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Insight, personality, and symptoms among individuals with psychosis: Cross-sectional and longitudinal relationships

Ilanit Hasson-Ohayon^{a,*}, Anne Neeltje Scholte-Stalenhoef^b, Frederike Schirmbeck^{c,d}, Lieuwe de Haan^{c,d}, Wiepke Cahn^e, Gerdina Hendrika Maria Pijnenborg^f, Lindy-Lou Boyette^g, For GROUP:

Therese van Amelsvoort, Agna A. Bartels-Velthuis, Richard Bruggeman, Wiepke Cahn, Lieuwe de Haan, Frederike Schirmbeck, Claudia J.P. Simons, Jim van Os

^a Department of Psychology, Bar-Ilan University, Ramat-Gan, Israel

^b Department of Psychiatry, Ziekenhuis Groep Twente, Almelo, the Netherlands

^c Department of Psychiatry, Amsterdam UMC, Location AMC, University of Amsterdam, Amsterdam, the Netherlands

^d Arkin, Institute for Mental Health, Amsterdam, the Netherlands

^e University Medical Center Utrecht, Department of Psychiatry, Brain Centre Rudolf Magnus, Utrecht University, Utrecht, the Netherlands

^f University of Groningen, Department of Psychology, Groningen, the Netherlands

^g Department of Clinical Psychology, University of Amsterdam, Amsterdam, the Netherlands

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ABSTRACT

Background: Reports on the relationship between clinical insight and psychotic symptoms have shown inconsistent results, and the association between clinical insight and personality has rarely been addressed. The aim of this study was to examine whether personality is correlated cross-sectionally with insight level, and longitudinally with change in insight, beyond symptoms.

Methods: Participants were a sub-sample of the Dutch Genetic Risk and Outcome of Psychosis (GROUP) project. Two hundred and eleven participants diagnosed with non-affective psychotic disorders took part in the cross-sectional part of the study, of whom 136 took part in the three-year follow-up assessment. They were administered with self-report Birchwood insight scale and NEO-Five Factor Inventory, and clinicians assessed them according to PANSS and CDS symptoms scales.

Results: Cross-sectional analysis showed baseline self-report insight was positively related to neuroticism and agreeableness and negatively related to extraversion. Longitudinal analysis showed change in level of self-reported insight was predicted by baseline-insight and change in symptoms of disorganization. Personality factors did not predict insight change (as measured either by self-report or by clinician assessment).

Discussion: The cross-sectional findings showed self-report insight (as opposed to clinician-rated) is associated with personality traits, suggesting negative affect is related to higher level of insight and that having insight may be influenced by the wish to comply with views of professionals, or a tendency to cover up problems. The longitudinal findings imply that not personality but change in severity of symptoms of disorganization, and possibly other variables, predicts change in insight.

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1. Introduction

Clinical insight – a construct commonly defined as one's level of awareness of having an illness, of the need for treatment, and of the implications of the illness (see definitions by Amador et al., 1991, Kemp and David, 1996) – has gained increased attention in the last three decades. Studies have shown that 50–80% of patients with schizophrenia lack insight into their illness (David, 1990; Amador et al., 1991;

Gharabawi et al., 2006; Lincoln et al., 2007). Although there is extensive literature on insight correlates, professionals in the field are still debating whether insight is part of the illness symptomatology or whether it is more indicative of personal characteristics of either reflective and theory of mind abilities or compliance with social norms and authority (Elowe and Conus, 2017; Hasson-Ohayon, 2018; Nair et al., 2014; Pijnenborg et al., 2013). There is some evidence of premorbid schizoid and schizotypal traits influencing later insight in psychosis (Campos et al., 2011). Of note, despite evidence of influence of personality traits on various outcomes in psychotic disorders, such as relapse (Gleeson et al., 2005), coping (Beauchamp et al., 2011) and quality of life

* Corresponding author.

E-mail address: ilanit.hasson-ohayon@biu.ac.il (I. Hasson-Ohayon).

(Boyette et al., 2014) studies on the relationship between personality traits and clinical insight are scarce. The aim of the current study was to examine whether five factor model of personality, is associated cross-sectionally and longitudinally with insight in psychosis, when symptoms are controlled for.

With regard to the associations between insight and symptoms, findings support a negative association between insight and psychotic symptomatology and a positive association between insight and depression (Mintz et al., 2003; Saeedi et al., 2007; Mingrone et al., 2013; De Hert et al., 2009). A number of longitudinal assessments have shown that when insight improves, symptoms of psychosis decrease (e.g., Saeedi et al., 2007), whereas others have shown no such relation (Erickson and Lysaker, 2012). The relationship between insight fluctuations and symptoms might support the idea that a deficit in insight is part of the illness and may be viewed as a positive symptom of delusional thinking, as a negative symptom of withdrawal from social views, or as a symptom dimension in and of itself (see Osatuke et al., 2008 and Lysaker and Buck, 2008 reviews on etiological explanations of insight deficits). In a previous study (Quee et al., 2014), conducted on the data of the Genetic Risk and Outcome of Psychosis (GROUP) project (i.e., the current study data), associations between insight and symptoms were examined. It was shown that improvement of insight was negatively related to baseline symptom severity according to remission criteria items (Andreasen et al., 2005), and that increase in insight across time was related to a decrease in symptoms (Quee et al., 2014).

However, Cuesta et al. (2000) had previously found that the pattern of associations between insight and symptoms differs at different time points and concluded that there must be at least a partially independent relationship between psychopathology and insight measures. That is, many factors other than symptoms may have an impact on insight. Indeed, insight has been related to deficits in neurocognition, social factors such as stigma, and psychological processes such as the ability to reflect on oneself, as well as social cognition (e.g., Vohs et al., 2016). It has been hypothesized that the impact of symptoms on insight might vary across these variables (e.g., Lysaker et al., 2011; Guerrerro and Lysaker, 2013). These studies suggest that personal characteristics such as, for instance, reflectiveness or compliance with others, are related to insight, and that an effort should be made to move beyond looking at symptoms only and to study personality traits in relation to insight as well.

Current conceptualization of insight questions insight as a “pure awareness” variable, suggesting it merely represents an attitude one has toward the illness (Lysaker et al., 2018; Hasson-Ohayon, 2018). Domains of insight that include accepting the label of having a psychotic disorder, the need for medication and recognizing the implications of the illness seem to express one's attitude toward the illness as well as the tendency to agree with professionals (Hasson-Ohayon, 2018; Lysaker et al., 2018; Lincoln et al., 2007). This multidimensional concept of insight might be related to specific personality traits. For example, it could be hypothesized that a personality trait that expresses conformity might be related to acceptance of the medical model expressed in high level of clinical insight. Previous study showed that personality predicted changes in coping styles (Beauchamp et al., 2013) and this could imply that personality characteristics might predict changes in attitudes to one's illness as well. Next to that, insight has been associated with tests of mental flexibility in previous studies (Nair et al., 2014) and while openness to experience as a trait has been related to flexibility (DeYoung et al., 2005), this trait might be hypothesized to play a role in insight and changeability of insight.

A well-known model of personality is the Five-Factor Model (FFM), consisting of five basic traits: neuroticism (i.e., moodiness and emotional instability; a tendency toward negative affect); extraversion (i.e., enjoying meeting new people and getting attention; a tendency toward positive affect); openness (i.e., being open to new experiences and ideas; intellect); agreeableness (i.e., altruism and prosocial behavior;

conformity); and conscientiousness (i.e., being organized and paying attention to detail; achievement-oriented) (Costa and McCrae, 1992, Digman, 1990). Of note, recently a suggestion has been made to address normal personality traits as intertwined with symptoms and schizotypy in psychosis (Cicero et al., 2019). Studies on the FFM among individuals with psychosis have shown that after the onset of illness, the FFM personality factors are relatively stable beyond psychosis-related variables (e.g., psychotic symptoms, number of relapses), although there is also evidence of depressive and negative symptoms impacting FFM levels (Boyette et al., 2015).

Only a few studies have addressed the association between insight and personality among individuals with psychosis. These studies have used different conceptualizations of personality and insight. Lysaker et al. (1999) found no cross-sectional association between the Eysenck P-E-N personality traits (that is, neuroticism, extraversion, and psychoticism) and level of impaired insight. However, when examining the variation in insight over time, a lower fluctuation in insight was related to higher levels of extraversion and psychoticism. Ritsner and Blumenkrantz (2007) found that insight was negatively associated with the novelty-seeking temperament dimension of personality, and positively associated with reward-dependence levels, both of which are correlated with the FFM trait extraversion (De Fruyt et al., 2000). In sum, the small number of studies that have been conducted on this topic have shown an inconsistency with regard to the association between insight and personality traits and therefore an explorative strategy was applied in the current study.

This study aimed to contribute to a further understanding of the nature of associations between insight into psychotic illness, symptoms, and personality. It utilized both cross-sectional and longitudinal assessments using the Five-Factor Model of personality, the Birchwood self-report insight scale, and symptom measures. Cross-sectional relations between personality domains, symptoms, and insight measures were explored. The longitudinal assessment examined the associations between baseline personality and change in insight over time.

2. Methods

2.1. Participants and procedure

The data pertain to a subsample of the Genetic Risk and Outcome of Psychosis (GROUP) study, a Dutch longitudinal multicenter cohort study on vulnerability and resilience factors for variation in expression and course of non-affective psychotic disorders. For details of the GROUP study's design and procedure, including medical ethical procedure and approval, please see Korver et al. (2012). Our sample consisted of patients from two (Amsterdam and Utrecht) of the four GROUP regions, who participated in a personality assessment at the second assessment period (here: baseline data). The third period was used for the three-year follow-up. Data release 5.0 was used for the analyses. Briefly, inclusion criteria for patients were (1) must be 18 years of age or older, (2) must meet DSM-IV criteria (American Psychiatric Association, 2000) for a non-affective psychotic disorder, and (3) must be fluent in Dutch.

2.2. Instruments

2.2.1. DSM-IV diagnoses were based on the Comprehensive Assessment of Symptoms and History (CASH) (Andreasen et al., 1992)

The CASH is a widely-used semi-structured interview, designed for research on symptoms and diagnosis of schizophrenia spectrum and affective spectrum conditions.

2.2.2. *The Dutch version of the NEO-Five Factor Inventory (NEO-FFI) (Hoekstra et al., 1996; Costa and McCrae, 1992) questionnaire was used to assess Five-Factor Model (FFM) personality traits*

The NEO-FFI is a 60-item self-report questionnaire, which has demonstrated satisfactory to excellent construct validity and moderate to good internal reliability in general population samples, with slightly lower Cronbach alphas for openness and agreeableness (Hoekstra et al., 1996; Costa and McCrae, 1992). The factor structure and reliability of the FFM scales in patients with schizophrenia were found to be highly similar to a normative sample (Bagby et al., 1999).

2.2.3. *Insight was assessed with the Birchwood Insight Scale (BIS) (Birchwood et al., 1994)*

The BIS is a short self-report questionnaire aimed at assessing changes in insight among individuals with psychosis. The higher the score, the higher the level of one's insight. It addresses three components of insight in psychosis: awareness of the illness, need for treatment, and attribution of symptoms. Given that a factor analysis on the BIS has shown the best fit for a single-factor solution in both a first-episode psychosis and a sample of individuals with chronic symptoms, with an indication of insufficient fit of Item 1 ("Some of the symptoms are made up by your mind") (Cleary et al., 2014), the total score was used in the current study. It is important to note that when using an adjusted total score for insight, with the deletion of Item 1, the findings were similar to those found when the item had been included.

2.2.4. *Symptoms of psychosis at baseline and three-year follow-up were assessed with the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987)*

The PANSS is a widely used interview that assesses the symptoms of schizophrenia spectrum conditions. In the current study, PANSS scales (positive symptoms, negative symptoms, disorganization, excitement, and emotional distress) according to the van der Gaag et al. (2006) model – which have shown good validity compared to earlier models (van der Gaag et al., 2006) – were used for analyses.

2.2.5. *Symptoms of depression were separately assessed via the Calgary Depression Scale (CDS) (Addington et al., 1993)*

The CDS is a brief structured interview specifically designed to assess symptoms of depression in patients with psychotic disorders. The CDS has been shown to be better at differentiating depressive from negative and extrapyramidal symptoms in patients with schizophrenia spectrum disorders than other assessment instruments for depression (Lako et al., 2012; Schennach et al., 2012).

2.3. Statistical analyses

Due to the report of one item's insufficient fit (Cleary et al., 2014), a reliability analysis was conducted for the insight measure. A normality analysis was performed to examine the data distribution of the personality, insight, and symptom measures, and it showed a violation of normality for insight: specifically, baseline and follow-up insight scores were negatively skewed, indicating a clustering of scores at the higher end. Also, symptoms of psychosis and depression were positively skewed at both baseline and follow-up, indicating clustering at the lower end. Personality traits were normally distributed. Accordingly, Spearman correlations between insight on the one hand and personality and symptoms on the other hand were performed. Personality traits and symptoms with at least a trend-level significant ($p < 0.10$) correlation with insight were entered into a regression analysis, with insight as the dependent variable. The first regression model consisted of cross-sectional (baseline) data. For the second regression model, regarding course of insight, a change in insight variable was computed by subtracting scores at the three-year follow-up with the corresponding scores at baseline. Again, Spearman correlation analyses were performed to identify baseline personality traits and symptoms with at

least a trend-level significant correlation with change in insight. These variables were entered into a regression analysis, including baseline levels of insight, with change in insight as the dependent variable.

Although personality is considered to be relatively stable, measurements of personality might be distorted by illness symptoms (Boyette et al., 2013). For this reason, in the longitudinal analysis we included not only change of symptoms as the independent variable, but also baseline symptoms, in order to correct for their effect on personality. In addition, taking into account the possibility that change of insight might be predicted by baseline insight, the longitudinal analysis was conducted without controlling for baseline insight and then again with the addition of baseline insight as an independent variable.

Although the BIS is a sensitive measure for change in insight (Birchwood et al., 1994) it includes possible bias of self-report measure. Therefore, we also calculated correlations between insight measure of the PANSS, which is the G12 item 'poor judgement and insight', and the BIS at two time points. Also, all analyses with the BIS were repeated with PANSS insight item instead of BIS.

3. Results

3.1. Sample characteristics

Our sample consisted of $N = 211$ patients with psychotic disorders. See Table 1 for their sociodemographic and clinical characteristics. Follow-up data were available for $N = 133$ patients (63.0%) out of 136 that took part at follow-up stage. See Table 2 for Mean and SD of personality, symptoms, and insight scores. While examining demographic correlates of insight, an age effect for self-report insight (Spearman rho: 0.17) at significance $p = 0.012$, but not for PANSS-item insight was observed. Age was negatively correlated with extraversion (Spearman rho: 0.21) at significance $p = 0.002$. Age of onset of psychotic illness showed no correlation with any of the two insight items.

No significant gender differences were found for personality or Birchwood insight scale. PANSS-item insight showed different means for males ($M = 1.73$) and females ($M = 1.36$) with $t(199) = 1.67$ $p = 0.26$.

3.2. Reliabilities of measures

Reliability of the insight measure was assessed with Cronbach's alpha, which was an acceptable 0.751 at baseline and 0.738 at follow-up. Item 1 showed a low item-total correlation (0.280 at baseline and 0.132 at follow-up) and a slightly higher alpha if the item were deleted (0.754 at baseline and 0.761 at follow-up). Therefore, in the current study, additional analyses were conducted for insight, using an adjusted total score with the deletion of Item 1 instead of the original total score.

Table 1
Sociodemographic and clinical characteristics at baseline ($N = 211$).

Gender (% male)	82.9
Age (M, SD yrs)	31.0 (7.54)
Ethnicity (% Caucasian)	80.6
Estimated IQ (M, SD) ^a	98.0 (16.31)
Age of onset first psychotic episode (M, SD yrs)	22.8 (7.04)
DSM diagnosis of psychotic disorder (%)	
Schizophrenia	75.8
Schizophreniform disorder	0.9
Schizoaffective disorder	10.9
Delusional disorder	0.9
Psychotic disorder NOS	10.0
Other psychotic disorder	1.4
Using antipsychotic medication (%)	
Yes	79.1
No	1.4
Unknown	19.5

^a Estimated with 4 subtests of the WAIS-III.

Table 2
Insight, personality and symptom scores.

	Baseline (n = 211)	Follow-up (n = 136)
BIS insight (M, SD)		
Total score	8.48 (2.91)	7.64 (2.73)
PANSS (M, SD)		
Positive symptoms	11.19 (5.63)	12.66 (5.91)
Negative symptoms	12.77 (5.97)	13.57 (5.95)
Disorganization	15.24 (5.49)	16.87 (6.62)
Excitement	10.76 (3.31)	11.68 (3.27)
Emotional distress	12.98 (4.46)	14.37 (5.20)
Poor judgement and insight item PANSS	1.67 (1.27)	1.84 (1.20)
CDS depression (M, SD)		
Total score	2.18 (2.87)	1.80 (2.59)
NEO-FFI personality (M, SD)		
Neuroticism	34.89 (8.48)	
Extraversion	37.54 (7.06)	
Openness	38.13 (6.15)	
Agreeableness	42.82 (5.18)	
Conscientiousness	41.40 (6.73)	

Reliability scores of the Five-Factor Model traits in the current sample have been described in Boyette et al. (2015).

3.3. Cross-sectional relations of personality, symptoms, and insight

Spearman rho correlations showed a positive association between self-report insight and neuroticism ($\rho = 0.40, p < 0.001$) and a negative association between self-report insight and extraversion ($\rho = -0.29, p < 0.001$) and between insight and conscientiousness ($\rho = -0.23, p = 0.001$). A positive association between self-report insight and agreeableness was present at a trend level ($\rho = 0.14, p = 0.051$). Regarding symptom levels, self-report insight was positively associated with CDS depressive symptoms ($\rho = 0.18, p = 0.012$) and was not statistically significantly associated with any symptom levels according to the PANSS. Birchwood Insight Scale and PANSS insight item showed significant, negative correlations at baseline ($\rho = -0.312, p < 0.001$) and follow up ($\rho = -0.19, p = 0.028$), higher self-report (BIS scale) insight and lower PANSS insight item corresponding with higher level of insight. Regarding personality measures, PANSS insight item showed a significant correlation with agreeableness only ($\rho = -0.21, p = 0.002$). Regarding symptoms, there was a correlation with PANSS positive symptoms ($\rho = 0.45, p < 0.001$), negative symptoms ($\rho = 0.35, p < 0.001$), disorganization ($\rho = 0.54, p < 0.001$), excitement ($\rho = 0.47, p < 0.001$) and emotional distress ($\rho = 0.23, p = 0.001$).

According to the observed correlations, neuroticism, extraversion, conscientiousness, agreeableness, and symptoms of depression were entered into a multiple regression analysis, with self-report insight as the dependent variable. The total amount of variance explained by the model (R^2) was 28.6% ($F = 15.43, p < 0.001$). Neuroticism, extraversion, and agreeableness were statistically significant predictors in the model, indicating that higher neuroticism and agreeableness and lower

Table 3a
Multiple regression of cross-sectional relations between personality and insight based on Birchwood scale (N = 199).

	B	CI ^a	SE B ^a	β	t	p
Neuroticism	0.14	0.08–0.20	0.03	0.42	5.02**	<0.001
Extraversion	-0.09	-0.15–0.03	0.03	-0.22	-2.83**	0.005
Agreeableness	0.17	0.09–0.25	0.04	0.30	4.64**	<0.001
Conscientiousness	-0.01	-0.08–0.06	0.04	-0.03	-0.34	0.735
Depressive symptoms	-0.08	-0.22–0.04	0.07	-0.08	-1.04	0.299

^a CI and SE are based on 1000 bootstrap samples.

** $p < 0.01$.

extraversion were associated with higher levels of self-report insight. See Table 3a for detailed results. Repeating multiple regression analysis with PANSS insight item, agreeableness and PANSS symptom domains were entered as independent variables. The total amount of variance explained by the model (R^2) was 48.2% ($F = 29.34, p < 0.001$). Positive symptoms, disorganization, excitement and emotions distress were statistically significant predictors, indicating that higher symptom levels of these were associated with higher level of G-12 PANSS item, i.e. higher symptom levels being related to less insight. See Table 3b.

3.4. Relations between personality and changes in insight at three-year follow-up

Birchwood Insight means decreased between the two measurement times ($t_{df=135} = 4.54, p < 0.001$) Associations between this decrease and both baseline symptoms and change in symptoms, as well as Birchwood insight decrease and personality factors, were tested. Spearman rho correlations showed a negative association between change in insight and neuroticism ($\rho = -0.30, p < 0.001$) and a positive association between change in insight and extraversion ($\rho = 0.20, p = 0.019$). In regard to symptoms, change in insight was negatively associated with CDS baseline depressive symptoms ($\rho = -0.18, p = 0.034$), with change in disorganization levels ($\rho = -0.22, p = 0.013$), and with change in positive symptoms on a trend level ($\rho = -0.15, p = 0.094$). Change in insight was negatively associated with insight at baseline ($\rho = -0.56, p < 0.001$). Analyses were repeated for change in PANSS-item insight, which increased over time ($t_{df=150} = -2.59, p = 0.011$). There was a negative association for this change with conscientiousness ($\rho = -0.16, p = 0.046$) and with baseline PANSS-item insight ($\rho = -0.35, p < 0.001$). Regarding symptoms, baseline depression symptoms showed a positive correlation at trend level ($\rho = 0.14, p = 0.80$). Change in insight on PANSS was correlated with change in positive symptoms ($\rho = 0.53, p < 0.001$) and change in disorganization symptoms ($\rho = 0.50, p < 0.001$) and also positively correlated with change in negative symptoms ($\rho = 0.18, p = 0.33$), change in excitement ($\rho = 0.29, p, 0.001$) and at a trend level with change in emotional distress ($\rho = 0.16, p = 0.06$) and change in depressive symptoms ($\rho = -0.19, p = 0.09$).

Neuroticism, extraversion, symptoms of depression, change in disorganization symptoms, and change in positive symptoms were entered into a multiple regression analysis, with change in Birchwood self-report insight as the dependent variable. The total amount of variance explained by the model (R^2) was 14.1% ($F = 3.73, p = 0.004$). Change in disorganization symptoms was the only statistically significant predictor in the model, indicating that higher change in disorganization levels was related to lower change in insight. Neuroticism showed a negative association on a trend level, which did not survive bootstrapping. See Table 4 for detailed results.

When baseline self-report insight was included as a predictor in the above regression model, the total amount of variance explained by the model (R^2) was 37.8% ($F = 11.46, p < 0.001$). Change in disorganization

Table 3b
Multiple regression of cross-sectional relations between personality and PANSS insight item (N = 196).

	B	CI ^a	SE B ^a	β	t	p
Agreeableness	0.01	-0.01–0.04	0.01	0.05	0.84	0.40
Positive symptoms	0.09	0.05–0.13	0.02	0.38	5.00**	<0.001
Negative symptoms	0.01	-0.02–0.06	0.02	0.05	0.78	0.44
Disorganization	0.09	0.05–0.13	0.02	0.39	5.13**	<0.001
Excitement	0.08	0.01–0.16	0.04	0.22	2.94**	0.00
Emotional distress	-0.10	-0.14–0.05	0.02	-0.35	-4.68**	<0.001

^a CI and SE are based on 1000 bootstrap samples.

** $p < 0.01$.

Table 4
Multiple regression of relations of personality and change in insight based on Birchwood scale (N = 118).

	B	CI ^a	SE B ^a	β	t	p
Neuroticism	-0.07	-0.15–0.01	0.04	-0.21	-1.79 ⁰	0.075
Extraversion	0.04	-0.04–0.14	0.04	0.10	1.05	0.296
Depressive symptoms	-0.02	-0.22–0.22	0.11	-0.02	-0.18	0.855
Change in disorg. ^b	-0.13	-0.24–-0.02	0.06	-0.22	-2.26*	0.026
Change in pos. ^b	-0.03	-0.14–0.19	0.06	-0.04	-0.45	0.655

^a CI and SE are based on 1000 bootstrap samples.

^b Change in disorganization symptoms (disorganization T2- T1), change in positive symptoms (positive symptoms T2-T1).

* p < 0.05.

⁰ p < 0.10.

symptoms and baseline insight were the only statistically significant predictors in the model, indicating that higher change in disorganization levels and higher baseline insight were related to lower change in insight. See Table 5a for detailed results.

Finally, multiple regression was performed for change in PANSS item insight including: baseline insight, conscientiousness, depressive symptoms, change in symptoms for depressive, positive, negative, disorganization, excitement and emotional distress domains. The total amount of variance explained by the model (R²) was 64.6% (F = 13.59, p < 0.001). Significant predictors were baseline insight, change in positive symptoms, change in disorganization, change in excitement and change in emotional distress. See Table 5b.

When regression analyses above were repeated involving gender or age, this did not influence any of the main results.

4. Discussion

Although there is a great deal of literature on factors associated with clinical insight, the association between clinical insight and illness-related variables versus personality traits has not been sufficiently addressed. The current study aimed to uncover the extent to which insight is related to symptoms and personality traits, both cross-sectionally and longitudinally in order to further understand the role played by insight in psychotic disorders.

4.1. Main results

Results of the current cross-sectional analysis showed that baseline self-report insight is not correlated with psychotic symptoms, but is positively correlated with depressive symptoms. It has positive associations with neuroticism and agreeableness, and a negative association with extraversion. In a bootstrapped regression analysis, no unique correlation between self-report insight and openness or insight and

Table 5a
Multiple regression of relations between personality and change in insight based on Birchwood scale, including baseline insight (N = 118).

	B	CI ^a	SE B ^a	β	t	p
Neuroticism	0.01	-0.06–0.09	0.04	0.03	0.28	0.777
Extraversion	0.01	-0.06–0.10	0.04	0.03	0.37	0.712
Depressive symptoms	-0.09	-0.27–0.12	0.10	-0.08	-0.89	0.375
Change in disorg. ^b	-0.13	-0.22–-0.03	0.05	-0.21	-2.59*	0.011
Change in pos. ^b	-0.02	-0.11–0.07	0.05	-0.04	-0.44	0.663
Baseline Birchwood insight	-0.61	-0.78–-0.45	0.09	-0.55	-6.57**	<0.001

^a CI and SE are based on 1000 bootstrap samples.

^b Change in disorganization symptoms (disorganization T2-T1), change in positive symptoms (positive symptoms T2-T1).

* p < 0.05.

** p < 0.01.

Table 5b
Multiple regression of relations between personality and change in PANSS insight item (N = 77).

	B	CI ^a	SE B ^a	β	t	p
Baseline PANSS-insight	-0.39	-0.56–0.14	-0.10	-0.41	5.42**	<0.001
Conscientiousness	-0.00	-0.02–0.3	0.01	-0.02	-0.25	0.800
Depression	0.07	-0.04–0.15	0.05	0.19	1.56	0.124
Change in pos. ^b	0.11	0.05–0.15	0.03	0.45	5.04**	<0.001
Change in neg. ^b	-0.01	-0.05–0.04	0.02	-0.03	-0.39	0.701
Change in disorg. ^b	0.07	0.04–0.12	0.02	0.30	3.56*	0.001
Change in exc. ^b	0.10	-0.01–0.17	0.05	0.24	2.82*	0.006
Change in emo. ^b	-0.10	-0.16–0.02	0.04	-0.42	-3.73**	<0.001
Change in depr. ^b	0.04	-0.65–0.14	0.05	0.13	1.04	0.303

^a CI and SE are based on 1000 bootstrap samples.

^b Change in positive symptoms, negative symptoms, disorganization symptoms, excitement, emotional distress and depressive symptoms respectively (T2-T1).

* p < 0.05.

** p < 0.01.

conscientiousness was found. Results of the longitudinal analysis (predicting insight change without controlling for baseline insight) showed that change of self-report insight over time was predicted by change in disorganization symptoms and baseline neuroticism, the latter only at a trend level. In analysis controlling for baseline insight, the effect of neuroticism disappeared, and only baseline insight and change in disorganization symptoms predicted change in insight. Taken together: self-report insight is cross-sectionally correlated with the following personality traits – neuroticism, extraversion, and agreeableness – and with symptoms of depression, whereas change in insight over time is predicted by baseline insight and disorganization symptoms, but not by personality traits. When analyses were repeated for PANSS-insight measure, regression analyses showed relations with PANSS positive symptoms, disorganization, excitement and emotional distress, both cross-sectionally and longitudinally when change of PANSS insight was examined.

4.2. Discussion of cross-sectional findings: relations of insight with symptoms and personality

Findings can be interpreted in the context of different etiological explanations of insight. As mentioned in the introduction, insight might be viewed as a symptom dimension of the illness. The use of PANSS-item G12 as an insight measure might fit in with this concept of insight as a symptom. Indeed, G-12 item is part of the general symptoms scale and therefore interpreted as such. The correlation that was found between PANSS-item insights with symptoms does ofcourse not necessarily imply the insight measure to be a symptom, but rather reveal a connection of the two. Given that conceptualizing insight as a symptom in relation to other symptoms has been done inconsistently so far, definite conclusions cannot be drawn in this respect from the current study. However, the relation that was found between observer rated insight with positive symptoms, disorganization, excitement and emotional distress versus self-reported insight related to depression is a noticeable finding.

An alternative explanation of insight is that it is the consequence of either a failure in carrying out cognitive acts such as complex judgments of experiences, or of a protective defense mechanism against the negative implications of stigma resulting in a rejection of the medical model of psychosis (Osatuke et al., 2008; Lysaker and Buck, 2008). The fact that at baseline, self-report insight was not related to positive symptoms, negative symptoms, or disorganization, may suggest that impaired insight as measured by the multidimensional Birchwood construct is not necessarily a symptomatic expression of psychotic illness but, rather, may be alternatively explained as a defensive or cognitive act, as mentioned above. It has been argued (Cuesta et al., 2000; Erickson and Lysaker, 2012) that insight may be a partially independent symptom

dimension that can fluctuate without observed fluctuations in other symptoms. This has raised the question to what other variables than symptoms insight might be related – or whether insight is merely an independent variable of its own. Apart from cognition and stigma-related variables as mentioned above, also personality might contribute to level of insight. In the current study, neuroticism, extraversion and agreeableness were revealed to be related to self-report insight.

To start with neuroticism; in order to understand its positive relation with insight it might be regarded as a variable closely related to depressive symptoms. Both neuroticism and depression are viewed as measures of negative affect: that is, emotional instability and a tendency toward negative emotions as a trait in neuroticism, and depressed mood as a state. The current finding regarding relationship between both neuroticism and depression with self-report insight seems to be in line with the extensively documented negative implications of insight regarding demoralization, depression, and suicidal ideation (e.g., Schapir et al., 2016; Crumlish et al., 2005; Foley et al., 2008; Robinson et al., 2009). This finding, furthermore, is in line with the literature suggesting that the impact of insight and the internalization of stigma on mental illness share a variance and that a negative attitude toward one's illness may result in a negative self-appraisal (Hasson-Ohayon, 2018). Of note, although greater insight into the nature and consequences of psychotic illness might contribute to a greater number of depressive symptoms, insight may at the same time be seen as a step in the individual's recovery process and an acceptance of painful things that have happened. Interestingly, the tendency to worry that typifies neuroticism might result in dwelling on the negative consequences of the illness, and in more feelings of helplessness and the need for treatment, rather than in the creation of a more positive and meaningful personal story of coping with the illness.

Extraversion has, consistent with our results, shown opposite effects from neuroticism on various outcome measures in previous studies. Neuroticism has been typically related to vulnerability, while extraversion has been related to protective factors (Dinzeo and Docherty, 2007). The tendency to be optimistic in extraversion might go hand-in-hand with a tendency to cover up problems and might therefore be associated with intact self-esteem and a covering up of mental health problems (Amirkhan et al., 1995), i.e., expressed in low insight. Accordingly, this optimism might prevent an individual from reflecting on the fact that he/she has a serious mental health problem, consequently leading to denial. Additionally, low extraversion, together with high neuroticism, has been shown to be related to depression (Ormel et al., 2004; Fanous et al., 2007).

The positive trend between insight and agreeableness might be explained as patients' acceptance of the medical model, as conveyed to them by their mental health providers, an idea that is in line with the tendency to conform among people with high agreeableness scores. Indeed, a greater degree of insight and higher agreeableness in patients have been connected to a better working alliance, from the therapists' perspective (Johansen et al., 2013). Adopting the medical model may in some cases provide an individual who does not understand his/her experience with an alternative narrative, leading to being compliant with people in positions of professional authority. This compliant behavior might be expressed in greater insight and even in an internalization of stigma (Hasson-Ohayon et al., 2014).

To conclude, insight as measured by self-report was found to be more related to personality than observer rated insight, even though there is a moderate correlation between the two insight measures. This might underscore the conceptual differences between the two measures, as the self-report presents a comprehensive scale that includes different domains of insight reported by the individual while PANSS-insight is related to other items from the same symptoms scale. Interestingly, related to the focus of this study, this might also mean that insight as assessed by the PANSS might reflect the present clinical status. At the same time, it might be that the more comprehensive self-report measure may present a trait like phenomenon that

represents an attitude one has toward the illness as it includes acceptance of label and compliance issues, although it is subject to changes more than personality. Previous studies have considered insight as being trait like (e.g. Wiffen et al., 2010) and it seems that at least some aspects of insight cannot be explained by state characteristics (Parellada et al., 2011).

4.3. Discussion of longitudinal findings: impact of symptoms on change of insight

Longitudinal analyses in the current study revealed that a change in self-report insight was predicted by a change in symptoms of disorganization while change in PANSS-insight was predicted by change in positive symptoms, disorganization, excitement and emotional distress. As, in this study, insight decreased between the two-time measurement points, it might be that an increase in disorganization symptoms had an effect on the decrease in insight. Questions have been raised with regard to the possible hampering effect of disorganization symptoms on treatment outcome (Hamm and Firmin, 2016), potentially related to a decrease in insight. The mechanism by which disorganization impacts insight change might take place via changes in cognitive functioning. The effect of disorganization on insight has previously been found and interpreted as being related to cognition, as the core symptoms of disorganization are poor attention, disorientation, abstract thinking, and other cognitive items (Monteiro et al., 2008), processes that have been shown to be related to insight in a meta-analysis (Nair et al., 2014).

Although personality has been shown to have an impact on the various effects of psychosis, such as quality of life and social functioning (van Dijk et al., 2018; Eklund et al., 2004), in the current study it did not predict change in insight. Other factors may play a role in clinical insight change. It may be that the way clinical insight was conceptualized in the scale used in the current study does not capture the complexity of reflective processes, and that, as a result, we did not find a longitudinal association between personality and insight change. Recently, the important role of mentalizing and metacognition in the recovery process of individuals with psychosis was discussed, and a new formulation of insight was accordingly suggested. That is, it was suggested that insight be conceptualized to include a reflective component that goes beyond an awareness of the illness label, and would refer, as well, to construction of meaning and the narrating process (Vohs et al., 2016). Insight defined in this broader way could therefore be related to personality traits, as it presents personal tendencies regarding the way people make sense of the self-experience in the world.

5. Limitations and Implications

A few limitations should be mentioned when considering current findings. First, in the longitudinal analysis, the explained variance was relatively minor, suggesting that other variables may serve as important contributors to insight change. Second, new approaches to personality assessment such as the Hierarchical Taxonomy of Psychopathology (HiTOP; Kotov et al., 2017) were not included in the current study. A recent study suggested that normal personality dimensions assessment, as well as schizotypy and symptoms of psychosis are intertwined and studies should address normal and pathological aspects of personality in the study of psychosis (Cicero et al., 2019). Third, there may be a bias in the current study's sample, given the inclusion of a large percentage of Caucasian males with relatively low symptom levels (it should be noted that symptoms of psychosis and depression were positively skewed at both baseline and follow-up, indicating clustering at the lower end).

With these limitations in mind, the current study adds to the literature on insight in psychosis, showing that self-report insight is cross-sectionally related to personality traits of neuroticism, agreeableness, and extraversion, as well as to severity of depressive symptoms. However, these personality traits, as well as depression, do not predict

insight change across time; only a change in the severity of disorganization symptoms predicted this change. This finding would suggest that special attention should be given to individuals with certain personality profiles, specifically those who exhibit high levels of insight and those who are prone to depression. However, given that these profiles do not predict a change in insight level, clinicians and researchers should explore additional factors that might affect insight and insight-related depression. It might be that contextual factors, such as therapeutic intervention, influence insight more than does personality, or that an interaction between personality and contextual factors such as therapy contribute to insight change. Specifically, therapies that focus on self-reflection as the metacognition insight reflection therapy (Lysaker and Klion, 2017) or intersubjective approach to psychotherapy with people with psychosis (Hasson-Ohayon et al., 2017), may be used to enhance insight while decreasing possible depression as they aim to construct a subjective adaptive meaning of one's illness, not necessarily in line with medical model. Future studies should explore these possibilities in order to deepen our understanding of the relationship between insight and personality across time.

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Contributors

Author IHO conceptualized the research question and wrote the first draft of the manuscript, author ANST managed literature search and contributed to writing of the manuscript, authors FS LdH WC GHMP reviewed advanced draft writing, author LLB undertook the statistical analysis and contributed to the conceptualization of research question.

All authors contributed to and have approved the final manuscript.

Declaration of competing interest

The authors have declared that there are no conflicts of interest in relation to the subject of this study.

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