Resilience and Associated Factors in Schizophrenia

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SUMMARY

Objective: Resilience in schizophrenia has been associated with multiple clinical variables that, to the best of our knowledge, do not include impulsiveness, aggression and also personality and insight with possible influences, which remain as poorly investigated topics. This study investigated the relationships of resilience with depression, aggression, impulsivity, personality and insight in order to assess the factors that explain resilience in schizophrenia.

Method: The study included 139 individuals with clinically stable schizophrenia. Data were acquired by means of the Resilience Scale for Adults (RSA), the Positive and Negative Syndrome Scale (PANSS), the Calgary Depression Scale for Schizophrenia (CDSS), the Schedule for Assessment of Insight (SAI), the Eysenck Personality Questionnaire Revised-Abbreviated (EPQR-A), the Barratt Impulsiveness Scale, 11th version (BIS-11) and the Buss–Perry Aggression Questionnaire (BPAQ). Correlations of the scores of the RSA with the scores of the other psychometric scales and the demographic and clinical data were evaluated. Linear regression analysis was used to determine the factors predicting resilience.

Results: The PANSS total and general psychopathology scores and scale scores on depression, impulsiveness and aggression were negatively correlated with resilience scores. Attentional impulsiveness, neuroticism and depression predicted low levels of resilience. There were no significant correlations between insight and the total or subdimension scores of resilience except for the subdimension structural style.

Conclusion: Treatments focusing only on clinical remission in schizophrenia are not sufficiently effective. Interventions for enhancing resilience in schizophrenia should consider depressive symptoms, attentional impulsivity and personality traits such as neuroticism.

Keywords: Schizophrenia, extraversion, neuroticism, structured style, depressive symptoms, aggression

INTRODUCTION

Research on resilience in psychiatry has progressed in the recent years to encompass serious mental disorders such as schizophrenia. With a shift in focus from risk to protective factors, and from psychopathological remission to personal recovery; resilience has become one of the key concepts in understanding the possibility of subjective wellness in schizophrenia (Bozikas et al. 2016, Palmer et al. 2014). Resilience is the ability for good adaptation despite trauma, significant stress or adversity (Masten 2001). In severe mental disorders, the adversity also consists of suffering the disease symptoms and their disruptive effects on many areas of daily functioning (Betensky et al. 2008, Dutescu et al. 2018). Many studies suggested that resilience is impaired in schizophrenia. Compared with healthy controls, resilience levels are lower in patients with schizophrenia (Deng et al. 2018, Edmonds et al.

2016, Mizuno et al. 2018, Palmer et al. 2014). Many studies regarding resilience processes in schizophrenia have suggested associations with positive clinical and psychosocial outcomes. Resilience in schizophrenia has been shown to be associated with self esteem and hopelessness (Hofer et al. 2016), the quality of life (Hofer et al. 2017, Wartelsteiner et al. 2016, Yoshida et al. 2016) and better levels of functionality (Rossi et al. 2017a, Torgalsboen 2012).

Depressive symptoms are not rare in schizophrenia and may arise in any phase of the disease (Fanta et al. 2020, Hasan et al. 2015). There are studies showing the associations of depressive symptoms with many negative factors such as the risk of suicide (Bertelsen et al. 2007, Cassidy et al. 2018, Coentre et al. 2017), aggressiveness (Hodgins and Riaz 2011), poor quality of life (van Rooijen et al. 2019). In this regard, the relation of resilience to depression is important

in schizophrenia. Depression comorbidity has been shown to be associated with lower resilience in patients with psychosis (Kim et al. 2020); resilience has been suggested to be related to depressive symptom severity in patients with schizophrenia (Rossi et al. 2017b). However, this relationship has not yet been studied in detail on the subdimensions of resilience.

Different dimensions of resilience have been identified by many researchers. Friborg et al. (2003) investigated resilience as intrapersonal dimensions comprised of perception of self, perception of future and structured style, and interpersonal dimensions defined as social competence, family cohesion and social resources. However, in most of the resilience scales, family and social dimensions cannot be measured. Through dimensional evaluation of resilience, it can be assessed which dimensions are higher in different individuals (Basım and Çetin 2011). By dimensional evaluation, it has been better comprehended by that resilience is a dynamic concept that can change with the effect of environmental factors, rather than being a relatively stable personal characteristic.

Individual differences in adaptability to stressors may also be related to personality characteristics (Southwick et al. 2014). Personality traits of extraversion and emotional stability have been associated with higher resilience levels in general population (Amstadter et al. 2016, Campbell-Sills et al. 2006). In a recent study, significant correlations between personality dimensions and resilience have been demonstrated in psychiatric inpatients (Sivri et al. 2019). Personality traits of lower neuroticism and higher extraversion have been proposed to alleviate the effects of childhood trauma in patients with psychotic disorders (Boyette et al. 2014). Personality, not studied in detail in schizophrenia, may be associated with multiple dimensions of resilience.

Awareness of having a mental disorder and its consequences may have potential importance in serious mental disorders when challenging adverse conditions are encountered. In a study on Japanese patients, insight was found to be negatively correlated with resilience levels in schizophrenia (Mizuno et al. 2016). In patients with bipolar disorder, insight has been shown to be negatively associated with resilience subdimension of perception of future (Şenormancı et al. 2020). However, in schizophrenia, the relationship between insight and resilience has not been studied in subdimensional level, yet.

As with depression, impulsivity and aggression are also among the major clinical challenges of schizophrenia treatment (Buckley et al. 2011, Ouzir 2013). Although most patients with schizophrenia do not have the tendency for impulsiveness or violence, impulsivity rates were found to be higher in comparison to healthy controls (Zhornitsky et al. 2012). There are multiple causes of aggression, and impulsivity has important role in etiology (Volavka ve Citrome

2008, Hoptman 2015, Witt et al. 2013). Resilience has been shown to be associated with lower impulsivity in euthymic patients with bipolar disorder (Choi et al. 2015, Şenormancı et al. 2020). Resilience has been proposed to have inverse relationship with aggression in a sample of healthy young adult males (Kim et al. 2015). To the best of our knowledge, the associations of resilience with impulsivity and aggression have not been studied in schizophrenia, yet.

Investigation of the relationships between depressive symptoms, impulsivity and aggression with resilience in schizophrenia would contribute to understanding the role of resilience as a treatment goal in schizophrenia. This study aimed to test the hypothesis that personality, insight, depression, impulsivity and aggression are associated with resilience dimensions, and to determine factors that predict resilience in clinically stable patients with schizophrenia. Thus, this study, by evaluating resilience as a multidimensional concept for focusing on clinical parameters expected to predict resilience in schizophrenia, was considered to make a distinct contribution to the literature.

METHOD

Participants

The 139 participants of this study were recruited from among individuals with diagnoses of schizophrenia on the DSM-5 criteria, consulting between March 2018 and May 2019, the outpatient psychiatry clinics at the University of Health Sciences Bakirkoy Training and Research Hospital for Psychiatry, Neurology and Neurosurgery, Department of Psychiatry and University of Health Sciences Bursa Yuksek Ihtisas Training and Research Hospital.

All participants met the inclusion criteria of being 18-65 years of age and having the ability to give informed consent. The exclusion criteria were illiteracy, a history of intellectual disability, diagnosis of any severe other medical condition, a history of alcohol and/or substance abuse in the last 6 months and hospitalisation and/or modifications in medical treatment due to symptom exacerbation in the last 6 months. Written informed consent was obtained from all patients. The study protocol was approved by the local ethics committee of University of Health Sciences Bakirkoy Training and Research Hospital for Psychiatry, Neurology and Neurosurgery.

Data Acquisition Tools

The Demographic and Clinical Data Form: This self-report type of questionnaire was prepared by the authors in accordance with the aims of the study and evaluated on the basis of participant response.

The Resilience Scale for Adults (RSA): The RSA, developed by Friborg et al. (2005) to evaluate intrapersonal and interpersonal aspects of resilience, is a Likert type self-report scale with 33-items, each scored between 1and 5, and 6 subdimensions measuring *perception of self, perception of future, structured style, social competence, family cohesion and social resources*. The subdimension on *perception of self* has 6 questions rating personal opinions on one's own inner strengths, skills, and self-esteem. *Perception of future* has 4 questions on beliefs on opportunities for future plans and goals. *Structured style* has 4 questions on skills of maintaining daily routine, ability to be organized, using time and being planned. *Social competence*, with 6 questions, assesses extraversion, social adaptability, ability to initiate activities, communication skills, flexibility in social issues. *Social resources* consists of 7 questions measuring social support from friends and relatives and the individual's ability to provide social support apart from family resources. *Family cohesion*, with 6 questions, evaluates cooperation between family members, family ties, perceived family support, and loyalty (Friborg et al. 2003). Reliability and validity of the Turkish language version of the RSA was carried out by Basım and Çetin (2011). Cronbach's alpha coefficient of the RSA was calculated as 0.84 in this study.

The Positive and Negative Syndrome Scale (PANSS): The PANSS, standardized by Kay et al. (1987), is a semi-structured, interviewer-administered scale with 30 items, each scored on a 1-7-point scale to rate symptom severity within a period of 1 week, mainly in psychotic spectrum disorders. Seven of the items of the PANSS are included in the positive symptoms subscale, seven in the negative symptoms subscale, and sixteen items in the general psychopathology subscale. Reliability and validity of the Turkish language version of the PANSS was verified by Kostakoğlu et al. (1999).

The Calgary Depression Scale for Schizophrenia (CDSS): This 9-item, 4-point Likert type scale designed by Addington et al. (1993), is directed by an interviewer to assess the severity of depressive symptoms in schizophrenia. Reliability and validity of the Turkish language version of the CDSS was conducted by Aydemir et al. (2000).

The Schedule for the Assessment of Insight (SAI): It is a semi-structured schedule, developed by David (1990), consists of 8 questions administered by an interviewer. The option of asking the hypothetical eighth question is left to the interviewer. The three subscales are on adherence to treatment, recognition of having a mental illness and the ability to relabel psychotic phenomena as abnormal (David 1990). Reliability and validity of the Turkish langauge version of the SAI was verified by Arslan et al. (2001).

The Eysenck Personality Questionnaire Revised-Abbreviated (EPQR-A): This is a self-report questionnaire consisting of 24 questions in the context of Eysenck's theory of personality. It has 4 subscales on *extraversion, neuroticism, psychoticism* and *lie*. The lie subscale is used for control purposes (Eysenck et al. 1985). Validity and reliability of the Turkish language version of the questionnaire was conducted by Karancı et al. (2007). The Cronbach's alpha coefficient of the EPQR-A was calculated as 0.33 in our study.

The Barratt Impulsiveness Scale-11th Version (BIS-11): The 30-item BIS-11 measures the trait impulsiveness on the 3 subscales, *motor impulsivess* assessing the tendency to act quickly without thinking and rapid reaction to external stimuli; *attentional impulsiveness* measuring the difficulties in sustaining attention and therefore making rapid decisions and the inability to tolerate complex cognitive tasks; and *non-planning impulsiveness* detecting the tendency for acting without regard for future and lack of planning or scheduling (Patton et al. 1995). Reliability and validity of the Turkish language version of the BIS-11 was verified by Güleç et al. (2008).

The Buss-Perry Aggression Questionnaire (BPAQ): The BPAQ is a self-report scale with 29-items that measure different dimensions of aggression including physical aggression, verbal aggression, anger and hostility (Buss and Perry 1992). Validity and reliability study of the Turkish language version of the scale was reported by Demirtaş Madran (2013).

Statistical Analysis

Statistical analyses of the data were made on the SPSS version 18 for Windows. Normality of data distribution was evaluated with the Shapiro-Wilk test. Relationships of the normally distributed variables were analysed by the Pearson correlation analysis, and The Spearman correlation analysis was used for variables without normal distribution. Student's t test and ANOVA (analysis of variance) were used for comparing groups of normally distributed variables, while the Mann-Whitney U test and the Kruskal Wallis test were used for comparing non-parametric quantitative data. Multivariate analysis of covariance (ANCOVA) was used to determine the differences that occur when the confounding effect of the duration of the disease was controlled. The Cronbach's alpha coefficient was calculated to assess internal consistency in the reliability analyses of the RSA and the EPQR-A. The numeric variables were presented with the mean and the standard deviation (mean± SD) or the median with the minimum–maximum range. The categorical variables were presented in terms of both the numbers of observations and percentages (%). Significance levels were set at $p<0.05$ and $p<0.001$. Linear regression analyses were made to determine the factors predicting resilience.

RESULTS

Demographic and Clinical Characteristics of the Participants

The participants consisted of 66 (47.5%) females and 73 (52.5%) males with a mean age of 37.0±10.3, and a mean age of 25.8±7.3 years at disease onset. Data on demographic characteristics are shown in Table 1. The clinical characteristics of the participants are presented in Table 2 and the scores obtained from the psychometric scales in Table 3.

Table 1. Demographic Characteristics of the Participants (n (%)/Mean± SD) (n=139)

Age	37.0 ± 10.3
Gender	
Female	66 (47.5)
Male	73 (52.5)
Level of education (years)	9 (4 - 18)
Marital status	
Single	76 (54.7)
Married	22 (15.8)
Divorced/widowed	41 (29.5)
Economic status	
Low	28 (20.1)
Middle	104 (74.8)
High	7 (5.0)
Working	17 (12.2)
Without regular employment	21 (15.1)
Unemployed	101 (72.7)

Table 2. Clinical Characteristics of the Participants (n (%)/Mean± SD/ Med (Min-Max)) (n=139)

Disease duration (years)	10 (1 - 42)
Age at disease onset (years)	25.8 ± 7.3
Number of psychotic episodes	3 (1 - 22)
Number of hospitalizations	3 (0 - 22)
Suicide attempt	
None	99 (71.2)
Once	22 (15.8)
More than once	18 (12.9)
History of suicide attempts in first degree relatives	
Present	9 (6.5)
None	130 (93.5)
Lifetime alcohol and substance use	
None	104 (74.8)
Alcohol	15 (10.8)
Substance*	20 (14.4)

*Cannabinoid and/or synthetic cannabinoid

Table 3. Psychometric Test Scores of the Participants (Mean± SS/Med (Min-Max) (n=139)

PANSS	
Positive symptoms	11.3 ± 3.0
Negative symptoms	16.7 ± 4.4
General psychopathology	28.8 ± 6.1
Total	56.9 ± 11.0
RSA	
Perception of self	23 (6 - 30)
Perception of future	16 (4 - 20)
Structured style	13.5 ± 4.0
Social competence	20.4 ± 5.7
Family cohesion	23 (8 - 30)
Social resources	27 (11 - 35)
Total	121.7 ± 21.6
SAI	
Compliance with treatment	3.5 (0 - 4)
Awareness of illness	5 (3 - 6)
Relabeling of psychotic experiences	3 (0 - 4)
Total	11 (6 - 14)
BIS-11	
Attentional impulsiveness	28.9 ± 6.8
Motor impulsiveness	12 (7 - 25)
Non-planning impulsiveness	21 (12 - 30)
Total	63 (40 - 97)
BPAQ	
Verbal aggression	6.0 ± 3.7
Physical aggression	6 (0 - 32)
Anger	7.5 ± 5.8
Hostility	8 (0 - 30)
Total	27 (0 - 86)
EPQR-A	
Extraversion	2.6 ± 1.8
Neuroticism	2 (0 - 6)
Psychoticism	1 (0 - 5)
Lie	5 (0 - 6)
CDSS	1 (0 - 17)

PANSS= Positive and Negative Syndrome Scale, RSA= Resilience Scale for Adults, SAI= Schedule for the Assessment of Insight, BIS-11= Barratt impulsiveness scale, 11th version, BPAQ= Buss–Perry Aggression Questionnaire, EPQR-A= Eysenck Personality Questionnaire Revised-Abbreviated, CDSS= Calgary Depression Scale for Schizophrenia

Relationships between RSA and Demographic Features

A weak but statistically significant negative correlation was found between the RSA subscale *family cohesion* and the data on the level of participant education (r:-0.17, p:0.035). Comparison of the RSA total scores and the data on economic status by ANOVA showed a statistically significant difference (p:0.002). Post-hoc Tukey test to determine the significance showed the RSA scores of the participants with a middle economic status were significantly higher than that of the participants with low economic status (p:0.003). ANCOVA on the RSA total scores of participants to detect the possible effect of disease duration taken as a covariate and by controlling the confounding effect resulted in the disappearance of the significance of the relationship between RSA total score and the economic status parameter (p:0.180). A statistically significant difference (p:0.004) was determined using the Kruskal Wallis test for comparing the score on the RSA *social resources* subscale and the data on economic status. After the Bonferroni-corrected Mann-Whitney U tests to analyse this significance, the score of the participant group with middle economic status on the RSA *social resources* was significantly higher as compared to that of the participant group with low economic status (p:0.001). As determined by the Mann-Whitney U test,

Table 4. Correlations Between the RSA, PANSS, SAI, BIS-11, BPAQ, EPQR-A, and the CDSS Scores

	RSA						
	Self-perception	Perception of future	Structured style	Social competence	Family cohesion	Social resources	Total
	r	r	r	r	r	r	r
PANSS							
Positive symptoms	-0.10[++]	-0.13[++]	-0.07[+]	0.11[+]	-0.13[++]	-0.12[++]	-0.10[+]
Negative symptoms	-0.00[++]	-0.08[++]	-0.02[+]	-0.23*[+]	-0.07[++]	-0.27*[++]	-0.16[+]
General psychopathology	-0.19*[++]	-0.25*[++]	-0.22*[+]	-0.17*[+]	-0.05[++]	-0.13[++]	-0.24*[+]
Total	-0.13[++]	-0.20*[++]	-0.15[+]	-0.16[+]	-0.07[++]	-0.23*[++]	-0.23*[+]
SAI							
Compliance with treatment	0.00[++]	-0.08[++]	0.13[+]	-0.11[+]	0.11[++]	-0.00[++]	-0.00[+]
Awareness of illness	-0.04[++]	0.09[++]	0.14[+]	0.02[+]	0.12[++]	0.11[++]	0.10[+]
Relabeling of psychotic experiences	-0.11[++]	0.04[++]	0.11[+]	-0.00[+]	0.05[++]	0.04[++]	0.01[+]
Total	-0.03[++]	0.10[++]	0.20*[+]	0.02[+]	0.12[++]	0.10[++]	0.12[+]
BIS-11							
Attentional impulsiveness	-0.47**[++]	-0.36**[++]	-0.40**[+]	-0.18*[+]	-0.21*[++]	-0.23*[++]	-0.45**[+]
Motor impulsiveness	-0.29**[++]	-0.01[++]	-0.23*[++]	-0.12[++]	-0.07[++]	-0.12[++]	-0.21*[++]
Non-planning impulsiveness	-0.35**[++]	-0.21*[++]	-0.28*[++]	-0.12[++]	-0.10[++]	-0.09[++]	-0.29**[++]
Total	-0.50**[++]	-0.30**[++]	-0.37**[++]	-0.18*[++]	-0.20*[++]	-0.23*[++]	-0.43**[++]
BPAQ							
Verbal aggression	0.03[++]	0.07[++]	0.02[+]	0.01[+]	-0.04[++]	-0.05[++]	-0.02[+]
Physical aggression	-0.22*[++]	-0.08[++]	-0.12[++]	-0.07[++]	-0.18*[++]	-0.20*[++]	-0.20*[++]
Anger	-0.21*[++]	-0.13[++]	-0.14[+]	-0.05[+]	-0.15[++]	-0.14[++]	-0.24*[+]
Hostility	-0.21*[++]	-0.11[++]	-0.06[++]	-0.10[++]	-0.19*[++]	-0.20*[++]	-0.21*[++]
Total	-0.19*[++]	-0.08[++]	-0.11[++]	-0.07[++]	-0.19*[++]	-0.20*[++]	-0.20*[++]
EPQR-A							
Extraversion	0.29**[++]	0.34**[++]	0.17*[+]	0.45**[+]	-0.06[++]	0.13[++]	0.09[+]
Neuroticism	-0.39**[++]	-0.22*[++]	-0.20*[++]	-0.15[++]	-0.15[++]	-0.18*[++]	-0.32*[++]
Psychoticism	-0.02[++]	0.01[++]	-0.04[++]	0.08[++]	-0.16[++]	-0.15[++]	-0.07[++]
Lie	0.10[++]	-0.07[++]	0.01[++]	-0.00[++]	0.07[++]	0.09[++]	0.05[++]
CDSS	-0.27*[++]	-0.27*[++]	-0.23*[++]	-0.14[++]	0.00[++]	-0.08[++]	-0.21*[++]

[+]Pearson, [++]Spearman, *p<0.05, **p<0.001, PANSS= Positive and Negative Syndrome Scale, RSA= Resilience Scale for Adults, SAI= Schedule for the Assessment of Insight, BIS-11= Barratt impulsiveness scale, 11th version, BPAQ= Buss–Perry Aggression Questionnaire, EPQR-A= Eysenck Personality Questionnaire Revised-Abbreviated, CDSS= Calgary Depression Scale for Schizophrenia

the RSA *perception of future* scores [16.2 (6-20)] of the participant group (n:86) with disease duration of ≤10 years were significantly higher (p:0.043) than the score [14.3 (4-20)], of the participant group (n:53) with disease duration of >10 years.When compared with the Mann-Whitney U test, the RSA *family cohesion* scores of the participants with a history of suicidal attempt in the first degree relatives were significantly lower than that of the participants without such a history (p:0.045). A weak significant positive correlation was found between the RSA *structured style* score and the SAI total score (r:0.20, p:0.043).

Weak significant negative correlations were determined between the RSA total score and the PANSS total score (r:-0.23, p:0.006) and the PANSS *general psychopathology* score (r:-0.24, p:0.004) and between the RSA *social competence* score and the PANSS *negative symptoms* score (r:-0.23, p:0.006). Also, a weak-moderate significant negative correlation existed between the RSA *social resources* score and the PANSS negative symptoms score (r:-0.27, p:0.001).

There was a weak significant negative correlation between RSA total and BPAQ total scores (r:-0.20, p:<0.015).

The BIS-11 total score correlation was weak-moderately significant negative with the RSA total score (r:-0.43, p:<0.001), the RSA *perception of future* score (r:-0.30, p:<0.001), the RSA *structured style* score (r:-0.37, p:<0.001) and moderately significant-negative with the RSA *perception of self* score (r:-0.50, p:<0.001). The BIS-11 attentional impulsiveness score correlation was weak-moderately significant negative with the RSA total score (r:-0.45, p:<0.001), the RSA *perception of self* score (r:-0.47, p:<0.001), the RSA *perception of future* (r:-0.36, p:<0.001) and with the RSA *structured style* score (r:-0.40, p:<0.001).

The BIS-11 motor impulsiveness score correlation was weakly significant negative with the RSA total score (r:-0.21, p:0.012), the RSA *structured style* score (r:-0.23, p:0.005)*., and weak-moderately significant negative with the RSA *perception of self* score (r:-0.29, p:<0.001).The BIS-11 non-planning impulsivity score correlation was weak-moderately significant negative with the RSA total score (r:-0.29, p:<0.001), the RSA *perception of self* score (r:-0.35, p:<0.001), the RSA structured style score (r:-0.28, p:0.001) and weakly significant negative with the RSA *perception of future* score (r:-0.21, p:0.010). The correlation between the EPQR-A *extraversion* score was weak-moderately significant positive with the RSA *perception of self* score (r:0.29, p:<0.001), the RSA *perception of future* score and (r:0.34, p:<0.001) and the RSA *social competence* score (r:0.45, p:<0.001). The correlation between the EPQR-A *neuroticism score was* weak-moderately significant with the RSA *perception of self* (r:-0.39, p:<0.001) and the RSA total score(r:-0.32, p:<0.001).

The correlation of the CDSS total score was weak-moderately significant negative with the RSA *perception of self* score (r:-0.27, p:0.001), the RSA *perception of future* score (r:-0.27, p:0.001); weakly significant negative with the RSA *structured style* (r:-0.27, p:0.005) and the RSA total score (r:-0.21, p:0.010).

Correlations between the RSA, PANNS, SAI, BIS-11, BPAQ, EPQR-A, and the CDSS scores were shown in Table 4.

Predictors of the RSA Total Score

The PANSS *general symptoms*, the BIS-11 *attentional impulsiveness*, *motor impulsiveness*, *non-planning impulsiveness*, the BPAQ *physical aggression, anger, hostility*, the EPQR-A *neuroticism* and the CDSS total score were included in the multiple linear regression analysis in order to investigate the predictors of RSA total score. After the variables were placed in the analysis formulation, eliminations were made by using the "backward stepwise" method. The resultant regression model was statistically significant (*F*=18.573, p:<0.001). The scores on the BIS-11 *attentional impulsiveness*, the EPQR-A *neuroticism* and the CDSS explained the RSA total score with a rate of 0.276 (Table 5).

Table 5. Predictors of the RSA Total Score

Dependent variable	Independent variable	β	p	Model (p)
RSA total	Constant	163.542	<0.001	<0.001
	BIS-11 attentional impulsiveness	-1.166	<0.001	
	EPQR-A neuroticism	-2.029	0.029	
	CDSS	-1.519	0.014	

Linear regression analysis, p<0.001, Adjusted R²= 0.276
RSA= Resilience Scale for Adults, BIS-11= Barratt Impulsiveness Scale, 11th version, EPQR-A= Eysenck Personality Questionnaire Revised-Abbreviated, CDSS= Calgary Depression Scale for Schizophrenia

DISCUSSION

The results of this study showed negative correlations between the RSA total score and the scores on depression, impulsiveness, aggressiveness, and the total score on the PANSS and the PANSS *general psychopathology* subscale. Scores on the *attentional impulsiveness*, *neuroticism* and depression predicted low levels of resilience. Significant correlation was not demonstrable between the total scores on insight and the RSA.

Significant negative correlations were determined between the BIS-11 total and subscale scores and the RSA total score which showed prominent association with the BIS-11 *attentional impulsiveness* score. The RSA *perception of self* subdimension

was more strongly associated with impulsiveness than the other RSA subdimensions. High level of impulsiveness, especially the *attentional impulsiveness* characterising intolerance for complexity and inability to focus attention (Stanford et al. 2009) may result in recurrent maladaptive situations in daily life and thereby, disruptions in the individual's perception of own personal resources.

The p*erception of self* has been shown to be the resilience dimension having the strongest association with the impulsive traits in general population (Friborg et al. 2005), and our study results are in accordance with this finding. While the concept of impulsiveness was associated with the use of avoidance coping mechanisms (Kruedelbach et al. 1993), resilience was linked with active coping strategies (Chen et al. 2019). Therefore, schizophrenia patients with low resilience can be expected to act without thinking, giving immediate, unplanned reactions or make decisions without regarding the future when facing stressful conditions.

The BPAQ total score negatively correlated with the RSA total score and except for the *verbal aggression* subscale, all subscale scores negatively correlated with the RSA total score. It has been proposed by Kim et al (2015) that resilience is a protective factor against aggression in young healthy individuals with a history of early life stress. Resilience was found to be associated with low levels of aggression in patients with bipolar disorder (Şenormancı et al. 2020). Although our study does not include the method to demonstrate causal relationships, the obtained results may reflect the lower capacity for coping with stress and the associated inappropriate aggressive behaviors in patients with low levels of resilience.

In this study, measurements on the depressive symptoms showed negative relationship with resilience in agreement with the results reported by others (Bozikas et al. 2016; Liu et al. 2020, Rossi et al. 2017a). As shown by Rossi et al (2017a), the depressive symptoms of schizophrenia were more strongly correlated with the intrapersonal subdimensions of the RSA. Our results show significant correlations between the scores on depressive symptoms and the RSA intrapersonal and total scores which put an emphasis on the potential of the personal resources of resilience in alleviating depressive symptoms. On the other hand, symptoms of depression might have negatively influenced the perceptions of the patients of their own personal resources These results collectively demonstrate the role of the intrapersonal dimensions of resilience in comparison to the interpersonal dimensions in adaptation to the disease symptoms or any significant stressors and thereby preventing the symptoms of depression in schizophrenia.

Only one report was found in the literature on the negative correlation between insight and resilience in schizophrenia (Mizuno et al. 2016). The difference from our results can be attributed to using a different scale to assess resilience and/or cultural differences of the participants. In our study only a weak positive correlation was found between the total SAI (insight) score and the score on the RSA *structured style* subdimension. Schizophrenia patients with high insight levels were shown to often use the active coping style of planning (Cooke et al. 2007). *Structured style* is related to goal oriented behaviors, planning of routines (Friborg et al. 2003), and these have similarities to behaviours closely related to planning which is of the coping styles.

In this study, scores on the EPQR-A *neuroticism* subscale were found to be negatively correlated with the RSA total score, particularly with the RSA *perception of self* subdimension while the EPQR-A *extraversion* showed positive relationship with the RSA *social competence* subdimension, in agreement with the results of the study on healthy individuals by Friborg et al. (2005). Also, emotional stability and extraversion were associated with higher resilience levels in general population (Campbell-Sills et al. 2006; Friborg et al. 2005; Peng et al. 2012). These results may reflect the validity of the associations between resilience and personality independently of diagnostic or cultural factors. Neuroticism was linked to greater use of avoidant coping in schizophrenia (Lysaker et al. 2007); whereas resilience was associated with active coping strategies (Chen et al. 2019). Despite having a serious mental disorder, patients with schizophrenia with higher emotional stability may cope and adapt better to the adversity and challenges in life.

Our results showing negative correlation between the total scores on the RSA and the PANSS agree with some reported results of research on resilience in schizophrenia (Hofer et al. 2016, Izydorczyk et al. 2019) while disagreeing with others (Mizuno et al 2016, Rossi et al 2017a, Rossi et al 2017b). The negative correlation between the PANSS general psychopathology score and the RSA total score observed in this study also agrees with the results of other studies (Bozikas et al. 2016, Poloni et al. 2018). The observed negative correlations between the PANSS negative symptoms score and the scores on the RSA *social competence* and *social resources* subdimesions may indicate the impact of negative symptoms on social life. The diversity in the discussed results could have arisen from using different scales to measure resilience or the recruitment of the participants with different clinical features. Our results indicate that regardless of the relatively low scores on the PANSS, symptoms of schizophrenia exert considerable negative impact on resilience.

In this study the score on the RSA *family cohesion* sudimension negatively correlated with the level of education which was considered as a predictor of work and social functioning in schizophrenia by Rossi et al.(2017a). Although the level of functioning was not evaluated in this study, this result might indicate that patients with education can live more

independently and might not need the protective, supportive family bonds as much as the patients with lower education level.

In this study the RSA total score and the score on the RSA *social resources* subdimension of the participants with middle economic status were found to be significantly higher than those of the participants with low economic status. When the confounding effect of disease duration was controlled, however, the significance of correlation between resilience and economic status was lost. Nevertheless, having better economic resources might enable patients to reach better social support. Family income has been suggested to serve as a resilience factor in families having a member with schizophrenia (Bishop and Greeff 2015). Resilience levels were also found to be positively correlated with the financial situation dimension of the quality of life in patients with schizophrenia (Wartelsteiner et al. 2016).

The RSA *family cohesion* score of the participant subgroup of this study without a history of suicidal attempt among their first degree relatives were significantly higher than that of the participants with such a history. Resilience has been regarded not only as an intrapersonal characteristic, but also as an attribute of the systems around the individual (Hanson and Gotterman 2012). Stressful life events such as suicide can cause estrangement in the family, harming the supportive relationship patterns within the family members (Delalibera et al. 2015). The RSA used in this study to evaluate resilience, unlike various other scales used for this purpose, has the advantage of measuring the interpersonal subdimensions of resilience and thereby, evaluating the strengths and weaknesses in the family and social surroundings. Significant relationship was not found between the resilience levels of the participants and their own suicidal attempts. It has been argued in the literature that patients with suicidal ideation and behaviors develop resilience in various ways in order to cope with and adapt to these experiences (Gooding et al. 2017).

The RSA *perception of future* score of the participants with disease duration of <10 years were significantly higher than the score of the participants with disease duration of ≥10 years. There are studies proposing that disease duration and resilience are not related (Bozikas et al. 2016, Mizuno et al. 2016), or that disease duration is associated with high resilience levels in schizophrenia (Yoshida et al. 2016). In so far as we know, there are not any reports in the literature on the association of disease duration with perception of the future. It may be considered that the possible destructive effects of the disease related symptoms and experiences in the life time of patients may negatively affect the perceptions of future goals, aims and plans.

Attentional impulsiveness, neuroticism and depressive symptoms scores were found in this study to be the predictors of resilience. In other words, neuroticism, increased levels of depressive symptoms, and higher levels of attentional impulsiveness are associated with the observed low levels of resilience in schizophrenia.

The heterogeneity of the partipants with chronic and early stage schizophrenia can cited as a limitation of our study. This, together with the heterogeneity in clinical characteristics of the disease may underlie the lower than expected levels of correlations determined in our study. The self-report structure of the psychometric scales used makes the results dependent on the participant judgement. Recruitment of the participants from the tertiary healthcare centers limits the generalization of the results and the cross sectional design of the study makes difficult the assessment of cause-outcome relationships.

Treatment of schizophrenia by targeting only the clinical improvement does not achieve the expected results. This study, despite its limitations, underlines the need to consider the factors of depressive symptoms, attentional impulsiveness and personality traits such as neuroticism in the interventions to enhance resilience in schizophrenia. Since resilience is a dynamic concept, longitudinal studies are needed to identify the factors related with resilience during the clinical course of the disease.

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