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Factor structure of the Subjective Well-being under Neuroleptic treatment Scale-short form in schizophrenic outpatients: Five factors or only one?

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Backround and aim: The Subjective Well-Being under Neuroleptics Scale, short form (SWNS), is a self-report measure that evaluates the states of well-being of schizophrenia patients using antipsychotic drugs independently from psychopathology of disease. This study examined the factor structure of the Turkish version of the scale using high-level statistical analyses. *Methods:* The SWNS was translated into Turkish and applied to 103 schizophrenic patients. A type of multi-trait–multi-method (MTMM) confirmatory factor analysis was conducted to determine the factor structure of the Turkish version of the scale. *Results:* The results of factor analysis of the SWNS were incompatible with the factor structure of the original scale. A set of MTMM analyses showed distinct method effects for both positive and negative item wording in the scale. In light of these findings, the factor structure of the SWNS was determined as having a one-dimensional structure, with bias due to item wording. *Conclusions:* The results of the present investigation indicated that the sub-factors of the SWNS failed to emerge from the data. This study is the first to show that there is an urgent need for further examination of the factor structure of the SWNS with regard to method effects. This issue has important implications for the use of sub-factors by both researchers and practitioners.

• *Antipsychotic treatment, Factor structure, Subjective well-being, Subjective Well-being under Neuroleptic Scale, SWNS.*

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At its simplest, the term "subjective well-being" represents a response to the question "How does a patient using antipsychotics feel?". The answer to this question is of great importance for patients with illnesses such as schizophrenia, for which treatment is frequently abandoned due to drug side-effects (1).

The Subjective Well-Being under Neuroleptics Scale, short form (SWNS), is a self-report instrument used in the comprehensive evaluation of the effectiveness and quality of drug treatment in schizophrenia and to measure patients' subjective well-being (2). One of the main characteristics of this scale is that it offers the possibility of evaluating patients' subjective thoughts and feelings independently of disease psychopathology. On the association of subjective well-being with psychopathology, research findings are ambiguous. In some studies, Positive and Negative Symptoms Scale (PANSS) scores correlate poorly with subjective well-being (3, 4). In other studies, PANSS negative and global psychopathology correlate substantially with SWN scores (2, 5). Severe illness with more psychopathological symptoms is reported to be predictive for negative subjective well-being (6). It is because of this perspective that it is widely used in studies evaluating patients' quality of life, responses to antipsychotic treatment and drug side-effects (7–10). Some studies have reported that the score on the SWNS is a good predictor of treatment response indicators, such as entering remission (11), drug compatibility (12) and quality of life (13). In schizophrenia, subjective well-being improves with antipsychotic medication. Early

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improvement of subjective well-being is predictive for the long-term outcome of schizophrenia. After all, the SWNS is a useful tool for prediction of response and subsequent recovery (14).

The original 38-item form of the scale was designed by Naber (15), who also developed a shortened, 20-item form (2). When considering adaptations of the SWNS in various foreign languages, it can be seen that no factor analysis was performed in the Chinese and Spanish validity studies (16, 17), while seven subdimensions were described in the Greek version (18) and three subdimensions in the Korean (19). While some previous studies making use of the SWNS considered only the total scores (9–11, 20), other also used subscales (7, 8, 21, 22).

Although the scale has been one of the most influential measurement tools in the field, only one study, to the best of our knowledge, examined its factor structure in detail (23) only using explanatory factor analysis. Given that the sub-factors of the SWNS highly correlated with each other (24), it might have crucial problems with construct validity. Moreover, since the SWNS has reverse items, it is highly possible to be affected by acquiescence factor. Indeed, Naber (personal communication, March 2011) confirmed that some factor analysis results implied such a situation.

Aim

The aim of the present study is to investigate the factor structure of this measurement tool with high-level statistical analyses such as confirmatory factor analyses and multi-trait–multi-method (MTMM) analyses, in addition to exploratory factor analyses.

Methods

Participants

Our study population consisted of patients diagnosed with “schizophrenia” and treated at the Ondokuz Mayıs University Faculty of Medicine Department of Psychiatry Psychosis Unit in Turkey. This unit contains two specialist psychiatrists, one assistant psychiatrist and one psychologist. Patients are monitored at frequent intervals, during examinations at which psychometric tools such as the PANSS are routinely administered, in addition to clinical evaluations.

Inclusion criteria were as follows: taking stable antipsychotic treatment and for at least the last month, being stable clinically for at least last month, aged 18–65 and diagnosis of “schizophrenia” on the basis of DSM-IV. “Being stable clinically” proposed by the Remission in Schizophrenia Working Group (25) was applied to the data set. This definition requires the simultaneous attainment of a score of 3 (mild), 2 (minimal) or 1 (absent) for all of the following symptoms (PANSS items): delusions (P1), concept disorganization (P2), hallucinatory behavior (P3), unusual thought content (G9), and mannerisms and posturing (G5); and blunted affect (N1), passive/apathetic social withdrawal (N4), and lack of spontaneity and flow of conversation (N6). Exclusion criteria were failure to provide written consent, visual or hearing problems sufficiently severe to restrict communication and scale completion, any additional neurological disease, and having undergone electroconvulsive treatment in the previous 6 months. One hundred and twelve patients meeting these criteria were enrolled. Data for nine patients who failed to complete the study scales, or who completed them incorrectly (marking more than one option) were excluded from the study. The remaining 103 patients completed the study.

Of the patients completing the study, 60.2% were male and 56.3% single. Average age was 35.1 ± 10.9, length of time in education 10.9 ± 3.8 years, age at onset of disease 23.2 ± 7.4 and average duration of disease 11.8 ± 8.3 years; 58.3% of patients were undifferentiated subtype, 30% paranoid, 6.8% residual and 4.9% disorganized. While 73.8% of the patients in the study were treated with just one antipsychotic, the remaining 26.2% received combined antipsychotic treatment. Of those receiving monotherapy, 19.4% used olanzapine, 10.7% clozapine, 9.7% amisulpride, 8.7% aripiprazole and 7.8% risperidone. Only four patients (3.8%) received typical antipsychotic monotherapy (two used haloperidol and two, pimozide), and 30.1% of all patients used depot preparation. A further 34.9% of patients were taking anticholinergic drugs (mainly biperiden) for side-effects. Finally, 24.3% of patients were using non-antipsychotic psychotropic drugs (antidepressants, mood stabilizers or anxiolytics) and 8% took drugs associated with medical diseases.

Written informed consent was obtained from all participants. Consent for this research was obtained from the Ethics Committee of Ondokuz Mayis University, Samsun. The research was performed in accordance with the Helsinki declaration.

Measurement tool

The self-report “Subjective Well-being Under Neuroleptics Scale”, short form (SWNS), enquires into patients’ subjective experiences over the previous 7 days. It consists of 20 items anchored by “not at all”, “hardly at all”, “a little”, “somewhat”, “much” and very much”. The original form of the scale includes five four-item subscales: mental functioning, self-control, emotional regulation, physical functioning and social integration. The total score from the scale ranges from 20 (bad subjective experience) to 120 (perfect subjective experience). In scoring terms, 10 of the items are scored in reverse and these items are distributed equally among the five subscales. In other words, each subscale contains two items calculated in reverse. The patient can complete the scale in approximately 10–15 min. The original version has been reported to have high internal consistency (Cronbach alpha 0.92) and good construct validity (2).

Translation procedure

Before the study commenced, the requisite permission was obtained from the developer of the scale, Dieter Naber, to investigate the reliability and validity of the Turkish version. The original English-language form was translated into Turkish by one of the authors, after which this Turkish-language form was translated back into English by another author with no knowledge of the original version. The form translated into Turkish, and both the original English-language version and the retranslated version were then evaluated by a committee made of up five individuals with a good knowledge of both languages. An experimental Turkish-language form was established through agreement on the linguistic validity of the form. The comprehensibility of each item in this experimental form was then tested with a focus group made up of three psychiatrists, one psychologist, two relative of patients and two schizophrenia patients in full remission.

Strategy of analysis

The construct validity of the SWNS was assured using both confirmatory (CFA) and exploratory factor analyses (EFA). Since there existed some pre-defined measurement models for the scale, these models were tested using Structural Equation Modeling (SEM). Given that the earlier findings showed higher intercorrelations among the factors, as indicated above, we also computed an EFA to determine the factor structure in the present sample. Moreover, given that the scale has reverse items, a response bias was also investigated using a MTMM strategy suggested by Marsh and colleagues (26, 27).

Results

Different *a priori* models and the model based on the EFA analyses were tested using CFA. The first two models were based on Naber et al.'s study (2), where a five-factor solution was determined with 20 items. In the first model, these 20 indicators were treated as the indicators of five first-order factors. In the second model, these five factors were treated as indicators of a higher-order factor, subjective well-being under neuroleptic treatment (SWB). The third and fourth models were based on Schmidt's study (24), where the same models were tested using only two items per factors. The results of the first two models showed that sub-factors were highly correlated, linear dependency among variables, and resulted in negative error variances due to correlations among factors exceeding 1.00.

A principal components analysis with oblique rotation was computed in order to understand the factor structure in an exploratory strategy. The result of Kaiser–Meyer–Olkin test (0.833) showed that the sample size large enough for a principal components analysis. The results of this analysis produced five factors, accounting for 66.66% of the variance, which did not correspond with the original factor structure. The scree-plot, however, showed a clear elbow occurred at the third factor, indicating that a two-factor solution was the best. The analysis was repeated using a two-factor solution. These two factors accounted for 49.83% of the total variance. The first factor with the eigenvalue of 6.91 accounted for 34.53% of the variance. This factor consisted of 10 negative items of SWN. The second factor with the eigenvalue of 2.86 accounted for additional 14.29% of the variance and consisted of 10 positive items.

Since the data was accounted for by these two factors, consisting of only positive or negative items, an MTMM strategy was used in order to understand whether these two factors are artifacts due to item wording, or real dimensions behind the data. The relative effect of the response bias was tested using the MTMM analyses suggested by Marsh et al. (27). Marsh et al. (27) suggested both using correlated uniqueness models (Models 3–5) and latent method factor (LMF) models (Models 6–8) against the models without any method factor (Models 1 and 2) for a thorough understanding of the wording effects (Figure 1).

Model 1 proposes a single SWB latent variable without method effect. Although this model defines no sub-factors, there is a general inclination to use a total score of SWN in the literature (9–11, 20).

Model 2 acknowledges the SWNS construct as two orthogonal factors constructed by positively and negatively worded items with no higher-order SWB factor. This model was based on the results of the EFA calculated in the present study.

The results of the CFA analyses showed that Model 2 produced better goodness-of-fit statistics [$\chi^2(169, n = 103) = 256.12$, $P < 0.05$; Comparative Fit Index (CFI) = 0.97; Incremental Fit Index (IFI) = 0.97; root mean square error of approximation (RMSEA) = 0.071 (90% confidence interval for RMSEA = 0.053–0.088); Expected Cross-validation Index (ECVI) = 3.31; Akaike Information Criterion (AIC) = 338.12] than Model 1 [$\chi^2(170, n = 103) = 467.07$, $P < 0.05$; CFI = 0.89; IFI = 0.89; RMSEA = 0.13 (90% confidence interval for RMSEA = 0.12–0.15); ECVI = 5.36; AIC = 547.07] based on the chi-square difference test (210.95, 1: $P < 0.001$). The standardized path coefficients for Model 2 are represented in Figure 2.

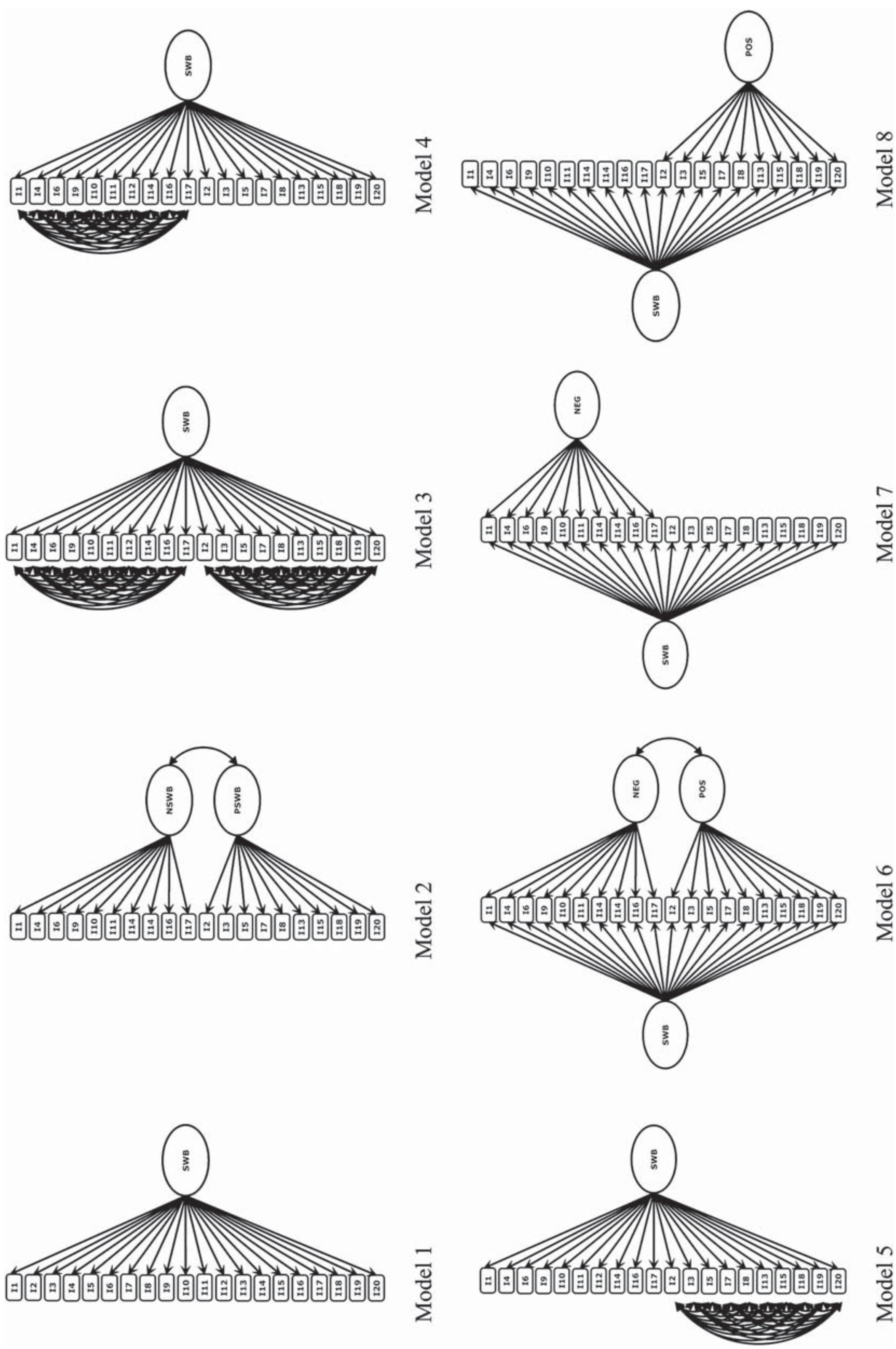

Fig. 1. The models tested in the present research: SWB, Subjective Well-being under neuroleptics; NSWB, Negative Subjective Well-being; PSWB, Positive Subjective Well-being; POS, Method effect due to positive item wording; NEG, Method effect due to negative item wording.

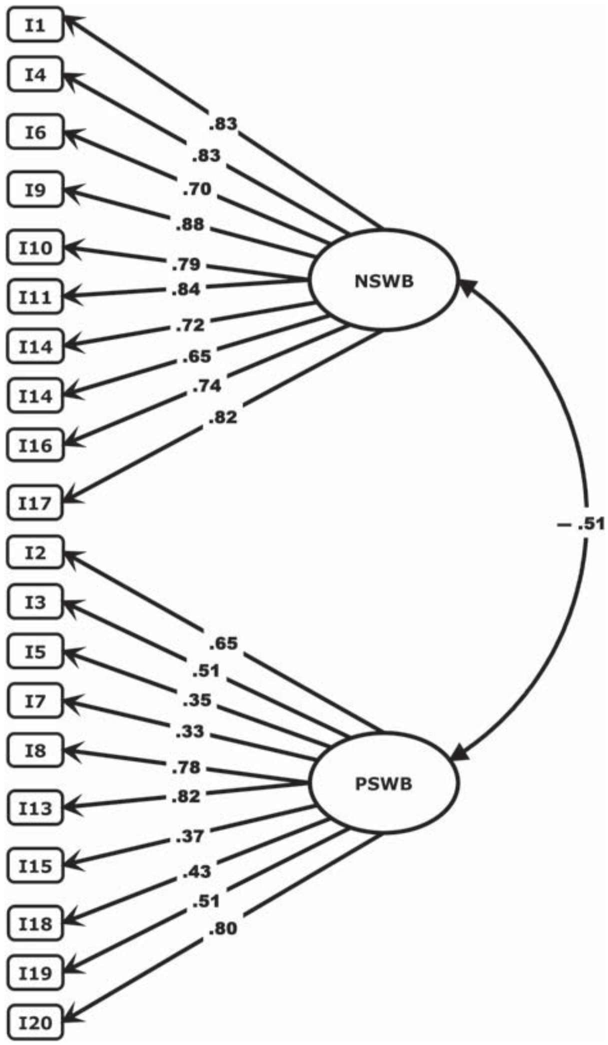

Fig. 2. Standardized parameter estimates for Model 2: $n = 103$; All parameter estimates are significant at $P = 0.01$; PSWB, Positive Subjective Well-being, NSWB, Negative Subjective Well-being.

All other models examined the method effects due to item wording. Models 3–5 were based on the correlated uniqueness approach (26), where method effects refer here to wording effects, negatively or positively worded items. Model 3 posits a single SWB latent variable with two method effects for negatively and positively worded items. Models 4 and 5 are nested within model 3, in which method effects were defined as either negatively or positively worded items, respectively. A comparison of Models 4 and 5 would give information about the effects of these wording effects (negative or positive) on measurement bias.

The approach method of Models 6–8 used LMFs for positive and negative use of words. In Model 6, both positive and negative LMFs were specified, while in Models 7 and 8, only negative or positive LMFs were defined, respectively. A comparison of Models 7 and 8 models would give information about the effects of these wording effects (negative or positive) on measurement bias.

These six models were tested using Structural Equation Modeling with LISREL 8.8 (28). The results of these analyses are represented in Table 1.

Table 1. Goodness-of-fit statistics for the models tested for response bias.

Model	Goodness-of-fit χ^2	df	CFI	IFI	RMSEA (CIs)	ECVI	AIC
Model 3	168.21	98	0.97	0.98	0.084 (0.062–0.10)	3.85	392.21
Model 4	250.36	134	0.96	0.96	0.092 (0.074–0.11)	3.94	402.63
Model 5	206.85	134	0.97	0.97	0.073 (0.053–0.092)	3.52	358.85
Model 6	196.92	149	0.98	0.98	0.056 (0.032–0.076)	3.13	318.92
Model 7	255.91	160	0.96	0.97	0.077 (0.059–0.094)	3.49	355.91
Model 8	231.50	160	0.97	0.97	0.066 (0.046–0.084)	3.25	331.50

$n = 103$; CFI, Comparative Fit Index; IFI, Incremental Fit Index; RMSEA, root mean square error of approximation; CIs, confidence intervals for RMSEA; ECVI, Expected Cross-validation Index; AIC, Akaike Information Criterion.

As can be seen from Table 1, Model 6 produced the best goodness-of-fit statistics than all other models concerning method effects. ECVI and AIC values also indicated that Model 6 was the best since lower values on these criteria are accepted as indicating better models. Moreover, a chi-square difference test (59.2, 20: $P < 0.01$) showed that Model 6 is also better than Model 2, indicating the existence of method effects in the measurement of SWB. Moreover, all the models taking method effects into account were found to be better than Model 2, although this model produced an acceptable fit to the data. The comparison of the Models 4 vs. 5 and 7 vs. 8 indicated that the method effect was more evident for the negative item wording. As can be seen from Table 1, Models 5 and 8, representing method effects due to negative item wording, produced better model fit statistics as indicated by lower chi-square values in addition to lower ECVI and AIC values.

All these results suggest that the factors yielded by the factor analysis were due to either item wording or mere artifacts.

Discussion

The correlations among the original sub-dimensions of the SWNS were found to be as high as in the earlier research (24). The correlations were so high that it was impossible to fit the models to the data, due to "not positive definite" problems. Although Schmidt et al. (24) tested the same models, their analyses contained a number of inconsistencies, for example the overuse of modification indices. In their test of the model in which five first-order factors were defined by four items in each, they used 17 error covariances without any theoretical justification. Moreover, in all model tests, they continued to use modifications, again without providing justification. Additionally, they argued that the most parsimonious model was the one in which only five items were defined as indicators. This model, however, consisted of only negative items and fitted the data after the use of an error covariance, for which, again, no justification was provided. Finally, the correlations among the factors in the study ranged from 0.76 to 0.96 when 10 items were used for the five-factor model, while from 0.79 to 0.86 when 12 items were used for the same five-factor model.

Surprisingly, no other researcher has noticed such high correlations among the sub-factors. However, these high correlations denote a problematic situation for the existence of sub-factors, since it violates the assumption of independency among factors. Indeed, testing the *a priori* models based on the earlier theoretical definitions produced improper solutions due to higher correlations among the sub-factors of the SWN. In the present research, the correlations among the factors were so high that the coefficients exceeded the value of 1.00, resulting in negative error variances or “not positive definite” warnings in Structural Equation Modeling (29).

In order to reach a factor structure fitting to the data in the present research, an exploratory principal component analysis was computed. The results showed that a two-factor solution accounted for approximately 50% of the variance. Indeed, results of this two-factor measurement model produced acceptable goodness-of-fit statistics. However, it is well known from the literature that two factors consisting of items in opposite directions could be artifacts resulting from item wording. Item wording has been a concern for researchers and recently MTMM approaches are used for detecting method effects due to item wording (26, 27). Indeed, results showed that the measurement model consisting of these two factors was strongly affected by the negative and positive method effects, indicating that the factors are not due to item content, but rather, specific item wording. Some researchers argue that these method effects are much more evident for individuals suffering from cognitive insufficiencies or abnormalities (30). The literature contains examples of specific cognitive problems (such as attention and executive functions deficits) inherent in patients with schizophrenia (31, 32). The possible cognitive deficits of schizophrenia patients in our study also may have an effect on our results.

This study is thus the first to show an urgent need for further examination of the factor structure of the SWNS with regard to method effects. This is especially important in the use of sub-factors by both researchers and practitioners. Although some researchers (23) have noticed the plausibility of a single factor structure, they reached such a conclusion only using exploratory factor analyses.

Conclusions

The results of the present investigation indicated that the sub-factors of the SWN failed to emerge from the data. A set of MTMM analyses showed a clear method effects for both positive and negative item wording in the SWN. Model 6 as, defining only a one-dimensional measurement model with two method effects, was shown to be the best in accounting for the variance in data. Such a result indicates that although the use of total score is more reliable than the sub-scores (both five-factor and two-factor solutions), without controlling for the method effects, it would result in biased estimations and interpretations.

In addition to future studies involving larger numbers of schizophrenia patients, studies with patient groups using antipsychotic drugs but with less cognitive impairment (such as those with bipolar disorder) or control groups with no mental illness may provide more comprehensive information about the use of this scale and its sub-dimensions.

Limitations

There are a number of limitations to this study; firstly, our sampling size was low, albeit enough for factor analysis; secondly, the confusing effect of other psychotropic drugs (benzodiazepine, antidepressants or emotional state regulators) used by schizophrenia patients in addition to antipsychotic drugs was not excluded. Finally, future research could also examine whether cultural differences exist concerning the effects of response set.

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Contributors

Ozan Pazvantoğlu and Alp Üçok have designed the study and wrote the protocol. Gökhan Sarısoy and Ömer Böke contributed to the data collection and carried out the clinical assessments. Ömer Faruk Şimşek and Ömer Aydemir performed the statistical analyses. Ozan Pazvantoğlu and Ömer Faruk Şimşek wrote the first draft of the manuscript and prepared the manuscript for publication. All authors approved the final version.

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