Journal Articles

2015

Personality domains, duration of untreated psychosis, functioning, and symptom severity in first-episode psychosis

M. Compton
Hofstra Northwell School of Medicine

R. Bakeman

Y. Alolayan

P. M. Balducci
Northwell Health

F. Bernardini
Northwell Health

See next page for additional authors

Follow this and additional works at: https://academicworks.medicine.hofstra.edu/articles

Part of the Psychiatry Commons

Authors

M. Compton, R. Bakeman, Y. Alolayan, P. M. Balducci, F. Bernardini, B. Broussard, A. Crisafio, S. Cristofaro, S. Johnson, C. R. Wan, and +1 additional author

HHS Public Access

Author manuscript

Schizophr Res. Author manuscript; available in PMC 2016 October 01.

Personality Domains, Duration of Untreated Psychosis, Functioning, and Symptom Severity in First-Episode Psychosis

Michael T. Compton, M.D., M.P.H.[a,b,*], **Roger Bakeman, Ph.D.**[c], **Yazeed Alolayan, M.B.B.S.**[d], **Pierfrancesco Maria Balducci, M.D.**[a,e], **Francesco Bernardini, M.D.**[a,e], **Beth Broussard, M.P.H., C.H.E.S.**[a], **Anthony Crisafio, B.S.**[d], **Sarah Cristofaro, M.P.H.**[f], **Patrick Amar, M.D.**[f], **Stephanie Johnson, M.A.**[f], and **Claire Ramsay Wan, M.P.H.**[g]

[a]Lenox Hill Hospital, Department of Psychiatry, New York, NY, USA

[b]Hofstra North Shore–LIJ School of Medicine at Hofstra University, Department of Psychiatry, Hempstead, NY, USA

[c]Georgia State University, Department of Psychology, Atlanta, GA, USA

[d]The George Washington University School of Medicine and Health Sciences, Department of Psychiatry and Behavioral Sciences, Washington, DC, USA

[e]Scuola di Specializzazione in Psichiatria, Dipartimento di Medicina, Università degli Studi di Perugia, Italy

[f]Emory University School of Medicine, Department of Psychiatry and Behavioral Sciences, Atlanta, GA, USA

[g]Tufts University School of Medicine, Physician Assistant Program, Boston, MA, USA

Abstract

Objectives—Early-course psychotic disorders have been extensively studied in terms of phenomenology, but little is known about the influence of personality traits on clinical features of first-episode psychosis. The aim of this study was to explore how the "big five" personality domains (neuroticism, extraversion, openness, agreeableness, and conscientiousness) are associated with treatment delay (duration of untreated psychosis, DUP), functioning, and positive and negative symptom severity.

[*]Corresponding author: Michael T. Compton, M.D., M.P.H., Lenox Hill Hospital, Department of Psychiatry, 111 E. 77th Street, New York, NY 10075. Tel: 212-434-3215. Fax: 212-434-3306. mcompton@nshs.edu.

Methods—Data for these analyses were obtained from 104 participants enrolled from psychiatric inpatient units in Atlanta, Georgia, between August 2008 and March 2011. The NEO Five-Factor Inventory (NEO-FFI) was used to assess personality domains, and all other variables were measured in a standardized and rigorous manner using psychometrically sound instruments. Correlational analyses and multiple linear regressions were carried out to examine the strength of associations between variables of interest.

Results—Findings indicated that except for openness, all the other personality variables contributed to some extent to the variance in DUP. Conscientiousness was positively correlated with functioning. Agreeableness was independently negatively associated with positive symptom severity and extraversion was independently negatively correlated with negative symptom severity.

Conclusions—We report the first evidence suggesting that DUP is in part driven by personality domains. Functioning and symptom severity are also associated with those domains. Personality should be taken into account in order to better understand the phenomenology of early-course psychotic disorders as well as treatment-seeking behaviors.

1. Introduction

The relevance of personality traits among individuals with schizophrenia and related psychotic disorders—both in terms of vulnerability and influencing clinical course—has received research attention in recent decades (Berenbaum and Fujita 1994). Some personality characteristics may negatively affect the course of psychotic disorders in terms of coping with the psychotic disorder and other stressful situations (Horan and Blanchard, 2003), social and work functioning (Lysaker et al. 1998; Lysaker and Taylor, 2007), quality of life (Kentros at al., 1997), and risk for substance abuse (Blanchard et al., 1999). Along these lines, Vohs and colleagues (2013) studied the role of two personality domains, neuroticism and extraversion, on the impairment of intrinsic motivation in schizophrenia, which could mediate diverse outcomes.

The ways in which personality and psychosis influence each other remain unclear. The life-altering experience of ongoing psychosis can be a cause of personality alterations (Hulbert et al., 1996), though evidence also suggests that particular personality traits predate schizophrenia onset (van Os and Jones, 2001). Partly for this reason, recent studies have focused on recent-onset patients who are not yet as impaired by the chronic illness (Horan et al., 2005).

Yet, while extensive research has examined clinical phenomenology of early-course psychotic disorders—including help-seeking and treatment delays, social functioning, and the nature of positive and negative symptoms to name a few features of interest—personality remains relatively rarely considered in such investigations. Among the studies that have taken personality traits of first-episode psychosis patients into account, the "big five" personality traits (neuroticism, extraversion, openness, agreeableness, and

conscientiousness) measured by the NEO Personality Index–Revised or the shorter NEO Five-Factor Inventory (NEO-FFI) have been rarely assessed. In terms of comparing personality domains between first-episode or early-course patients and unaffected controls, Couture et al. (2007) found lower extraversion and higher neuroticism, openness, and agreeableness in first-episode patients. Another report also indicated lower extraversion and higher neuroticism, as well as lower openness and conscientiousness, in early-course schizophrenia (Johansen et al., 2013). Gurrera and colleagues (2014) reported lower extraversion and elevated neuroticism, as well as higher openness and lower agreeableness and conscientiousness.

A few reports in the literature suggest that variations in personality domains among patients with early-course schizophrenia may impact clinical features. For example, Gleeson et al. (2005) found that among patients experiencing first-episode psychosis, lower agreeableness and higher neuroticism could influence relapse. Beauchamp and coworkers (2011) reported links between personality and coping (e.g., neuroticism being associated with poorer coping and related outcomes), confirming previous findings from non-first-episode samples (Lysaker 1999b; 2003; 2004). Healthy or normal personality traits, such as those pertaining to openness, agreeableness, and conscientiousness (Bagby et al., 1997; Camisa et al., 2005; Kentros et al., 1997) have been examined in individuals with psychotic disorders (and more recently with early psychosis patients; Beauchamp et al., 2013) with regard to predicting therapeutic outcomes.

Aside from these initial studies, relatively little is known about the ways in which neuroticism, extraversion, openness, agreeableness, and conscientiousness are associated with critical constructs pertaining to early-course psychosis. Because of research evidence indicating links between personality traits and coping, motivation, and related outcomes among individuals with psychotic disorders, in this analysis, we examined how these personality domains are associated with treatment delay (defined as the duration of untreated psychosis [DUP], the period between the onset of psychotic symptoms and the initial evaluation/treatment for a diagnosed psychotic disorder), functioning, and positive and negative symptom severity. Because delays in treatment-seeking can give rise to differences in clinical outcome, first, we asked whether personality domains were related to DUP. Given the complete dearth of literature on this topic (though other patient-, family-, and services-level predictors of DUP have been established; Compton and Broussard, 2011), we had no a priori hypotheses, but sought to explore associations. Second, we hypothesized that neuroticism would be associated with poorer functioning among first-episode psychosis patients, and that this association would be mediated by DUP if neuroticism were found to be related to both DUP and functioning. Third, we expected neuroticism to be positively, and agreeableness to be negatively, associated with the severity of positive symptoms (e.g., delusions, grandiosity, suspiciousness/persecution, hostility). Fourth, we hypothesized that extraversion and openness would be negatively associated with the severity of negative symptoms (e.g., blunted affect, emotional withdrawal, poor rapport, passive/apathetic social withdrawal). Fifth, because mode of onset of psychosis is a known, strong determinant of DUP (Compton et al., 2008, 2011a, 2011b), we compared its predictive strength relative to DUP with that of the five personality domains, at least for that subset of participants for whom mode of onset could be reliably determined.

2. Methods

2.1. Setting and Sample

As part of a larger project examining the effects of premorbid marijuana use on early-course psychosis (Kelley et al., 2015), 104 patients (recruited and assessed between August 2008 and March 2011) had available data on the key variables of interest in this analysis. Participants were recruited from the inpatient psychiatric units (n=82) or psychiatric emergency service (n=5) of a large, urban, university-affiliated, public sector hospital and from a suburban county psychiatric crisis center (n=17), both in Atlanta, Georgia, and both of which serve a predominantly African American population. Eligibility criteria included: being between the ages of 18 and 40 years, English-speaking, and hospitalized for a first-episode, non-affective psychotic disorder. Potential participants were ineligible if they had known or suspected mental retardation, a Mini-Mental State Examination (MMSE; Folstein et al., 1975; Cockrell and Folstein, 1988) score of <24, a significant medical condition compromising ability to participate, a prior hospitalization for psychosis >3 months before the index hospitalization, prior antipsychotic treatment of >3 months in duration, or inability to provide informed consent. Written informed consent was obtained from all participants prior to study enrollment, and all procedures were approved by the university's institutional review board. While enrolling these 104 participants, 163 other patients were referred to the study team but found to be ineligible or uninterested. Specifically, eight were outside the specified age-range; five were not English- speaking; 55 were not first-episode, non-affective psychosis patients based on the criteria detailed above; four had known or suspected mental retardation; five had a MMSE score of <24; four a significant medical condition compromising ability to participate; 11 were unable to provide informed consent; and the remainder met eligibility criteria but refused to participate.

2.2. Measures and Rating Scales

The *Structured Clinical Interview for DSM-IV Axis I Disorders* (SCID; First et al., 1995)—an in-depth, semi-structured interview informed by collateral information from the medical record, clinicians, and informant interviews when available—was used to establish research diagnoses. The date of onset of psychotic symptoms was determined using the *Symptom Onset in Schizophrenia* (SOS; Perkins et al., 2000) inventory, following an in-depth interview with the patient (including cross-referencing dates with memorable life events to enhance reliability), a chart review, and interviews with 1–3 informants when available. The duration of untreated psychosis (DUP) was operationalized as starting on the date of onset of psychotic symptoms and ending on the date of the patient's first hospitalization for psychosis. Given the expected right-skewed distribution of DUP, analyses relied on log10(DUP+1).

Global functioning was measured using the *Global Assessment of Functioning* (GAF) scale (Hilsenroth et al., 2000) and the *Social and Occupational Functioning Assessment Scale* (SOFAS; Goldman et al., 1992), both of which rely on a 100-point continuum divided into 10-point intervals with descriptive anchors. Inter-rater reliability between the study's two main raters was assessed using a two-way mixed (judges fixed) effects intraclass correlation (ICC) coefficient analysis of variance model (Shrout and Fleiss, 1979). ICC coefficients for

the GAF and SOFAS scores were .68 and .91, respectively. A sum of these two variables (GAF+SOFAS) was used for analyses, as they were highly correlated (r=.74, p<.001).

The *NEO Five-Factor Inventory* (NEO-FFI) is a 60-item abbreviated questionnaire derived from the 240-item NEO Personality Index Revised (NEO-PI-R) (Costa and McCrae, 1992). The NEO-FFI assesses an individual's personality using the "big five" personality traits: neuroticism, extraversion, openness, agreeableness, and conscientiousness (Saucier, 1998). Each of the five domains is represented with 12 items on the NEO-FFI (Saucier, 1998), which, along with the NEO-PI-R, is the most widely used method of measuring personality using the five-factor model (McCrae and Allik, 2002). The items on the NEO-FFI (e.g., "I like to have a lot of people around me"; "I have a clear set of goals and work toward them in an orderly fashion"; "I often try new and foreign foods") are rated on a 5-point Likert scale (which we coded as 0=strongly disagree, 1=disagree, 2=neutral; 3=agree; 4=strongly agree) (Costa and McCrae, 1992). The NEO-FFI has good internal consistency and test-retest reliability (Murray et al., 2003; Saucier, 1998). We had complete data for n=104, except that one participant was missing only one conscientiousness item; thus, rather than scoring conscientiousness as missing, we computed it as 12 times the mean of the 11 items answered.

Positive and negative symptom severity was assessed with the commonly used *Positive and Negative Syndrome Scale* (PANSS; Kay et al., 1987). Following an in-depth interview and a chart review, trained research assessors rated severity of 30 symptoms at present and over the past month on a scale from 1=absent to 7=extreme. The original PANSS positive and negative symptom subscales were used. Inter-rater reliability of the PANSS positive and negative subscale scores was assessed across the study's trained raters with two-way mixed (judges fixed) effects ICC coefficients, which were .92 for both the positive and negative symptom subscales.

For the 83 participants for whom it could be reliably determined, mode of onset of psychotic symptoms was rated by team consensus after the in-depth research interviews with participants and, when available, collateral informants. It was coded as acute with sudden onset, acute with precipitous onset, subacute, gradual, and insidious, as defined for the World Health Organization International Pilot Study of Schizophrenia (Jablensky et al., 1992). These five levels were then trichotomized as *acute* (comprised of the sudden and precipitous categories), *subacute*, and *chronic* (including gradual and insidious categories) for subsequent analysis.

2.3. Data Analyses

Distributional properties were examined for all variables. We began by computing zero-order correlations between the five personality domain scores and the four outcomes of interest (DUP, functioning, positive symptom severity, and negative symptom severity). We then examined these associations, using multiple regression models in which all five personality domains were entered together, in order to examine the independent effects of each personality domain while controlling for the effects of the others. For functioning, positive symptoms, and negative symptoms, we also examined models including DUP as a control variable because it is known to be associated with these early-course features

(Marshall et al., 2005; Perkins et al., 2005). For the subset of participants for whom mode of onset could be reliably determined, we used multiple regression to compare the proportions of DUP variance accounted for uniquely and jointly by the five personality domains and by mode of onset. Finally, post-hoc exploratory tests were used to assess for potential differences in key variables between first-episode patients with and without a mood component.

3. Results

3.1. Sociodemographic and Clinical Characteristics of the Study Sample

Basic demographic characteristics of the sample (Table 1) revealed a mean age of 24.5±5.2 years, and a mean years of educational attainment of 11.9±2.0. The majority of participants were male (74, 71.2%), African American (89, 85.6%), and single and never married (90, 86.5 %). SCID-based diagnoses—the most common of which were schizophrenia, paranoid type (46, 44.2%), psychotic disorder not otherwise specified (16, 15.4%), and schizophreniform disorder (12, 11.5%)—are shown in Table 1. The median DUP was 53.5 weeks, and mean GAF and SOFAS scores were 38.5±12.6 and 42.6±13.1, respectively.

At the time of beginning the research interview, participants had been hospitalized 4.9±3.4 days (median, 4; mode, 3), and the overall length of hospitalization was 9.7±5.1 (median, 8; mode, 7). The majority of participants (71, 68.3%) were prescribed risperidone during hospitalization (daily dosage of 3.9±1.7mg; median, 4; mode, 4; range 1–10). Because antipsychotic medications can produce motor effects that may be confused with negative symptoms (although our PANSS negative symptoms were rated at present and over the past month), we confirmed that risperidone dosage was not significantly correlated with positive or negative symptom severity scores (r=.18 and .16, respectively, both non-significant). Risperidone dosage was only modestly correlated with one of the five personality domains (with agreeableness, r=-.25, p=.04; the other four correlations were non-significant and <. 13).

3.2. Correlations among the Five Personality Domains and the Four Outcome Variables

Correlations for the personality domains and outcome variables are shown in Table 2. Using Cohen's (1988) guidelines (absolute correlations .1–.3 are weak, .3–.5 are moderate, and .5 and above are strong), neuroticism was negatively associated with conscientiousness strongly, with extraversion and agreeableness moderately, and with openness weakly. The remaining four domains were positively correlated amongst themselves. In particular, conscientiousness was strongly correlated with extraversion and moderately correlated with agreeableness. Among the four outcome variables, functioning was negatively correlated, though weakly, with DUP and positive symptom severity, and strongly with negative symptom severity. Other correlations were either weak or, for DUP and negative symptom severity, near zero (see Table 2).

3.3. Associations between NEO-FFI Personality Domains and DUP

To answer our first question—how personality domains relate to treatment delay (DUP)— we compared the zero-order correlations with the betas (standardized partial multiple

regression coefficients) obtained when DUP was regressed on the domain scores. To facilitate this comparison, we reproduced the relevant correlations from Table 2 in Table 3. As shown, neuroticism was positively and extraversion, agreeableness, and conscientiousness negatively correlated with DUP, all significantly (openness was weak and insignificant). In contrast to the correlations, the betas gauge the associations of each domain with DUP controlling for the other domains. As shown in Table 3, whether controlling for other domains or not, higher neuroticism scores and lower extraversion and agreeableness scores tended to be associated with longer DUP, significantly so. Effects for openness were weak and statically non-significant, and whereas the zero-order correlation between conscientiousness and DUP was weakly negative, its beta was positive and not statistically significant. However, not too much should be made of the positive point estimate; the 95% confidence interval included negative values [−.09, .43]. Taken together, the model including the five personality domains accounted for 21% of the variation in DUP scores and suggested unique contributions for neuroticism, extraversion, and agreeableness (all betas significant).

3.4. Associations between NEO-FFI Personality Domains and Functioning

A similar analysis—comparing zero-order correlations with betas—when functioning was regressed on the domain scores revealed a different pattern (see Table 4). For the zero-order correlations, the pattern was similar but reversed compared to the DUP-related findings: neuroticism was negatively and extraversion, agreeableness, and conscientiousness positively correlated with functioning (again openness was weak and non-significant). Betas for these four domains had the same sign as their correlations, but none were statistically significant. Taken together, the model including the five personality domains accounted for 16% of the variation in functioning scores and suggested that none of the domains made unique contributions (no betas significant; the strongest was conscientiousness with $\beta = .21$, $p = .13$), but instead all worked together, in concert, to account for variation in functioning.

To address our second hypothesis—that the association between neuroticism and functioning would be mediated by DUP—we decomposed the total effect of neuroticism into its direct and indirect (mediated by DUP) components (Kline, 2010). As we hypothesized, higher neuroticism tended to be associated with lower functioning ($r = −.28$, the total effect). The direct effect of neuroticism was −.22 (the beta for neuroticism, regressing functioning on both neuroticism and DUP), thus the indirect effect was −.06 (.38, the correlation between neuroticism and DUP, multiplied by −.16, the beta for DUP, regressing functioning on both neuroticism and DUP). Thus 78% of the effect was direct and 22% mediated by DUP. This is probably best characterized as relatively weak, partial mediation.

As an exploratory analysis, undertaken due to the moderate correlation between DUP and functioning ($r = −.25$), we asked whether DUP would account for additional variation in functioning, above and beyond the personality domains. The answer is no; the increase in R^2 when DUP was added to the five domain scores was .012, $F(1,97) = 1.4$, $p = .23$.

3.5. Associations between NEO-FFI Personality Domains and Positive and Negative Symptoms

When positive symptom severity was regressed on the domain scores (see Table 5), only agreeableness seemed to matter. Both the simple correlation and the beta indicated that higher agreeableness tended to be associated with lower positive symptom severity. Taken together, the model including the five personality domains accounted for 18% of the variation in positive symptom severity and suggested that most of the influence was due to agreeableness. Thus, our third hypothesis was partially supported: agreeableness was negatively associated with the severity of positive symptoms, but neuroticism was essentially uncorrelated and not positively associated as we had thought.

When negative symptom severity was regressed on the domain scores (see Table 6), primarily extroversion seemed to matter. The simple correlations indicated that higher extraversion and conscientiousness tended to be associated with lower negative symptom severity. The betas were likewise negative, but only extraversion remained statistically significant, with neuroticism being marginal ($p = .07$). Taken together, the model including the five personality domains accounted for 12% of the variation in negative symptom severity and suggested that unique contributions, judging from the betas, were made primarily by extraversion and neuroticism. Thus, our fourth hypothesis was likewise partially supported: extraversion was inversely associated with the severity of negative symptoms, but openness was essentially uncorrelated and not negatively associated as we had expected.

3.6. Mode of Onset, NEO-FFI Personality Domains, and DUP

To answer our fifth question—comparing mode of onset to the personality domains when predicting DUP—we employed hierarchic multiple regression. The sample consisted of the 83 participants for whom mode of onset (*acute*, *subacute*, or *chronic*) could be reliably determined, and who, as it turns out, were distributed approximately evenly among the three recruitment sites; $\chi^2(2, N = 104) = 0.08$, $p = .96$. When DUP was regressed on the five personality domains, $R^2 = .241$, $F(5,77)$, $p = .001$; and when mode of onset was added, it accounted for an additional 8.5%; $R^2 = .085$, $F(1,76)$, $p = .003$. Reversing the order, when DUP was regressed first on mode of onset, $R^2 = .169$, $F(1,71)$, $p < .001$; and when the five personality domains were added, they accounted for an additional 15.6%; $R^2 = .156$, $F(5,76)$, $p = .006$. Thus, with respect to variation in DUP, the personality domains accounted uniquely for 15.6%, mode of onset uniquely for 8.5%, and the domains and mode of onset jointly for 8.4%. In sum, controlling for mode of onset, the personality domains accounted for significant additional variation in DUP, and their unique contribution was almost twice as much as the unique contribution for mode of onset.

3.7. Schizoaffective Disorder versus Truly Non-Affective Psychotic Disorders

Because of a post-hoc concern that the presence of a mood component could influence symptom severity or personality self-reports—but in light of a limited sample size that precluded the addition of more variables into our models—we conducted post-hoc exploratory tests to determine if any of our variables of interest differed between the small group (15, 14.4%) with schizoaffective disorder, depressive type (11, 10.6%) or

schizoaffective disorder, bipolar type (4, 3.9%) and the larger group with truly non-affective psychotic disorders (89, 85.6%). Although the two groups did not differ significantly on GAF+SOFAS, positive symptom severity, or negative symptom severity, those with a mood component had a significantly longer DUP: 306.0±360.3 weeks (median, 170.5), compared to 139.1±236.0 weeks (median, 30.5) among those with truly non-affective psychotic disorders (Mann-Whitney U-test z=2.27, p=.02). Furthermore, those with a mood component had greater neuroticism (31.3±7.2 compared to 20.1±7.4, p<.001), lesser agreeableness (24.7±6.0 compared to 28.6±6.5, p=.03), and lesser conscientiousness (28.2±7.2 compared to 34.3±7.1, p=.002). These findings indicate a need for future, larger studies to consider the presence of bipolar and depressive symptomatology among first-episode psychosis patients.

4. Discussion

At least three noteworthy findings emerged from this analysis, which is the first study to examine NEO-FFI scores in relation to our key clinical variables in a first-episode psychosis sample. First, personality domains are predictive of DUP. In his article on unresolved questions pertaining to earlier detection and intervention in schizophrenia, Vaglum (1996) proposed that certain innate, premorbid personality types could extend DUP. Yet, virtually no research is available on this topic. The current study suggests that specific personality traits do indeed influence DUP. Specifically, we found a positive correlation between neuroticism and DUP, and a negative correlation between extraversion and agreeableness and DUP. Those with more emotional instability and reactivity—a greater vulnerability to stress, irritability, mood swings, and negative emotional reactions (i.e., neuroticism)—have a significantly longer DUP, even when controlling for other personality domains and the mode of onset of psychosis. On the other hand, those who are more socially engaged, are more talkative, and have higher visibility in the external world (i.e., extraversion) have a shorter DUP, controlling for the other factors. Additionally, those who value getting along with others—and are more concerned about and interested in other people and their emotions (i.e., openness)—have a shorter DUP. Whereas some drivers of DUP are modifiable through early detection and intervention strategies (e.g., improving pathways to care, expanding access to specialty early intervention services, reducing bottlenecks within referral pathways, better educating the public about early signs of psychotic disorders), the present findings suggest that, to some extent, treatment delays might be linked to innate personality traits. The implications of this, vis-à-vis increasing focus on early intervention efforts, should be explored.

Second, we had hypothesized that neuroticism would be inversely associated with functioning at the time of the first episode of psychosis; however, we uncovered that, in addition, conscientiousness, extraversion, and agreeableness were meaningfully associated with functioning in zero-order correlations. Yet, when controlling for all personality domains (and DUP), these specific personality factors were no longer independently significantly predictive of functioning. Unlike DUP, functioning in psychotic disorders has been previously studied with regard to personality. Neuroticism has been shown to be associated with poorer treatment response, greater symptom severity, and impairment in functioning in patients with schizophrenia (Lysaker et al., 1998, 1999a, 1999b; Smith et al., 1995; Camisa

et al., 2005). This is consistent with the association between lower neuroticism and more favorable course and outcome in schizophrenia described by Berenbaum and Fujita (1994), and recently also by Boyette et al. (2013). The lower functioning linked to greater neuroticism could be explained by poor engagement with treatment; e.g., poor engagement with treatment for psychotic disorders seems to be associated with specific personality traits, including neuroticism (Johansen et al., 2013).

With regard to extraversion, Smith et al. (1995) reported that extraversion positively contributed to variability in clinical presentation and treatment response in schizophrenia. Lysaker et al. (1999b) proposed that patients who had higher extraversion would have better outcomes because these personality characteristics would help maintain participation in social networks. Our zero-order correlation is also compatible with an association between extraversion and better functioning. Lecomte et al. (2008) found, somewhat counterintuitively, that poor engagement with treatment was associated with higher levels of agreeableness, which is in contrast to our zero-order correlation between agreeableness and functioning. We know of no prior findings on the association between conscientiousness and functioning in schizophrenia; our analysis revealed that this personality trait was most strongly predictive of functioning, even when controlling for the other factors (with greater conscientiousness being linked to better functioning at the time of the first episode of psychosis).

Third, with regard to associations between personality domains and positive and negative symptoms of psychotic disorders, agreeableness was independently, inversely associated with positive symptom severity, as we had hypothesized, though neuroticism was not. Additionally, extraversion was inversely associated with negative symptom severity, as we had hypothesized, though openness was not. Lysaker and colleagues (2003) reported an association between higher PANSS positive symptoms and lower agreeableness, consistent with our findings. Additionally, several studies report lower agreeableness among individuals with schizophrenia in comparison with control groups (Gurrera et al., 2000; Kentros et al., 1997). Furthermore, some studies have elaborated on the significance of this inverse relationship between agreeableness and positive symptoms, suggesting the possibility that it is either an independent predictor or a mediator that influences the course of the disease or the severity of the symptoms (Gleeson et al., 2005). The inverse relationship between extraversion and negative symptoms documented here is aligned with Lysaker et al. (1999b). On the other hand, a recent study by Gurrera and colleagues (2014), reported that negative symptoms were positively correlated with neuroticism and inversely correlated with conscientiousness, despite our findings that these variables were not significant correlates.

Several methodological limitations must be considered. First, although personality traits are considered to be long-standing and stable, measurable with reliable and valid instruments such as the NEO-FFI, it is possible that recent and ongoing experiences of psychosis, or treatment of it, could have affected participants' responses. The extent to which such "state" experiences influence reporting of presumed "trait" characteristics is largely unknown. Second, and related to the first point, although the NEO-FFI has been used in at least 10 prior studies involving individuals with schizophrenia and other psychotic disorders (Gurrera

et al., 2000; Pillmann et al., 2003; Reno, 2004; Bell et al., 2007; Couture et al., 2007; Brenner et al., 2009; Boyette et al., 2013; Johansen et al., 2013; Gurrera et al., 2014; Suslow et al., 2014;), it has not yet been truly validated in this population. Third, while our research team has expertise in interview-based retrospective measurement using rigorous and standardized procedures, the risk of recall error, for variables such as DUP, must be recognized; furthermore, it is unknown whether such error could include systematic bias that might have influenced the results of hypothesis testing in one direction or the other. Fourth, as is often the case with first-episode psychosis research, our sample size was limited, which undoubtedly negatively impacted power, especially when mode of onset of psychosis was added to the models (given that data on this variable were not available for all participants). Regarding our models, the cases-to-variables ratio is of concern. While some suggest that the minimum ratio needed for stability of regression results is ~15 (Stevens, 2001), others suggest 5 as a bare minimum, but note that higher ratios are desirable, especially when variables are skewed, effects sizes are anticipated to be small, or measurement is unreliable (Tabachnick and Fidell, 1989). Our limited sample size precluded us from adding other variables of interest to the models; in particular a variable indicating the presence of a mood component (i.e., those with depressive type or bipolar type schizoaffective disorder, as opposed to those with truly non-affective psychotic disorders). Fifth, the generalizability of our findings may be limited, because of the specific demographic (e.g., predominantly African American males) and clinical characteristics of our sample. Regarding the latter, all subjects were recruited from acute psychiatric care settings, and as such, associations between personality domains and key variables (e.g., functioning, symptoms) might not be generalizable to periods of clinical stability. Sixth, although we were interested in determining whether personality domains were related to DUP, and although we considered one illness-related variable that is clearly associated with DUP (mode of onset of psychosis), there are undoubtedly many other factors—including those with which our sample was particularly burdened, such as unemployment, prior incarceration, impoverishment, and limited social support systems—that might have contributed to DUP in this sample. Finally, we would have ideally measured key variables that could mediate the association between personality domains and DUP, such as coping and motivation.

More investigations are needed to better understand how personality relates to key features of early-course psychosis. Therapeutic improvements in active coping strategies are influenced by personality traits in psychosis (Beauchamp et al., 2011) and such traits may also mediate internal motivation (Barch et al., 2008; Vohs et al., 2013), which is often disrupted in schizophrenia and which adversely affects neurocognitive performance and psychosocial functioning (Barch, 2005; Nagakami et al., 2010). In this context and based on these initial findings, additional studies, ideally ones that are longitudinal, involve larger samples, and explore mediating and moderating variables, are warranted. Our results suggest that early-course phenomenology cannot be fully understood without taking into account the role of accepted, measurable domains of personality.

Acknowledgments

References

Bagby RM, Bindseil KD, Schuller DR, Rector NA, Young LT, Cooke RG, Seeman MV, McCay EA, Joffe RT. Relationship between the five-factor model of personality and unipolar, bipolar and schizophrenic patients. Psychiatry Res. 1997; 70:83–94. [PubMed: 9194202]

Barch DM. The relationships among cognition, motivation, and emotion in schizophrenia: how much and how little we know. Schizophr Bull. 2005; 31:875–881. [PubMed: 16079388]

Barch DM, Yodkovik N, Sypher-Locke H, Hanewinkel M. Intrinsic motivation in schizophrenia: relationships to cognitive function, depression, anxiety, and personality. J Abnormal Psychol. 2008; 117:776–787.

Beauchamp MC, Lecomte T, Lecomte C, Leclerc C, Corbière M. Personality traits in early psychosis: relationship with symptom and coping treatment outcomes. Early Interv Psychiatry. 2011; 5:33–40. [PubMed: 21272273]

Beauchamp MC, Lecomte T, Lecomte C, Leclerc C, Corbière M. Do personality traits matter when choosing a group therapy for early psychosis? Psychol Psychother. 2013; 86:19–32. [PubMed: 23386553]

Bell M, Fiszdon J, Richardson R, Lysaker P, Bryson G. Are self-reports valid for schizophrenia patients with poor insight? Relationship of unawareness of illness to psychological self-report instruments. Psychiatry Res. 2007; 151:37–46. [PubMed: 17343920]

Berenbaum H, Fujita F. Schizophrenia and personality: exploring the boundaries and connections between vulnerability and outcome. J Abnorm Psychol. 1994; 103:148–158. [PubMed: 8040476]

Blanchard JJ, Squires D, Henry T, Horan WP, Bogenschutz M, Lauriello J, Bustillo J. Examining an affect regulation model of substance abuse in schizophrenia: the role of traits and coping. J Nerv Ment Dis. 1999; 187:72–79. [PubMed: 10067946]

Boyette LL, Korver-Nieberg N, Verweij K, Meijer C, Dingemans P, Cahn W, de Haan L. for GROUP. Associations between the Five-Factor Model personality traits and psychotic experiences in patients with psychotic disorders, their siblings and controls. Psychiatry Res. 2013; 210:491–497. [PubMed: 23890697]

Brenner K, Liu A, Laplante DP, Lupien S, Pruessner JC, Ciampi A, Joober R, King S. Cortisol response to a psychosocial stressor in schizophrenia: blunted, delayed, or normal? Psychoneuroendocrinol. 2009; 34:859–868.

Camisa KM, Bockbrader AM, Lysaker P, Rae LL, Brenner CA, O'Donnel BF. Personality traits in schizophrenia and related personality disorders. Psychiatry Res. 2005; 133:23–33. [PubMed: 15698674]

Cockrell JR, Folstein MF. Mini-mental state examination (MMSE). Psychopharmacol Bull. 1988; 24:689–692. [PubMed: 3249771]

Cohen, J. Statistical Power Analysis for the Behavioral Sciences. Hillsdale, NJ: Lawrence Erlbaum Associates; 1988.

Compton MT, Broussard B. Conceptualizing the multi-faceted determinants of the duration of untreated psychosis. Curr Psychiatry Rev. 2011; 7:1–11.

Compton MT, Chien VH, Leiner AS, Goulding SM, Weiss PS. Mode of onset of psychosis and family involvement in help-seeking as determinants of duration of untreated psychosis. Soc Psychiatry Psychiatr Epidemiol. 2008; 43:975–982. [PubMed: 18604616]

Compton MT, Gordon TL, Goulding SM, Esterberg ML, Carter T, Leiner AS, Weiss PS, Druss BG, Walker EF, Kaslow NJ. Patient-level predictors and clinical correlates of duration of untreated psychosis among hospitalized first-episode patients. J Clin Psychiatry. 2011a; 72:225–232. [PubMed: 21382306]

Compton MT, Gordon TL, Weiss PS, Walker EF. The "doses" of initial, untreated hallucinations and delusions: a proof-of-concept study of enhanced predictors of first-episode symptomatology and functioning relative to duration of untreated psychosis. J Clin Psychiatry. 2011b; 72:1487–1493. [PubMed: 21294999]

Costa, PT.; McCrae, RR. Revised NEO personality inventory (NEO-PI-R) and NEO five factor inventory (NEO-FFI) Professional Manual. Odessa, FL: Psychological Assessment Resources, Odessa, FL; 1992.

Couture S, Lecomte T, Leclerc C. Personality characteristics and attachment in first episode psychosis: impact on social functioning. J Nerv Ment Dis. 2007; 195:631–639. [PubMed: 17700294]

First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured Clinical Interview for DSM-IV Axis I Disorders – Patient edition (SCID-I/P, version 2.0). New York State Psychiatric Institute. Biometrics Research Department; New York: 1995.

Folstein MF, Folstein SE, McHugh PR. "Mini Mental State": a practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975; 12:189–198. [PubMed: 1202204]

Gleeson JF, Rawlings D, Jackson HJ, McGorry PD. Agreeableness and neuroticism as predictors of relapse after first-episode psychosis: a prospective follow-up study. J Nerv Ment Dis. 2005; 193:160–169. [PubMed: 15729105]

Goldman HH, Skodal AE, Lave TR. Revising Axis V for DSM-IV: a review of measures of social functioning. Am J Psychiatry. 1992; 149:1148–1156. [PubMed: 1386964]

Gurrera RJ, McCarley RW, Salisbury D. Cognitive task performance and symptoms contribute to personality abnormalities in first hospitalized schizophrenia. J Psychiatr Res. 2014; 55:68–76. [PubMed: 24750960]

Gurrera RJ, Nestor PG, O'Donnell BF. Personality traits in schizophrenia: comparison with a community sample. J Nerv Ment Dis. 2000; 188:31–35. [PubMed: 10665458]

Hilsenroth MJ, Ackerman SJ, Blagys MD, Baumann BD, Baity MR, Smith SR, Price JL, Smith CL, Heindselman TL, Mount MK, Holdwick DJ. Reliability and validity of DSM-IV Axis V. Am J Psychiatry. 2000; 157:1858–1863. [PubMed: 11058486]

Horan WP, Blanchard JJ. Emotional responses to psychosocial stress in schizophrenia: the role of individual differences in affective traits and coping. Schizophr Res. 2003; 60:271–283. [PubMed: 12591589]

Horan WP, Subotnik KL, Reise SP, Ventura J, Nuechterlein KH. Stability and clinical correlates of personality characteristics in recent-onset schizophrenia. Psychol Med. 2005; 35:995–1005. [PubMed: 16045066]

Hulbert CA, Jackson HJ, McGorry PD. Relationship between personality and course and outcome in early psychosis: a review of the literature. Clin Psychol Rev. 1996; 16:707–727.

Jablensky, A.; Sartorius, N.; Ernberg, G.; Anker, M.; Korten, A.; Cooper, JE.; Day, R.; Bertelsen, A. Psychol Med Monograph Supplement. Vol. 20. Cambridge: Cambridge University Press; 1992. Schizophrenia: manifestations, incidence and course in different cultures: a World Health Organization ten-country study.

Johansen R, Melle I, Cabral Iversen V, Hestad K. Personality traits, interpersonal problems and therapeutic alliance in early schizophrenia spectrum disorders. Compr Psychiatry. 2013; 54:1169–1176. [PubMed: 23856387]

Kay SR, Fizbein A, Opler LA. The Positive and negative Syndrome Scale (PANSS) for schizophrenia. Schizophr Bull. 1987; 13:261–276. [PubMed: 3616518]

Kelley, ME.; Ramsay Wan, C.; Broussard, B.; Crisafio, A.; Cristofaro, S.; Johnson, S.; Reed, TA.; Haggard, PJ.; Kaslow, NJ.; Walker, EF.; Compton, MT. Earlier and escalating premorbid marijuana use is associated with earlier age at onset of schizophrenia and related psychotic disorders. 2015. (submitted)

Kentros M, Smith TE, Hull J, McKee M, Terkelsen K, Capalbo C. Stability of personality traits in schizophrenia and schizoaffective disorder: a pilot project. J Nerv Ment Dis. 1997; 185:549–555. [PubMed: 9307616]

Kline, RB. Principles and Practice of Structural Equation Modeling. 3. New York: The Guilford Press; 2010.

Lecomte T, Spidel A, Leclerc C, MacEwan GW, Greaves C, Bentall RP. Predictors and profiles of treatment non-adherence and engagement in services problems in early psychosis. Schizophr Res. 2008; 102:295–302. [PubMed: 18295458]

Lysaker PH, Bell MD, Bryson GJ, Kaplan E. Personality as a predictor of the variability of insight in schizophrenia. J Nerv Ment Dis. 1999a; 187:119–122. [PubMed: 10067955]

Lysaker PH, Bell MD, Kaplan E, Bryson G. Personality and psychosocial dysfunction in schizophrenia: the association of extraversion and neuroticism to deficits in work performance. Psychiatry Res. 1998; 80:61–68. [PubMed: 9727964]

Lysaker PH, Bell MD, Kaplan E, Greig TC, Bryson GJ. Personality and psychopathology in schizophrenia: the association between personality traits and symptoms. Psychiatry. 1999b; 62:36–48. [PubMed: 10224622]

Lysaker PH, Bryson GJ, Marks K, Greig TC, Bell MD. Coping style in schizophrenia: associations with neurocognitive deficits and personality. Schizophr Bull. 2004; 30:113–121. [PubMed: 15176766]

Lysaker PH, Taylor AC. Personality dimensions in schizophrenia: associations with symptoms and coping concurrently and 12 months later. Psychopathology. 2007; 40:338–344. [PubMed: 17630502]

Lysaker PH, Wilt MA, Plascak-Hallberg CD, Brenner CA, Clements CA. Personality dimensions in schizophrenia: associations with symptoms and coping. J Nerv Ment Dis. 2003; 191:80–86. [PubMed: 12586960]

Marshall M, Lewis S, Lockwood A, Drake R, Jones P, Croudace T. Association between duration of untreated psychosis and outcome in cohorts of first-episode patients: a systematic review. Arch Gen Psychiatry. 2005; 62:975–983. [PubMed: 16143729]

McCrae, RR.; Allik, J. The Five-Factor Model of Personality across Cultures. New York, New York: Kluwer Academic/Plenum Publishers; 2002.

Murray G, Rawlings D, Allen NB, Trinder J. NEO five-factor inventory scores: psychometric properties in a community sample. Measurement Eval Counsel Devel. 2003; 36:140–149.

Nakagami E, Hoe M, Brekke JS. The prospective relationships among intrinsic motivation, neurocognition, and psychosocial functioning in schizophrenia. Schizophr Bull. 2010; 36:935–948. [PubMed: 20462998]

Perkins DO, Gu H, Boteva K, Lieberman JA. Relationship between duration of untreated psychosis and outcome in first-episode schizophrenia: a critical review and meta-analysis. Am J Psychiatry. 2005; 162:1785–804. [PubMed: 16199825]

Perkins DO, Leserman J, Jarskog LF, Graham K, Kazmer J, Lieberman JA. Characterizing and dating the onset of symptoms in psychotic illness: the Symptom Onset in Schizophrenia (SOS) inventory. Schizophr Res. 2000; 44:1–10. [PubMed: 10867307]

Pillmann F, Bloink R, Balzuweit S, Haring A, Marneros A. Personality and social interactions in patients with acute brief psychoses. J Nerv Ment Dis. 2003; 191:503–508. [PubMed: 12972852]

Reno RM. Personality characterizations of outpatients with schizophrenia, schizophrenia with substance abuse, and primary substance abuse. J Nerv Ment Dis. 2004; 192:672–681. [PubMed: 15457110]

Saucier G. Replicable item-cluster subcomponents in the NEO Five Factor Inventory. J Pers Assess. 1998; 70:263–276. [PubMed: 9697330]

Shrout PE, Fleiss JL. Intraclass correlations: uses in assessing rater reliability. Psychol Bull. 1979; 86:420–428. [PubMed: 18839484]

Smith TE, Shea MT, Schooler NR, Levin H, Deutsch A, Gradstein E. Personality traits in schizophrenia. Psychiatry. 1995; 59:99–112. [PubMed: 7568541]

Stevens, JP. Applied Multivariate Statistics for the Social Sciences. 4. Psychology Press; 2001. p. 143

Suslow T, Lindner C, Kugel H, Egloff B, Schmukle SC. Using implicit association tests for the assessment of implicit personality self-concepts of extraversion and neuroticism in schizophrenia. Psychiatry Res. 2014; 218:272–276. [PubMed: 24816120]

Tabachnick, BG.; Fidell, LS. Using Multivariate Statistics. 2. HarperCollins; 1989. p. 129

Vaglum P. Earlier detection and intervention in schizophrenia: unsolved questions. Schizophr Bull. 1996; 22:347–51. [PubMed: 8782290]

van Os J, Jones PB. Neuroticism as a risk factor for schizophrenia. Psychol Med. 2001; 31:1129–1134. [PubMed: 11513380]

Vohs JL, Lysaker PH, Nabors L. Associations of personality with intrinsic motivation in schizophrenia. Psychiatry Res. 2013; 208:78–80. [PubMed: 23566367]

Table 1

Basic Sociodemographic and Clinical Characteristics of the Sample of First-Episode Psychosis Patients (n=104)

Age at hospitalization, years	24.5±5.2
Years of educational attainment	11.9±2.0
Gender	
Male	74 (71.2%)
Female	30 (28.9%)
Race	
Black/African American	89 (85.6%)
White	7 (6.7%)
Other	8 (7.7%)
Marital Status	
Single and never married	90 (86.5%)
Married or living with a partner	5 (4.8%)
Separated or divorced	9 (8.7%)
SCID-Based Diagnosis	
Schizophrenia, paranoid type	46 (44.2%)
Psychotic disorder not otherwise specified	16 (15.4%)
Schizophreniform disorder	12 (11.5%)
Schizoaffective disorder, depressive type	11 (10.6%)
Schizophrenia, undifferentiated type	9 (8.7%)
Schizoaffective disorder, bipolar type	4 (3.9%)
Schizophrenia, disorganized type	2 (1.9%)
Brief psychotic disorder	2 (1.9%)
Delusional disorder	2 (1.9%)
Duration of Untreated Psychosis (median, in weeks)	53.5
Global Assessment of Functioning	38.5±12.6
Social and Occupational Functioning Assessment Scale	42.6±13.1
PANSS scores	
Positive Symptom Scale	22.7±5.0
Negative Symptom Scale	21.2±6.1
NEO-FFI personality domain scores	
Neuroticism	21.6±8.6
Extraversion	29.5±6.7
Openness	27.0±4.7
Agreeableness	28.3±6.7

Conscientiousness	33.4±7.6

Table 2

Correlations among Personality Domains and Outcome Variables (n=104)

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Neuroticism	—							
2. Extraversion	−.44 **							
3. Openness	−.11	.21 *						
4. Agreeableness	−.33 **	.20 *	.16					
5. Conscientiousness	−.53 **	.65 **	.25 *	.36 **				
6. DUP	.38 **	−.32 **	−.10	−.29 **	−.22 *			
7. Functioning	−.28 **	.31 **	.09	.25 **	.37 **	−.25 *		
8. Positive symptom severity	.06	−.07	−.02	−.38 **	−.01	.19	−.23 *	
9. Negative symptom severity	.01	−.28 **	−.07	−.14	−.23 *	.05	−.54 **	.17

*
$p < .05$

**
$p < .01$

Table 3

Predicting the Duration of Untreated Psychosis (DUP) from Personality Domains (n=104)

Variable	Simple Correlations		Multiple Regression	
	r	p	β	p
Neuroticism	.38	.000	.29	.010
Extraversion	−.32	.001	−.26	.035
Openness	−.10	.29	−.03	.76
Agreeableness	−.29	.003	−.20	.049
Conscientiousness	−.22	.023	.17	.19
Multiple regression statistics			R^2=.21, $p < .001$ $F(5,98) = 5.2$	

Table 4

Predicting Functioning (GAF+SOFAS) from Personality Domains, Controlling for DUP (n=104)

	Simple Correlations		Multiple Regression	
Variable	r	p	β	p
Neuroticism	−.28	.004	−.08	.48
Extraversion	.31	.002	.11	.36
Openness	.09	.36	−.01	.89
Agreeableness	.25	.009	.13	.19
Conscientiousness	.37	.000	.21	.13
Multiple regression statistics			$R^2 = .16$, $p = .003$ $F(5,98) = 3.9$	

Table 5

Predicting Positive Symptom Severity from Personality Domains, Controlling for DUP (n=104)

Variable	Simple Correlations		Multiple Regression	
	r	p	β	p
Neuroticism	.06	.57	−.04	.73
Extraversion	−.07	.46	−.15	.23
Openness	−.02	.85	.02	.80
Agreeableness	−.38	<.001	−.45	<.001
Conscientiousness	−.01	.92	.22	.10
Multiple regression statistics			$R^2 = .18, p = .002$ $F(5,98) = 4.3$	

Table 6

Predicting Negative Symptom Severity from Personality Domains, Controlling for DUP (n=104)

Variable	Simple Correlations		Multiple Regression	
	r	p	β	p
Neuroticism	.01	.91	−.21	.07
Extraversion	−.28	.005	−.25	.05
Openness	−.07	.47	.01	.90
Agreeableness	−.14	.16	−.11	.31
Conscientiousness	−.23	.02	−.15	.30
Multiple regression statistics			$R^2 = .12$, $p = .032$ $F(5,98) = 2.6$	