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Cognitive deficits in nonaffective functional psychoses: A study in the Democratic Republic of Congo

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ABSTRACT

Cognition has been studied extensively in schizophrenia in Western countries. Far less research is devoted, however, to cognitive functioning in brief psychotic disorder and schizophreniform disorder. Moreover, few studies have been performed in third world countries. In this study, we want to fill this gap by comparing the cognitive functioning of three groups of ambulant, first-episode patients with a non-affective psychosis in the Democratic Republic of Congo. To test if cognitive dysfunction is a core symptom of psychosis in an African population, 153 healthy control subjects are compared with a sample of 68 patients with brief psychotic disorder, 50 patients with schizophreniform disorder, and 70 patients with schizophrenia in a cross-sectional study on several distinctive cognitive domains including verbal, visual, and working memory, attention, visuomotor control, motor speed, verbal fluency, and executive functions. In addition, these three groups of patients are compared among themselves on these cognitive domains. Results indicate that patients perform significantly worse than healthy controls on all cognitive domains with cognitive deficits being most pronounced in verbal and working memory, attention, motor speed, and executive functions. No major differences were found, however, between the three patient groups.

1. Introduction

Cognitive functioning is intensively studied in schizophrenia and cognitive deficits are considered to be core symptoms of schizophrenia for several reasons (Frith, 1996; Green, 1996; Aleman et al., 2006; Keefe et al., 2006). First, neurocognitive deficits can be assessed in the overwhelming majority of patients (Keefe et al., 2006) including first-episode patients, chronic patients (Hoff et al., 1992; Harvey et al., 1998; Bilder et al., 2000) and also antipsychotic-naive patients (Mohamed et al., 1999; Hill et al., 2004). In this context, meta-analytic techniques suggest that patients with schizophrenia perform more than a full standard deviation below the normal mean in numerous areas of neurocognitive ability (Heinrichs and Zakzanis, 1998). Second, these impairments are very similar in profile and severity at the time of the first psychotic episode to those seen in patients with more chronic illness (Saykin et al., 1991). The fact that these impairments are present in antipsychotic naive patients and in patients not currently on antipsychotic treatment indicates that they are not a deleterious effect of treatment. Third, there is evidence that neurocognitive impairment is not simply the result of the symptoms. In the Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE) study, an 'all-comer' clinical trial, these deficits are modestly related to negative symptoms and essentially independent of positive symptom severity (Keefe et al., 2006) and similar findings were also obtained in other studies (Heydebrand et al., 2004). Finally, and most importantly, the severity of cognitive deficits in schizophrenia is associated with various aspects of poor outcome, such as the inability to acquire skills, poor social problem-solving, and poor community functioning (Green, 1996; Keefe et al., 2003). In fact, cognitive impairment may be among the strongest predictors of functional outcome in patients with schizophrenia (Green, 1996; Harvey et al., 1998; Velligan et al., 2000).

Whereas a vast amount of research has been devoted to the study of cognitive functioning in schizophrenia in Western countries, almost no studies have explored cognitive functioning in psychosis in African countries. It seems interesting to complement Western studies on cognition in psychosis with studies from an African population. Indeed, multi-center studies conducted by the World Health Organization (WHO) have highlighted important differences between 'Western' and 'Third World' populations as regards the course and

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outcome of schizophrenia, with a significantly better prognosis in the developing countries (Jablensky, 2000). The factors underlying the better outcome of schizophrenia in developing countries remain essentially unknown but are likely to involve interactions between genetic variation and specific aspects of the environment (Jablensky, 2000). Independently of the WHO studies, a high proportion of better outcomes in schizophrenia in developing countries has been reported by several investigators (Kulhara and Chandiramani, 1988; Ohaeri, 1993; Thara et al., 1994).

The goal of this study is twofold. First, we want to examine cognitive functioning in an African population of first-episode patients with non-affective functional psychoses to verify whether neurocognitive deficits constitute indeed one of the core symptoms of patients with psychosis in the Democratic Republic of Congo in comparison with a group of healthy control subjects. To test this, patients and healthy controls were examined on several, distinctive, cognitive domains including verbal memory, visual memory, working memory, attention, visuomotor control, motor speed, verbal fluency, and executive functions as it was hypothesized that healthy controls — controlling for gender, age, and level of education — would score better on these cognitive tests than patients with a non-affective psychosis, particularly in memory, attention, and executive functioning (Heinrichs and Zakzanis, 1998; Goldberg et al., 2003; Mishara and Goldberg, 2004; Velligan et al., 2004). As outlined by Harvey et al. (2002), however, multiple features of cognitive tests must be considered when classical neuropsychological tests with well-established reliability and validity are translated for use in another country and language. Tests that have no explicit verbal stimuli that subjects have to process and for which only the instructions have to be translated should not yield much problems. For other tests, however, more problems may arise when verbally oriented skills are measured because many words have no direct translations across all languages and some words may vary greatly in their frequency across languages. For these reasons, we made great efforts to select cognitive tests that are as culture-aspecific as possible and all tests were carefully translated and back-translated by native speakers to avoid item bias (threats to validity at the level of the item by poor translation) (Artioli I Fortuny and Mullaney, 1997; Artioli I Fortuny et al., 2004). In addition, to avoid method bias (threats to the validity that are based in conditions of test administration, such as cultural differences in social desirability and familiarity with response formats, as well as poor communication between examiner and patient), all tests were judged and administered by trained, local psychologists who live in the same culture as the patients.

A second goal of this study is to compare patients with schizophrenia, schizophreniform disorder, and brief psychotic disorder on the different cognitive domains mentioned above. An advantage of doing this study in an African country is that the incidence of brief psychotic disorder is higher in African countries and, more generally, in developing countries (Jablensky et al., 1992; Susser and Wanderling, 1994; Collins et al., 1996; Das et al., 2001; Marneros and Pillmann, 2004) than in Western countries. Given the different prognosis of patients with schizophrenia, schizophreniform disorder, and brief psychotic disorder, it may be interesting to examine whether differences in cognitive functioning are helpful to distinguish the three groups. A key idea is that there may be a vulnerability dimension predisposing for psychosis with patients with brief psychotic disorder being less vulnerable than patients with schizophrenia. Cognitive impairment can be expected to covary with this vulnerability dimension with patients having schizophrenia displaying more severe neurocognitive deficits in comparison to patients with brief psychotic disorder; patients having schizophreniform disorder would then constitute an intermediate group. Given this hypothesis, we compared three groups of patients with respectively schizophrenia, schizophreniform disorder, and brief psychotic disorder, who were stabilized, in the Democratic Republic of Congo on the distinctive cognitive domains mentioned above.

2. Methods

2.1. Participants

The participants in this study were 153 healthy control subjects, 70 patients with schizophrenia, 50 patients with a schizophreniform disorder, and 68 patients with brief psychotic disorder. All patients were ambulatory (except one) first-episode patients at the "Centre Neuro-Psychopathologique" (CNPP) and the "Centre de santé mentale Telema" of Kinshasa (Democratic Republic of Congo) diagnosed by an experienced senior psychiatrist according to the Diagnostic Manual of Mental Disorders IV-R (DSM IV-R) criteria. However, although preliminary diagnostic assessment occurred at the start of the study, diagnoses were re-evaluated by the same psychiatrist once the necessary time periods, as defined by DSM IV (1 month, 6 months), had elapsed. For all patients, it was their first contact with professional, psychiatric care. Only subjects with the Congolese nationality between 18 and 45 years of age were engaged in the study. An educational level of at least primary school was required. With respect to medication, before and during assessment, 30 patients (16%) never took antipsychotic medication, whereas 158 (84%) patients were treated with antipsychotics: 154 with classical neuroleptics and four with a combination of classical neuroleptics and atypical antipsychotics. Patients with neurological illness, substance abuse or dependence, schizoaffective disorder, mood disorder with psychotic symptoms, or a general somatic disorder with delusions, and/or hallucinations as possible features were excluded. Healthy control subjects consisted of personnel and trainees, working at the psychiatric centers mentioned above, who were willing to participate in the study. All participants gave informed consent and the Ethical Committee of the University Psychiatric Centre KU Leuven — Campus Kortenberg approved all research procedures.

2.2. Materials

2.2.1. Cognitive assessment

The following cognitive domains were considered:

(1) Verbal memory: Patients were presented with 15 words and then asked to recall as many as possible, in any order. This procedure was repeated five times (15 words of Rey (15WR)) (Lezak, 1983). The used measure is the total number of correctly recalled words in the five trials.
(2) Visual memory: The richness of the copy of the Complex Figure of Rey (CFR) (Corwin and Bylsma, 1993).
(3) Working memory: The number of correct items in the Letter–Number Sequencing Test (LNST) (Wechsler, 1981).
(4) Attention: Total score minus the incorrectly deleted items of the d2 Test of Attention (d2TA) of Brickenkamp (1981).
(5) Visuomotor control: Time to carry out Part A of the Halsted–Reitan's Trail Making Test (TMTA) (Reitan and Wolfson, 1985).
(6) Motor speed: Average number of hits with dominant and nondominant finger in five trials of the Finger Oscillation Test (FOT) (Reitan, 1979).
(7) Verbal fluency: Sum score of number of animals (semantic) and number of words starting with F, A, and S (phonetic) that subjects generated in 1 min in Benton's Controlled Oral Word Association (COWA) task (Spreen and Strauss, 1998).
(8) Executive functions were measured with three tests: (a) The interference score of the Stroop Color and Word Test (SCWT) (Stroop, 1935) measuring the speed of inhibition (Spreen and Strauss, 1998), (b) the number of achieved series of the 256 card version of the Wisconsin Card Sorting Test (WCST) (Heaton, 1981), and (c) the time to carry out Part B of the Halsted–Reitan's Trail Making Test (TMTB) (Reitan and Wolfson, 1985).

All instructions for the neuropsychological tests were translated and back-translated from English to French and Lingala, the language spoken in Kinshasa. It may be noted that all tests were administered in Lingala with the exception of the 15 words of Rey and the Stroop Color and Word Test (SCWT). For the 15 words of Rey, French words were used and for the SCWT, the words 'red', 'green', and 'blue' were presented in French. In advance of the study, all translated tests were administered to check for applicability in the Congolese population.

2.2.2. Clinical variables

(1) Age of disease onset expressed in years with the onset of the disease being defined as the first moment when the family of the patient noticed behavioral alterations and/or manifestations of the disease.
(2) Positive symptoms, negative symptoms, and general psychopathology were assessed by means of the Positive and Negative Symptoms Scale (PANSS) (Kay, 1990) at the time of cognitive testing.
(3) Antipsychotic drug doses were expressed in equivalents of mg of chlorpromazine (Hoes, 1989; American Psychiatric Association, 1997; Bezchlibnyk-Butler and Jeffries, 1998).

2.3. Procedures

When patients were clinically stable and psychotic symptoms were under control, neuropsychiatric nurses or psychiatrists working at the centers mentioned above referred potential candidates to a senior psychiatrist who was responsible for the study.

At that moment, this senior psychiatrist diagnosed the patients according to the DSM IV-R criteria by means of a neuro-somatic examination, information provided by people accompanying the patient and the assessment of the PANSS. After inclusion, the neuropsychological test battery was administered and scored within 72 h by two qualified and trained psychologists who had no knowledge of the patients' diagnosis. Finally, diagnoses were re-evaluated by the same senior psychiatrist once the necessary time periods, as defined by DSM IV (1 month, 6 months), had elapsed.

2.4. Statistical analysis

First, healthy controls and patients were compared on demographic variables by chi-square tests (or exact tests) for categorical variables and analysis of variance (ANOVA) for continuous variables. Then, both groups were compared with respect to cognitive functioning by means of ANOVA controlling for relevant demographic variables (gender, age, and educational level). For the reaction times of Trail A and B of the Halsted–Reitan's Trail Making Test, the logarithm was taken because both variables were exponentially instead of normally distributed. Second, the scores of three patient groups were compared among themselves in a similar way. To compare pairs of patient groups, Tukey's studentized range tests were used for *post hoc* group comparisons. All analyses were performed using the Statistical Analysis Software (SAS) version 9.1.

3. Results

3.1. Healthy controls versus patients with nonaffective psychosis

In Table 1, the demographic variables for both healthy control subjects and all patients are depicted. In this table, it can be seen that there is a significant association between group and gender with females being underrepresented in the group of healthy controls. In addition, there is a significant association between group and educational level; in the patient group, more patients have a secondary educational level. No significant age differences were found between both groups.

Next, healthy controls and patients were compared on all eight domains of cognitive functioning, adjusting for gender and educational level (see Table 2). Patients score significantly worse on all cognitive variables in comparison with healthy controls. In Fig. 1, differences between the healthy controls and patients are expressed in units standard deviation (*Z*-scores) and indicate the pattern of cognitive impairment of the patients. This figure shows that patients display especially a cognitive dysfunction (≥1 S.D.) in (verbal and working) memory, attention, and executive functioning. Patients also performed poor on motor speed. One may note that in this figure, we put a minus-sign before the reaction times of Trail A and Trail B of Halsted–Reitan's Trail Making Test, and before the inference score of the Stroop Color and Word Test to assure that all scores on the tests have the same direction.

Summarizing, we may conclude that we found major cognitive dysfunctions in our sample of Congolese first-episode patients with nonaffective psychosis.

Table 1
Demographic variables of healthy control subjects and patients with nonaffective psychosis.

	Healthy controls	Patients	Main effect of group (degrees of freedom)	*P*-value
	N = 153	*N* = 188		
Gender				
Male	66 (43%)	102 (54%)		
Female	87 (57%)	86 (46%)	$\chi^2(1) = 4.17$	0.04
Level of education				
Primary	31 (20%)	12 (6%)		
Secondary	69 (45%)	146 (78%)		
Superior	52 (34%)	30 (16%)	$\chi^2(2) = 38.49$	<0.0001
Age (years): mean (standard deviation)	28.14 (7.1)	28.0 (7.1)	$F(1,339) = 0.02$	0.90

3.2. Comparison among patients with brief psychotic disorder, schizophreniform disorder, and schizophrenia

First of all, we compared the three patient groups on demographic variables (see Table 3). There appears to be a significant association between gender and diagnosis; there are more female patients with brief psychotic disorder and schizophreniform disorder. The reverse is observed among patients with schizophrenia. There is no significant difference among the three groups in terms of level of education. The three groups did not vary significantly in terms of age of onset of their disorder but the group of schizophrenia was significantly older than the other two groups. With respect to symptoms, patients with brief psychotic disorder scored significantly lower on positive and negative symptoms as well as on general psychopathology on the PANSS than the two other groups at the moment of neuropsychological testing. The groups did not differ significantly from one another in terms of doses of antipsychotic medication.

The differences among the three patient groups, adjusted for gender and age, on the distinctive cognitive domains, are depicted in Table 4. As can be seen in this table, the three groups did not differ from one another on any cognitive domain with the exception of verbal memory. For this cognitive domain, patients with schizophreniform disorder scored significantly lower than the patients with a brief psychotic disorder. After a Bonferroni-correction for multiple testing, however, we may conclude that we were not able to detect substantial differences among the three groups in terms of cognitive functioning.

As a result, we can conclude that there is no evidence for our hypothesis that patients with schizophrenia would display more severe cognitive impairment than patients with brief psychotic disorder or schizophreniform disorder.

4. Discussion

As far as the demographic variables are concerned, we observe a preponderance of men over women in schizophrenia patients. We see the reverse in patients with brief psychotic disorder. Both observations in this African population are in line with existing epidemiological findings (Marneros and Pillmann, 2004; McGrath, 2005). Further, it appears that a large sample of first-episode patients with nonaffective functional psychosis in an African population performs worse on cognitive testing in comparison with healthy controls. It may be noted that these results were found after control for important confounding variables such as level of education and age, two well-known predictors of current success in cognitive test performance (Harvey et al., 2002; Keefe et al., 2006). As such, the results of this study are in line with the fact that cognitive impairments are widely recognized as core features of schizophrenia (for a meta-analysis of cognitive impairment in schizophrenia, see Heinrichs and Zakzanis, 1998) and with the general consensus that cognitive impairment is a useful endophenotype for studying psychosis (Gottesman and Gould, 2003).

Next, in line with Harvey et al. (2002), the results of this study suggest that it is meaningful and useful to administer translated cognitive tests, which are validated in Western countries, in a third world country. In their study, Harvey et al. (2002) compared different countries in which the same language is spoken (e.g., United States versus United Kingdom), different countries in which a different language is spoken (e.g., Unites states versus France), and the same country in which different languages are spoken (English versus French in Canada) to examine whether translated cognitive tests produce consistent results across different languages and countries. In general, the variance in performance across the sites tested in English was as large as the variance between English and non-English speakers when all cognitive tests used in the study were considered. In addition, in the one country where a substantial number of patients were assessed in English and a different language there were no

Table 2
Differences in cognitive functioning between healthy control subjects and patients with nonaffective psychosis.

Cognitive domains	Healthy	Psychotic	Main effect of group (*df*)	*P*-value
	Controls	Patients		
	N = 153	*N* = 188		
	Mean (S.D.)	Mean (S.D.)		
1. Verbal memory: 15 words Rey	51.43 (9.19)	40.29 (10.38)	$F(1,335) = 106.95$	<0.0001
2. Visual memory: Complex Figure Rey	30.79 (4.59)	27.89 (6.38)	$F(1,334) = 28.85$	<0.0001
3. Working memory: Letter–Number Sequencing Task	11.59 (4.77)	6.18 (2.54)	$F(1,334) = 227.02$	<0.0001
4. Attention	121.82 (49.65)	55.04 (59.75)	$F(1,335) = 119.18$	<0.0001
5. Visuomotor control: Trail A	72.57 (41.53)	86.16 (41.68)	$F(1,334) = 21.33$	<0.0001
6. Motor speed: Finger Oscillation Task	83.05 (11.73)	66.91 (13.72)	$F(1,335) = 125.79$	<0.0001
7. Verbal fluency: Controlled Word Association Task	13.28 (4.01)	10.46 (3.35)	$F(1,335) = 58.74$	<0.0001
8. Executive functioning				
Interference in Stroop Color and Word Test	4.33 (8.30)	6.22 (7.03)	$F(1,334) = 10.83$	<0.0011
Number of categories in Wisconsin Card Sorting Test	5.38 (1.72)	3.59 (2.39)	$F(1,333) = 57.94$	<0.0001
Trail B	141.16 (62.50)	198.99 (80.19)	$F(1,334) = 57.08$	<0.0001

Note: *df* = degrees of freedom; S.D. = standard deviation. All analyses adjusted for differences in gender and level of education.

differences in performance on any of the tests. As a result, differences between countries were larger than differences between languages. Furthermore, the results suggest that the translation of tests of memory and verbal skills can lead to consistent results across translated versions of the tests and that differences across countries could be due to the levels of education completed by the subjects, since correction for educational level leads to abolition of some between-country differences in performance. Generally spoken, Harvey et al. (2002) conclude that their data support the validity of cross-national neuropsychological assessments. The fact that we found a major cognitive deficit between psychotic patients and healthy controls in our study seems to support the conclusion that it is meaningful to translate classical cognitive tests for use in third world countries such as the Democratic Republic of Congo.

One may note, however, that the differences in cognitive performance between healthy controls and patients in this study seem to be less pronounced than expected on the basis of Western studies (Saykin et al., 1991; Heinrichs and Zakzanis, 1998). In the present study, the maximum difference in cognitive performance between patients and controls is about 1.4 S.D. and the minimum is 0.2. On the contrary, in studies in Western countries, patients with schizophrenia score a full, and mostly more standard deviations lower than normal controls on cognitive tests (Saykin et al., 1991; Heinrichs and Zakzanis, 1998; Keefe and Fenton, 2007). We may offer four possible explanations for the smaller differences between patients and normal controls. First, the patients in this study were clinically stable and had low PANSS scores. As a result, although it is generally accepted that cognitive deficits are largely independent of symptom severity (Heydebrand et al., 2004; Keefe et al., 2006), patients may have performed at an optimal level and this may explain partially the smaller differences. Second, the educational level of patients in this study was somewhat higher than the educational level of controls (secondary level is underrepresented in the control group), which could partially explain the smaller differences between patients and controls. After stratification on educational level, however, we could rule out this possibility. Third, one may question whether our sample of normal controls, which consists of trainees and workers in the hospital, is representative for the normal Congolese population. In our

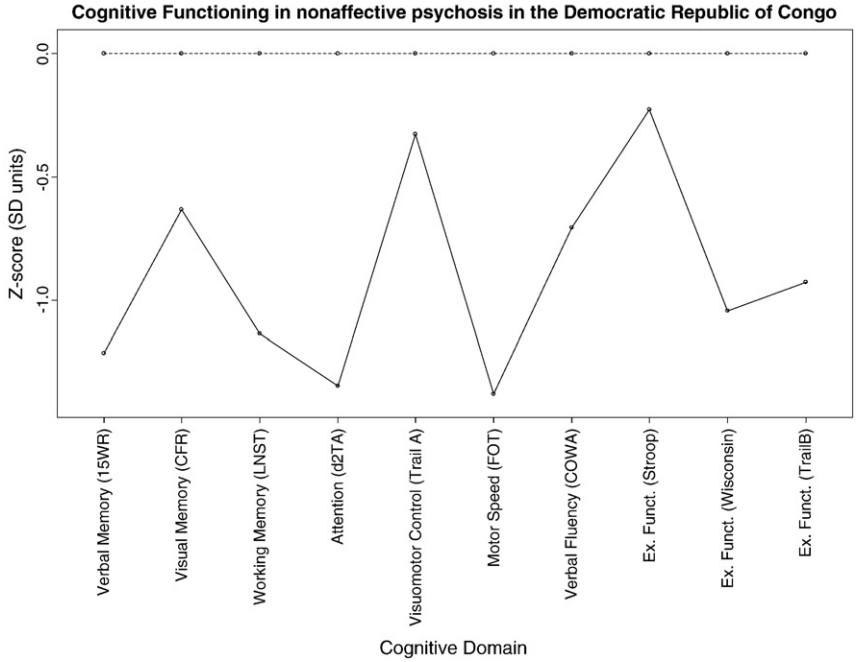

Fig. 1. Differences in cognitive functioning expressed in units standard deviations between healthy control subjects and patients with a nonaffective psychosis in the Democratic Republic of Congo.

Table 3
Demographic variables and PANSS scores of patients with brief psychotic disorder, schizophreniform disorder, and schizophrenia.

	BPD	SFD	SCH	Test statistic (*df*)	*P*-value
	N = 68	*N* = 50	*N* = 70		
Gender					
Male	23 (34%)	21 (42%)	42 (60%)		
Female	45 (66%)	29 (58%)	28 (40%)	$\chi^2(2) = 9.91$	0.007
Level of education					
Primary	4 (6%)	1 (2%)	7 (10%)		
Secondary	56 (82%)	39 (78%)	51 (73%)		
Superior	8 (12%)	10 (20%)	12 (17%)	*Fischer exact test*	0.33
Age (years): mean (S.D.)	27[a] (7)	26.5[a] (6.3)	30.2[b] (7.2)	$F(2,185) = 5.27$	0.006
Age of disease onset (years): mean (S.D.)	27[a] (7)	26.4[a] (6.1)	28.5[a] (7)	$F(2,185) = 1.52$	0.22
PANSS total: mean (S.D.)	54.54[a] (12.45)	62.56[b] (14.47)	63.33[b] (15.93)	$F(2,181) = 12.74$	<0.0001
PANSS positive symptoms: mean (S.D.)	11.50[a] (4.56)	15.38[b] (5.85)	15.97[b] (6.12)	$F(2,181) = 10.75$	<0.0001
PANSS negative symptoms: mean (S.D.)	11.41[a] (3.01)	13.72[b] (4.56)	14.00[b] (5.19)	$F(2,181) = 7.21$	<0.0010
PANSS general psychopath.: mean (S.D.)	28.63[a] (7.18)	33.42[b] (7.68)	33.36[b] (8.27)	$F(2,181) = 7.60$	<0.0007
Antipsychotic drug doses: mean (S.D.)	479.6[a](253.7)	501.0[a](278.4)	487.7[a](288.3)	$F(2,185) = 0.09$	0.92

Note: BPD = brief psychotic disorder, SFD = schizophreniform disorder, SCH = schizophrenia, *df* = degrees of freedom, S.D. = standard deviation; PANSS = Positive And Negative Symptom Scale (Kay, 1990). [ab]Means in the same row that do not share subscripts differ at $P < 0.05$ in the Tukey honestly significant differences comparisons.

opinion, our sample of healthy controls is representative and if this were not the case, we would expect them to perform better on the cognitive tests (and not worse) than subjects from the normal population because they are working in a setting where the cognitive tests are used, and hence, may be more familiar with these tests. In that case, we would have expected a larger difference between normal controls and patients but this is inconsistent with the findings. Finally, given the fact that multi-center studies by the WHO (Jablensky, 2000), and other independent studies (Kulhara and Chandiramani, 1988; Ohaeri, 1993; Thara et al., 1994), highlighted important differences between 'Western' and 'Third World' populations as regards the course and outcome of schizophrenia, with a significantly better prognosis in the developing countries, it may just be the case that cognitive differences between normal controls and patients — although clearly present — are less pronounced in the Democratic Republic of Congo. This hypothesis, however, requires further research in a study in which the same cognitive test battery would be administered in both the Democratic Republic of Congo and in a Western country. Such a study would allow us to directly compare cognitive performance between normal controls and patients in both countries.

There are very few studies (for an exception, see Kitamura et al., 2007) in which cognitive functioning is examined in brief psychotic disorder and in this study, we wanted to fill this gap by exploring cognitive functioning among brief psychotic disorder, schizophreniform disorder, and schizophrenia. The key hypothesis was that there is a vulnerability dimension predisposing for psychosis with patients with brief psychotic disorder being less vulnerable for psychosis than patients with schizophrenia. In correspondence with this vulnerability dimension, we expected that patients with brief psychotic disorder would display less cognitive impairment than patients with schizophrenia. However, contrary to our hypothesis, patients with brief psychotic disorder did not differ from patients with schizophrenia on cognitive variables. It may be noted that the fact that we found no differences in cognitive performance between the three groups of patients cannot be explained by the fact that they were in an acute psychotic episode. Patients were clinically stable and had low PANSS scores at the time of cognitive testing; as a result, one could say that

Table 4
Differences in cognitive functioning between patients with brief psychotic disorder, schizophreniform disorder, and schizophrenia.

	BPD	SFD	SCH	Test- statistic (*df*)	*P*-value
	N = 68	*N* = 50	*N* = 70		
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)		
1. Verbal memory: 15 words Rey	42.79[a] (8.45)	38.16[b] (10.82)	39.39[a] (11.36)	$F(2,181) = 4.82$	0.0092
2. Visual memory: Complex Figure Rey	27.24[a] (6.52)	28.41[a] (5.74)	28.14[a] (6.86)	$F(2,181) = 0.21$	0.81
3. Working memory: Letter–Number Sequencing Task	5.93[a] (2.30)	5.94[a] (2.49)	6.59[a] (2.76)	$F(2,181) = 0.53$	0.59
4. Attention	52.5[a] (52.12)	47.56[a] (62.50)	62.84[a] (64.46)	$F(2,181) = 0.61$	0.54
5. Visuomotor control: Trail A	84.91[a] (33.85)	84.54[a] (44.76)	88.54[a] (46.51)	$F(2,181) = 1.00$	0.37
6. Motor speed: Finger Oscillation Task	66.21[a] (14.41)	67.92[a] (13.35)	66.87[a] (13.45)	$F(2,181) = 2.04$	0.13
7. Verbal fluency: Controlled Word Association Task	9.79[a] (3.16)	10.62[a] (3.06)	10.66[a] (3.66)	$F(2,181) = 0.76$	0.47
8. Executive functioning					
(a) Interference in Stroop Color and Word Test	6.51[a] (7.23)	7.08[a] (7.30)	5.32[a] (6.61)	$F(2,181) = 0.45$	0.64
(b) Number of Categories in Wisconsin Card Sorting Test	3.74[a] (2.29)	3.62[a] (2.39)	3.41[a] (2.51)	$F(2,181) = 0.42$	0.66
(c) Trail B	197.60[a] (66.93)	195.16[a] (86.39)	203.07[a] (88.01)	$F(2,181) = 0.25$	0.78

Note: BPD = brief psychotic disorder, SFD = schizophreniform disorder, and SCH = schizophrenia. All analyses are adjusted for differences in gender and age. *df* = degrees of freedom; S.D. = standard deviation; [ab]Means in the same row that do not share subscripts differ at $P < 0.05$ in the Tukey honestly significant differences comparisons.

their cognitive performance was rather optimal. Moreover, the patient groups did not differ in cognitive performance despite the fact that they were characterized by distinctive symptoms at the time of the neuropsychological testing with patients with brief psychotic disorder showing significantly less positive and negative symptoms, and less general psychopathology (as measured by the PANSS) in comparison with patients with schizophreniform disorder or schizophrenia. These results seem to confirm the independence of cognitive disorders and the symptomatology of schizophrenia (Heydebrand et al., 2004; Keefe et al., 2006) and perhaps the nonaffective psychoses in general.

Our findings are also in line with the study of Kitamura et al. (2007) that showed that the Weschler Adult Intelligence Scale — Revised (WAIS-R) is not useful in discriminating schizophrenia from other psychoses including schizophreniform disorder and brief psychotic disorder (Kitamura et al., 2007). Given the higher incidence of brief psychotic disorder in African countries and developing countries (Jablensky et al., 1992; Susser and Wanderling, 1994; Collins ió et al., 1996; Das et al., 2001; Marneros and Pillmann, 2004) and given the differences between 'Western' and 'Third World' populations regarding the course and outcome of schizophrenia (Jablensky, 2000), it remains unclear to what extent these results are specific for the Democratic Republic of Congo or can be generalized to other developing or Western countries.

Summarizing, cognitive dysfunction is one of the core symptoms of nonaffective psychosis in the Democratic Republic of Congo with psychotic patients performing worse in comparison with normal controls on a broad range of cognitive functions. However, this core symptom of psychosis does not appear to be different among distinct groups of nonaffective functional psychoses — including brief psychotic disorder, schizophreniform disorder, and schizophrenia — during their first episode. Apparently, in addition to the importance of the cognitive deficits, other factors are responsible for the course and outcome of psychosis. As such, these findings are in line with the recent view (van Os and Kapur, 2009) that the course and outcome of psychotic disorders is characterized by mainly unexplained heterogeneity rather than uniform poor outcome.

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