) and problem-focused coping and RSQ ($r = 0.281$).

Model fit was good and improved over the initial model, with RMSEA = 0.039, CFI = 0.958 and TLI = 0.937. The explained variances of the outcomes were 0.170 for PANSS-Ss and 0.297 for PSP. Due to some sparse missing data on the independent variables, the model was tested on 902 patients with complete data (missing data proportion was $19/921 = 2.1\%$). This sample size was more than adequate to estimate the 30 free parameters of the final model.

Discussion

To our knowledge, this is the first study examining the relationships of personal resources with symptom severity and psychosocial functioning in a large sample of patients with schizophrenia.

Despite the wide literature on PANSS factors, no single model achieved broad consensus [38]. To have a more global index of core symptom severity, we decided to use a new PANSS measurement obtained by summing all item scores selected by Andreasen et al. [26] in the Remission in Schizophrenia Working Group (RSWG). These items were chosen because they reflect the three dimensions of psychopathology in schizophrenia, overcoming the factor-analytic debate.

PSP has been used as a measure of social functioning in patients with stable schizophrenia with well-reported reliability and validity [5].

We found that some variables were associated with both PANSS-Ss and PSP (i.e., age, age at onset, service engagement and recovery style); some were associated with PSP only (i.e., resilience and educational level); and others were associated with PANSS-Ss only (i.e., gender, problem focus coping, internalized stigma and depression).

As expected, correlations between PANSS scores and PSP were negative [6, 28, 39, 40]. The strongest one was the correlation between PANSS-Ss and PSP. This was even higher than the widely reported correlations of PSP with the PANSS negative factor and the PANSS total score [6], suggesting that the PANSS-Ss may have a strong face validity.

The significant association of service engagement with the severity of symptom and with psychosocial functioning is a new finding. Service engagement is a useful tool for research and clinical purposes [10]. Individuals who are experiencing difficulties in engaging with services have poorer outcomes (i.e., higher severity of symptoms and poorer psychosocial functioning). This domain could be a target of further attention.

An interesting difference was found between the two outcomes with regard to their association with the symptoms of depression, which were related to PANSS-Ss but not to PSP. Depression could represent a nonspecific symptom limiting psychosocial functioning improvement [24, 41, 42], and several studies reported persisting symptoms of depression associated with reduced quality of life and functioning [43, 44]. However, most of the studies that investigated the relationship between depression and psychosocial functioning utilized bivariate instruments, not considering other factors that could be associated with psychosocial functioning and related to depression.

The association of depression with severity of symptoms could also be the consequence of more severe symptoms inducing a demoralizing effect. Unfortunately, the cross-sectional design of the study cannot clarify the meaning of the reported association.

Either depression or low self-esteem could interact with stigma, as reported by Lysaker et al. [22], limiting symptom improvement. Our results indicate that internalized stigma is significantly associated with symptom severity but not with PSP. As recently reviewed by Gerlinger et al. [45], personal stigma (i.e., self-stigma) is well characterized, but stigma correlates differ remarkably. Social functioning was reported to show ambiguous associations with personal stigma that otherwise shows a significant correlation with positive symptoms and general psychopathology [45, 46]. Our findings confirm the latter observations.

The association between stigma and more severe symptoms [22, 46, 47] addresses the issue of possible strategies aimed at stigma reduction. van Zelst et al. [48] reported that enhancing psychological resources, by increasing self-esteem and the ability to cope with symptoms, could improve stigma resilience.

Research into recovery in psychosis has shown that people with a diagnosis of schizophrenia often use avoidance coping strategies rather than problem-focused ones [11, 16, 17, 49]. We report that problem-focused but not emotion-focused coping strategies were associated with a lower severity of symptoms. Although there is no consensus regarding which coping strategies are most effective in reducing psychopathological and distress symptoms [50], researchers have found that patients with schizophrenia tend to use ineffective emotionally oriented or non-problem-focused coping styles [22, 49, 51]. Our findings

suggest that treatment strategies aiming to enhance the coping of individuals with psychosis could ultimately reduce the severity of symptoms [49].

This study builds on previous work [17] examining the hypothesis that recovery styles could predict outcomes. Interestingly, recovery styles (i.e., integration) are associated with both psychosocial functioning and symptom severity.

A relatively new finding is the relationship of resilience with psychosocial functioning. Torgalsbøen [20] reported a significant correlation between resilience and present psychosocial functioning and a significant difference between fully recovered individuals and those in remission regarding their resilience score. Mirroring the problem-focused coping, we found an association of resilience with social functioning but not with severity of symptoms, suggesting that slight but meaningful differences between coping, resilience and recovery styles exist. This finding could help to further refine these constructs in the broad area of remission/recovery/functioning in schizophrenia.

Our results indicate that some demographic and clinical variables, such as age and age at onset, were associated with both the severity of symptoms and psychosocial functioning, while gender was related to severity of symptoms only. The association between symptom severity and older age, as well as the relationship of older age at onset and female gender with lower symptom severity, confirms findings from previous reports [43, 52–54]. The association of poorer functioning with younger age and lower age at onset is a well-established finding [55] and is in line with our results.

Educational level has been historically considered a predictor of social and work functioning [40, 56–58], and we confirm this finding.

For social and everyday living outcomes, variance accounted for by the entire array of predictive variables was less than 30 %, suggesting that other factors, such as social and cultural influences, are involved as well [9, 24].

The issue of differences between first- versus second-generation antipsychotics on measure of functioning is still open for debate [59, 60] so that the differences in the association between psychosocial function and antipsychotic treatment that we reported deserve further investigations either for the considerable pharmacologic heterogeneity within and between the FGA and SGA groups or for the cross-sectional design of the study that impedes any causal interpretation of the findings. The cross-sectional nature of this study constitutes important limitation and prevents conclusions regarding the causality of findings. The major strengths of the study are the large size of the sample and the wide array of state-of-the-art instruments, which allowed the use of a multivariate model in a SEM framework to test the associations among a large number of variables with high reliability.

In conclusion, our results indicate that personal resources, clinically relevant demographic features (i.e., age at onset and gender) and non-core symptoms, such as depression, are significantly associated with either severity of symptoms or psychosocial functioning or with both outcomes, but with different loadings.

The results of the current study might inform psychosocial treatments aimed to reduce stigma, improve coping strategies and shape recovery styles. Some of these factors are potentially modifiable by specific therapeutic interventions, which can produce considerable clinical and functional improvements.

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Conflict of interest

None.

Table 1 - Characteristics of the study population

| Variable | <i>n</i> | Mean (SD) or % |
|--|-----------------|-----------------------|
| Education (years) | 919 | 11.61 (3.43) |
| Age | 921 | 40.17 (10.71) |
| Age at onset | 918 | 24.02 (7.20) |
| Antipsychotics treatment | | |
| First-generation antipsychotics | 630 | 68.6 % |
| Second-generation antipsychotics | 130 | 14.1 % |
| Both | 13 | 14.1 % |
| None | 29 | 3.2 % |
| Gender (% males) | 921 | 69.6 % |
| Work ^a (% working) | 893 | 29.2 % |
| PANSS positive ^a | 920 | 16.12 (6.74) |
| PANSS negative ^a | 920 | 21.93 (8.52) |
| PANSS general psychopathology ^a | 920 | 37.44 (11.81) |
| PANSS total ^a | 920 | 75.49 (23.05) |
| PANSS severity | 921 | 21.94 (7.81) |
| RSA total | 921 | 106.56 (21.30) |
| PSP total ^a | 919 | 52.99 (16.55) |
| PSP activities | 920 | -2.43 (1.20) |

| Variable | <i>n</i> | Mean (SD) or % |
|-------------------------|----------|----------------|
| PSP relationships | 919 | -2.46 (1.06) |
| PSP self-care | 920 | -1.07 (1.05) |
| PSP aggressive behavior | 920 | -0.54 (0.88) |
| Problem-focused coping | 921 | 39.68 (10.51) |
| Emotion-focused coping | 921 | 24.95 (6.16) |
| SES | 921 | 12.89 (7.71) |
| RSQ | 909 | 7.99 (2.23) |
| SERS | 921 | 16.01 (40.65) |
| ISMI | 910 | 2.20 (0.44) |
| SNQ | 911 | 2.28 (0.50) |
| CDSS | 920 | 3.99 (4.02) |

PANSS Positive and Negative Syndrome Scale, *PSP* Personal and Social Performance Scale, *SES* Service Engagement Scale, *RSA* Resilience Scale for Adults, *RSQ* Recovery Style Questionnaire, *SERS* Self-Esteem Rating Scale, *ISMI* Internalized Stigma of Mental Health, *SNQ* Social Network Questionnaire, *CDSS* Calgary Depression Scale for Schizophrenia

^aNot included in the SEM models

Fig. 1

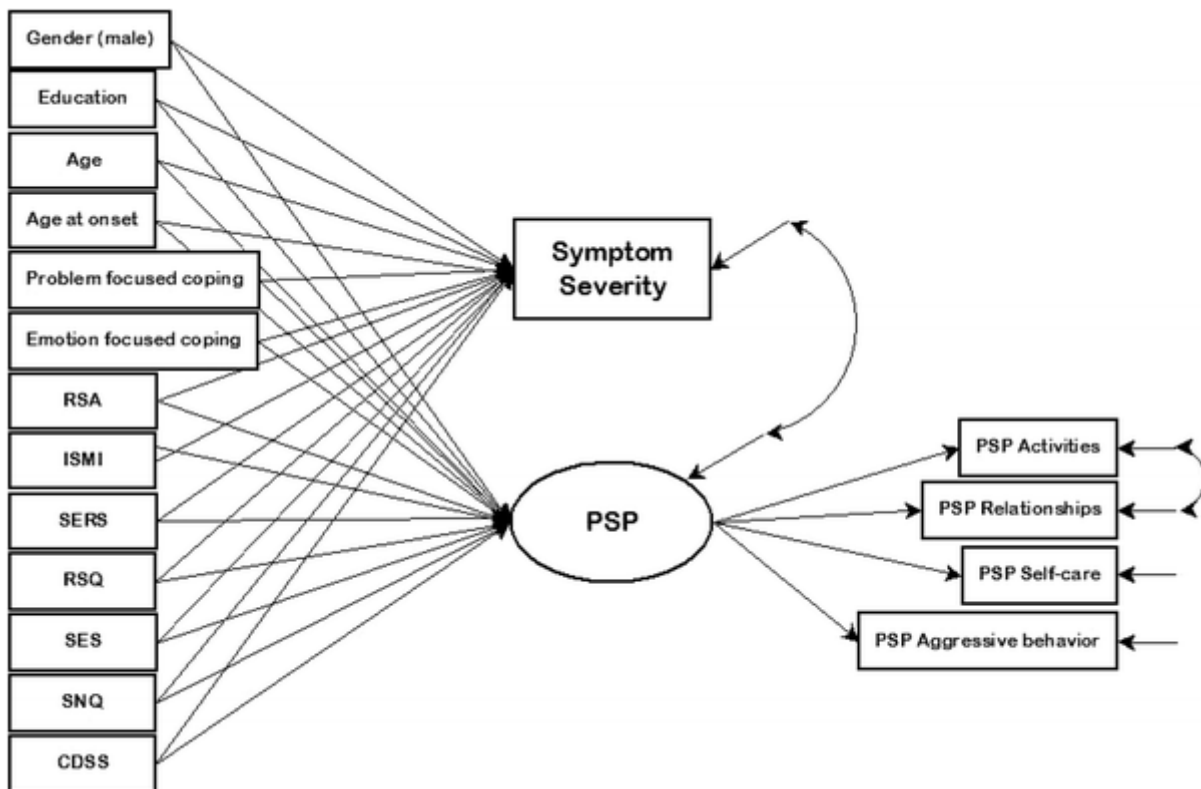


Diagram of the initial SEM. Rectangles indicate observed variables; the ellipsis indicates that PSP is a latent variable with arrows pointing to its indicators. Straight arrows from the independent observed variables on the left to symptom severity and to PSP indicate regressions; small straight arrows on the dependent variables indicate the presence of residuals; curved arrows linking residuals indicate correlations. RSA Resilience Scale for Adults, ISMI Internalized Stigma of Mental Health, SERS Self-Esteem Rating Scale, RSQ Recovery Style Questionnaire, SES Service Engagement Scale, SNQ Social Network Questionnaire, CDSS Calgary Depression Scale for Schizophrenia, PSP Personal and Social Performance Scale

Fig.2

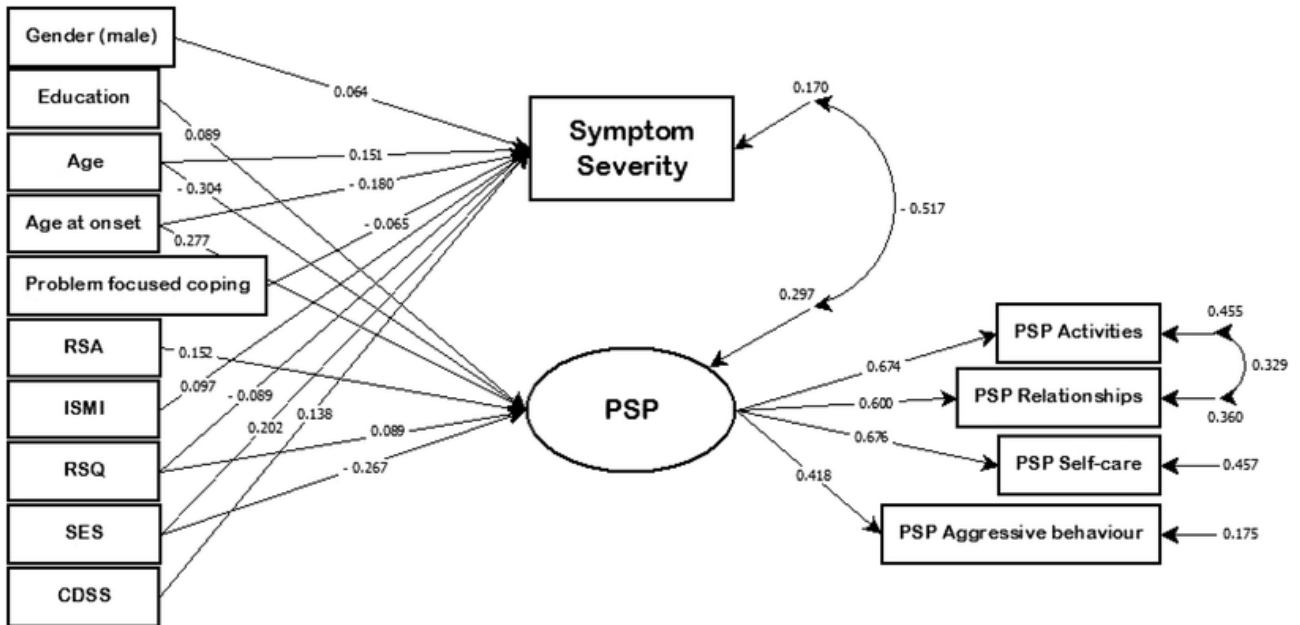


Diagram of the final SEM. Rectangles indicate observed variables; the ellipsis indicates that PSP is a latent variable with arrows pointing to its indicators. Straight arrows from the independent observed variables on the left to symptom severity and to PSP indicate regressions, with numbers showing the estimated standardized regression coefficients; small straight arrows on the dependent variables indicate the presence of variance residuals, with numbers showing the explained variance; curved arrows linking residuals indicate correlations, with numbers showing the estimated coefficients. RSA Resilience Scale for Adults, ISMI Internalized Stigma of Mental Health, RSQ Recovery Style Questionnaire, SES Service Engagement Scale, CDSS Calgary Depression Scale for Schizophrenia, PSP Personal and Social Performance Scale

Table 2 - Results of the final SEM

| Dependent and independent variables | <i>b</i> | <i>p</i> value |
|---|-----------------|-----------------------|
| <i>Measurement model (PSP on PSP subscales)</i> | | |
| PSP activities | 0.674 | <0.001 |
| PSP relationships | 0.600 | <0.001 |
| PSP self-care | 0.676 | <0.001 |
| PSP aggressive behavior | 0.418 | <0.001 |
| <i>Outcome PANSS-Ss</i> | | |
| Gender | 0.064 | 0.023 |
| Age | 0.151 | <0.001 |
| Age at onset | -0.180 | <0.001 |
| Problem-focused coping | -0.065 | 0.026 |
| ISMI | 0.097 | 0.002 |
| CDSS | 0.138 | <0.001 |
| RSQ | -0.089 | 0.005 |
| SES | 0.202 | <0.001 |
| <i>Outcome PSP</i> | | |
| Education | 0.089 | 0.010 |
| Age | -0.304 | <0.001 |
| Age at onset | 0.277 | <0.001 |
| RSA | 0.152 | <0.001 |
| RSQ | 0.089 | 0.015 |

| Dependent and independent variables | <i>b</i> | <i>p</i> value |
|-------------------------------------|----------|----------------|
| SES | -0.267 | <0.001 |

PANSS Positive and Negative Syndrome Scale, *PSP* Personal and Social Performance Scale, *SES* Service Engagement Scale, *RSA* Resilience Scale for Adults, *RSQ* Recovery Style Questionnaire, *ISMI* Internalized Stigma of Mental Health, *CDSS* Calgary Depression Scale for Schizophrenia

b = standardized regression coefficient

Model fit was good and improved over the initial model, with RMSEA = 0.039, CFI = 0.958 and TLI = 0.937. The explained variances of the outcomes were 0.170 for PANSS-Ss and 0.297 for PSP. Due to some sparse missing data on the independent variables, the model was tested on 902 patients with complete data (missing data proportion was 19/921 = 2.1 %). This sample size was more than adequate to estimate the 30 free parameters of the final model.

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