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REGULAR ARTICLE

# Attitudes toward taking medication among outpatients with schizophrenia: cross-national comparison between Tokyo and Beijing

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**Abstract**
*Objectives* The aim of this study was to compare attitudes toward medication and associated factors for patients with schizophrenia in Japan and China.
*Methods* Age-group matched samples were drawn from outpatients in Tokyo ($N = 76$) and Beijing ($N = 76$) according to the same inclusion/exclusion criteria. Psychotropic prescription and attitudes toward medication were measured using Drug Attitude Inventory-30 (DAI-30) and an original questionnaire regarding beliefs about psychiatric medication. Stepwise regression analysis of the DAI-30 data was performed for each group.
*Results* Japanese subjects were prescribed significantly larger amounts of antipsychotics. Polypharmacy of antipsychotics and concurrent use of anticholinergics, anxiolytics, or hypnotics were more frequently found among subjects in Tokyo than among those in Beijing. However, subjects in Tokyo and Beijing had similar subjective responses to medication, subjective evaluation of side-effects, and complaints about overuse of psychotropics. Subjects in Tokyo complained less about physician's over-reliance on medication and were less concerned about medication cost than those in Beijing. In Tokyo, longer duration of illness and lower subjective distress caused by side effects predicted a more positive subjective response, while female gender, younger age, and lower Brief Psychiatric Rating Scale score were independently correlated with a better subjective response in Beijing.
*Conclusions* Subjective acceptance of multiple medications is greater for patients in Japan than those in China. Determinants of subjective response to medication varied between Japan and China.

**Keywords** Attitude toward medication · Schizophrenia · Cross-cultural comparison · Japan · China

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## Introduction

International comparative studies on psychotropic prescriptions have shown that prescription practices for patients with schizophrenia vary greatly [1, 2]. Particularly, in Japan, prescription practice for inpatients with schizophrenia is characterized by polypharmacy and high dosing. This practice is a clear departure from that of other Asian countries [2]; in China, the total quantity of antipsychotics prescribed was the lowest among six East-Asian countries [2].

The use of polypharmacy and high dosing in Japan has been explained by several factors, for example prolonged hospitalization [2], use of antipsychotics to control patients' behavior by sedation [1], psychiatrists' skepticism toward the use of prescription algorithms, and nurses' requests for more drugs [3]. However few studies have explored this phenomenon from the patient's point of view; it is unknown if different prescription habits affect patients' attitudes toward medication.

The goals of pharmacological treatment for schizophrenia have evolved from objective improvement in psychotic symptoms into patient-related factors such as quality of life [4, 5] and patient satisfaction with treatment. Evaluating attitudes toward medication is now regarded as an important measure of outcome. Moreover, the patient's attitude toward medication affects a number of significant clinical variables [6–8] including medication non-adherence, quality of life, treatment outcomes, suicidal behavior, and substance abuse. Therefore it is necessary for clinicians to understand the characteristics of patients' attitudes toward medication and further research in this area is required [9].

The aim of this research was to investigate the following:

1 Do prescription practices for outpatients with schizophrenia vary between Tokyo and Beijing?
2 How do patients in Tokyo and Beijing differ in their attitudes toward medication?
3 What factors are associated with patients' attitudes toward medication for patients in Tokyo and Beijing?

## Materials and methods

### Study setting and recruitment procedure

A cross-sectional study was performed with the collaboration of University of Tsukuba and Beijing Huilongguan Hospital. A convenient sample was drawn from outpatient attendees. The Japanese subjects were recruited from outpatient clinics at Hasegawa Hospital, which is a psychiatric hospital with 576 beds located in Tokyo. The Chinese subjects were recruited from outpatient clinics at Beijing Huilongguan Hospital, the largest psychiatric hospital in Beijing, with 1,369 beds. These two hospitals were comparable in the following characteristics:

1 located in a suburban area of their respective national capitals, with a wide catchment area including urban and suburban populations;
2 psychiatric hospitals for acute treatment rather than long-term care; and
3 affiliated with a medical school as a psychiatric educational facility.

The study protocol was independently approved by both institutional ethics review boards at University of Tsukuba, Hasegawa Hospital, and Beijing Huilongguan Hospital. The subjects from the two countries were selected according to the following inclusion/exclusion criteria. The subjects were:

1 diagnosed with schizophrenia or schizoaffective disorder using the criteria of ICD-10;
2 taking antipsychotic medication continuously for at least one month; and
3 aged 18–65 years.

We excluded those who:

1 were at risk of clinical deterioration by participating in the study;
2 suffered from substance abuse or dependency;
3 had severe physical illness;
4 were pregnant; or
5 were mentally retarded or illiterate.

In Tokyo, subjects were recruited after their routine hospital visits. The first author (NK) interviewed and administered the questionnaires to all subjects. In Beijing, subjects were invited during an outpatient visit. Trained psychiatrists conducted the interviews and administered the questionnaires under the supervision of the second author (SS). At both sites, written informed consent was obtained. In Beijing, written consent from the subject's family member was also obtained. To minimize social desirability bias, the subjects were assured that their treatment was not influenced by participation or refusal to participate in the research. In addition, subjects were reassured that confidentiality and anonymity were preserved. In total, 200 subjects (100 in Tokyo and 100 in Beijing) participated in the study. Although no significant differences were observed in gender and psychopathology between the two groups, participants in Tokyo were significantly older than those in Beijing (Tokyo; $39.6 \pm 11.7$, Beijing; $34.0 \pm 11.3$, ANOVA, $F = 12.06$, $df = 1, P < 0.001$). To control for potential confounding by age, these 200 participants were stratified into ten age-groups and then randomly sampled to yield 152 age-group-matched patients (76 in Tokyo and 76 in Beijing).

### Data collection and measures

Data on sociodemographic background, illness history, and prescribed medication were gathered from subjects' medical charts. All antipsychotic drugs were converted into chlorpromazine equivalents using published guidelines [10]. Psychopathology was evaluated by using the 18-item Brief Psychiatric Rating Scale (BPRS) [11]. The BPRS is one of the most frequently used instruments for evaluating psychopathology in patients with schizophrenia. It is an 18-item scale measuring positive symptoms, general psychopathology, and affective symptoms. Each item is rated on a seven-point scale (1 = not present to 7 = extremely severe). To make the cross-national data comparable, each item was rated using anchoring points

developed by Woerner [12] (BPRS-anchored). This is a modified version of BPRS that has detailed criteria for each anchoring point.

The data collection sheet and self-report questionnaire were developed using Japanese and translated into Chinese by a professional translator. These were then independently back-translated into Japanese by two professionals. One was a Chinese postgraduate student with a master's degree in psychology and the other was a Chinese psychiatrist with a medical degree from a Japanese university (the third author, LZ); both were fluent in Japanese. Incompatibilities between the original and back-translated versions were resolved by discussion with LZ.

The patients' subjective responses to psychiatric medication were assessed by using the 30-item version of Drug Attitude Inventory (DAI-30) [13]. This is an established, reliable self-report instrument that evaluates patients' perceived effects and benefits of maintenance antipsychotic drug therapy. The scale has been translated into several languages and has been frequently used in international clinical trials [9]. It consists of 15 items for positive attitudes and 15 items for negative attitudes toward medication with which patients can agree or disagree. Total score was calculated according to the original author's instructions [9] to produce a score ranging from −30 to 30 where a positive total score indicates an overall positive subjective response and a negative total score indicates an overall negative subjective response. The psychometric properties of Japanese and Chinese versions of the scale were reported to be satisfactory [14, 15]. In this sample, the internal consistency was $\alpha = 0.84$ (Tokyo) and $\alpha = 0.72$ (Beijing). Response style analysis was also performed to investigate acquiescent tendency which reflects an individual's communication style [16]. DAI-30 is balanced for negative and positive items; we therefore used the total number of endorsements to measure the individual's systematic tendency to agree, in other words, an index of acquiescence [17]. In addition, a newly devised self-report questionnaire was used to measure patients' beliefs about psychiatric medication. It included the following items:

1 I take too much medicine;
2 physicians rely too much on medication; and
3 the cost of the medication is a substantial burden.

The answers were scored on a four-point Likert scale, from 1 (strongly disagree) to 4 (strongly agree). Side effects of psychiatric medication were assessed by asking subjects, "How much are you bothered by side effects of psychiatric drug therapy?" The answer was scored on a four-point Likert scale, from 1 (not at all) to 4 (very much).

### Data analysis

Analyses were conducted using SPSS for Windows version 12.0 (SPSS, Chicago, IL, USA). Analysis of variance (ANOVA) was used for continuous data, Mann–Whitney's $U$ test was used for ordinary data and the $\chi^2$ test was used for categorical data. To adjust for background variable differences, analysis of covariance (ANCOVA) was used, where appropriate. Variables that were significantly different between two sites, and showed significant correlation with dependent variables were used as covariates. Spearman's rank-correlation coefficient was used to evaluate relationships between two variables. To examine the associations between background variables and subjective response to medications, stepwise multiple regression analysis was performed for each group. Gender, age, marital status, employment status, length of illness, BPRS, side effects and total amount of antipsychotics were entered as independent variables. All statistical tests were two-tailed. The significance level was set at $P < 0.05$.

## Results

### Sample characteristics

Sociodemographic and clinical characteristics of the two groups are displayed in Table 1. No statistically significant differences were found for age, gender, length of illness, number of hospitalizations, or BPRS between subjects from Tokyo and Beijing. However, the proportion of subjects who were married and living with family was significantly higher in Beijing. A significant difference was also found in employment status. The major subgroup in Tokyo consisted of subjects who were attending rehabilitation programs or sheltered workshops, whereas more than half of the subjects in Beijing were employed. Years of education and total length of hospitalization were significantly longer for subjects in Tokyo. In addition, samples were significantly different in regards to health economic resources; all subjects in Tokyo had health insurance, whereas only 25% of the subjects in Beijing had insurance.

### Psychotropics prescription

Prescribed psychotropics are shown in Table 2. Subjects in Tokyo received about twice the amount of antipsychotics. Antipsychotic polypharmacy occurred more frequently for subjects in Tokyo. Subjects in Tokyo were more frequently prescribed atypical antipsychotics in combination with typical antipsychotics. Clozapine was prescribed for twenty-one subjects (27.6%) in Beijing; 0% in Tokyo. Also

**Table 1** Comparison of sociodemographic and clinical variables between subjects in Tokyo ($N = 76$) and Beijing ($N = 76$)

| | Tokyo | Beijing | Test statistics |
|---|---|---|---|
| Age (years) | 37.4 ± 11.0 | 37.2 ± 10.2 | $F = 0.07$ |
| Gender (Male) | 38 (50.0%) | 35 (46.1%) | $\chi^2 = 0.24$ |
| Marital status (married) | 11 (14.5%) | 42 (55.3%) | $\chi^2 = 27.84$*** |
| Education (years) | 12.9 ± 2.4 | 11.8 ± 2.7 | $F = 7.22$** |
| Living arrangement (not alone) | 64 (84.2%) | 72 (94.7%) | $\chi^2 = 4.47$* |
| Employment status | | | $\chi^2 = 57.75$*** |
| Employed | 14 (18.4%) | 41 (53.9%) | |
| Sheltered work or rehabilitation | 41 (53.9%) | 0 (0%) | |
| None | 21 (27.6%) | 35 (46.1%) | |
| Health insurance | | | $\chi^2 = 76.75$*** |
| Medical insurance | 76 (100%) | 25 (32.9%) | |
| Government | 0 (0%) | 15 (19.7%) | |
| None | 0 (0%) | 36 (47.4%) | |
| Length of illness (years) | 11.0 ± 8.5 | 8.7 ± 8.2 | $F = 2.90$ |
| Number of hospitalizations | 2.3 ± 2.3 | 1.8 ± 1.4 | $F = 1.73$ |
| Length of hospitalization (months) | 16.3 ± 33.4 | 6.2 ± 6.3 | $F = 6.70$* |
| BPRS | 29.4 ± 6.9 | 29.1 ± 7.4 | $F = 0.80$ |

*BPRS* brief psychiatric rating scale

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$

**Table 2** Comparison of psychotropic prescription patterns between subjects in Tokyo ($N = 76$) and Beijing ($N = 76$)

| | Tokyo | Beijing | Test statistics |
|---|---|---|---|
| Total antipsychotics dose (mg)[a] | 666.7 ± 470.4 | 309.3 ± 219.6 | $F = 34.84$*** |
| Antipsychotic polypharmacy | 47 (61.8%) | 3 (3.9%) | $\chi^2 = 57.70$*** |
| Type of antipsychotics | | | $\chi^2 = 31.53$*** |
| Typical only | 15 (19.7%) | 15 (19.7%) | |
| Atypical only | 32 (42.1%) | 59 (77.6%) | |
| Combined | 29 (38.1%) | 2 (2.6%) | |
| Anticholinergic use | 64 (84.2%) | 25 (32.9%) | $\chi^2 = 41.23$*** |
| Anxiolytic/hypnotic use | 64 (84.2%) | 19 (25.0%) | $\chi^2 = 53.75$*** |
| Total number of psychiatric drugs[b] | 5.4 ± 2.6 | 1.7 ± 0.8 | $F = 141.56$*** |
| Dose frequency per day | 3.4 ± 0.9 | 1.9 ± 0.9 | $F = 109.86$*** |

BPRS, brief psychiatric rating scale

[a] Chlorpromazine equivalent

[b] Psychotropics and anticholinergics

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$

Japanese subjects were more frequently and concurrently prescribed anticholinergics, anxiolytics, or hypnotics. The total number of psychiatric drugs prescribed for Japanese subjects was three times larger than for patients in Beijing. The number of doses per day for Japanese subjects was significantly larger than the number of doses for subjects in Beijing. Traditional Chinese Medicine was prescribed for a few subjects in both Tokyo and Beijing for amelioration of autonomic side-effects such as constipation.

## Attitudes toward medication

Comparison of attitudes toward medication is presented in Table 3. There were no significant differences between total DAI-30 scores for subjects in Tokyo and Beijing. The proportion of subjects with a positive DAI-30 total score was not significantly different between the two sites (Tokyo; 84.2% vs. Beijing; 92.1%, $\chi^2 = 0.13$, $df = 1$, $P = 0.209$). Subjects in Beijing, compared with those in Tokyo, more frequently endorsed the 15 positive items (Tokyo; 9.2 ± 3.6, Beijing; 11.8 ± 2.5, Mann–Whitney's $U$, $Z = 4.37$, $P < 0.001$) and the 15 negative items (Tokyo; 2.9 ± 2.3, Beijing; 9.2 ± 3.6, Mann–Whitney's $U$, $Z = 5.60$, $P < 0.001$). The total number of endorsements for the scale was significantly higher for Beijing, indicating that acquiescent response tendency was greater for subjects in Beijing than for those in Tokyo (Table 3). The biggest difference at the item level was for item 13, "I take medication only when I feel ill" (Tokyo; 0% vs. Beijing; 67.1%, $\chi^2 = 76.75$, $df = 1$, $P < 0.001$).

No significant difference was found for, "I take too much medicine". However, subjects in Tokyo were less likely to believe that "Physicians rely too much on medication", and "The cost of the medication is a substantial burden". There was no significant difference in subjective evaluation of side effects between the two groups. "The

**Table 3** Comparison of attitudes toward medication among subjects in Tokyo ($N = 76$) and Beijing ($N = 76$)

| | Tokyo | Beijing | Test statistics |
|---|---|---|---|
| DAI-30[a] | 12.7 ± 10.6 | 12.7 ± 8.5 | $Z = 0.22$ |
| Total endorsement in DAI-30[b] | 12.1 ± 3.0 | 17.2 ± 3.3 | $Z = 8.04$*** |
| I take too much medicine[c] | 2.3 ± 0.9 | 2.1 ± 0.9 | $Z = 0.97$ |
| Physicians rely too much on medication[c] | 2.3 ± 0.9 | 2.7 ± 1.1 | $Z = 2.56$* |
| The cost of medication is a substantial burden[c] | 2.3 ± 1.1 | 3.4 ± 0.9 | $Z = 5.82$*** |
| Side effects[d] | 2.3 ± 0.9 | 2.3 ± 0.8 | $Z = 0.03$ |

*DAI-30* drug attitude inventory-30

[a] Scores range from −30 to 30

[b] Total number of "agree" responses for DAI-30 (15 positive and 15 negative items)

[c] 1 (strongly disagree) to 4 (strongly agree)

[d] Patients' subjective evaluation using a 4-point Likert scale from 1(not bothered at all) to 4 (bothered very much)

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$

cost of the medication is a substantial burden" showed significant correlation with living arrangement (with others, $\rho = 0.22$, $P < 0.01$), years of education ($\rho = -0.25$, $P < 0.01$), length of hospitalization ($\rho = -0.21$, $P < 0.01$), and health insurance ($\rho = -0.25$, $P < 0.01$). However, cross-national difference for the item remained significant after adjusting for these covariates. (Tokyo; 2.3 ± 0.1 vs. Beijing; 3.4 ± 0.1, ANCOVA, $F = 32.62$, $df = 1$, $P < 0.001$). Marital status, years of education, living arrangement, employment, health insurance, and length of hospitalization did not show significant relationships with attitudes toward medication. In Beijing, no significant difference was observed in DAI-30; other specific attitudes toward medication; or subjective side effects for subjects taking or not taking clozapine (data not shown).

### Associations between DAI-30 and background variables

In Tokyo, age ($\rho = 0.33$, $P < 0.01$) and length of illness ($\rho = 0.38$, $P < 0.01$) had a significant positive correlation with subjective response to medication. Side effects ($\rho = -0.35$, $P < 0.01$) had a significant negative correlation with subjective response to medication. In Beijing, male gender ($\rho = -0.33$, $P < 0.01$) and BPRS ($\rho = -0.50$, $P < 0.01$) had significant negative correlation with subjective response to medication. The results of stepwise regression analysis for DAI-30 are summarized in Table 4. In Tokyo, longer duration of illness and lower subjective distress caused by side effects were predictive for a more favorable subjective response to medication. On the other hand, female gender, younger age, and lower BPRS score were independently correlated with a positive subjective response to medication in Beijing. Total variance explained by the regression model was 27% for the Tokyo group and 35% for the Beijing group.

**Table 4** Stepwise multiple regression analysis of DAI-30

| | | $\beta$ | $P$ |
|---|---|---|---|
| Tokyo ($N = 76$) | Length of illness (years) | 0.35 | 0.001 |
| | Side effects[a] | −0.35 | 0.001 |
| | $R^2 = 0.27$, $F = 13.50$, $P < 0.001$ | | |
| Beijing ($N = 76$) | Age (years) | −0.21 | 0.021 |
| | Gender[b] | −0.24 | 0.034 |
| | BPRS | −0.45 | 0.000 |
| | $R^2 = 0.35$, $F = 12.45$, $P < 0.001$ | | |

*DAI-30* drug attitude inventory-30; BPRS, brief psychiatric rating scale

[a] Patients' subjective evaluation using a four-point Likert scale from 1 (not bothered at all) to 4 (bothered very much)

[b] 0 = female, 1 = male

## Discussion

The samples at both sites comprised clinically stable chronic outpatients with schizophrenia; they had no significant differences in psychopathology. However, subjects in Tokyo were prescribed significantly larger amounts of antipsychotics. Polypharmacy of antipsychotics and concurrent use of anticholinergics, anxiolytics, or hypnotics were more frequently found in Tokyo. Past studies [4, 5, 18, 19] indicated that patients' subjective responses are generally more favorable to atypical antipsychotics than to typical antipsychotics, but in Tokyo, the advantage of atypical antipsychotics would be compromised by frequent concomitant use of typical antipsychotics. The differences between the two countries align with past reports

comparing prescription practices for inpatients [1, 2]. The variation in prescription habits between Japan and China is a phenomenon that occurs during inpatient care, but it appears to extend into outpatient settings. Unlike previous studies investigating prescription practices for Japanese inpatients [1, 2], in this study, daily antipsychotics dosage for subjects in Tokyo was not over 1,000 mg chlorpromazine equivalent. This is below the criteria of high-dosing [20]; for maintenance purposes, however, the dosage is relatively high compared with dosage in Western countries. Kane [21] reported that for chronic schizophrenics in clinical research, the average dosage was 385 mg chlorpromazine equivalent. In this study, antipsychotic dosage for subjects in Beijing was similar to Kane's report.

In an outpatient setting, the patient's commitment to the drug regimen is essential for continuous treatment, therefore the patient's perception of the prescribed drugs is a critical element of the overall success of the treatment plan. In this study we compared attitudes toward medication and associated factors for patients with schizophrenia in Japan and China.

A major finding of our study is that subjects in Tokyo did not have more negative attitudes toward medication than subjects in Beijing, despite the higher proportion of antipsychotics polypharmacy and more complicated drug regimens. Subjects in Tokyo and Beijing had comparably positive subjective responses to medication and similar subjective evaluation of side-effects. Moreover, patients' complaints about the overuse of psychotropics were not significantly different between the two sites. These findings suggest that subjective responses or attitudes toward medication are not simply determined by characteristics of prescribed medicine per se, but also by psychosocial or environmental factors. Subjective response to psychotropic medication can be associated with previous experience with medications, attitudes toward health and illness [9], or culturally based cognitive styles [22]. Specifically, the following interpretations can be made for our results.

First, subjects in Tokyo have a greater subjective acceptance of polypharmacy than those in Beijing; subjects in Tokyo complained less about the physicians' over-reliance on pharmacotherapy than those in Beijing. In Japan, it is culturally characteristic for the patient to be passive [23, 24] and to rely on the physician rather than to act independently [25]. Additionally, lower subjective burden of medical cost for subjects in Tokyo would also support patients' subjective acceptance for multiple medications. This should be mainly attributable to differences in availability of health insurance between the two sites. Japanese patients have universal health insurance coverage [25] whereas only 25% of Chinese subjects had health insurance in our study and 19% had insurance in a previous report [26]. However when we controlled for the factor of health insurance coverage, a significant difference in attitude still existed. Dissimilarity in other social-welfare systems or the general economic level may also be involved. Second, it is possible that subjects in Tokyo have gradually adapted to these practices thorough prolonged exposure. This assumption is supported by our findings; DAI-30 was positively correlated with length of illness in subjects in Tokyo.

On the other hand, subjects in Beijing could have negative views of psychiatric medication for other reasons. The majority of subjects in Beijing had positive DAI-30 scores, indicating that they are generally compliant with medication regimens [9]. However, it is remarkable that 70% of subjects in Beijing responded, "I take medication only when I feel ill". This suggests that subjects in Beijing are more likely to become nonadherent when superficial symptoms disappear. Chinese subjects may have less knowledge about illness and treatment because of insufficient rehabilitation or psychoeducational programs [27]. Also, because of limited health-economic resources, Chinese patients are more reluctant to continue medication if they feel better. Additionally, the Chinese patient may express an individual preference for traditional Chinese medicine or Western medicine [28]. This decision would be based on the belief that Western medicine provides a rapid palliative action, whereas traditional Chinese medicine is believed to produce a slow but curative or prophylactic action [22]. We presumed that subjects in Beijing had more negative attitudes toward medication due to a higher employment rate; because employment was associated with negative attitudes toward medication in previous studies [29–31]. However this hypothesis was not supported by our data. Also, this study did not indicate that frequent mandatory blood testing for the use of clozapine had a negative impact on patients' attitudes toward medication in subjects in Beijing.

Sociodemographic and clinical factors associated with subjective response to medication were substantially different between Tokyo and Beijing. Previous reports from Western or African countries have revealed that subjective responses to medication were associated with side effects [29, 31, 32], psychopathology [18, 29, 31–33], and employment status [29–31], but were independent of other sociodemographic variables or length of illness [18, 30–34]. In this study, however, age and gender (China) and length of illness (Japan), were significantly associated with DAI-30, but employment status showed no significant association. This would suggest that various sociodemographic, clinical, and social factors can potentially affect subjective response to medication, but dominant determining factors vary by country, according to the healthcare system and medical traditions. In this analysis it is particularly interesting to note that in Tokyo, older patients

with longer length of illness had more positive attitudes toward medication whereas older Chinese patients in this sample tended to have more negative attitudes. Positive correlation between length of illness and attitudes toward medication in Tokyo indicates that positive attitudes toward medication are developed as patients habituate to taking medication over time. A possible explanation of the negative correlation between age and attitudes toward medication in the Chinese group is that older people are more familiar with Chinese traditional medicine [35], so they tend to have a negative view of Western medication. Our results also imply that the male gender in China negatively affects the response from the subjects, however further investigation is needed to clarify this point.

Response style analysis revealed that when responding to questionnaire items, subjects in Tokyo were generally less likely to agree compared with subjects in Beijing. A high acquiescent response is associated with a preference for uncertainty avoidance [16]; therefore our results indicate that patients in China are more straightforward, whereas in Japan, patients experience more ambiguity in expressing their subjective experience related to taking medication. This tendency in Japanese patients can limit physician-patient communication; therefore physicians could be underestimating patients' subjective response to psychopharmacotherapy.

This research has several limitations that should be considered. Subjects were recruited from a single hospital within each country. Thus, the sample may not be representative. Subjects were outpatients with relatively positive attitudes toward medication who voluntarily participated in the study; therefore, patients with poorer adherence were not included. Lack of established reliability between sites for the BPRS is also a significant limitation. Further research is needed with larger sample sizes from more than one site per country. Nevertheless, these findings should help clinicians from both countries to understand patients' drug-taking behavior. Incorporating the cultural context of behavior will allow clinicians to provide more rational psychopharmacotherapy. In turn, patients should demonstrate better adherence with medication regimens and improved quality of life.

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## References

1. Bitter I, Chou JC, Ungvari GS, Tang WK, Xiang Z, Iwanami A, et al. Prescribing for inpatients with schizophrenia: an international multi-center comparative study. Pharmacopsychiatry. 2003; 36:143–9.
2. Chong MY, Tan CH, Fujii S, Yang SY, Ungvari GS, Si T, et al. Antipsychotic drug prescription for schizophrenia in East Asia: rationale for change. Psychiatry Clin Neurosci. 2004;58:61–7.
3. Ito H, Koyama A, Higuchi T. Polypharmacy and excessive dosing: psychiatrists' perceptions of antipsychotic drug prescription. Br J Psychiatry. 2005;187:243–7.
4. Chue P. The relationship between patient satisfaction and treatment outcome in schizophrenia. J Psychopharmacol. 2006;20:38–56.
5. Hellewell JS. Patients' subjective experiences of antipsychotics: clinical relevance. CNS Drugs. 2002;16:457–71.
6. Awad AG, Hogan TP, Voruganti LN, Heslegrave RJ. Patients' subjective experiences on antipsychotic medications: implications for outcome and quality of life. Int Clin Psychopharmacol. 1995;10:123–32.
7. Hogan TP, Awad AG. Subjective response to neuroleptics and outcome in schizophrenia: a re-examination comparing two measures. Psychol Med. 1992;22:347–52.
8. Lacro JP, Dunn LB, Dolder CR, Leckband SG, Jeste DV. Prevalence of and risk factors for medication nonadherence in patients with schizophrenia: a comprehensive review of recent literature. J Clin Psychiatry. 2002;63:892–909.
9. Awad AG, Voruganti LN, Heslegrave RJ, Hogan TP. Assessment of the patient's subjective experience in acute neuroleptic treatment: implications for compliance and outcome. Int Clin Psychopharmacol. 1996;11:55–9.
10. Inagaki A, Inada T, Fujii Y, Yagi G. Equivalent doses of psychotropics. Tokyo: Seiwa Shoten; 1999.
11. Overall JE, Gorham DR. The brief psychiatric rating scale. Psychol Rep. 1962;10:799–812.
12. Woerner MG, Mannuzza S, Kane JM. Anchoring the BPRS: an aid to improved reliability. Psychopharmacol Bull. 1988; 24:112–7.
13. Hogan TP, Awad AG, Eastwood R. A self-report scale predictive of drug compliance in schizophrenics: reliability and discriminative validity. Psychol Med. 1983;13:177–83.
14. Cheng HL, Yu YW. Validation of the Chinese version of "the Drug Attitude Inventory". Kaohsiung J Med Sci. 1997;13:370–7.
15. Miyata R, Fujii Y, Inagaki A, Yagi G. Pharmacotherapy for patients with schizophrenia and quality of life (1) Japanese version of Drug Attitude Inventory. Seishin Shinkeigaku Zasshi. 1996;98:1045–6. (article in Japanese).
16. Smith BP. Acquiescent response bias as an aspect of cultural communication bias. J Cross Cult Psychol. 2004;35:50–61.
17. Fischer R. Standardization to account for cross-cultural response bias: a classification of score adjustment procedures and review of research in JCCP. J Cross Cult Psychol. 2004;35:263–82.
18. Ritsner M, Perelroyzen G, Ilan H, Gibel A. Subjective response to antipsychotics of schizophrenia patients treated in routine clinical practice: a naturalistic comparative study. J Clin Psychopharmacol. 2004;24:245–54.
19. Voruganti L, Cortese L, Oyewumi L, Cernovsky Z, Zirul S, Awad A. Comparative evaluation of conventional and novel antipsychotic drugs with reference to their subjective tolerability, side-effect profile and impact on quality of life. Schizophr Res. 2000;43:135–45.
20. Sim K, Su A, Leong JY, Yip K, Chong MY, Fujii S, et al. High dose antipsychotic use in schizophrenia: findings of the REAP (research on east Asia psychotropic prescriptions) study. Pharmacopsychiatry. 2004;37:175–9.
21. Kane JM. Dose selection and comparator drugs in schizophrenia research. J Clin Psychiatry. 2001;62(Suppl 9):29–32.
22. Lee S. The prevalence and nature of lithium noncompliance among Chinese psychiatric patients in Hong Kong. J Nerv Ment Dis. 1993;181:618–25.

23. Sekimoto M, Asai A, Ohnishi M, Nishigaki E, Fukui T, Shimbo T, et al. Patients' preferences for involvement in treatment decision making in Japan. BMC Fam Pract. 2004;5:1.
24. Slingsby BT. Decision-making models in Japanese psychiatry: transition from passive to active patterns. Soc Sci Med. 2004;59:83–91.
25. Iihara N, Tsukamoto T, Morita S, Miyoshi C, Takabatake K, Kurosaki Y. Beliefs of chronically ill Japanese patients that lead to intentional non-adherence to medication. J Clin Pharm Ther. 2004;29:417–24.
26. Phillips MR, Lu SH, Wang RW. Economic reforms and the acute inpatient care of patients with schizophrenia: the Chinese experience. Am J Psychiatry. 1997;154:1228–34.
27. Yip KS. An historical review of the mental health services in the People's Republic of China. Int J Soc Psychiatry. 2005;51:106–18.
28. Hesketh T, Zhu WX. Health in China. Traditional Chinese medicine: one country, two systems. BMJ. 1997;315:115–7.
29. Adewuya AO, Ola BA, Mosaku SK, Fatoye FO, Eegunranti AB. Attitude towards antipsychotics among out-patients with schizophrenia in Nigeria. Acta Psychiatr Scand. 2006;113:207–11.
30. Freudenreich O, Cather C, Evins AE, Henderson DC, Goff DC. Attitudes of schizophrenia outpatients toward psychiatric medications: relationship to clinical variables and insight. J Clin Psychiatry. 2004;65:1372–6.
31. Hofer A, Kemmler G, Eder U, Honeder M, Hummer M, Fleischhacker WW. Attitudes toward antipsychotics among outpatient clinic attendees with schizophrenia. J Clin Psychiatry. 2002;63:49–53.
32. Gervin M, Browne S, Garavan J, Roe M, Larkin C, O'Callaghan E. Dysphoric subjective response to neuroleptics in schizophrenia: relationship to extrapyramidal side effects and symptomatology. Eur Psychiatry. 1999;14:405–9.
33. Cabeza IG, Amador MS, Lopez CA, Gonzalez de Chavez M. Subjective response to antipsychotics in schizophrenic patients: clinical implications and related factors. Schizophr Res. 2000; 41:349–55.
34. Sibitz I, Katschnig H, Goessler R, Unger A, Amering M. Pharmacophilia and pharmacophobia: determinants of patients' attitudes towards antipsychotic medication. Pharmacopsychiatry. 2005;38:107–12.
35. Chan MF, Mok E, Wong YS, Tong TF, Day MC, Tang CK, et al. Attitudes of Hong Kong Chinese to traditional Chinese medicine and Western medicine: survey and cluster analysis. Complement Ther Med. 2003;11:103–9.