Journal of Biosciences and Medicines, 2022, 10, 86-117
https://www.scirp.org/journal/jbm
ISSN Online: 2327-509X
ISSN Print: 2327-5081

Medication Non-Adherence and Disability among Outpatients with Schizophrenia in North-Central Nigeria

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How to cite this paper: Taru, M.Y., Bamidele, L.I., Faith, A.O., Philip, T.F., Allagoa, E.L. and Izevbokun, O.H. (2022) Medication Non-Adherence and Disability among Outpatients with Schizophrenia in North-Central Nigeria. *Journal of Biosciences and Medicines*, **10**, 86-117.
https://doi.org/10.4236/jbm.2022.109008

Received: July 20, 2022
Accepted: September 10, 2022
Published: September 13, 2022

Abstract

Background: About fifty percent of patients with Schizophrenia do not take their medication as prescribed. This scenario often results in disease progression and increased relapse rates, resulting in poor outcomes, including functional disability. **Aim:** This study was design to evaluate the relationship between medication non-adherence and disability in patients with Schizophrenia attending the outpatient clinic at the Jos University Teaching Hospital, north-central Nigeria, from June 2017 to November 2017. **Methods:** We carried out a cross-sectional study that employed a systematic sampling method to select 301 eligible subjects. We used the Medication Adherence Rating Scale (MARS) 10 and World Health Organization Disability Assessment Schedule version 2.0 (WHODAS 2.00) to assess medication adherence and levels of disability. **Results:** The results show that 39.9% of the respondents were medication nonadherent. Medication adherence correlated negatively with the total disability score and all the domains of disability. A low level of education and poor social support were significant predictors of non-adherence. **Conclusion:** Medication non-adherence and its associated factors, if identified early and proper interventions instituted, a disability could be avoided or minimized among people with Schizophrenia. Therefore, we recommend regular screening of patients with mental disorders for early identification and intervention for medication adherence.

Keywords

Disability, Medication Non-Adherence, Schizophrenia, The Associative Role

1. Introduction

Schizophrenia is a chronic and the most disabling major mental illness characterized by periods of relapse and remission [1]. However, the chronic nature of the illness should not obscure the fact that continuous long-term treatment with antipsychotic keeps symptoms under control and prevent relapse for at least a high proportion of patients [2]. Schizophrenia, despite being a treatable condition, non-adherence to prescribed medications has continued to be a challenging aspect of the treatment [3]. Non-adherence to a medication includes a range of patient behaviors, from treatment refusal to irregular use or partial change of daily medication doses [4].

Though the etiology of non-adherence to medication appears to be multiple, Lacro and his colleagues [5], in a comprehensive review of previous articles, reported that clinical factors such as poor insight, positive psychotic symptoms, cognitive decline, and other contextual factors unique to schizophrenic illness rather than sociodemographic factors were most consistently associated with medication non-adherence.

The prevalence of non-adherence with antipsychotics in schizophrenia varies between studies, reflecting differences in the populations studied and the methodology used. However, the review of the previous articles reported a 40% - 50% rate of medication non-adherence among patients with schizophrenia [5]. Similar studies in Nigeria reported a 40% - 65.5% rate [6] [7] [8] [9].

Non-adherence to medication posits severe consequences to the person, society, and the healthcare system because of its association with adverse outcomes and higher care costs [4] [10] [11]. Accordingly, non-adherence to antipsychotic medication often results in inconsistent symptoms control or relapse. These scenarios constitute an active morbid process, with brain damage leading to poor outcomes and, consequently, an increased level of disability [10]. The inconsistent symptoms control or exacerbation could lead to violent behaviors towards society, 4 necessitating frequent visits to the emergency room, rehospitalizations, and increased need for clinician intervention, all of which lead to increased costs to healthcare systems [11]. Our study focuses on consequences to the patient, particularly the functional disability.

Studies that evaluate the impact of medication non-adherence on outcomes in Patients with Schizophrenia are scarce in Nigeria [6] [8]. In particular, we couldn't identify any study in north-central Nigeria that precisely assessed disability due to non-adherence to medication in schizophrenia. Therefore, this study evaluates Medication non-adherence 7and disability in patients with schizophrenia attending outpatient clinics at the Jos University Teaching Hospital, north-central Nigeria. The study also identifies the predictors of medication non-adherence among these patients. Assessing the factors and consequences of non-adherence together may highlight the importance of adherence to medication in schizophrenia. It could be a step to designing suitable intervention strategies to avoid or minimize disability due to non-adherence [12] [13].

2. Materials and Methods

2.1. Type of Study

We conducted a hospital-based cross-sectional study to evaluate the relationship between medication non-adherence and disability in patients with Schizophrenia attending the outpatient clinic at the Jos University Teaching Hospital, Northern-central Nigeria within a 6 month period (from June 2017 to November 2017).

2.2. Study Location

The study was conducted at the Jos University Teaching Hospital, a tertiary health institution that provides clinical services for at least 4 states in Northern-central and part of north-west and North-eastern Nigeria. The department of psychiatry runs an outpatient clinic from Mondays to Fridays.

2.3. Study Population

Our target population were adults aged 18 years and above with a diagnosis of schizophrenia as confirmed by a consultant psychiatrist according to the International Classification of Diseases, tenth edition (ICD-10) and have been on antipsychotic medication for at least one-year duration.

We excluded subjects who declined consent, had a Brief Psychiatric Rating Scale score of ≥10, and had a general medical condition that impaired their participation in the study. We also excluded clinically unstable participants for at least six months before the assessment date.

2.4. Sampling

Eligible participants were selected through a systematic random sampling technique. By sampling technique, we first of all selected retrieved folders for the patients with schizophrenia and arranged them in a sequence of arrival at the clinic. Available statistics from the records department showed an average of about 80 patients with schizophrenia attend outpatient clinics weekly. Thus, our sampling interval $K = 80/16 = 5$.

The first participant was randomly selected between 1 and 5, and subsequently, every 5th that fulfilled the criteria was recruited. This process continued three times weekly for over six months, and we obtained our sample size of 310.

To avoid multiple selections of patients, we made a notation on all the selected folders.

2.5. Sample Size Determination

This paper being a part of our main study that compared disability among patients with schizophrenia and type2 diabetes mellitus attending the outpatient clinics of the Jos University Teaching Hospital, the sample size was calculated in the main study, using the formula for comparison of 2 groups as $n = K[(P1Q1) + (P2q2)]/(P1 - P2)^2$ with an assumption of 95.0% confidence level, 5% margin of

error, and prevalence of 41.0% and 50.0% for schizophrenia and T2DM respectively. After adjusting for attrition and non-response, this yielded a final sample size of 300 for each group, but we interviewed 310 subjects with schizophrenia [14].

2.6. Instruments

The sociodemographic questionnaire

This is a semi-structured instrument designed by the researchers and sought information on age, gender, educational level, marital status, occupation, income, living condition, residential type, social support and clinical characteristics (age of onset of illness, duration of illness, and number of hospital admissions). See **Appendix 1**.

The Brief Psychiatric Rating Scale (BPRS) [15]

This is a widely used semi-structured instrument that assesses psychotic and non-psychotic symptoms in schizophrenia and other major psychiatric illnesses. The BPRS has a score ranging from 1 (not present) to 7 (extremely severe) and 0 (not assessed) in each item. In this study, the BPRS was used as a screening tool. Hence, respondents with a total score of ten and above (prominent psychotic symptoms) were replaced with eligible ones. Previous studies conducted in Nigeria had also used this instrument successfully [6] [8]. See **Appendix 2**.

The Medication Adherence Rating Scale (MARS)

It is a 10-item self-reporting instrument with an excellent psychometric property that assess adherence to antipsychotic medication. It was developed by Thompson *et al.* [16] from two previous scales, the 30-item Drug Attitudes Inventory and the four-item Morisky Medication Adherence Questionnaire. The ten items in MARS provide information on medication adherence behavior, beliefs about medications, and adverse side effects. The questionnaire has a yes or no response, a response consistent with non-adherence coded as 0, and a response consistent with adherence as 1. Thus, for questions 1 - 6 and 9 - 10, a "no" answer is coded as 1, while for questions 7 and 8, a "yes" answer is coded as 1. The total scores range between 0 and 10, and scores ≤ 5 indicate medication non-adherence. A previous study conducted in Nigeria had used this instrument to assess medication adherence among patients with mental illness [9] [17]. See **Appendix 3**.

The World Health Organization Disability Assessment Schedule version 2.0 (WHODAS 2.00) [18].

This instrument assesses disability within the last month. The questionnaire sought difficulties in the six domains: cognition, mobility, self-care, getting along with people, life activities, and participation, including work-related disability. The instrument has good validity, internal consistency, and overall inter-rater reliability. A study conducted in Nigeria had used this tool successfully [19]. The scoring involves assigning values from 0 - 4, which corresponds to none, mild, moderate, severe, and extreme. The sum of the scores in each domain is con-

verted into a metric range. Based on Andrews *et al.* [20] Scorings. Individuals with a summary score of ≥10 were assigned a high level of disability. See **Appendix 4**.

2.7. Procedure

Following the approval by the health ethical committee of the Jos University Teaching Hospital, with permission granted by the Head of the Department of Psychiatry, the researchers who were fluent in both English and Hausa languages and conversant with the use of the survey instruments, approached the participants in the outpatient clinic. The participants' informed consent was obtained after explaining the aim and objectives of the study to them, and their confidentiality was assured. It was also clear that the interviews were entirely voluntary; hence, they could withdraw without implications for their treatments. We put this in writing, and those who agreed to participate in the study were required to sign or thumbprint as appropriate. Data were collected from the eligible respondents, using the survey instruments. We used the Hausa versions of the instruments to collect data from those who could not speak the English language. Participants identified with a high level of disability had their findings discussed with the managing consultant to consider integrated rehabilitative care.

2.8. Data Analysis

We analyzed our data using the Statistical Package for Social Sciences (SPSS) version 20.0 and presented the results using simple descriptive analysis. The relationship between MARS and WHODAS II scores was analyzed using a correlation test. We also used logistic regression analysis to determine the Predictors of medication non-adherence, using the variables significantly associated with it in bivariate analysis. Values of $P < 0.05$ were considered statistically significant.

3. Results

Out of the total 310 subjects interviewed, 301 filled the questionnaire completely and correctly, which gave a response rate of 97.1%. The mean age of the respondents was 38 ± 12 years. There were 173 men and 128 women. About 51% were never married, 72.4% lived with their parents, and only 10% lived alone. Of the respondents, 48.5% had secondary education, 175 (58.1%) were unemployed, and 170 (56.5%) had no stable income. There was a statistically significant association between medication adherence and level of education, $P \leq 0.001$, residential type, $P = 0.020$, and social support, $P = 0.001$. See **Table 1** for details.

The illness's age of onset was between 20 and 34 years for 75% of the respondents. About 63% had been admitted at least once. Overall, 120 (39.9%) were medication non-adherence, while 60.1% were adherent to their medications. A high level of disability occurred in 49.2% of all respondents, 52.7% of those with poor medication adherence, and 47.3% of those with good adherence to their medications respectively. There was a statistically significant difference in levels

Table 1. Sociodemographic characteristics of respondents versus medication adherence status.

Variables		Non-adherence f (%)	Adherent f (%)	Total F (%)	Statistics		
Adhe. Status		120 (39.9%)	181 (60.1)	301	X^2	df	*P*
Age group	18 - 34	42 (35.0)	84 (46.4)	126 (41.9)	4.227	2	0.121
	35 - 59	72 (60.0)	87 (48.1)	159 (52.8)			
	≥60	6 (5.5)	10 (5.5)	16 (5.3)			
Gender	Male	61 (35.3)	112 (64.7)	173 (57.5)	3.602	1	0.058
	Female	59 (46.1)	69 (53.9)	128 (42.5)			
Education level	No formal education	6 (5.0)	10 (5.5)	16 (5.3)	19.845	3	**<0.001**
	Primary	18 (15.0)	23 (12.7)	41 (13.6)			
	Secondary	74 (61.7)	72 (39.8)	146 (48.5)			
	Tertiary	22 (18.3)	76 (42.8)	98 (32.6)			
Occupation	Unemployed	71 (59.2)	104 (57.5)	175 (58.1)	4.063	2	0.131
	Non-professionals	47 (39.2)	65 (35.9)	112 (37.2)			
	Professionals	2 (1.7)	12 (6.6)	14 (4.7)			
Income	No income	68 (56.7)	102 (56.2)	170 (56.5)	2.891	3	0.409
	N < 18,000	35 (29.2)	42 (23.2)	77 (25.6)			
	N18,000 - N50,000	16 (13.3)	33 (18.2)	49 (16.3)			
	>50,000	1 (0.8)	4 (2.2)	5 (1.6)			
Marital Status	Never married	57 (47.5)	99 (54.7)	156 (51.8)	2.674	2	0-263
	Married	36 (30.0)	54 (29.8)	90 (29.9)			
	Previously married	27 (22.5)	28 (15.5)	56 (18.3)			
Residential type	Urban	71 (59.2)	132 (72.9)	203 (67.4)	7.804	2	**0.020**
	Semi-urban	41 (34.2)	36 (19.9)	77 (25.6)			
	Rural	8 (6.7)	13 (7.2)	21 (7.0)			
Living condition	Parents/Relatives	132 (72.9)	86 (71.7)	218 (72.4)	5.782	3	0.123
	Spouse/Partner	39 (21.5)	26 (21.7)	65 (21.6)			
	Friends	2 (1.1)	6 (5.0)	8 (2.7)			
	Alone	8 (4.4)	2 (1.7)	10 (3.3)			
Social support	Good	27 (14.9)	154 (85.1)	181 (60.1)	60.238	1	**<0.001**
	Poor	69 (57.5)	51 (42.5)	120 (39.9)			

of disability between respondents who adhered to their medication and those who did not, $P \leq 0.001$. Similarly, there was a statistically significant association between the status of medication adherence and duration of illness, $P = 0.002$, and number of hospitalizations, $P < 0.001$. See Table 2 for details.

In terms of medication adherence behavior; 137 (45.5%) ever forgot to take their medication, 72 (23.9%) were careless at times about taking their medication, and 138 (45.8%) sometimes stop taking their medication when they feel

Table 2. Clinical characteristics of respondent versus medication adherence status.

Variables		Non-adherence F (%)	Adherence F (%)	Total F (%)	Statistics		
Adh, status		120 (39.9%)	181 (60.1%)	301 (100%)	X^2	Df	*P*
Age of onset	<20	21 (15.9)	27 (14.9)	48 (15.9)	0.947	2	0.623
	20 - 39	91 (75.7)	137 (75.7)	228 (75.7)			
	40 - 59	8 (8.3)	17 (9.4)	25 (8.4)			
Duration of illness	<5	16 (13.3)	53 (29.3)	69 (22.9)	12.609	2	**0.002**
	5 - 9	38 (31.7)	59 (32.6)	97 (32.2)			
	≥10	66 (55.0)	69 (38.1)	135 (44.9)			
No. of Admission	0	10 (8.3)	58 (32.0)	68 (22.6)	32.423	2	**<0.001**
	1 - 2	82 (68.3)	110 (60.0)	192 (63.8)			
	≥3	28 (23.3)	13 (7.2)	41 (13.6)			
Disability	High	78 (52.7)	70 (47.3)	148 (49.2)	20.010	1	**<0.001**
	Low	42 (27.5)	111 (72.5)	153 (50.8)			

better. The rest were; Stop taking if they feel worse when they take the medication 114 (37.9), take their medication only when they are sick 116 (38.5%). With respect to beliefs about medications; 142 (47.2%) respondents indicated that it is unnatural for their mind and body to be controlled by Medication. In contrast, 157 (52.2) of the respondents said their thoughts are clearer on medication and 162 (53.8%) responded that by staying on medication, they can prevent getting sick. In terms of adverse side effects, 27.9% of the total respondents indicated feeling weird, like a "zombie" on medication and 26.2% indicated yes to medication makes them feel tired and sluggish. See Table 3 for details.

A weak but statistically significant negative correlation was observed between medication adherence and the overall disability (r = −0.314, $p \leq 0.001$). Similarly, medication adherence was negatively correlated with all the various domains of disability: understanding and communication (r = −0.200, $P = 0.001$); getting around, (r = −0.168, $P = 0.003$); self-care (r = −0.124, $P = 0.032$); getting along (r = −0.258, $p \leq 0.001$); life activities (r = −0.226, $p \leq 0.001$) and participation in society (r = −0.274, $p \leq 0.001$). See Table 4 for details.

The Logistic regression analysis shows the odds of disability was significantly reduced with good adherence compared to poor adherence with medication (OR = 2.243, $P \leq 0.001$). In the same vein, the odds of medication non-adherence was more than two times likely among those with primary (OR = 2.243, $P = 0.000$) and secondary **(OR = 2.497, $P = 0.007$)** education than those with no formal education (OR = 1.347, $P = 0.666$). On the other hand, the odds of medication non-adherence was significantly reduced among respondents with no history of hospital admission **(OR = 0.172, $P = 0.003$)** than those with 1 - 3 admissions (OR = 0.552, $P = 0.144$). Similarly, the odds of medication non-adherence was significantly reduced with good social support **(OR = 0.213, $P \leq 0.001$)** than

Table 3. Medication adherence rating scale responses.

Variables	Yes = f (%)	No = f (%)
Do you ever forget to take your medication?	137 (45.5)	164 (54.5)
Are you careless at times about taking your medication?	72 (23.9)	229 (76.i)
When you feel better, do you sometimes stop taking your medication	138 (45.8)	163 (44.2)
Sometimes if you feel worse when you take the medication, do you stop taking it?	114 (37.9)	187 (62.1)
I take my medication only when I am sick	116 (38.5)	185 (61.5)
It is unnatural for my mind and body to be controlled by Medication	142 (47.2)	159 (52.8)
My thoughts are clearer on medication	157 (52.2)	144 (47.8)
By staying on medication, I can prevent getting sick.	162 (53.8)	139 (46.2)
I feel weird, like a zombie on medication	84 (27.9)	217 (72.1)
Medication makes me feel tired and sluggish	79 (26.2)	222 (73.8)

Table 4. Correlation between MARS score and WHODAS II score.

Medication adherence	R	*P*
D1 Understanding and communication	−0.200	**0.001**
D2 Getting around	−0.168	**0.003**
D3 Self-care	−0.124	**0.032**
D4 Getting along	−0.258	**<0.001**
D5 Life activities	−0.226	**<0.001**
D6 Participation in society	−0.274	**<0.001**
Overall domain (Total Score)	−0.314	**<0.001**

poor social support. Other factors such as Residential type and duration of illness revealed no statistically significant odds. See Table 5 for details.

4. Discussion

Pharmacotherapy with antipsychotic medication is an essential component in the acute and maintenance treatment of schizophrenia. Yet, the full benefits of the treatment are often not realized in about half of the patients due to poor treatment adherence [3] [5]. This study assessed factors and functional disability associated with non-adherence to antipsychotic medication in outpatient attendees with schizophrenia in north-central Nigeria.

The sample's sociodemographic and clinical features such as age, educational status, employment status, marital status, income levels, social support, age of onset, and duration of illness are similar to earlier studies done among outpatients with schizophrenia in Nigeria [6] [7] [8] [9], and at the same time differ from other studies. For instance, Maggio *et al.* [21] in their study, found a younger

Table 5. Logistic regression analysis.

Variables	OR	Lower	Upper	*P*
Education				
No formal education	1.347	0.348	5.211	0.666
Primary	2.243	0.855	5.885	0.101
Secondary	2.497	1.285	4.852	**0.007**
Tertiary	1.000			
Residential type				
Urban	0.766	0.222	2.642	0.673
Semi-urban	1.662	0.459	6.012	0.439
Rural	1.000			
Duration of illness				
Less than 5	0.591	0.251	1.390	0.228
5 - 9	1.415	0.715	2.801	0.318
≥10	1.000			
Number of Admission				
0	0.172	0.053	0.559	**0.003**
1 - 3	0.522	0.218	1.248	0.144
≥4	1.000			
Social support				
Good	0.213	0.114	0.398	**<0.001**
Poor	1.000			

age of onset of schizophrenia among French cohorts as against the 26 ± 7 years found in our study. Unlike in developed countries, the developing countries, including Nigeria are more inclined to the belief about the supernatural causation of mental illness. This implies an increased likelihood of accessing initial care from spiritual or traditional healers, resulting in presenting to a mental health care facility several years after the onset of the illness [22] [23].

In addition, our results also showed that more than two-thirds of the respondents had been ill for at least 5 years, and in the course of the illness, 1 in 2 had been admitted for inpatient treatment more than once, which perhaps brings to fore the chronic nature of schizophrenia.

Concerning MARS, while less than 50% of the subjects had poor medication adherence behavior and beliefs about the medication, about a quarter cited side effects as reason for their non-adherence to prescribed medication. This is not surprising because, apart from the fact that we sampled mentally stable outpatients, possibly, with good insight into the illness, a considerable proportion of them might have been taking effective dose of antipsychotics with minimal or no deterrent side effects. Research has shown that medication side effects and lack of illness awareness are among the unique factors contributing to medication

non-adherence in patients with schizophrenia [5] However, our items on the questionnaire did not specify the type and dosage of prescribed medication or level of patient's insight. In the overall responses, we found a medication non-adherence rate of 39.9%, lower than the 40% - 65.5% previously reported in studies conducted in Nigeria [6] [7] [8] [9]. The variation in the rate of non-adherence with antipsychotics between previous studies in Nigeria and ours may be due to differences in methodology. For instance, our study design excluded subjects with prominent psychotic symptoms (BPRS > 9) such that only mentally stable patients were recruited. Moreover, it has been demonstrated in previous research that lower total scores on the BPRS which often translate to fewer psychotic symptoms, correlate positively with good adherence to treatment [6].

We also found that adherence to medication correlates negatively with the overall disability summary score (r = 0.314, $P \leq 0.001$), and all the various domains of disability, implying that disability levels increases with poor adherence to medication. In support of our findings, previous studies in Nigeria have reported same [8] [12] [13]. Medication non-adherence might indirectly affect patients' level of disability via several factors such as poor insight, negative attitude toward medication, and substance abuse [5], resulting in inconsistent symptoms control and relapse. Both scenarios constitute an active morbid process, with brain damage and consequent disability [10]. However, the effect sizes of these correlations were weak, bringing to the fore the impacts of the chronic course of schizophrenia. Moreover, more than two-thirds of our respondents had been ill for at least five years. Beyond the chronic nature of this illness, the weak correlation might suggest that though non-adherence to medication impacts disability, there are other important factors. For example, medical co-morbidities and delayed hospital presentation leading to prolonged duration of untreated psychosis could have also been the case in our study, though we did not assess them.

Previous studies have indicated various factors associated with medication non-adherence, with clinical rather than sociodemographic factors being the consistent predictors of medication non-adherence among patients with schizophrenia [5]. Thus, our results may or may not be in keeping with previous studies. Accordingly, over 95% of our respondents had at least a primary level of education, and those with secondary education were about two times more likely to be nonadherent than those with a tertiary level of education, which is related to previous findings in Ethiopia [24] and India [25], but in contrast with other previous studies [6] [7] [8] [9]. A potential explanation for this association might hold that one must understand and accept a message to comply or agree with it [26]. Therefore, people with a lower level of education are likely to show poor recognition of medications, knowledge of their indications, and understanding of dosage schedule and, therefore, less likely to take their medications as prescribed.

Similar to previous studies in Nigeria [6] [7], we also found that medication non-adherence was more likely among respondents with poor social support

than those with good social support. Perhaps the unique features of schizophrenia, such as psychotic symptoms, cognitive decline, socioeconomic disadvantages, etc. [5], imply most of them have to depend on their social support networks for the cost of care and as reminders of their medications dose schedule. Hence poor social support could be a barrier to medication adherence.

Our results also show that the odds of re-hospitalization were higher among those with medication non-adherence, which is in tandem with previous studies with similar report [6] [8]. This finding is likely a consequence rather than a predictor, reflecting a cross-sectional study limitation. As per previous studies, the relationship between non-adherence and hospitalization is an indirect one mediated through symptoms exacerbation resulting in violence, and other dangerous behaviors, necessitating frequent visits to psychiatric emergencies and subsequent hospitalization [4] [5].

Though the residential type was not predictive of medication non-adherence, more than half of the respondents living in semi-urban areas were nonadherent to their medication, similar to the previous study in Nigeria [6] and China [27]. This is not surprising because in this part of the word, as patients in rural and semi-urban areas have to travel a long distance to access mental health care. Some patients may not make it to their clinic visits regularly due to the combined cost of medications and transportation. Unfortunately, outpatient clinic default increases the risk of medication non-adherence as reported in previous study in Nigeria [6].

Unlike the report from the review of previous articles by Lacro and his colleagues that found a shorter illness duration to be predictive of medication non-adherence [5], our study revealed that respondents with at least five years of illness duration had a higher rate of medication non-adherence, similar to the study by ogunnubi and colleagues in Nigeria [6]. A plausible reason for this finding in our environment could be that, after taking medications for a long time, patients and their caregivers get worn out and seek a somewhat permanent cure, with the most likely option being resorting to traditional or spiritual healers who may influence patients and their caregivers to believe in the supernatural causation of mental illness. Hence, a spiritual rather than orthodox solution is required to resolve their mental health problems, and therefore, they view treatment with conventional medicine as useless [22] [23]. In support of this, a previous study has shown that poor adherence to medication and clinic visit schedules were higher among patients who believed in a spiritual etiology of mental illness [28].

Strength and Limitation

Our study could lay a foundation for future in-depth research. Studies that precisely assess the associative role of medication adherence with disability among outpatients with schizophrenia in north-central Nigeria are scarce. Another strength is that the conduct of the study was relatively quick and inexpensive,

with data on all variables collected at a one-time point. However, our study had some limitations:

The study's cross-sectional nature and a one-time measurement of medication non-adherence and disability make it difficult to derive a causal inference between these variables. A longitudinal study can overcome this limitation.

Our instruments' responses are subjective and therefore susceptible to manipulations by the respondents and the interviewers. Thus, responder, recall, and interviewer bias cannot be ruled out.

5. Conclusions

This study showed that disability was associated with non-adherence to antipsychotic therapy and highlighted the significant predictors for non-adherence among these patients. Thus, the identified risk factors are crucial in the early detection of patients who require support for medication adherence which can help avoid or minimize disability among patients with schizophrenia.

We recommend that healthcare professionals identify practically possible strategies to improve medication adherence to enhance therapeutic outcomes, which in turn reduces or minimizes disability. This approach needs to be carried out with the support of patients and caregivers.

Acknowledgements

We want to thank the head of the department, Psychiatry, for permitting us to conduct this research in the department and our respondents for their cooperation.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix 1

Kindly fill in below, the information requested in the space provided.

Section A: Socio-demographic data.

1) Study serial number _____

2) Age (as at last birth day) _____

Please tick as appropriate

3) Gender: Male ( ) Female ( )

4) Marital status: Single ( ) Married ( ) Divorced ( ) Separated ( ) Widow/widower ( ) others specify_____

5) Living condition: i) Alone ( ) ii) With Parents, family or relatives ( )

iii) With spouse/partner ( ) iv) With friends (no family relation) ( )

v) Other ( ) (specify) _____

(c)Area of residence: i) Urban ( ) ii) Semi-Urban ( ) iii) Rural ( )

6) Highest educational level: i) No formal education ( ) ii) Some (Never completed) primary school ( )

iii) Completed primary school ( ) iv) Some secondary school ( )

v) Completed secondary school ( ) vi) Some tertiary ( )

vii) Completed tertiary/graduate ( )

7) Occupation: Unemployed ( ) Apprentice ( ) Employed ( ) Retired ( )

Exact Occupation (if employed) International Labour Organisation (ILO)

Major Group 0:	Professionals, Technical and Related Workers
Major Group 1:	Managers, Administrators and Officers
Major Group 2:	Clerical, Office and related Workers
Major Group 3:	Sales men and related Workers
Major Group 4:	Famers, Fishers men, Hunters, plumber men, and related workers
Major Group 5:	Workers in mines, Quarry and related occupation
Major Group 6:	Workers in operating transport operations.
Major Group 7:	Craftsmen, Factory operators and workers in related Occupation
Major Group 8:	Manual and Labourers'.
Major Group 9:	Service and related workers
Major Group 10:	other workers (not elsewhere classified) and workers in occupation undeniable or not reported.

11) Average monthly income (ILO)

(a) Below 18,000 naira ( )

(b) 19,000 - 68,000 naira ( )

(c) 69,000 naira and above ( )

SECTION B: (Tick as appropriate)

1) **SOCIAL SUPPORT**

i) Do you have someone you can confide in or talk to about your private feeling or concern?

Yes ( ) No ( )

ii) Do you have someone you can really count on in crisis situation?

Yes ( ) No ( )

iii) Do you have someone who makes you loved and cared for?

Yes ( ) No ( )

iv) Do you feel rejected by people?

Yes ( ) No ( )

2) **CLINICAL VARIABLES**

History of personal illness (Tick as appropriate)

a) Age of onset of illness

i) Duration of illness_____

ii) Number of hospitalisation _____

Appendix 2

Brief Psychiatric Rating Scale (BPRS)

Introduction

This section reproduces an interview schedule, symptom definitions, and specific anchor points for rating symptoms on the BPRS. Clinicians intending to use the BPRS should also consult the detailed guidelines for administration contained in the reference below.

Scale Items and Anchor Points

Rate items 1 - 14 on the basis of individual's self-report. Note items 7, 12 and 13 are also rated on the basis of observed behaviour. Items 15 - 24 are rated on the basis of observed behaviour and speech.

1) SOMATIC CONCERN

Degree of concern over present bodily health. Rate the degree to which physical health is perceived as a problem by the individual, whether complaints have realistic bases or not. Somatic delusions should be rated in the severe range with or without somatic concern. Note: be sure to assess the degree of impairment due to somatic concerns only and not other symptoms, e.g., depression. In addition, if the individual rates 6 or 7 due to somatic delusions, then you must rate Unusual Thought Content at least 4 or above.

2 Very mild Occasional somatic concerns that tend to be kept to self.

3 Mild Occasional somatic concerns that tend to be voiced to others (e.g., family, doctor).

4 Moderate Frequent expressions of somatic concern or exaggerations of existing ills OR some preoccupation, but no impairment in functioning. Not delusional.

5 Moderately severe Frequent expressions of somatic concern or exaggerations of existing ills OR some preoccupation and moderate impairment of functioning. Not delusional.

6 Severe Preoccupation with somatic complaints with much impairment in functioning OR somatic delusions without acting on them or disclosing to others.

7 Extremely Severe Preoccupation with somatic complaints with severe impairment in functioning OR somatic delusions that tend to be acted on or disclosed to others. "Have you been concerned about your physical health?" "Have you had any physical illness or seen a medical doctor lately? (What does your doctor say is wrong? How serious is it?)"

"Has anything changed regarding your appearance?"

"Has it interfered with your ability to perform your usual activities and/or work?"

"Did you ever feel that parts of your body had changed or stopped working?"

[If individual reports any somatic concerns/delusions, ask the following]:

"How often are you concerned about [use individual's description]?"

"Have you expressed any of these concerns to others?"

2) ANXIETY

5 Reported apprehension, tension, fear, panic or worry. Rate only the individual's statements , not observed anxiety which is rated under Tension.

2 Very mild Reports some discomfort due to worry OR infrequent worries that occur more than usual for most normal individuals.

3 Mild Worried frequently but can readily turn attention to other things.

4 Moderate Worried most of the time and cannot turn attention to other things easily but no impairment in functioning OR occasional anxiety with autonomic accompaniment but no impairment in functioning.

5 Moderately Severe Frequent, but not daily, periods of anxiety with autonomic accompaniment OR some areas of functioning are disrupted by anxiety or worry.

6 Severe Anxiety with autonomic accompaniment daily but not persisting throughout the day OR many areas of functioning are disrupted by anxiety or constant worry.

7 Extremely Severe Anxiety with autonomic accompaniment persisting throughout the day OR most areas of functioning are disrupted by anxiety or constant worry. "Have you been worried a lot during [mention time frame]? Have you been nervous or apprehensive? (What do you worry about?)"

"Are you concerned about anything? How about finances or the future?"

"When you are feeling nervous, do your palms sweat or does your heart beat fast (or shortness of breath, trembling, choking)?"

[If individual reports anxiety or autonomic accompaniment, ask the following]:

"How much of the time have you been [use individual's description]?"

"Has it interfered with your ability to perform your usual activities/work?"

3) DEPRESSION

Include sadness, unhappiness, anhedonia and preoccupation with depressing topics (can't attend to TV or conversations due to depression), hopeless, loss of self-esteem (dissatisfied or disgusted with self or feelings of worthlessness). Do not include vegetative symptoms, e.g., motor retardation, early waking or the a motivation that accompanies the deficit syndrome.

2 Very mild Occasionally feels sad, unhappy or depressed.

3 Mild Frequently feels sad or unhappy but can readily turn attention to other things.

4 Moderate Frequent periods of feeling very sad, unhappy, moderately depressed, but able to function with extra effort.

5 Moderately Severe Frequent, but not daily, periods of deep depression OR some areas of functioning are disrupted by depression.

6 Severe Deeply depressed daily but not persisting throughout the day OR many areas of functioning are disrupted by depression.

7 Extremely Severe Deeply depressed daily OR most areas of functioning are disrupted by depression. "How has your mood been recently? Have you felt depressed (sad, down, unhappy, as if you didn't care)?"

"Are you able to switch your attention to more pleasant topics when you want to?" "Do you find that you have lost interest in or get less pleasure from things you used to enjoy, like family, friends, hobbies, watching TV, eating?"

[If individual reports feelings of depression, ask the following]:

"How long do these feelings last?" "Has it interfered with your ability to perform your usual activities?"

4) SUICIDALITY

Expressed desire, intent, or actions to harm or kill self.

2 Very mild Occasional feelings of being tired of living. No overt suicidal thoughts.

3 Mild Occasional suicidal thoughts without intent or specific plan OR he/she feels they would be better off dead.

4 Moderate Suicidal thoughts frequent without intent or plan.

5 Moderately Severe Many fantasies of suicide by various methods. May seriously consider making an attempt with specific time and plan OR impulsive suicide attempt using non-lethal method or in full view of potential saviours.

6 Severe Clearly wants to kill self. Searches for appropriate means and time, OR potentially serious suicide attempt with individual knowledge of possible rescue.

7 Extremely Severe Specific suicidal plan and intent (e.g., "as soon as _____ I will do it by doing X"), OR suicide attempt characterised by plan individual thought was lethal or attempt in secluded environment.

"Have you felt that life wasn't worth living? Have you thought about harming or killing yourself? Have you felt tired of living or as though you would be better off dead? Have you ever felt like ending it all?"

[If individual reports suicidal ideation, ask the following]:

"How often have you thought about [use individual's description]?"

"Did you (Do you) have a specific plan?"

5) GUILT

Over concern or remorse for past behaviour. Rate only individual's statements, do not infer guilt feelings from depression, anxiety, or neurotic defences. Note: if

the individual rates 6 or 7 due to delusions of guilt, then you must rate Unusual Thought Content at least 4 or above, depending on level of preoccupation and impairment.

2 Very mild Concerned about having failed someone, or at something, but not preoccupied. Can shift thoughts to other matters easily.

3 Mild Concerned about having failed someone, or at something, with some preoccupation. Tends to voice guilt to others.

4 Moderate disproportionate preoccupations with guilt, having done wrong, injured others by doing or failing to do something, but can readily turn attention to other things.

5 Moderately Severe Preoccupation with guilt, having failed someone or at something, can turn attention to other things, but only with great effort. Not delusional.

6 Severe Delusional guilt OR unreasonable self-reproach very out of proportion to circumstances. Moderate preoccupation present.

7 Extremely Severe Delusional guilt OR unreasonable self-reproach grossly out of proportion to circumstances. Individual is very preoccupied with guilt and is likely to disclose to others or act on delusions. "Is there anything you feel guilty about? Have you been thinking about past problems?"

"Do you tend to blame yourself for things that have happened?"

"Have you done anything you're still ashamed of?"

[If individual reports guilt/remorse/delusions, ask the following]:

"How often have you been thinking about [use individual's description]?"

"Have you disclosed your feelings of guilt to others?"

6) HOSTILITY

Animosity, contempt, belligerence, threats, arguments, tantrums, property destruction, fights, and any other expression of hostile attitudes or actions. Do not infer hostility from neurotic defences, anxiety or somatic complaints. Do not include incidents of appropriate anger or obvious self-defence.

2 Very mild Irritable or grumpy, but not overtly expressed.

3 Mild Argumentative or sarcastic.

4 Moderate Overtly angry on several occasions OR yelled at others excessively.

5 Moderately Severe Has threatened, slammed about or thrown things.

6 Severe Has assaulted others but with no harm likely, e.g., slapped or pushed, OR destroyed property, e.g., knocked over furniture, broken windows.

7 Extremely Severe Has attacked others with definite possibility of harming them or with actual harm, e.g., assault with hammer or weapon.

"How have you been getting along with people (family, co-workers, etc.)?"

"Have you been irritable or grumpy lately? (How do you show it? Do you keep it to yourself?"

"Were you ever so irritable that you would shout at people or start fights or arguments?

(Have you found yourself yelling at people you didn't know?)"

"Have you hit anyone recently?"

7) ELEVATED MOOD

A pervasive, sustained and exaggerated feeling of well-being, cheerfulness, euphoria (implying a pathological mood), optimism that is out of proportion to the circumstances. Do not infer elation from increased activity or from grandiose statements alone.

2 Very mild Seems to be very happy, cheerful without much reason.

3 Mild Some unaccountable feelings of well-being that persist.

4 Moderate Reports excessive or unrealistic feelings of well-being, cheerfulness, confidence or optimism inappropriate to circumstances, some of the time. May frequently joke, smile, be giddy, or overly enthusiastic OR few instances of marked elevated mood with euphoria.

5 Moderately Severe Reports excessive or unrealistic feelings of well-being, confidence or optimism inappropriate to circumstances, much of the time. May describe feeling "on top of the world", "like everything is falling into place", or "better than ever before", OR several instances of marked elevated mood with euphoria.

6 Severe Reports many instances of marked elevated mood with euphoria OR mood definitely elevated almost constantly throughout interview and inappropriate to content.

7 Extremely Severe Individual reports being elated or appears almost intoxicated, laughing, joking, giggling, constantly euphoric, feeling invulnerable, all inappropriate to immediate circumstances.

"Have you felt so good or high that other people thought that you were not your normal self?" "Have you been feeling cheerful and 'on top of the world' without any reason?" [If individual reports elevated mood/euphoria, ask the following]:

"Did it seem like more than just feeling good?"

"How long did that last?"

8) GRANDIOSITY

Exaggerated self-opinion, self-enhancing conviction of special abilities or powers or identity as someone rich or famous. Rate only individual's statements about himself, not his/her demeanour. Note: if the individual rates 6 or 7 due to grandiose delusions, you must rate Unusual Thought Content at least 4 or above.

2 Very mild Feels great and denies obvious problems, but not unrealistic.

3 Mild Exaggerated self-opinion beyond abilities and training.

4 Moderate Inappropriate boastfulness, e.g., claims to be brilliant, insightful or gifted beyond realistic proportions, but rarely self-discloses or acts on these inflated self concepts. Does not claim that grandiose accomplishments have actually occurred.

5 Moderately Severe Same as 4 but often self-discloses and acts on these grandiose ideas. May have doubts about the reality of the grandiose ideas. Not

delusional.

6 Severe Delusional—claims to have special powers like ESP, to have millions of dollars, invented new machines, worked at jobs when it is known that he/she was never employed in these capacities, be Jesus Christ, or the Prime Minister. Individual may not be very preoccupied.

7 Extremely Severe Delusional—same as 6 but individual seems very preoccupied and tends to disclose or act on grandiose delusions.

"Is there anything special about you? Do you have any special abilities or powers? Have you thought that you might be somebody rich or famous?"

[If the individual reports any grandiose ideas/delusions, ask the following]:

"How often have you been thinking about [use individuals' description]? Have you told anyone about what you have been thinking? Have you acted on any of these ideas?"

9) SUSPICIOUSNESS

Expressed or apparent belief that other persons have acted maliciously or with discriminatory intent. Include persecution by supernatural or other non-human agencies (e.g., the devil). Note: ratings of 3 or above should also be rated under Unusual Thought Content.

2 Very mild Seems on guard. Reluctant to respond to some "personal" questions. Reports being overly self-conscious in public.

3 Mild Describes incidents in which others have harmed or wanted to harm him/her that sound plausible. Individual feels as if others are watching, laughing or criticising him/her in public, but this occurs only occasionally or rarely. Little or no preoccupation.

4 Moderate Says other persons are talking about him/her maliciously, have negative intentions or may harm him/her. Beyond the likelihood of plausibility, but not delusional. Incidents of suspected persecution occur occasionally (less than once per week) with some preoccupation.

5 Moderately Severe Same as 4, but incidents occur frequently, such as more than once per week. Individual is moderately preoccupied with ideas of persecution OR individual reports persecutory delusions expressed with much doubt (e.g., partial delusion).

6 Severe Delusional, speaks of Mafia plots, the FBI or others poisoning his/her food, persecution by supernatural forces.

7 Extremely Severe Same as 6, but the beliefs are bizarre or more preoccupying. Individual tends to disclose or act on persecutory delusions.

"Do you ever feel uncomfortable in public? Does it seem as though others are watching you? Are you concerned about anyone's intentions toward you? Is anyone going out of their way to give you a hard time, or trying to hurt you? Do you feel in any danger?" [If individual reports any persecutory ideas/delusions, ask the following]:

"How often have you been concerned that [use individual's description]? Have you told anyone about these experiences?"

10) HALLUCINATIONS

Reports of perceptual experiences in the absence of relevant external stimuli. When rating degree to which functioning is disrupted by hallucinations, include preoccupation with the content and experience of the hallucinations, as well as functioning disrupted by acting out on the hallucinatory content (e.g., engaging in deviant behaviour due to command hallucinations). Include thoughts aloud ("gedenkenlautwerden") or pseudohallucinations (e.g., hears a voice inside head) if a voice quality is present.

2 Very mild While resting or going to sleep, sees visions, smells odours or hears voices, sounds, or whispers in the absence of external stimulation, but no impairment in functioning.

3 Mild While in a clear state of consciousness, hears a voice calling the individual's name, experiences non-verbal auditory hallucinations (e.g., sounds or whispers), formless visual hallucinations or has sensory experiences in the presence of a modality relevant stimulus (e.g., visual illusions) infrequently (e.g., 1 - 2 times per week) and with no functional impairment.

4 Moderate Occasional verbal, visual, gustatory, olfactory or tactile hallucinations with no functional impairment OR non-verbal auditory hallucinations/visual illusions more than infrequently or with impairment.

5 Moderately Severe Experiences daily hallucinations OR some areas of functioning are disrupted by hallucinations.

6 Severe Experiences verbal or visual hallucinations several times a day OR many areas of functioning are disrupted by these hallucinations.

7 Extremely Severe Persistent verbal or visual hallucinations throughout the day OR most areas of functioning are disrupted by these hallucinations.

"Do you ever seem to hear your name being called?"

"Have you heard any sounds or people talking to you or about you when there has been nobody around? [If hears voices]:

"What does the voice/voices say? Did it have a voice quality?"

"Do you ever have visions or see things that others do not see? What about smell odours that others do not smell?"

[If the individual reports hallucinations, ask the following]:

"Have these experiences interfered with your ability to perform your usual activities/work? How do you explain them? How often do they occur?"

11) UNUSUAL THOUGHT CONTENT

Unusual, odd, strange, or bizarre thought content. Rate the degree of unusualness, not the degree of disorganisation of speech. Delusions are patently absurd, clearly false or bizarre ideas that are expressed with full conviction. Consider the individual to have full conviction if he/she has acted as though the delusional belief was true. Ideas of reference/persecution can be differentiated from delusions in that ideas are expressed with much doubt and contain more elements of reality. Include thought insertion, withdrawal and broadcast. Include grandiose, somatic and persecutory delusions even if rated elsewhere. Note: if

Somatic Concern, Guilt, Suspiciousness or Grandiosity are rated 6 or 7 due to delusions, then Unusual Thought Content must be rated 4 or above.

2 Very mild Ideas of reference (people may stare or may laugh at him), ideas of persecution (people may mistreat him). Unusual beliefs in psychic powers, spirits, UFOs, or unrealistic beliefs in one's own abilities. Not strongly held. Some doubt.

3 Mild Same as 2, but degree of reality distortion is more severe as indicated by highly unusual ideas or greater conviction. Content may be typical of delusions (even bizarre), but without full conviction. The delusion does not seem to have fully formed, but is considered as one possible explanation for an unusual experience.

4 Moderate Delusion present but no preoccupation or functional impairment. May be an encapsulated delusion or a firmly endorsed absurd belief about past delusional circumstances.

5 Moderately Severe Full delusion(s) present with some preoccupation OR some areas of functioning disrupted by delusional thinking.

6 Severe Full delusion(s) present with much preoccupation OR many areas of functioning are disrupted by delusional thinking.

7 Extremely Severe Full delusion(s) present with almost total preoccupation OR most areas of functioning disrupted by delusional thinking.

"Have you been receiving any special messages from people or from the way things are arranged around you? Have you seen any references to yourself on TV or in the newspapers?"

"Can anyone read your mind?"

"Do you have a special relationship with God?"

"Is anything like electricity, X-rays, or radio waves affecting you?"

"Are thoughts put into your head that are not your own?"

"Have you felt that you were under the control of another person or force?"

[If individual reports any odd ideas/delusions, ask the following]:

"How often do you think about [use individual's description]?"

"Have you told anyone about these experiences? How do you explain the things that have been happening [specify]?"

Rate items 12 - 13 on the basis of individual's self-report and observed behaviour.

12) BIZARRE BEHAVIOUR

Reports of behaviours which are odd, unusual, or psychotically criminal. Not limited to interview period. Include inappropriate sexual behaviour and inappropriate affect.

2 Very mild Slightly odd or eccentric public behaviour, e.g., occasionally giggles to self, fails to make appropriate eye contact, that does not seem to attract the attention of others OR unusual behaviour conducted in private, e.g., innocuous rituals that would not attract the attention of others.

3 Mild Noticeably peculiar public behaviour, e.g., inappropriately loud talking,

makes inappropriate eye contact, OR private behaviour that occasionally, but not always, attracts the attention of others, e.g., hoards food, conducts unusual rituals, and wears gloves indoors.

4 Moderate Clearly bizarre behaviour that attracts or would attract (if done privately) the attention or concern of others, but with no corrective intervention necessary. Behaviour occurs occasionally, e.g., fixated staring into space for several minutes, talks back to voices once, inappropriate giggling/laughter on 1 - 2 occasions, talking loudly to self.

5 Moderately Severe Clearly bizarre behaviour that attracts or would attract (if done privately) the attention of others or the authorities, e.g., fixated staring in a socially disruptive way, frequent inappropriate giggling/laughter, occasionally responds to voices, or eats non-foods.

6 Severe Bizarre behaviour that attracts attention of others and intervention by authorities, e.g., directing traffic, public nudity, staring into space for long periods, carrying on a conversation with hallucinations, frequent inappropriate giggling/laughter.

7 Extremely Severe Serious crimes committed in a bizarre way that attract the attention of others and the control of authorities, e.g., sets fires and stares at flames OR almost constant bizarre behaviour, e.g., inappropriate giggling/laughter, responds only to hallucinations and cannot be engaged in interaction.

"Have you done anything that has attracted the attention of others?"

"Have you done anything that could have gotten you into trouble with the police?"

"Have you done anything that seemed unusual or disturbing to others?"

13) SELF-NEGLECT

Hygiene, appearance, or eating behaviour below usual expectations, below socially acceptable standards or life threatening.

2 Very mild Hygiene/appearance slightly below usual community standards, e.g., shirt out of pants, buttons unbuttoned, shoe laces untied, but no social or medical consequences.

3 Mild Hygiene/appearance occasionally below usual community standards, e.g., irregular bathing, clothing is stained, hair uncombed, occasionally skips an important meal. No social or medical consequences.

4 Moderate Hygiene/appearance is noticeably below usual community standards, e.g., fails to bathe or change clothes, clothing very soiled, hair unkempt, needs prompting, noticeable by others OR irregular eating and drinking with minimal medical concerns and consequences.

5 Moderately Severe Several areas of hygiene/appearance are below usual community standards OR poor grooming draws criticism by others and requires regular prompting. Eating or hydration are irregular and poor, causing some medical problems.

6 Severe Many areas of hygiene/appearance are below usual community standards, does not always bathe or change clothes even if prompted. Poor grooming

has caused social ostracism at school/residence/work, or required intervention. Eating erratic and poor, may require medical intervention.

7 Extremely Severe Most areas of hygiene/appearance/nutrition are extremely poor and easily noticed as below usual community standards OR hygiene/appearance/nutrition require urgent and immediate medical intervention.

"How has your grooming been lately? How often do you change your clothes? How often do you take showers? Has anyone (parents/staff) complained about your grooming or dress? Do you eat regular meals?"

14) DISORIENTATION

Does not comprehend situations or communications, such as questions asked during the entire BPRS interview. Confusion regarding person, place, or time. Do not rate if incorrect responses are due to delusions.

2 Very mild Seems muddled or mildly confused 1 - 2 times during interview. Oriented to person, place and time.

3 Mild Occasionally muddled or mildly confused 3 - 4 times during interview. Minor inaccuracies in person, place, or time, e.g., date off by more than 2 days, or gives wrong division of hospital or community centre.

4 Moderate Frequently confused during interview. Minor inaccuracies in person, place, or time are noted, as in 3 above. In addition, may have difficulty remembering general information, e.g., name of Prime Minister.

5 Moderately Severe Markedly confused during interview, or to person, place, or time. Significant inaccuracies are noted, e.g., date off by more than one week, or cannot give correct name of hospital. Has difficulty remembering personal information, e.g., where he/she was born or recognising familiar people.

6 Severe Disoriented as to person, place, or time, e.g., cannot give correct month and year. Disoriented in 2 out of 3 spheres.

7 Extremely Severe Grossly disoriented as to person, place, or time, e.g., cannot give name or age. Disoriented in all three spheres.

"May I ask you some standard questions we ask everybody?"

"How old are you? What is the date [allow 2 days]"

"What is this place called? What year were you born? Who is the Prime Minister?"

Rate items 15 - 24 on the basis of observed behaviour and speech.

15) CONCEPTUAL DISORGANISATION

Degree to which speech is confused, disconnected, vague or disorganised. Rate tangentiality, circumstantiality, sudden topic shifts, incoherence, derailment, blocking, neologisms, and other speech disorders. Do not rate content of speech.

2 Very mild Peculiar use of words or rambling but speech is comprehensible.

3 Mild Speech a bit hard to understand or make sense of due to tangentiality, circumstantiality, or sudden topic shifts.

4 Moderate Speech difficult to understand due to tangentiality, circumstantiality, idiosyncratic speech, or topic shifts on many occasions OR 1-2 instances of incoherent phrases.

5 Moderately Severe Speech difficult to understand due to circumstantiality, tangentiality, neologisms, blocking or topic shifts most of the time, OR 3 - 5 instances of incoherent phrases.

6 Severe Speech is incomprehensible due to severe impairment most of the time. Many BPRS items cannot be rated by self-report alone.

7 Extremely Severe Speech is incomprehensible throughout interview.

16) BLUNTED AFFECT

Restricted range in emotional expressiveness of face, voice, and gestures. Marked indifference or flatness even when discussing distressing topics. In the case of euphoric or dysphoric individuals, rate Blunted Affect if a flat quality is also clearly present.

2 Very mild Emotional range is slightly subdued or reserved but displays appropriate facial expressions and tone of voice that are within normal limits.

3 Mild Emotional range overall is diminished, subdued or reserved, without many spontaneous and appropriate emotional responses. Voice tone is slightly monotonous.

4 Moderate Emotional range is noticeably diminished, individual doesn't show emotion, smile or react to distressing topics except infrequently. Voice tone is monotonous or there is noticeable decrease in spontaneous movements. Displays of emotion or gestures are usually followed by a return to flattened affect.

5 Moderately Severe Emotional range very diminished, individual doesn't show emotion, smile, or react to distressing topics except minimally, few gestures, facial expression does not change very often. Voice tone is monotonous much of the time.

6 Severe Very little emotional range or expression. Mechanical in speech and gestures most of the time. Unchanging facial expression. Voice tone is monotonous most of the time.

7 Extremely Severe Virtually no emotional range or expressiveness, stiff movements. Voice tone is monotonous all of the time.

Use the following probes at end of interview to assess emotional responsivity:

"Have you heard any good jokes lately? Would you like to hear a joke?"

17) EMOTIONAL WITHDRAWAL

Deficiency in individual's ability to relate emotionally during interview situation. Use your own feeling as to the presence of an `invisible barrier' between individual and interviewer. Include withdrawal apparently due to psychotic processes.

2 Very mild Lack of emotional involvement shown by occasional failure to make reciprocal comments, appearing preoccupied, or smiling in a stilted manner, but spontaneously engages the interviewer most of the time.

3 Mild Lack of emotional involvement shown by noticeable failure to make reciprocal comments, appearing preoccupied, or lacking in warmth, but responds to interviewer when approached.

4 Moderate Emotional contact not present much of the interview because individual does not elaborate responses, fails to make eye contact, doesn't seem to care if interviewer is listening, or may be preoccupied with psychotic material.

5 Moderately Severe Same as 4 but emotional contact not present most of the interview.

6 Severe Actively avoids emotional participation. Frequently unresponsive or responds with yes/no answers (not solely due to persecutory delusions). Responds with only minimal affect.

7 Extremely Severe Consistently avoids emotional participation. Unresponsive or responds with yes/no answers (not solely due to persecutory delusions). May leave during interview or just not respond at all.

18) MOTOR RETARDATION

Reduction in energy level evidenced by slowed movements and speech, reduced body tone, decreased number of spontaneous body movements. Rate on the basis of observed behaviour of the individual only. Do not rate on the basis of individual's subjective impression of his own energy level. Rate regardless of medication effects.

2 Very mild Slightly slowed or reduced movements or speech compared to most people.

3 Mild Noticeably slowed or reduced movements or speech compared to most people.

4 Moderate Large reduction or slowness in movements or speech.

5 Moderately Severe Seldom moves or speaks spontaneously OR very mechanical or stiff movements

6 Severe Does not move or speak unless prodded or urged.

7 Extremely Severe Frozen, catatonic.

19) TENSION

Observable physical and motor manifestations of tension, "nervousness" and agitation. Self-reported experiences of tension should be rated under the item on anxiety. Do not rate if restlessness is solely akathisia, but do rate if akathisia is exacerbated by tension.

2 Very mild More fidgety than most but within normal range. A few transient signs of tension, e.g., picking at fingernails, foot wagging, scratching scalp several times or finger tapping.

3 Mild Same as 2, but with more frequent or exaggerated signs of tension.

4 Moderate Many and frequent signs of motor tension with one or more signs sometimes occurring simultaneously, e.g., wagging one's foot while wringing hands together. There are times when no signs of tension are present.

5 Moderately Severe Many and frequent signs of motor tension with one or more signs often occurring sim ultaneously. There are still rare times when no signs of tension are present.

6 Severe Same as 5, but signs of tension are continuous.

7 Extremely Severe Multiple motor manifestations of tension are conti-

nuously present, e.g., continuous pacing and hand wringing.

20) UNCO-OPERATIVENESS

Resistance and lack of willingness to co-operate with the interview. The uncooperativeness might result from suspiciousness. Rate only unco-operativeness in relation to the interview, not behaviours involving peers and relatives.

2 Very mild Shows non-verbal signs of reluctance, but does not complain or argue.

3 Mild Gripes or tries to avoid complying, but goes ahead without argument.

4 Moderate Verbally resists but eventually complies after questions are rephrased or repeated.

5 Moderately Severe Same as 4, but some information necessary for accurate ratings is withheld.

6 Severe Refuses to co-operate with interview, but remains in interview situation.

7 Extremely Severe Same as 6, with active efforts to escape the interview

21) EXCITEMENT

Heightened emotional tone or increased emotional reactivity to interviewer or topics being discussed, as evidenced by increased intensity of facial expressions, voice tone, expressive gestures or increase in speech quantity and speed.

2 Very mild Subtle and fleeting or questionable increase in emotional intensity. For example, at times seems keyed-up or overly alert.

3 Mild Subtle but persistent increase in emotional intensity. For example, lively use of gestures and variation in voice tone.

4 Moderate Definite but occasional increase in emotional intensity. For example, reacts to interviewer or topics that are discussed with noticeable emotional intensity. Some pressured speech.

5 Moderately Severe Definite and persistent increase in emotional intensity. For example, reacts to many stimuli, whether relevant or not, with considerable emotional intensity. Frequent pressured speech.

6 Severe Marked increase in emotional intensity. For example, reacts to most stimuli with inappropriate emotional intensity. Has difficulty settling down or staying on task. Often restless, impulsive, or speech is often pressured.

7 Extremely Severe Marked and persistent increase in emotional intensity. Reacts to all stimuli with inappropriate intensity, impulsiveness. Cannot settle down or stay on task. Very restless and impulsive most of the time. Constant pressured speech.

22) DISTRACTIBILITY

Degree to which observed sequences of speech and actions are interrupted by stimuli unrelated to the interview. Distractibility is rated when the individual shows a change in the focus of attention as characterised by a pause in speech or a marked shift in gaze. Individual's attention may be drawn to noise in adjoining room, books on a shelf, interviewer's clothing, etc. Do not rate circumstantiality, tangentiality or flight of ideas. Also, do not rate rumination with delusional ma-

terial. Rate even if the distracting stimulus cannot be identified.

2 Very mild Generally can focus on interviewer's questions with only 1 distraction or inappropriate shift of attention of brief duration.

3 Mild Individual shifts focus of attention to matters unrelated to the interview 2 - 3 times.

4 Moderate Often responsive to irrelevant stimuli in the room, e.g., averts gaze from the interviewer.

5 Moderately Severe Same as above, but now distractibility clearly interferes with the flow of the interview.

6 Severe Extremely difficult to conduct interview or pursue a topic due to preoccupation with irrelevant stimuli.

7 Extremely Severe Impossible to conduct interview due to preoccupation with irrelevant stimuli.

23) MOTOR HYPERACTIVITY

Increase in energy level evidenced in more frequent movement and/or rapid speech. Do not rate if restlessness is due to akathisia.

2 Very mild Some restlessness, difficulty sitting still, lively facial expressions, or somewhat talkative

3 Mild Occasionally very restless, definite increase in motor activity, lively gestures, 1 - 3 brief instances of pressured speech.

4 Moderate Very restless, fidgety, excessive facial expressions, or non-productive and repetitious motor movements. Much pressured speech, up to one-third of the interview.

5 Moderately Severe Frequently restless, fidgety. Many instances of excessive non-productive and repetitious motor movements. On the move most of the time. Frequent pressured speech, difficult to interrupt. Rises on 1 - 2 occasions to pace.

6 Severe Excessive motor activity, restlessness, fidgety, loud tapping, noisy, etc., throughout most of the interview. Speech can only be interrupted with much effort. Rises on 3 - 4 occasions to pace.

7 Extremely Severe Constant excessive motor activity throughout entire interview, e.g., constant pacing, constant pressured speech with no pauses, individual can only be interrupted briefly and only small amounts of relevant information can be obtained.

24) MANNERISMS AND POSTURING

Unusual and bizarre behaviour, stylised movements or acts, or any postures which are clearly uncomfortable or inappropriate. Exclude obvious manifestations of medication side effects. Do not include nervous mannerisms that are not odd or unusual.

2 Very mild Eccentric or odd mannerisms or activity that ordinary persons would have difficulty explaining, e.g., grimacing, picking. Observed once for a brief period.

3 Mild Same as 2, but occurring on two occasions of brief duration.

4 Moderate Mannerisms or posturing, e.g., stylised movements or acts, rocking, nodding, rubbing, or grimacing, observed on several occasions for brief periods or infrequently but very odd. For example, uncomfortable posture maintained for 5 seconds more than twice.

5 Moderately Severe Same as 4, but occurring often, or several examples of very odd mannerisms or posturing that are idiosyncratic to the individual.

6 Severe Frequent stereotyped behaviour assumes and maintains uncomfortable or inappropriate postures, intense rocking, smearing, strange rituals or foetal posturing. Individual can interact with people and the environment for brief periods despite these behaviours.

7 Extremely Severe Same as 6, but individual cannot interact with people or the environment due to these behaviours.

Appendix 3

MEDICATION ADHERENCE RATING SCALE (MARS)

NO.	Questionnaire	Questions Answer
1	Do you ever forget to take your medication?	Yes/No
2	Are you careless at times about taking your medication?	Yes/No
3	When you feel better, do you sometimes stop taking your medication?	Yes/No
4	Sometimes if you feel worse when you take the medication, do you stop taking it?	Yes/No
5	I take my medication only when I am sick	Yes/No
6	It is unnatural for my mind and body to be controlled by Medication	Yes/No
7	My thoughts are clearer on medication	Yes/No
8	By staying on medication, I can prevent getting sick.	Yes/No
9	I feel weird, like a zombie on medication	Yes/No
10	Medication makes me feel tired and sluggish	Yes/No

Appendix 4

WHO DAS DISABILITY ASSESSMENT SCHEDULE 2.0. 36-LIKERT SCORING SCALE.

Serial Number: _____ **Time Interview Began: _____**

Interviewer's Name: _____ **Time Interview Ended: _____**

Date of Interview: _____ **Total Time: _____**

Please Note: when scoring WHO DAS, The following numbers are assigned to responses:
0 = No Difficult
1 = Mild Difficult
2 = Moderate Difficult
3 = Severe difficult
4 = Extreme Difficult or cannot do

		Score
Understanding and communicating		
D1.1	Concentrating on doing something for ten minutes	
D1.2	Remembering to do important thing?	
D1.3	Analyzing and finding solution, to problems in day-to-day life?	
D1.4	Learning a new task for example, learning how to get to a new place	
D1.5	Generally understanding what people say?	
D1.6	Starting and maintaining a conversation	
Getting around		
D2.1	Standing for long period such as 30 minutes?	
D2.2	Standing up from sitting down	
D2.3	Moving around inside your home	
D2.4	Getting out of your home	
D2.5	Walking a long distance such as a kilometer (or equivalent)	
Self-care		
D3.1	Standing for long period such as 30 minute	
D3.2	Getting dressed	
D3.3	Eating	
D3.4	Staying by yourself for a few days	
Getting along with people		
D4.1	Dealing with people you do not know	
D4.2	Maintaining a friendship	
D4.3	Getting along with people who are close to you	
D4.4	Making new friends	
D4.5	Sexual activities	
Life activities		
D5.1	Taking care of your household responsibility	

Continued

D5.2	Doing most important household task well
D5.3	Getting all the household work done that you needed to do
D5.4	Getting your household work done as quickly as needed
D5.5	Your day to day work/school
D5.6	Doing your most important work/school tasks well
D5.7	Getting all the work done that you need to do
D5.8	Getting your work done as quickly as needed
Participation in society	
D6.1	How much of a problem did you have in joining in community activities for example, festivities, religious or other activities in the same way as anyone else can
D6.2	How much of a problem did you have because of barriers or hindrances in the world around
D6.3	How much of a problem did you have living with dignity because of the attitude and actions of other
D6.4	How time did you spend on your health condition, or its consequences
D6.5	How much have you been emotionally affected by your health condition
D6.6	How much has your health been a drain on the financial resources of you or your family
D6.7	How much of a problem did your family have because of your health problems
D6.8	How much of a problem did you have in doing things by yourself for relaxation or pleasure
Overall Score	
H1	Overall, in the past 30 days, how many days were these difficulties present
H2	In the past 30 days, for how many days were you totally unable to carry out your usual activities or work because of any health condition
H3	In the past 30 days, not counting the days that you were totally unable, for how many days did you cut back or reduce your usual activities or work because of any health condition