

PSYCHOMETRIC CHARACTERISTICS OF THE MACEDONIAN VERSION OF CLINICAL ASSESSMENT INTERVIEW FOR NEGATIVE SYMPTOMS (CAINS)

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SUMMARY

Background: Despite the importance of effective assessment and treatment of negative symptoms among patients with psychosis, no validated instruments are available in the Republic of North Macedonia. The aim of this paper was to explore psychometric properties, namely factorial structure, internal consistency, convergent and discriminant validity of the Clinical Assessment Interview for Negative Symptoms (CAINS).

Subjects and methods: In this cross-sectional study 82 outpatients diagnosed with psychosis (64 with schizophrenia and 18 with bipolar disorder; female=34, mean age=41.05±10.09) were assessed.

Results: The exploratory factor analysis revealed two factorial structure of the negative symptoms as measured by the CAINS, i.e. 'expression and motivation' and 'pleasure'. Two items aimed to measure motivation for family relations and motivation for work/school activities loaded on the expression factor instead on motivation and pleasure factor which differs from the original version of the CAINS. Convergent validity was proven by positive relationship to negative symptoms as measured by the BPRS. Positive, but weak correlation with BPRS positive symptoms demonstrated its discriminant validity. Internal consistency of overall CAINS scale and its two subscales was very high.

Conclusion: The CAINS can be used to assess negative symptoms in individuals with psychosis in the Macedonian clinical context. Consequently, this work can provide a foundation for further clinical advancement and research of negative symptoms in Macedonian healthcare.

Key words: CAINS - negative symptoms - psychometric properties – psychosis - Macedonian clinical context

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INTRODUCTION

Negative symptoms in patients with psychosis represent diminished emotional expressiveness, as well as, inability or decreased capacity to initiate and to persist in goal-directed activities. Blunted affect, avolition, anhedonia, avolition and asociality are considered as key negative symptoms (Kirkpatrick et al. 2006, Marder & Galderisi 2017), contributing to decreased motivation, lack of affect, decline in capacity to experience joy, impoverished speech, reduced social contacts and social withdrawal. They are related, but still separate constructs distinctive from cognitive impairment (Marder & Galderisi 2017). In addition, important issue is to distinguish primary negative symptoms from secondary negative symptoms which could result from medication side-effects, depression, and positive symptoms (Blanchard & Cohen 2006, Newcomer et al. 1990), such as hallucinations, and delusions (Kirkpatrick 2014) and paranoia (Correll & Schooler 2020).

The prevalence of negative symptoms is considerably high in patients with schizophrenia (Bobes et al. 2010, Lyne et al. 2012) and lesser, but noticeable in bipolar disorder (Ameen & Ram 2007). However, both disorders are characterized with similar level of severity in regard to anhedonia, avolition and asociality, and difference on blunted affect and avolition (Strauss et al. 2016).

The influence of negative symptoms on decline in psychosocial functioning among individuals with psychosis has been well documented (e.g. Fervaha et al. 2014, Hunter & Barry 2012, Mucci et al. 2017). According to Giacco et al. (2012) almost twice as many patients with absent or mild negative symptoms had met a friend in the last week, compared to those with moderate negative symptoms. In addition, negative symptoms can be serious burden for family/caregivers (Provencher & Mueser 1997).

Negative symptoms continue to pose a huge challenge to clinicians because they are not easy to assess and currently effective treatments are not effective

(Remington 2016). Therefore, to have psychometrically sound measure of negative symptoms is critically important as this may facilitate advancements in diagnostics and treatment. In that line, CAINS was developed to overcome the first generation measures of negative symptoms and to contribute to better assessment of negative symptoms and consequently to their more effective treatment (Blanchard et al. 2011). The CAINS assesses domains that map the phenomenology of schizophrenia, on the one hand, and emotion, motivation, and affect processing as constructs that have been extensively researched in neurobiology and psychology fields (Barch 2013). The same author had stressed that particular characteristic of the CAINS is the novel distinction that this measure makes between anticipatory components of pleasure and motivation, as well as the experience or consummation of pleasurable activities. As was reported by the authors of the CAINS, this instrument has acceptable reliability and confirmed construct and discriminant validity (Kring et al. 2013).

The aim of the present study

Despite the importance of effective assessment and treatment of negative symptoms among patients with psychosis, no validated instruments are available in RN Macedonia. The aim of this study was to explore psychometric properties, namely factorial structure, internal consistency, convergent and discriminant validity of the CAINS. This will provide a foundation for further clinical advancement and research of negative symptoms in Macedonian healthcare.

SUBJECTS AND METHODS

Study participants and procedure

The study included 82 outpatients diagnosed with psychotic disorders. Patients eligibility criteria included: primary diagnosis of psychosis or related disorder (ICD-10 F20-29, F31) (ICD-10, WHO, 2016), age above 18, currently attending the outpatient clinic, history of at least one psychiatric hospital admission in their lifetime, and capacity and will to provide informed consent. Patients were excluded if having a diagnosis of organic brain disorders and severe cognitive deficits, thus being unable to provide informed consent and reliable information to study instruments.

The data was collected during February-March, 2019 in hospital centers where participants use outpatient mental health care services. They were invited to come in the term suitable for them during the working days. Usually, it was the term before their regular treatment/examination appointment. The interview/assessment lasted for 30 minutes. All researchers were trained in administering the CAINS and BPRS.

The study was approved by Ethical committee by the Faculty of Medicine, Ss. Cyril and Methodius University in Skopje. All participants provided written informed consent prior to the study.

Measures

Clinical Assessment Interview for Negative Symptoms (CAINS, Kring et al. 2013) consists of 13 items covering motivation and pleasure in social (4 items), vocational (2 items), and recreation (3 items) domains, as well as emotion expression and speech (4 items). The items were rated on a scale from 0 to 4. Higher obtained scores denoted greater impairment. Patients' reports of experienced motivation, interest and emotion, as well as reports of their actual engagement in relevant social (family, romantic and friend relationships), vocational (work/school), and recreational activities were used as a basis to assess motivation and pleasure (past-week pleasure and expected next-week pleasure). Emotion expression and speech were rated on the basis of observation. The answers given by study participants were evaluated following authors' manual (Blanchard et al. 2012).

Brief Psychiatry Rating Scale (BPRS, Ventura et al. 1993) with 24 items was applied to assess psychiatric symptoms in study participants, but for the purposes of this study only items referring to positive and negative symptoms were used. Based on interview questions and rating guidelines recommended/provided by the authors, all items were rated on a 7 point Likert scale ranging from 1-not present to 7-extremely severe. Higher score indicated more severe symptomatology. Internal consistency of the overall BPRS in this study was $\alpha=0.81$. Cronbach alpha reliability of the BPRS negative symptoms and BPRS positive symptoms was 0.83 and 0.70, respectively.

Data analysis

Internal consistency (Cronbach alpha coefficient) was used to test reliability of CAINS. In order to examine its factorial structure, exploratory factor analysis (principal component analysis) was applied, while convergent and discriminant validity were investigated performing correlation analysis (Pearson) between CAINS subscales and BPRS negative and positive symptoms subscales.

RESULTS

The sample consisted of 82 outpatients with psychosis (64 with schizophrenia and 18 with bipolar disorder) recruited from two psychiatric hospitals in Skopje, the capital of RN Macedonia. Participants' mean age was 41.05 years (SD=10.09, range 24-66). Their socio-demographic characteristics are presented in Table 1.

Table 1. Socio-demographic characteristics of study participants

Socio-demographics	Frequency	Percent
Gender		
Female	34	41.5
Male	48	58.5
Total	82	100.0
Education		
Primary education	12	14.6
Secondary education/high school	47	57.3
Higher education (BA diploma)	21	25.6
Postgraduate/doctoral studies (MA/PhD diploma)	2	2.4
Total	82	100.0
Employment status		
Paid employment	24	29.3
Student	7	8.5
Unemployed	39	47.6
Retired	9	11.0
Other	3	3.7
Total	82	100.0
Marital status		
Single/unmarried	47	57.3
Married	21	25.6
Divorced	12	14.6
Widow/widower	2	2.4

Principal component analysis (PCA) with varimax rotation was applied to assess factor structure of CAINS.

Kaiser-Meyer-Olkin measure was 0.809 indicating very good sampling adequacy. Bartlett's test of sphericity was statistically significant ($\chi^2(78)=691.06$, $p<0.001$) demonstrating that correlation coefficients among variables/items were high. Both measures revealed that the data was suitable for PCA.

Eigenvalue greater than 1 was used as a criterion for factor extraction. The result was four factor solution, i.e. motivation and pleasure in social domain, motivation

and pleasure in recreation domain, motivation and pleasure in vocational domain and expression factor. As seen, motivation/avolition and pleasure/anhedonia factor in this sample was separated into three groups of symptoms referring to distinct life/social areas. Further, q1 was found to have nearly equal loadings on motivation/pleasure in social activities factor, as well as on expression factor.

Considering that almost all previous studies demonstrated two-factor structure of the CAINS and because motivation and pleasure in work/school domain factor consisted of only 2 items, PCA was rerun using fixed factor criterion with two a priori defined factors. Two extracted factors explained 60.88% of the variance in the measured construct. Six items loaded on factor 1 accounting for 46.06% in the variance of the negative symptoms as measured with CAINS. Those were items intended to measure emotion expression and speech in original CAINS version along with q1 and q5 that assess motivation for family contacts and motivation for work/school activities, respectively. Factor 2 accounted for 14.82% in the variance and was represented by seven items measuring motivation for romantic relations and friendship and experienced and anticipated pleasure in social and vocational domain. Rotated component/ factor structure with factor loadings is presented in Table 2.

Internal consistency of the CAINS total scale was $\alpha=0.90$. Cronbach alpha reliability for Expression factor (Factor 1) and Motivation and pleasure in social activities (Factor 2) was 0.88 and 0.85, respectively.

Table 3 summarizes mean, standard deviation, and item-total correlation of the CAINS items and obtained factors.

As seen, participants in this study reported moderately severe deficit to anticipate pleasure related to work/school activities. They, also, demonstrated tendency to relatively low level of motivation for friendships

Table 2. Rotated component/factor structure of CAINS and factor loadings

	Factor 1: <i>Expression</i>	Factor 2: <i>Motivation and pleasure in social activities</i>
Vocal expression	0.926	
Expressive gestures	0.889	
Facial expression	0.887	
Quantity of speech	0.804	
Motivation for close family/spouse/partner relationships	0.526	
Motivation for work/school activities	0.517	
Experienced pleasure from social activities		0.818
Expected pleasure from the recreational activities		0.792
Motivation for recreational activities		0.757
Expected pleasure from the social activities		0.747
Experienced pleasure from social activities		0.719
Motivation for romantic relations and friendship		0.565
Expected pleasure from the work/school activities		0.448

Table 3. Descriptive statistics and reliability of CAINS (N=78)*

Items	M	SD	Item-Total Correlation	Cronbach's Alpha if Item Deleted
f1 expression	1.26	0.960		
q10 facial expression	1.44	1.295	0.833	0.828
q11 vocal expression	1.04	1.167	0.865	0.825
q12 expressive gestures	1.29	1.186	0.765	0.842
q13 quantity of speech	0.99	1.026	0.752	0.848
q1 motivation for close family/spouse/partner relationships	1.03	1.032	0.479	0.885
q5 motivation for work/school activities	1.83	1.574	0.507	0.899
f2 motivation and pleasure in social activities	1.68	0.850		
q2 motivation for close friendships & romantic relationships	1.63	1.186	0.563	0.835
q3 experienced pleasure from social activities	1.79	1.221	0.700	0.814
q4 expected pleasure from the social activities	1.96	1.145	0.663	0.820
q6 expected pleasure from the work/school activities	2.82	1.384	0.395	0.866
q7 motivation for recreational activities	1.28	1.127	0.688	0.816
q8 expected pleasure from the recreational activities	1.05	1.005	0.671	0.821
q9 experienced pleasure from social activities	1.23	1.104	0.647	0.823
Cains total	1.49	0.800		

*due to missing values on two CAINS items, the analyses were performed on 78 participants

Table 4. Pearson correlation coefficients among the CAINS and BPRS

	BPRS negative	BPRS positive
CAINS total	0.724**	0.309**
CAINS motivation and pleasure in social activities	0.502**	0.250*
CAINS expression	0.791**	0.300**

*statistically significant at $p < 0.05$; **statistically significant at $p < 0.01$

and romantic relationships, as well as capacity to experience and anticipate pleasure in those social domains. On the other hand, they, generally, manifested interest to be engaged and to maintain close family relations and had mild deficit in vocational expression and quantity of speech. Inter-item correlation coefficients were high or relatively high in both subscales (factors extracted).

Pearson correlation analysis between the CAINS subscales/factors and BPRS negative symptoms subscale was performed to examine convergent validity (Table 4). Results demonstrated that both CAINS factors, expression and motivation/pleasure were positively and strongly related to BPRS negative symptoms ($r(df=76)=0.79$, $p < 0.001$ and $r(df=76)=0.50$, $p < 0.001$, respectively). Discriminant validity was assessed on the basis of linear correlation coefficients of CAINS factors with BPRS positive symptoms subscale (Table 4). These findings showed that CAINS expression factor and motivation/pleasure factor were considerably weakly associated with BPRS positive symptoms subscale, but still significantly ($r(df=76)=0.25$, $p < 0.05$ and $r(df=76)=0.30$, $p < 0.05$, respectively).

DISCUSSION

In this study psychometric properties of the CAINS in a sample of outpatients with psychosis in Macedonia were examined. Applied principal component analysis

with varimax rotation when eigenvalue > 1 was used as a criterion for factor extraction revealed four factor solution. The identified factors/dimensions of negative symptoms as measured by the CAINS were emotional expression (F1), motivation for and pleasure in recreational activities (F2) motivation for and pleasure in social contacts (F3) and motivation for and pleasure in work/school activities (F4). This factor solution was similar to that found in a sample of outpatients with schizophrenia in Singapore (Rekhi et al. 2019).

It could be concluded that obtained factor solution reflected tendency of amotivation/avolition and anhedonia symptoms, i.e. motivation-pleasure items to form distinct groups on the base of life domains considered. Namely, extracted factors corresponded to the domains in which aforementioned negative symptoms can be present or refer to. In addition, it was noted that Factor 4 consisted of only two items, while item 1 aiming to measure intrinsic motivation and interest in family relations loaded on Factor 1 and Factor 3 almost equally. Its correlation to both, F1 and F2, were close to .50. Even more, screeplot represented two factorial structure of the negative symptoms as measured by the CAINS.

For that reasons, and according to previous study findings (e.g. Engel et al. 2014, Jung et al. 2016, Kring et al. 2013, Valiente-Gómez et al. 2015) PCA was rerun using a priori defined number of factors (two) to be extracted. It should be stressed that q1-motivation and interest for family relations, as well as, frequency of

actual contacts with family members and q5-motivation and engagement for work activities correlated highly to Expression factor 1 as consistent with study findings in Chinese sample of patients with schizophrenia (Chan et al. 2015). Consequently, factorial structure of the CAINS in this study was shown to be closer/similar to that obtained in Asian culture than in Western culture (e.g. Engel et al. 2014, Valiente-Gómez et al. 2015). The finding that q1 i q5 go along in group of emotional expression items/symptoms might be explained through the notion that family and work are interconnected domains (Greenhouse & Foley 2007) and both, positive family experiences and positive work experiences can have additive effect on well-being, life satisfaction and happiness (Greenhouse & Powel 2006) which could be relevant for individuals with psychosis, too. In that line, it might be proposed that involvement in and maintenance of close family relations and work activities that are sources of positive emotional experiences can lead to less impairment in emotional expression.

The content of the Expression factor in this study might be culturally depended. In Macedonian context, collectivistic cultural orientation is relatively highly expressed (Kenig 2006) implying that family members value and tend to hold close bonds characterized with emotions exchange and open emotional expression. Social relations, especially, family, are very important for emotion regulation, as was reviewed by Morris et al. (2007). Furthermore, frequent social contacts in individuals with psychosis would be basis for less emotional withdrawal (Siegrist et al. 2015). Factor 2 CAINS motivation and pleasure in this study was comprised of motivation in friendships and romantic relationships, anticipatory pleasure in work/school activities, as well as interest and pleasure in hobbies and free activities.

It should be noted that, item 1 and item 5 had relatively good correlation with Factor1, however other items referring to expression symptoms loaded on Factor 1 evidently highly. More than 60% in their variance was accounted by Factor 1. On the other hand, as reported in previous studies q1 and q5 loaded on motivation and pleasure factor, but with low factor loadings (e.g. Kring et al. 2013, Richter et al. 2019). These results indicated that q1 and q5 were problematic factors, yet deserved to be further explored (Richter et al. 2019). In addition, more information on the CAINS structure tested using confirmatory factor analysis needs to be provided. For example, model fit indexes in confirmatory factor analysis applied in validation of the Korean version of the CAINS (Jung et al. 2016) are below the recommended values. This implies on possible differences in factors' content and need for further investigation.

In line with the report regarding the reliability (Strauss & Gold 2016), CAINS total scale and both CAINS Expression subscale and CAINS motivation and

pleasure subscale demonstrated excellent internal consistency, but test-retest reliability should be examined in order to confirm the CAINS time stability in Macedonian sample of individuals with psychosis.

The results on convergent validity showed that the overall CAINS measure and its two subscales were strongly and positively associated with BPRS negative symptoms subscale. In particular, CAINS Expression subscale demonstrated very high correlation with this subscale, probably not surprisingly, since both are aiming to assess level of severity of emotional expression. Relationship of CAINS total score, CAINS Expression subscale and CAINS motivation and pleasure to BPRS positive score was higher than expected, yet reflected that negative symptoms as measured by the CAINS can be distinguished from positive symptoms in individuals with psychosis. Similarly, CAINS motivation and pleasure subscale in the initial version (Forbes et al. 2010), as well as in the final version of the CAINS measure (Kring et al. 2013) demonstrated small and significant positive association with positive symptoms. Similar results regarding discriminant validity of the two CAINS factors and positive symptoms were registered in recent studies. However, this aspect should be further explored (Strauss & Gold 2016).

The average level of motivation-pleasure symptoms and emotional expression symptoms were similar to previous findings (e.g. Chan et al. 2015, Strauss & Gold 2016). Results on the level of interest for and engagement in social contacts are in line with existing empirical findings that nearly 50% of social network is accounted by family members and 26% by friends (Palumbo et al. 2015), that individuals with psychosis have fewer friends (Giacco et al. 2012) and experience difficulties to engage in romantic relationships (Redmond et al. 2010).

CONCLUSION

This study showed that the CAINS measure can be used for assessment of the negative symptoms in outpatients with psychosis. Specifically, its factorial structure was very similar to those obtained in another studies, thus confirming that two groups of negative symptoms can be identified/assessed using this measure in a clinical setting. Additional support of this conclusion is its high internal consistency. These results are particularly important since there is no validated measure of negative symptoms in a Macedonian clinical/health care context.

Further, the CAINS can be used as a valid and reliable instrument in research purposes when negative symptoms among individuals with psychosis would be examined. However, its factorial structure using confirmatory factor analysis conducted on a larger sample needs to be investigated in the future studies.

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Contribution of individual authors:

Biljana Blaževska Stoilkovska took part in data collection and literature review, performed statistical analyses, interpretation of data and manuscript writing.

Stojan Bajraktarov & Antoni Novotni recruited and selected participants in the study, organized questionnaires and took part in literature searches.

Silvana Markovska Simoska, Miloš Milutinović & Ljubiša Novotni organized and administered questionnaires to the study participants and took part in database preparation.

Slavica Arsova, Valentina Čalovska Samardziska & Sonja Delova took part in recruitment and selection of the participants in the study.

Gabriela Novotni took part in literature searches.

Nikolina Jovanović designed the study, and took part in manuscript writing.

All authors drafted the manuscript and approved its final version.

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