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The impact of immigration and visible minority status on psychosis symptom profile

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ABSTRACT:

PURPOSE: Immigrants have heightened risks of psychotic disorders, and it is proposed that migration influences symptom profiles. The purpose of this study was to investigate if either migration experience and/or visible minority status affected symptom profiles, using a cross-culturally validated five-factor model of the Positive and Negative Syndrome Scale (PANSS), in patients with broadly defined psychotic disorders.

METHODS: PANSS was assessed in a large catchment area based sample of patients with psychotic disorders verified with the Structured Clinical Interview for DSM-IV (n = 1081). Symptom profiles based on Wallwork et al. (2012) five-factor model were compared for Norwegians (73%), white immigrants (10.5 %), and visible minority groups (16.5 %).

RESULTS: Visible minorities were significantly younger, had less education, more often a schizophrenia diagnosis and higher PANSS positive, negative and disorganized/concrete factor scores than Norwegians and white immigrants. After controlling for confounders only the items "Delusions" and “Difficulty in abstract thinking" differed between groups. Multivariate analyses indicated that these items were not associated with immigration per se, but rather belonging to a visible minority.

CONCLUSION: We found mostly similarities in psychotic symptoms between immigrants and Norwegians when using a cross-culturally validated five-factor model of the PANSS. Immigration did not directly influence psychotic symptom profiles but visible minority groups had higher levels of “delusions” and “difficulty in abstract thinking”, both symptoms that are partially context dependent.

KEYWORDS: Immigration, Ethnic minority, Visible minority, Psychosis, Symptoms, Schizophrenia

Introduction

Immigrants have heightened risk of both schizophrenia and other psychotic disorders [1-3]. Even though immigration in itself appears to affect the prevalence of psychotic disorders, several studies also find even higher risk for visible minorities. Examples include Surinamese [4] and Moroccans [5] in the Netherlands, African-Caribbean's [6] in the UK, and African-Americans in the USA [7]. In addition, a high ethnic density of a minority group in a specific neighbourhood is a protective factor [8, 9]. It has consequently been proposed that the experience of being the "exception to the norm" over a lifetime contributes to the heightened risk of psychosis, rather than the stressors of migration per se [10, 11]. This is in line with findings of increased risk also in second and third generation immigrants and in visible minorities without a recent migration history [2, 12, 13]. Since many immigrant groups are also visible minorities, it is difficult to disentangle the effects of having a migration history, from factors associated with the post-migration context.

Both immigrants and ethnic minorities are found to have higher rates of schizophrenia spectrum and lower rates of bipolar spectrum disorder compared to the majority population [14-16]. One hypothesis is that this could be caused by culturally based misinterpretations leading to incorrect diagnostics. An alternative hypothesis is that patients from immigrant groups or ethnic minorities present with specific symptom profiles. This in particular concerns persons with a visible minority status who could be more prone to perceived discrimination; an experience that is associated with higher levels of positive and depressive symptoms [17] in particular more delusions [18]. Studies from the UK, USA, Germany and the Netherlands have found more severe affective [19, 20], positive [21-23] , and negative symptoms [24-26] in patients from a large variety of immigrant- and ethnic minorities. Others report more depressive symptoms in patients from the majority populations [22, 27-29] while still others find similar symptom profiles between minority and majority groups [30-33]. However these previous studies have not attempted to disentangle immigrant experience from visible minority status.

An additional problem is that the instruments used to assess symptom profiles are seldom cross-culturally validated. The Positive and Negative Syndrome Scale (PANSS) is the most widely used instrument to assess psychotic- and related symptoms among patients with schizophrenia and other psychotic disorders [34]. It was developed and validated in an ethnically diverse population. In its original form the items were combined into three different symptom scales based on clinical consideration; i.e. the positive, negative and general symptoms [35]. This three factor model is the most commonly used in studies of minority groups [19, 25, 36-39]. Later psychometric studies have however indicated that a five factor model consisting of a positive, negative, cognitive/disorganized, depressive/emotional and excitement factors are more appropriate. While used all over the world, few of these PANSS models have been cross-culturally validated. Recently, Wallwork and co-workers [40] developed a consensus model combining the items most often included in the five factor models based on a US Caucasian patients sample with a later replication in a Japanese patient sample.

Theories concerning heightened psychosis in immigrants have found "being an exception from the norm" to be a potent risk factor. The main aim of the current study was to investigate if this experience was associated with a symptom profiles in patients with migration and/or visible minority status using the recently validated Wallwork et al. (2012) PANSS 5-factor model to improve assessment methodology. The study was done in a large group of patients with psychotic disorders with a sample size making it possible to differentiate between immigrants who were visibly similar to Norwegians (white immigrants) or dissimilar from the majority population (visible minority immigrants).

Method

The current study is part of the ongoing "Thematically Organized Psychosis" (TOP) Study at the University of Oslo, and is approved by the Regional Committee for Medical Research Ethics and the Norwegian Data Inspectorate. Our research methodology conformed to The Code of Ethics of the World Medical Association, Helsinki Declaration [41]. The study had a cross-sectional design including a large, non-selected consecutively recruited catchment area sample of patients with a DSM-IV psychotic disorder.

Sample

Our sample consists of patients who have experienced psychotic episodes and meet the diagnostic requirements for a DSM-IV psychotic disorder. We recruited consecutively from in and outpatient units at four hospitals in Oslo covering a catchment area of 540.000 (88% of Oslo's total population). Clinicians from the recruitment units were asked and reminded at regular intervals to refer all patients with a clear or potential diagnosis of any psychotic disorder including bipolar disorder to the study. Those who gave informed consent to participate were assessed by a team consisting of trained psychologists and psychiatrists. Inclusion criteria were age 18 – 65 years, IQ > 70, no signs of organic aetiology or substance induced symptoms, ability to understand and speak a Scandinavian language. The treatment units served all patients living in these areas and there were no alternative psychiatric services offering treatment for psychotic disorders, thus reducing possible recruitment bias.

Instruments

Diagnosis was assessed with The Structured Clinical Interview for DSM-IV, affective, psychotic and substance abuse sections (A-E) [21]. This study included participants with schizophrenia (including schizophreniform disorder), schizoaffective disorder, bipolar I and NOS who had experiences one or more psychotic episodes in their lifespan in addition to other non-organic psychotic disorder (i.e delusional disorder, brief psychotic disorder, and psychotic disorder NOS excluding somatic or substance induced disorders) and major depressive disorder with mood-incongruent psychotic symptoms. The reliability and validity of DSM-IV diagnoses across ethnic groups was ensured through participation in an international training program based at the University of California, Los Angeles, including ratings of patients with different ethnic backgrounds [42]. The overall agreement for DSM-IV diagnoses was 82 % with an overall kappa of 0.77 (95% CI: 0.60 – 0.94). Difficult differential diagnoses were decided upon by consensus with trained experts. Since all assessment included a full lifetime history (actual study patients) and/or videotapes (training videos) they were not blind to information about migration history. Global symptom severity and function were rated with the Global Assessment of Functioning Scale (GAF) split version [43].

Present symptoms were assessed with The Structured Interview for the Positive and Negative Syndrome Scale - SCI-PANSS [35]. Items were grouped into the consensus driven five-factor model by Wallwork [40] as it showed very good fit in two distinct cultural samples. The validity of this model has also recently been replicated [44] and it is also very similar to the revised model found in an analysis reported by van der Gaag et al. [45] that also showed goodness of fit across many different samples from varying nationalities.

Migration assessment

Oslo has for the last 20 years had a relatively large and stable immigrant population mainly from Asia (including Turkey), former Eastern European states (in particular Poland, Russia , Bosnia/Herzegovina and the Baltics) and the neighbouring Scandinavian countries [46]. To explore the different effect of migration with or without visible minority status we grouped participants based on a combination of racial or ethnic characteristics (Caucasian, African, Latino, Lapp, Asian, Arab, mixed or other), nationality, birthplace of participant and parents, migration history, and mother tongue (details below). This is an enhancement of a method found to be both valid and practical in the classification of immigrants into ethnic categories [47]. We did not assess cultural background or beliefs.

Immigrants were defined as either foreign born participants with two foreign born parents (1st generation immigrant), Norwegian born participants with two foreign born parents (2nd generation) and foreign or Norwegian born participants with one parent born outside of Norway ("other"). The other Scandinavian countries have similar culture, ancestry, heritage and language to Norway, so participants born in Norway with one Norwegian parent and one parent from another Scandinavian country were grouped as ethnic Norwegians. For Norwegian-born participants with an immigrant background, we registered the parent's (or mothers) country of birth as region of origin using Statistics Norway's official categorization [48].

From May 2002 to August 2012 a total of 1101 participants with psychotic disorders were included in the TOP sample. After removing 7 participants because of missing migration information, and 13 adoptees because of their specific circumstances and the small size of the group, the final sample for this study was 1081. This

sample included 296 immigrants (27 % of the sample) which are consistent with the percentage of immigrants found in the general population in the Oslo area (25%).

Our aim was to explore different effects of being the "exception to the norm" on symptom profile. To do this we divided the immigrant/minority sample into two smaller groups. One group consisted of immigrants with Caucasian characteristics (White immigrants; N=116). This group had an immigrant experience but did not visibly differ from the majority population. They were primarily from Europe (N = 96, 83%), and North America (N = 10, 8.5%) with 10 (8.5%) from other regions and were mostly 1st generation immigrants (N=55, 47.5%) or categorized as having "other" immigrant background (N=55, 47.5%). The second group consisted of immigrants with African, Latino, Asian, or Arab characteristics (Visible minority groups; N=180). This group had immigrant experience and differed visibly from the majority population giving them an evident ethnic minority status in their daily lives. This group consisted of participants with background from Asia with Turkey (N= 103, 58%), Africa (N = 58, 33%), South America (N = 8, 4.5%), and other (N = 8, 4.5%), and were primarily 1st generation (N = 130, 73.5%) or 2nd generation (N = 30, 17%) immigrants. In cases of mixed heritage we categorized according to the non-Caucasian parent. For analysis of the overall effect of immigrant background we clustered together both white immigrants and visible minority groups.

Statistical Analysis

Statistical analysis was performed using SPSS 19.0. The level of significance was pre-set to < 0.05, two sided. Analysis of variance (ANOVA) and chi-square test were used to compare demographic and clinical variables between groups, including the PANSS factors, applying Tukey HSD test for post-hoc comparisons. We used standardised residuals as post-hoc tests for categorical variables. Those above 2.00 were interpreted as a statistically significant differences at the 0.05 level from expected count for that category [49].

To examine if group differences in PANSS factors were driven by differences across all items included in the whole factor scores, or primarily associated with specific items, we proceeded using a multivariate analysis of variance (MANOVA) for the items included in those PANSS factors that differed statistically significantly between patient groups in the first ANOVAs.

For those PANSS items that showed a significant between-groups difference we finally conducted a series of hierarchical, blockwise, multiple regression analyses to evaluate if this could be based in group differences for possible confounding variables. These variables were chosen based on theoretical considerations and/or significant correlations with the item in question in bivariate correlations (Pearson's R). We thus included the variables gender, being married/cohabitant and being employed in block 1, age and education level in block 2, a diagnosis in the schizophrenia spectrum (including schizoaffective disorder)- or bipolar spectrum versus other psychotic diagnosis, and being a first episode patient versus previous treatment history in block 3. The next three blocks were included to measure the specific effect of immigrant background, with block 4 having immigrant background, block 5 being a visible minority versus all other patients (Norwegians and white immigrants) and block 6 being a 1st generation immigrant. We removed variables with non-significant contributions in block 1 – 3, from the final models presented here.

Results

The white immigrants group resembled Norwegians on most socio-demographic and clinical variables (table 1). Compared to the Norwegians, visible minorities were significantly younger, more often male, married/co-inhabitant and first episode patients. Compared to both Norwegians and white immigrants, visible minorities also had less education, more often unemployed, had a diagnosis in the schizophrenia spectrum and poorer GAF scores. We found no significant group differences in duration of untreated psychosis in the subgroup of first episode patients (n = 394).

PANSS factors: Visible minorities had significantly higher total PANSS scores (mean 63.8, SD 17.4) compared to both Norwegians (mean 58, SD 16.9) and white immigrants (mean 55.3, SD 16.1) ($F = 10.941$, df 2/1055, $p < .001$). Table 2 shows the results of the ANOVAs for PANSS factor scores based on the Wallwork five-factor model. We found statistically significant between group differences for the positive, negative and

disorganized/concrete factors; post-hoc analysis showed that visible minorities had significantly higher scores on these factors compared to both Norwegians and white immigrants.

PANSS items: To examine which items contributed to the between group variance in the three PANSS factors with significant between-group differences (i.e. positive, negative and disorganized/concrete) we conducted a series of MANOVAs (table 3). Post hoc-analyses revealed that the items of "delusions" (P1) and "hallucinations" (P3) in the positive factor; "difficulty in abstract thinking" (N5) and "poor attention" (G11) in the disorganized/concrete factor; and "passive/apathetic withdrawal" (N4) and "lack of spontaneity" (N6) in the negative factor were significantly higher for visible minorities compared to both other groups. The items of "emotional withdrawal" (N2) and "motor retardation" (G7) in the negative factor were significantly higher in visible minorities compared to Norwegians, but not white immigrants.

Follow-up analyses: Multiple regression analyses indicated that the significant differences between immigrant groups were based on possible confounding variables for all items included in negative factor (i.e. emotional and passive apathetic withdrawal, lack of spontaneity, motor retardation), one of the items included in the positive factor (hallucinations) and one of the item included in the disorganized/concrete factor (poor attention). Only "Delusions" (P1) and "Difficulty in abstract thinking" (N5) remained statistically significantly associated with aspects of being an immigrant also after controlling for possible confounders

In further regression analyses immigrant background per se did not contribute to scores on the "Delusion" (P1) item after controlling for relevant socio-demographic and clinical variables; however visible minority status did significantly predict higher scores on this item, while being a white immigrant predicted lower scores (Table 4). Diagnosis and having a first episode of psychosis (block 3) explained most of the variance (17%; R^2 change .175, $F = 77.958^{3/1033}$, $p > .001$) in this model. Immigrant background had a significant effect on the item "Difficulty in abstract thinking" (N5) which was primarily based in higher scores for the visible minority group (Table 5). There was a non-significant trend towards higher scores in 1st generation immigrants (R^2 change .003, $F = 3.713^{1/1034}$, $p > .054$). Education level explained most of the variance (9%; R^2 change .087, $F = 101.433^{1/1038}$, $p > .001$) in this model.

Discussion

Immigrants with psychotic disorders did not appear to have a specific symptom profile compared to patients without a migration history. This is in line with reports from both the UK and North America [26, 32, 33, 50, 51]. The visible minority group in the current study had significantly higher total PANSS scores, within the range categorized as "markedly ill" in treatment studies [52], and scored higher on PANSS positive, negative and disorganized/concrete factor. The PANSS items "Delusions" (P1) and "Difficulty in abstract thinking" (N5) remained significantly higher in this group even after controlling for possible confounders. First generation immigrants did not have higher levels of these symptoms compared to second generation immigrants, again indicating that visible minorities had more severe symptoms independent of their birthplace and the experience of migration. Existing theories suggest that the environmental context experienced by visible minorities is a particular risk for psychosis, and here we show that it also influences symptom profile.

These findings could be due to the complex association between perception of disadvantage and acculturation strategy [53], both factors that seem to predict heightened risk for psychosis in visible minorities [54-56]. Discrimination, perceived alienation and exposure to unfamiliar environment effects the occurrence of psychotic experience in those that are vulnerable, and has previously been found to be associated with more positive symptoms in psychotic patients [17, 57, 58]. In particular delusions are found to be higher among visible minorities such as African Americans, Africans and African Caribbean's (in the UK), and among Moroccans (in the Netherlands) [21, 59-62]. Also socio-economic disadvantage, which is common in visible minority groups, is associated with delusion like experiences in the general population [63].

Another significant finding was that visible minorities had more disorganized/concrete symptoms, primarily because of higher levels of the PANSS item "Difficulties in abstract thinking". This item was originally included in the negative factor of the PANSS 3-factor solutions. In the current study the level of "Difficulties in abstract

thinking" was predicted by education level and might explain why patient groups with less education are found to have more negative symptoms in previous studies [22, 25, 27, 37, 64]. This includes studies finding that the level of education was lower among immigrant Malays to Singapore, contributing to a higher level of PANSS negative factor (original 3-factor solution) in this group [39].

"Difficulties in abstract thinking" is assessed through testing the ability to find similarities between two words or concepts, and to understand different proverbs. For people who have finished a higher education or belong to the majority culture the proverbs and abstract categorizations used are supposedly well known and may not require much reasoning, while unfamiliar tasks require more complex neuropsychological processing [65]. Studies of this PANSS item's relation to standard cognitive tests indicate that it does not correlate significantly with tests measuring abstraction, but rather with those measuring problems with cognitive flexibility [66]. We suggest that this PANSS item is especially subject to cross-cultural and cross-lingual misinterpretation and may not be a valid measure of difficulties with abstract thinking as a psychotic symptom. This should be kept in mind when evaluating PANSS total or factor scores.

The three PANSS items of conceptual disorganization, difficulty in abstract thinking and poor attention tend to load on the same factor in factor analyses. What domain this actually measures is still under debate and it has been categorized as both a cognitive, disorganized and autistic preoccupation factor. The level of the PANSS cognitive factor has been found to be significantly associated with measures of the Gorham proverbs bizarreness and the SAPS global thought disorder factor indicating that this might be a measure related to formal though disorder. [67].

The differences found for these two symptom measures could also be associated with cultural variation which was not measured specifically in this study. Visible minority status could in this context also be seen not just as a risk of discrimination but as a proxy for a higher degree of cultural difference which suggests broader differences in languages but also to what degree abstraction is an important aspect of everyday discourse and function [68, 69]. Differences in the level of delusions could also hypothetically be associated with faulty assessment of culturally valid beliefs as delusions. This is however less likely, since it is not delusions per se but their bizarreness that usually is difficult to judge in cross-cultural settings [70, 71]. Bizarreness is primarily assessed through the PANSS item "Unusual thought content" (G9) and we found no significant group differences for this item. In the current study, all assessment personnel were trained using ethnically diverse training videos, and when in doubt cases were discussed with other assessors and a supervisor, and scores consensus based.

An important limitation to our results was the exclusion of immigrants who did not speak a Scandinavian language or were in the country illegally. This would include asylum seekers who had arrived in the country recently and were to a lesser extent integrated into the public health system. This would also effect the participation of people, who for a variety of reasons including segregation, marginalization, and illiteracy had not learned a Scandinavian language. We have however found longer duration of untreated psychosis among first generation immigrants who have migrated after age of school start, which suggests perhaps a longer pathway to treatment, but also that they are indeed referred to our study [72].

It is of ethical consideration that we classified patients based on visible minority status using these crude characteristics as a proxy for the stressors and experiences associated with being an exception from the majority "norm". Medical research needs to better understand the health issues of immigrants and minority groups. Achieving valid classification is however difficult and associated with weaknesses that may contribute to racialized identity [47]. A variety of methods with variable quality have been used; from simple self-report of ethnic affiliation to combined methods, such as those applied in this study. Combining ethnic affiliation with immigrant history, language, nationality and country of birth for the participants and their parents is a thorough method that has been found to be both valid and practical in previous studies [47]. As we studied visible minority status per se, we did not refer to specific ethnic groups, as we were interested in the health consequences of being an "exception to the norm" rather than a specific ethnic affiliation as risk factor. This improves generalization as the findings are not associated with a particular race or culture. However, future studies could enhance current knowledge by also evaluating associations between psychotic symptoms and social defeat, in addition to visible minority status. During assessment, researchers were not blind to the

participants' backgrounds. This could theoretically have influenced assessments. They were however blind to the specific hypotheses of the current study.

The strength of the current study is that it recruited from a catchment area based public health care system, providing equal treatment services for all groups of the society and with long experience in handling patients from different backgrounds. The percentage of immigrant patients included into the study was the same as that found in the areas general population even if we cannot completely rule out that immigrants had less engagement in treatment and subsequently in recruitment to research participation compared to Norwegians. A previous study of treatment engagement from this specific area found that the percent of immigrants from non-western countries receiving treatment was actually higher than the proportion in the general population, but smaller than what would be expected based on their own rapport of psychological distress [73]. It is however expected that this difference would be smaller for serious mental disorders such as psychosis.

In conclusion, we found that a history of immigration did not directly influence symptom profiles in a large sample of patients with psychotic disorders. The main finding was that visible minorities had higher levels of the PANSS items "delusions" and "difficulty in abstract thinking», both symptoms that are partially context dependent. It is of clinical significance that visible minorities with psychotic symptoms have more severe delusions. This could be a result of longer duration of untreated psychosis, less mental health literacy, more discriminatory experiences, and/or other stressors associated with their particular environmental context and could also possibly lead to worse prognosis and outcome. More studies are needed to explore factors relating to outcome in this vulnerable group. In a world influenced by increasing migration and cultural diversity, it is also of major importance to mental health research to not only cross-culturally validate the instruments used in psychiatric assessment, but also explore variation in symptoms associated with the context experienced by visible minority groups.

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Conflict of interest statement:
On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Table 1. Demographic and clinical characteristics

	A Norwegian N = 785 M ± SD	B White immigrant N = 116 M ± SD	C Visible minority N = 180 M ± SD	F (df)	Post-hoc Tukey P > .05
Age	32.2 (11.1)	32.2 (10.3)	30 (8.9)	3.171 (2, 1078)*	A > C
Education (n= 1051)	13.2 (2.8)	13.8 (3.2)	11.6 (3.0)	26.642 (2,1048)*** 1048)***	A/B > C
Gaf – symptom (n= 1079)	46.3 (13.2)	47.8 (13.7)	42.9 (11.3)	6.655 (2, 1076)***	A/B > C
Gaf-function (n= 1079)	46.7 (12.6)	48.4 (12.3)	43.2 (10.7)	7.755 (2, 1076) ***	A/B > C
	N (%)	**N (%)**	**N (%)**	**χ2 (df)**	**SR > 2**
Male	412 (52.5)	60 (51.7)	116 (64.4)	8.817 (2)*	C >
Married/co-inhabitant (n=1077)	165 (21)	22 (19)	55 (31)	8.382 (2)*	C >
Employed/Student (n =1074)	224 (29)	38 (33)	35 (19.5)	8.205 (2)*	C <
Inpatient (n=915)	230 (35)	34 (34)	57 (37)	ns	
Substance abuse diagnosis	189 (24)	23 (20)	43 (24)	ns	
Schizophrenia	346 (44)	43 (37)	99 (55)	10.476 (2)**	C >
Schizoaffective	71 (9)	17 (15)	20 (11)	ns	
Bipolar I disorder/NOS	199 (25.5)	38 (33)	17(9.5)	26.809 (2)***	B >, C <
Other psychosis	169 (21.5)	18 (15)	44 (24.5)	ns	
First episode psychosis	317 (40)	53 (46)	95 (53)	9.557 (2)**	C >

* p >.05. ** p > .01. *** p > .001

Abb: M = Mean, SD = Standard deviation, SR = Standard residuals, GAF = Global Assessment of Functioning Scale, NOS = Not otherwise specified.

Table 2. Between group comparisons of PANSS factor scores (ANOVA)

PANSS factors	**A Norwegian N = 776**	**B White immigrant N = 115**	**C Visible minority N = 180**	**F (df)**	**Post Hoc Tukey p <.05**
Positive	8.9 (4.3)	8.2 (4.0)	10.0 (4.2)	F = 7.234 (2,1068)**	A/B < C
Negative	12.0 (5.9)	11.3 (5.4)	13.3 (6.0)	F = 4.888 (2,1068)*	A/B < C
Disorganized (N = 1068)	5.3 (2.5)	4.9 (2.2)	6.5 (2.7)	F = 20.086 (2,1065)**	A/B < C
Excited (N = 1069)	5.7 (2.2)	5.7 (2.2)	5.8 (2.2)		
Depressed	8.1 (3.2)	8.2 (3.1)	8.5 (3.8)		

* p > .01, ** P > .001

Table 3 Effects of group category on PANSS factor items (MANOVA)

	Mean (95% CI)					
	A Norwegian N = 776	**B White immigrant N = 115**	**C Visible minority N = 180**	**F (df)**	**Partial eta^2**	**Post Hoc Tukey p <.05**
Positive factor						
P1 Delusions	2.8 (2.7 - 2.9)	2.3 (2.1 - 2.6)	3.2 (3.0 - 3.5)	11.933 (2,1068)***	.022	A/B < C
P3 Hallucinations	2.3(2.2 - 2.4)	2.1 (1.8 - 2.4)	2.7 (2.5 - 2.9)	6.785 (2,1068)***	.013	A/B < C
P5 Grandiosity	1.7 (1.6 - 1.8)	1,7 (1.4 - 1.9)	1.8 (1.6 - 1.9)	ns		
G9 Unusual thought content	2.2 (2.1 - 2.3)	2.0 (1.8 - 2.3)	2.3 (2.1 - 2.4)	ns		
Negative factor						
N1 Blunted affect	2.2 (2.1 - 2.3)	2.1 (1.8 - 2.3)	2.3 (2.0 - 2.2)	ns		
N2 Emotional withdrawal	2.1 (2.0 - 2.2)	2.1 (1.9 - 2.3)	2.4 (2.2 - 2.6)	3.615 (2,1068)*	.007	A < C
N3 Poor rapport	2.0 (1.9 - 2.0)	1.8 (1.6 - 2.0)	2.0 (1.9 - 2.2)	ns		
N4 Passive/Apathetic social withdrawal	2.3 (2.2 - 2.4)	2.1 (1.8 - 2.3)	2.6 (2.4 - 2.8)	4.898 (2,1068) **	.009	A/B < C
N6 Lack of spontaneity	1.9 (1.8 - 2.0)	1.7 (1.5 - 2.0)	2.2 (2.1 - 2.4)	7.448 (2,1068)***	.014	A/B < C
G7 Motor retardation	1.6 (1.5 - 1.6)	1.5 (1.4 - 1.7)	1.8 (1.6 - 1.9)	3.495 (2,1068)*	.007	A < C
Disorganized						
P2 Conceptual disorganization	1.7 (1.6 - 1.8)	1.6 (1.4 - 1.7)	1.8 (1.6 - 2.0)	ns		
N5 Difficulty in abstract thinking	1.9 (1.9 - 2.0)	1.8 (1.5 - 2.0)	2.8 (2.6 - 3.0)	40.451 (2/1065)***	.071	A/B < C
G11 Poor attention	1.6 (1.6 - 1.7)	1.6 (1.4 - 1.8)	1.9 (1.7 - 2.0)	4.748 (2/1065)**	.009	A/B < C

*p = <.05, ** p = > .01, *** p = > .001

Analysis combined positive factor: F (8, 2130) = 4.711, p = > .001, Wilks' Lambda = .97

Analysis combined negative factor: F (12, 2126) = 2.535, p = > .003, Wilks' Lambda = .97

Analysis combined disorganized factor: F (6, 2126) = 14.066, p = > .001, Wilks' Lambda = .93

Table 4. Multiple hierarchical regression for PANSS item "Delusion" (P1) including possible confounders

	Block 1		Block 2		Block 3		Block 4		Block 5		Block 6	
Variables	**B (SE)**	*β*	**B (SE)**	*β*	**B (SE)**	*β*	**B (SE)**	*β*	**B (SE)**	*β*	**B (SE)**	*β*
Employed	-.477 (.108)	-.136***	-.388 (.107)	-.111***	-.235 (.100)	-.067*	-.239 (.100)	-.068*	-.224 (.100)	-.064*	-.224 (.100)	-.064*
Education			-.099 (.016)	-.187***	-.041 (.015)	-.078**	-.043 (.015)	-.081**	-.036 (.015)	-.068*	-.036 (.015)	-.068*
Schizophrenia-spectrum					.679 (.113)	.216***	.683 (.113)	.217***	.700 (.113)	.223***	.701 (.113)	.223***
Bipolar I and NOS					-.841 (.132)	-.227***	-.844 (.131)	-.228***	-.805 (.132)	-.217***	-.805 (.132)	-.217***
FEP					.557 (.089)	.176***	.566 (.090)	.179***	.564 (.089)	.179***	.564 (.089)	.179***
Immigrant							-.125 (.097)	-.036	-.407 (.141)	-.116**	-.405 (.163)	-.116*
Visible minority									.470 (.171)	.113**	.471 (.177)	.113**
1st generation											-.005 (.174)	-.001
R^2	.019***		.053***		.228***		.229		.235**		.235	

Final model $\Delta R2 = .23$, $F (8/1030) = 39.492$, $p > .001$,

* p > .01, ** p > .05, *** p > .001, Abbr: FEP = First episode psychosis

Table 5. Multiple hierarchical regression for PANSS item "Difficulty in abstract thinking" (N5) including possible confounders

	Block 1		Block 2		Block 3		Block 4		Block 5		Block 6	
Variable	B (SE)	*β*	B (SE)	*β*	B (SE)	*β*	B (SE)	*β*	B (Se)	*β*	B (SE)	*β*
Male	-.387 (.078)	-.151***	-.320 (.075)	-.125***	-.297 (.074)	-.116***	-.281 (.074)	-.110***	-.259 (.073)	-.101***	-.258 (.073)	-.101***
Education			-.127 (.013)	-.296***	-.113 (.013)	-.264***	-.108 (.013)	-.252***	-.096 (.013)	-.224***	-.098 (.013)	-.228***
Schizophrenia-spectrum					.398 (.076)	.155***	.383 (.075)	.150***	.377 (.075)	.147***	.372 (.074)	.145***
Immigrant							.343 (.083)	.120***	-.106 (.119)	-.037	-.239 (.137)	-.084
Visible minority									.748 (.144)	.220***	.675 (.149)	.199***
1st generation											.283 (.147)	.084
R^2	.023***		.110***		.133***		.147***		.169***		.172	

Final model ΔR2 = .167 , F (6/1034) = 35.706, p > .001,

*** = p > .001