Cognitive Symptom Trajectories among Forensic Inpatients Diagnosed with Psychotic Disorders

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Introduction

The majority of forensic inpatients, including those who have been adjudicated insane at the time of an offense, live with psychotic disorders (Fazel & Danesh, 2002). Psychotic disorders, such as schizophrenia, often involve experiencing atypical perceptions, beliefs, and thoughts. First signs of these disorders typically occur during late adolescence and early adulthood. Due to the complex nature of the etiology of these disorders, little is known about cognitive symptom trajectories across adulthood. Cognitive symptoms involve dysfunctions in processing, storing, and retrieving information. Research identifies six areas in which these patients have the most dysfunction; processing speed, reasoning/problem-solving, attention/volition, verbal memory, visual memory, and working memory (Garcia, Viechtbauer, Simons, van Os, & Krabbendam, 2009; Keefe, & Harvey, 2012). Research shows these cognitive symptoms having a deleterious impact on the lives of individuals living with psychotic disorders (Keefe & Harvey, 2012). Additionally, patients with psychotic disorders often have comorbid (i.e., co-occurring) disorders and symptoms such as mood disorders (e.g., depression). Although common, the impact of comorbid mood symptoms on cognitive symptoms is still unclear. Clinicians and researchers need an accurate understanding of the cognitive symptoms that patients living with psychotic disorders experience so treatment strategies can be improved.

Research on the course of cognitive symptoms has been inconclusive, leaving a discrepancy between two competing trajectory models: the *Neurodevelopmental* and *Neurodegenerative* models. The Neurodevelopmental model—primarily supported by longitudinal studies—describes a decrease in cognitive symptom severity from young adulthood to older adulthood (Heaton, 2001; Kurtz, 2005) while the Neurodegenerative model—primarily

derived from cross-sectional studies and supported from neuroimaging studies—shows an increase in cognitive symptom severity from young to older adulthood (Herold, Schmid, Lässer, Seidl, & Schröder, 2017; Irani et al., 2011; Hulshoff Pol et al., 2002). To date, studies have been inconsistent in determining which areas of cognitive symptoms change over time, have used small or nonrepresentative samples, and have methodological discrepancies (e.g., not accounting for factors such as medication use, age of onset, and length of time at an institution in their analyses; Heaton, 2001; Herold et al., 2017). With two competing models, clinicians cannot be sure how cognitive symptoms will impact treatment planning.

Research on associations between comorbid mood symptoms and cognitive symptoms is also inconclusive. While some research demonstrates patients with schizophrenia and comorbid mood disorders have worse cognitive outcomes than patients without comorbid mood disorders (Depp et al., 2007), other research reports patients with schizoaffective disorder (a schizophrenia spectrum disorder with major depressive episodes) demonstrate better cognitive functioning than those with schizophrenia alone (Bora, Yucel, & Pantelis, 2009). The ambiguity of the impact of mood symptoms on cognitive symptom severity limits clinician insight into how to tailor treatments for those with and without comorbid mood symptoms.

Current Study

To better inform clinicians of their patient's cognitive symptoms across adulthood, this two-part study seeks to first resolve the discrepancy between the two trajectory models, and secondly to explore the impact of comorbid mood symptoms on cognitive symptoms. We[1] use a cross-sectional approach to examine mean scores for two measures of cognitive dysfunction across 1) three age groups and 2) diagnostic groups from a sample of adult forensic inpatients

[1] Independent research project in collaboration with Dr. David M. Glassmire under the mentorship of Dr. Danielle Burchett

diagnosed with psychotic disorders. Within a sample of inpatients living with psychotic disorders, we hypothesized our overall findings would be consistent with the Neurodegenerative model, where young adults would exhibit some cognitive dysfunction, which would be somewhat more severe in middle-age adults, and which would be significantly worse in older. For the second part of our study examining differences among schizophrenia and schizophrenia with mood diagnostic groups, we conducted exploratory analyses without a priori hypotheses.

Method

Participants

We utilized an archival dataset of 708 adult forensic inpatients diagnosed with psychotic disorders (73.7% male) with an age range of 18 to 87 years (M = 40.20, SD = 10.72). The average length of time in hospital by time of testing was 2.46 years (SD = 4.30). The ethnic composition of patients was Caucasian (50.1%), African American (27.4%), Hispanic (17.4%), Asian American (2.4%), and Other races (2.7%). Demographics of subgroups for the second part of our analyses can be provided upon request.

Measures

The Minnesota Multiphasic Personality Inventory-2 Restructured Form (MMPI-2-RF; Ben-Porath & Tellegen, 2008/2011) is a 338-item personality and psychopathology self-report inventory and is commonly used by mental health clinicians. We used the Variable Response Inconsistency (VRIN-r) and Cognitive Complaints (COG) scales in this study. VRIN-r is a test validity indicator, designed to indicate when test-takers are randomly filling in options (random responding), but high scores on this indicator ($\geq$ 80) can also suggest issues with reading comprehension, fatigue, and cognitive dysfunction (Ben-Porath, 2012). assesses self-reported cognitive dysfunction severity (e.g., memory, attention, and concentration problems).

Procedures

Based on neuropsychological studies of patients with schizophrenia across the lifespan (Herold et al., 2017), we divided patients into the following age groups: young adult (18-34 years), middle adult (35-49 years), and older adult (≥ 50 years). We first examined ANOVAs and Hedges' *g* values to compare mean VRIN-r and COG scores across age groups. For COG, we excluded patients with invalid tests indicated by our validity indicators (CNS ≥ 18; VRIN-r ≥ 80; TRIN-r ≥ 80; F-r ≥ 120; Fp-r ≥ 100; RBS ≥ 80) (included $n = 632$), as previous research suggests invalid test-taking approaches can decrease the validity of the substantive scales (Gervais, Ben-Porath, Wygant, & Green, 2008; Burchett & Ben-Porath, 2010). For subset analyses, we split the sample into two groups: psychotic disorder only versus psychotic and mood disorders. We examined mean score differences using *t*-tests within each age group to determine the impact of mood symptoms on severity of cognitive symptoms.

Results

For between-age group analyses, we found no significant mean differences in VRIN-r or COG scores [$F(2, 705) = 1.52$, $p = .22$; $F(2, 456) = .69$, $p = .51$] (Table 1). Contrary to our hypothesis, these nonsignificant results suggest age may have no impact on cognitive symptom severity for adults diagnosed with psychotic disorders. Further, we observed no significant differences in subsample analyses, suggesting comorbid mood symptoms may have little to no impact on cognitive symptom severity for patients with psychotic disorders (Table 2).

Discussion

Results were statistically and practically nonsignificant in overall and subset analyses using indirect (VRIN-r) and self-report (COG) measures of cognitive dysfunction. This may indicate cognitive problems do not change dramatically with age or in the presence of comorbid mood symptoms. This would suggest that major alterations of cognitive symptom treatments are not needed for different age groups or for patients with comorbid depressive symptoms. An alternative explanation could be that our measures were not sensitive enough to differences in cognitive symptom severity. VRIN-r may be better suited to detect issues with reading comprehension, uncooperativeness, and fatigue (Ben-Porath & Tellegen, 2008/2011; Ben-Porath, 2012). As COG is a self-report measure of cognitive problems and a lack of insight into symptoms is relatively common among patients with psychotic disorders (Nair, Palmer, Alemanc, & David, 2013), limited patient awareness into their cognitive symptoms could make COG of modest utility in this context. Additionally, COG item endorsement could be inflated by other psychosis-related symptoms reported by this patient population (e.g., odd thoughts) not directly due to memory or concentration problems. These limitations of our measures bring to light the importance of multimethod assessment for these complex symptoms. Future studies should use measures that are particularly sensitive to cognitive symptoms as well as clinician- and family-rated measures to provide clinicians with a more comprehensive understanding of the course of cognitive symptoms across adulthood for patients with psychotic disorders.

Appendix 1

Table 1

Variable Response Inconsistency (VRIN-r) and Cognitive Complaints (COG) scores for all younger, middle, and older patients diagnosed with psychotic disorders

	Younger (18-34 years)			Middle (34-49 years)			Older (> 50 years)				
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*F*	*p*
Variable Response Inconsistency (VRIN-r)	236	59.94	17.10	338	59.36	14.12	134	57.12	15.03	1.52	.22
Cognitive Complaints (COG)	148	51.18	11.62	216	50.37	9.95	95	51.84	10.54	.69	.51

Note. For Cognitive Complaints (COG) analyses, invalid protocols (CNS ≥ 18; VRIN-r ≥ 80; TRIN-r ≥ 80; F-r ≥ 120; Fp-r ≥ 100; RBS ≥ 80) were excluded.

Table 2

Variable Response Inconsistency (VRIN-r) and Cognitive Complaints (COG) scores for patients with psychotic disorders with and

without comorbid mood symptoms

		Schizophrenia Only			Schizophrenia with Mood				
		n	*M*	*SD*	*n*	*M*	*SD*	*t*	*p*
Younger (18-34 years)	VRIN-r	116	59.03	17.18	120	60.82	17.05	-.80	.42
	COG	81	50.52	11.78	67	51.99	11.47	-.76	.45
Middle (34-49 years)	VRIN-r	172	59.44	13.64	166	59.29	14.64	0.10	.92
	COG	116	50.59	10.03	100	50.12	9.89	.34	.73
Older (≥ 50 years)	VRIN-r	65	57.12	16.16	69	57.12	14.00	.003	.998
	COG	46	50.46	9.16	49	53.14	11.64	-1.25	.22

Note. VRIN-r: Variable Response Inconsistency. For Cognitive Complaints (COG) analyses, invalid protocols (CNS ≥ 18; VRIN-r ≥ 80; TRIN-r ≥ 80; F-r ≥ 120; Fp-r ≥ 100; RBS ≥ 80) were excluded.

Appendix 2

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