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## ORIGINAL

## Psychometric performance of the Oviedo Sleep Questionnaire in patients with severe mental disorder

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### KEYWORDS

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Questionnaire;  
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Schizophrenia;  
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### Abstract

**Introduction:** The prevalence of sleep disturbances among patients with severe mental disorder ranges from 30 to 80%. Since the impact of these disturbances on patients' lives is substantial, there is a need for their evaluation and management. The aim of this study was to examine the reliability and validity of the Oviedo Sleep Questionnaire (OSQ) in patients with severe mental disorder.

**Material and methods:** We performed an observational, prospective (3-month), multicenter study. A total of 259 individuals (184 patients with severe mental disorder and 75 controls) were included. Evaluation: the OSQ, the sleep items of the Bech-Rafaelsen's Scales for Depression (MES item 3) and Mania (MAS item 5), and the Clinical Global Impression Scales for Severity of Mental Disorder (CGI-SMD) and Sleep Disorder (CGI-SSD).

**Results:** a) Factorial structure: two factors accounted for 57.65% of the variance; factor 1 (insomnia) accounted for 44.65% and factor 2 (hypersomnia) for 13%. b) internal consistency: total OSQ = 0.90, insomnia scale = 0.91, hypersomnia scale = 0.88; c) test-retest reliability = 0.87; d) convergent validity: Pearson's correlation coefficients were 0.632 with item 3 of the MES, 0.619 with item 5 of the MAS, and 0.630 with the

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CGI-SS ( $p < 0.001$ ); e) discriminant validity: the OSQ was able to differentiate between patients and controls ( $p = 0.018$ ), and among distinct degrees of mental disorder severity (CGISMD) ( $p < 0.001$ ) and sleep disorder severity (CGI-SSD) ( $p < 0.001$ ); f) responsiveness: the OSQ, like the CGI-SSD ( $p = 0.004$ ), identified a significant decrease in the insomnia severity score after 3 months ( $p = 0.005$ ).

**Conclusions:** The OSQ is a valid and reliable method for measuring the sleep/wake cycle in patients with severe mental disorder.

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## PALABRAS CLAVE

Cuestionario Oviedo de Sueño;  
Insomnio;  
Hipersomnio;  
Esquizofrenia;  
Trastorno bipolar

## Rendimiento psicométrico del Cuestionario Oviedo de Sueño en pacientes con trastorno mental grave

### Resumen

**Introducción:** El 30-80% de los pacientes con trastorno mental grave manifiestan dificultades del sueño. Su impacto es especialmente significativo en ellos por lo que su evaluación y su manejo resultan obligados. El objetivo fue examinar la fiabilidad y validez del Cuestionario Oviedo de Sueño (COS) en pacientes con trastorno mental grave.

**Material y métodos:** Estudio observacional, prospectivo (3 meses), multicéntrico. Participaron 259 sujetos (184 con trastorno mental grave y 75 como controles). Evaluación: COS, ítems del sueño de las Escalas de Bech-Rafaelsen para Depresión (MES, ítem 3) y para Manía (MAS, ítem 5), escalas de Impresión Clínica Global de Gravedad del Trastorno Mental (ICG-GTM) y del Trastorno del Sueño (ICG-GTS).

**Resultados:** a) Estructura factorial: dos factores que explican el 57,65% de la variancia; el factor 1, insomnio, explica el 44,65% y el 2, hipersomnio, el 13%; b) consistencia interna: COS total = 0,90, escala insomnio = 0,91, escala hipersomnio = 0,88; c) fiabilidad test-retest, 0,87; d) validez convergente: coeficiente de correlación de Pearson con ítem 3 MES = 0,632, con ítem 5 MAS = 0,619, y con ICG-GTS = 0,630 ( $p < 0,001$ ); e) validez discriminante: discriminó entre pacientes y controles ( $p = 0,018$ ), y entre distintos grados de gravedad del trastorno mental (ICG-GTM) ( $p < 0,001$ ) y del trastorno del sueño (ICG-GTS) ( $p < 0,001$ ), y f) sensibilidad a los cambios: detectó disminución significativa de la gravedad del insomnio a los 3 meses ( $p = 0,005$ ) al igual que la ICG-GTS ( $p = 0,004$ ).

**Conclusiones:** El COS es un instrumento de medida del ritmo sueño-vigilia válido y fiable en los pacientes con trastorno mental grave.

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## Introduction

Sleep disorders constitute one of the most prevalent health problems, as demonstrated by the fact that approximately one third of the adult population suffers from them.<sup>1</sup> Between 30 and 80% of patients with severe mental disorders present sleeping disorders during the mental condition's acute phase, depending on the condition's severity.<sup>2</sup> Recent studies relate lack of sleep with health problems such as diabetes,<sup>3,4</sup> obesity<sup>4</sup> and hypertension,<sup>5</sup> decreased social/working capacity and worse quality of life,<sup>6-8</sup> increased risk of suffering from mental disorders,<sup>9</sup> work- and traffic-related accidents,<sup>10-12</sup> and increased health costs.<sup>13</sup> In addition, insomnia has been identified as a possible risk factor for suicide in schizophrenic patients,<sup>14</sup> and can indicate mood changes in bipolar patients.<sup>15</sup>

Keeping in mind the information given above, and the fact that the impact of sleep disorders is especially

significant in patients with central nervous system (CNS) comorbidities (anxiety disorders, mood disorders including type I and II bipolar, impulse control and substance abuse disorders),<sup>16</sup> precise assessment of sleep disorders in patients with a severe mental condition is necessary in order to determine each patient's specific needs, plan individual treatment strategies, gain satisfactory results and be able to recognise condition relapses/recurrences at an early stage. Unfortunately, very few sleep evaluation tools have been validated in populations with mental disorders in Spain.

The Pittsburgh Sleep Quality Index (PSQI)<sup>17</sup> is a questionnaire designed to evaluate how patients with psychiatric disorders subjectively evaluate their sleep quality. The index itself contains 19 items grouped into seven component scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime

dysfunction. The sleep profile is given by the scores for each of the seven components and a total sleep quality score that distinguishes between “good” and “poor” sleepers. Total scores  $\leq 5$  indicate good sleep quality, while scores  $\geq 6$  indicate poor sleep quality. A Spanish-language version of the PSQI<sup>18</sup> has been adapted and validated for the general population.

The MOS sleep scale (MOS-SS)<sup>19</sup> provides subjective information about sleep quality and quantity. Its 12 items are grouped into the following six dimensions: sleep disorders, snoring, waking up with shortness of breath or a headache, quantity and adequacy of sleep and daytime somnolence. The MOS-SS scale assigns scores between 0 and 100 for each of the six dimensions. A higher score corresponds to a higher level of the assessed parameter. This tool has been evaluated in patients with neuropathic pain in Spain.<sup>20</sup>

Unlike the two previously mentioned tools, the Oviedo Sleep Questionnaire (OSQ)<sup>21</sup> is a semi-structured interview to aid with insomnia and hypersomnia diagnosis according to ICD-10 and DSM IV diagnostic criteria, and it has been validated in patients with depressive disorders.

The object of the present study was to determine the reliability and validity of the OSQ in patients with severe mental disorders, specifically schizophrenia and bipolar disorder.

## Material and methods

This multi-centre, observational and prospective (3-month) study to validate a measurement instrument compared one group of patients diagnosed with schizophrenia, another group diagnosed with bipolar disorder and a control group with neither condition. The study was approved by the Regional Clinical Research Ethics Committee for the Principality of Asturias, and all patients gave their informed written consent to participate in the study.

## Subjects

The study included a total of 259 subjects (87 patients with schizophrenia, 97 with bipolar disorder and 75 control-group subjects) from 10 Spanish centres (Oviedo, Santiago de Compostela, Valencia [2], Barcelona [3], Madrid [2] and Jaén). According to clinical state, the patient groups were subdivided into a stable group (psychopathologically stable, without treatment changes in the last 6 months) and an unstable group (treatment had been started or changed due to flare-up or ineffectiveness). The unstable group contained 49 of the 87 patients with schizophrenia and 52 of the 97 patients with bipolar disorder.

Inclusion criteria for patients were the following: a) age  $\geq 18$  years; b) diagnosis of schizophrenia or bipolar disorder; c) treatment on outpatient basis; and d) providing written informed consent to participate in the study. Given the nature of the study, the only exclusion criterion was the patient's refusal to participate. Inclusion criteria for the control group were the following: a) age  $\geq 18$  years; b) no mental or behavioural disorder, including dyssomnia,

somatic disease or a treatment that could alter the sleep/wake cycle according to medical criteria, and c) providing written informed consent.

The mean age in the sample was  $41.83 \pm 12.3$  years; patients with bipolar disorder were significantly older than schizophrenic patients and the control group (46.44, 39.84 and 38.25 years respectively;  $F = 12.06$ ;  $p < 0.001$ ). Males made up 50.2% of the sample, and their percentage was significantly higher in the schizophrenia group than in the other two groups (schizophrenia, 74.7% bipolar disorder, 39.2% control, 36%  $\chi^2 = 31.68$ ;  $p < 0.001$ ).

## Evaluation

The three groups were given a baseline evaluation at the time they were included in the study. In addition, the unstable patient group was re-evaluated 3 months later (to determine the instrument's sensitivity to change), and the stable patient group was re-evaluated one week later (to determine test-retest reliability).

The following evaluation instruments were used: a) the OSQ<sup>21</sup> (appendix 1); b) the sleep components from the Spanish version of the Bech-Rafaelsen melancholia scale (MES),<sup>22</sup> item 3, and the mania scale (MAS),<sup>22</sup> item 5; c) the Clinical Global Impression of Severity scale for mental illness (CGI-S),<sup>23</sup> and d) an *ad hoc* adaptation of the CGI-S for a clinical evaluation of the severity of sleep disorders (CGI-SSD).

## Oviedo Sleep Questionnaire

The OSQ is a brief semi-structured interview that allows us to take an exhaustive clinical history of the patient's sleep-wake rhythms. The information we gather helps us diagnose insomnia and hypersomnia according to ICD-10 and DSM IV criteria. It consists of 15 items, 13 of which are grouped into three dimensions:

1. Subjective satisfaction with sleep: this single item (OSQ1) is rated using a Likert intensity scale with seven levels from 1 (very unsatisfied) to 7 (very satisfied).
2. Insomnia: this consists of 9 items (OSQ21 to OSQ24, OSQ3 to OSQ7) that evaluate the nature of the insomnia (difficulties with sleep initiation or maintenance, early awakening, non-restorative sleep), its repercussions on wakefulness (concern, tiredness, decreased function) and its severity. Items OSQ21 to OSQ24 together with OSQ7 constitute the algorithm for categorical insomnia diagnosis, whether by the ICD-10 or the DSM IV criteria. These nine items constitute the OSQ Insomnia Severity Scale (OSQ-SS). The ICD-10 diagnostic algorithm for insomnia is as follows (appendix 2):

- At least one of the four items from OSQ21 to OSQ24 must appear a minimum of three days a week (difficulties with initiating or maintaining sleep, reaching restorative sleep or waking up at the normal hour), resulting in a score of  $\geq 3$ .
- Item OSQ7 must be present at least three days a week (concern, tiredness or decreased function due to night-time sleep disorders), resulting in a score  $\geq 3$ .

The DSM IV diagnostic algorithm for insomnia is as follows (appendix 2):

- At least one of the four items between OSQ21 and OSQ24 must appear a minimum of six to seven days a week (difficulties with initiating or maintaining sleep, reaching restorative sleep or waking up at the normal hour), resulting in a score of 5.
- Item OSQ7 must be present at least six to seven days a week (concern, tiredness or decreased function due to night-time sleep disorders), resulting in a score of 5.

The OSQ-SS provides a score which rates the severity of the insomnia, obtained by adding the points from each of the nine items that make up the scale (appendix 2).

3. Hypersomnia: this is constituted by three items (OSQ25, OSQ8 and OSQ9) that evaluate daytime sleeping and worries/decrease of function due to this behaviour. These three items constitute the algorithm for the categorical hypersomnia diagnosis; in this case, it is the same according to both the ICD-10 and DSM IV criteria. There is no OSQ scale for hypersomnia severity. The diagnostic algorithm for hypersomnia consists of (appendix 2):

- Lack of difficulty with daytime sleep, that is, an OSQ score of 1 for items OSQ21 to OSQ24.
- Presence of the three items in OSQ25, OSQ8 and OSQ9 at least 6-7 times a week, resulting in a score of 5.

The two remaining items (OSQ10 and OSQ11) provide additional information about parasomnias and possible organic sleep disorders, and about the use of sleep aids (herbs, drugs, etc.).

This is a multiple application instrument used by a professional to gather information and clarify it with a patient. The time framework is "during the past month". It provides the following information:

1. Patient's subjective satisfaction with sleep, ranging from 1 to 7, with a higher number signifying higher satisfaction.
2. Categorical diagnosis of insomnia or hypersomnia according to ICD-10 and DSM IV diagnostic criteria.
3. Proportional score reflecting insomnia severity. The score interval is from 9 to 45, with a higher score indicating greater severity. In the population with depression, a direct score of 30 on this scale is equal to the 50th percentile.<sup>1</sup>

### Items from the MES and MAS scales

Item 3 on the MES (sleep disorders) and item 5 on the MAS (sleep disturbances) assess the patient's self-reported sleep duration for the three previous nights. The possible score for both items ranges between 0 (habitual sleep duration) and 4 (MES: extreme sleep deprivation, which has a large impact on the patient's daily life; MAS: patient does not sleep).

### CGI-S and CGI-SSD scales

The CGI-S and CGI-SSD scales represent the professional's evaluation of the severity of the mental and sleep disorder, respectively, at the present time. For both, the score ranges between 1 (normal, not sick) and 7 (some of the very sickest patients).

### Data analysis

Data analysis did not include item 1, which was a subjective assessment given by the patient (it was only included in the descriptive statistics of the items) or items 10 and 11, since the latter only provided additional information and did not form part of a scale. Statistical software SPSS version 15 and a confidence interval of 95% were used for the analysis; the Factor<sup>24</sup> programme was used for factor analysis.

The study of the OSQ's internal structure was carried out using weighted least squares regression with subsequent Promin rotation based on the polychoric correlation matrix<sup>25</sup> (given the ordinal nature of the items) for the patient group. The criteria used to determine the number of factors to extract were Kaiser's criterion, the sedimentation graph, parallel analysis and factor interpretability.

The reliability of the items that make up each OSQ factor is estimated using Cronbach's alpha for ordinal data.<sup>26</sup> The test-retest reliability for the dimensional score for insomnia severity was calculated using Pearson's coefficient for the baseline insomnia severity score and the same score in week 1 for stable patients.

To determine convergent validity, we used Pearson correlations between the score for the OSQ-SS, the scores for the CGI-SSD scale, and scores for item 3 in the MES and item 5 in the MAS. ANOVA for a factor with Tukey's test as a *post hoc* test was used to determine discriminating validity.

Change sensitivity was measured with the t-test for related samples.

## Results

### Descriptive statistics

Table 1 shows the descriptive statistics (mean and typical deviation) for OSQ items in baseline assessment for both the patient groups (schizophrenia and bipolar disorder) and control groups. Most of the items presented acceptable skewness and kurtosis levels, although none had a normal distribution. We did not find statistically significant differences among the means scores for each of the OSQ items between schizophrenic patients and those with bipolar disorder.

### OSQ internal structure

The mean sample normality (Bartlett's test) was 1110.1 ( $p < 0.001$ ) and the KMO was 0.84. According to the previously described criteria, the recommended number of factors to extract was two. The first factor accounted for 44.65% of the total variance, and was called "insomnia".

**Table 1** Descriptive statistics for items from the Oviedo Sleep Questionnaire (OSQ)

OSQ items	Schizophrenia (n = 87)	Bipolar disorder (n = 97)	Control group (n = 75)
1. Satisfaction with sleep habits	4.66 ± 1.55	4.35 ± 1.63	4.43 ± 1.72
2.1. Difficulties initiating sleep	2.09 ± 1.37	1.98 ± 1.41	1.55 ± 1
2.2. Difficulties maintaining sleep	2.01 ± 1.32	2.17 ± 1.51	1.77 ± 1.35
2.3. Difficulties reaching restorative sleep	2.20 ± 1.45	2.08 ± 1.50	1.99 ± 1.40
2.4. Difficulties waking at the normal hour	1.76 ± 1.24	2.02 ± 1.52	1.83 ± 1.31
2.5. Difficulties due to excessive somnolence	2.10 ± 1.45	2.22 ± 1.57	1.60 ± 1
3. Sleep latency	2.60 ± 1.48	2.05 ± 1.28	1.61 ± 1.02
4. Nocturnal awakening	2.45 ± 1.33	2.35 ± 1.27	2.08 ± 1.02
5. Early awakening	1.71 ± 1.24	1.95 ± 1.45	1.65 ± 1.02
6. Sleep effectiveness	2.14 ± 1.33	1.90 ± 1.20	1.43 ± 0.82
7. Concerns about function due to insomnia	1.80 ± 1.26	2.03 ± 1.39	1.65 ± 0.87
8. Excessive somnolence/diurnal sleepiness	2.02 ± 1.41	1.97 ± 1.35	1.33 ± 0.60
9. Concerns about function due to somnolence	1.79 ± 1.31	1.84 ± 1.34	1.27 ± 0.50

Data are expressed as a mean ± typical deviation.

**Table 2** Estimated factorial loads and communalities for items on the Oviedo Sleep Questionnaire

Items	Factors		Communalities
	I. Insomnia	II. Hypersomnia	
2.1	0.88		0.70
2.2	0.71		0.55
2.3	0.60		0.60
2.4	0.39		0.36
2.5		0.68	0.43
3	0.62		0.43
4	0.44		0.20
5	0.38		0.28
6	0.64		0.46
7	0.34	0.53	0.60
8		0.86	0.61
9		0.97	0.87
Eigenvalues	5.53	1.56	
Explained (%) variance	44.65	13	

The second factor accounted for 13% of the total variance, and was called "hypersomnia". The correlation between the resulting factors was 0.57. For this factorial solution, the root mean square residual (RMSR) was 0.06 and the Bentler index was 0.99. The factor loading and common factor loading for the exploratory factorial analysis of OSQ items is found in table 2.

### Internal consistency and test-retest reliability

The internal consistency for the items that make up the insomnia scale was 0.91, whereas it was 0.88 for those on

the hypersomnia scale. The internal consistency level for the total OSQ was 0.90. All of the discrimination indexes for the 12 OSQ items included in the analysis were > 0.39.

For test-retest reliability, the Pearson coefficient was 0.87 (n = 76; p < 0.001).

### Convergent and discriminating validity

The correlations between the scores on the OSQ-SS and the CGI-SSD scales, and between item 3 on the MES and item 5 on the MAS scales were statistically significant (p < 0.001). The Pearson correlation coefficients were as follows: 0.630 with CGI-SSD, 0.632 for item 3 on the MES scale and 0.619 for item 5 on the MAS scale.

We then observed whether there were statistically significant differences in the OSQ-SS score between the two patient groups (schizophrenia and bipolar groups) and the control group using the one-factor ANOVA test. The results showed statistically significant differences (table 3). *Post hoc* comparisons indicated that both patient groups scored higher on the OSQ-SS scale than the control group did.

Next, the participants were divided into three groups according to the severity of their mental disorder (CGI-SSD) (mild - scores from 1 to 3; moderate - scores of 4; and severe - scores from 5 to 7) to determine whether a more severe mental disorder was associated with more severe insomnia. The ANOVA results indicated that there were statistically significant differences in the OSQ-SS scores (table 3). *Post hoc* comparisons indicated that patients with a moderate or severe mental disorder had higher OSQ-SS scores than patients with mild conditions. However, we found no statistically significant differences between patients with moderate and severe conditions.

Lastly, we divided participants into the same three groups (mild, moderate and severe) according to their sleep disorder (CGI-SSD) in order to determine whether patients with a more severe sleep disorder according to the doctor's general impression had higher OSQ-SS scores.

**Table 3** ANOVA for one factor. Dependent variable: score by the OSQ Scale for insomnia severity. Independent variables: diagnosis, severity of mental disorder, severity of sleep disorder

	Schizophrenia	Bipolar Disorder	Control group	F-p
OSQ-SS	18.82 ± 7.8	18.43 ± 8.5	15.62 ± 6.2	4.069-0.018
CGI-S	Mild (score of 1-3)	Moderate (score of 4)	Severe (score of 5-7)	F-p
OSQ-SS	15.75 ± 6.2	19.61 ± 8.3	22.05 ± 9.5	14.134-< 0.001
CGI-SSD	Mild (score of 1-3)	Moderate (score of 4)	Severe (score of 5-7)	F-p
OSQ-SS	15.61 ± 5.8	24.79 ± 7.8	28.65 ± 9.8	57.339-< 0.001

OSQ: Oviedo Sleep Questionnaire; OSQ-SS: OSQ Insomnia Severity Scale; CGI-S: Clinical Global Impression of Severity (Mental Illnesses); CGI-SSD: Clinical Global Impression, Severity of Sleep Disorder.  
Data are expressed as a mean ± standard deviation.

Once again, ANOVA results found statistically significant differences (table 3). In this case, post hoc comparisons indicated that the three grades of sleep disorder according to CGI-SSD were significantly different from each other in the anticipated direction. This means that patients with a mild condition, according to CGI-SSD, obtained significantly lower scores by OSQ-SS than those with moderate and severe disorders, and in turn, patients in the moderate category had significantly lower scores than those considered to have a severe condition.

### Sensitivity to change

Scoring on the OSQ-SS scale decreased significantly after three months; it went from  $20.36 \pm 9.03$  in the baseline evaluation to  $17.74 \pm 8.27$  in the three-month evaluation ( $T = 2.881$ ;  $p = 0.005$ ). In the same way, the CGI-SSD score decreased significantly after three months (3 vs. 2.61;  $T = 2.959$ ;  $p = 0.004$ ).

### Discussion

The OSQ is a brief, semi-structured interview that was developed as a rigorous evaluation of patients' sleep-wake cycles. At present, OSQ has been validated in patients with depressive disorders,<sup>21</sup> and this article now presents validation data for patients with severe mental disorders, namely schizophrenia and bipolar disorder. These results indicate that OSQ is a valid, reliable instrument which therefore may be useful for measuring the sleep-wake cycle in patients with severe mental disorders.

The internal structure of OSQ in this population replicated the theoretical and actual structure obtained for patients with depressive disorders, resulting in one insomnia factor and one hypersomnia factor. Its internal consistency, test-retest reliability and score stability index were good.

The data supporting the convergent validity of the OSQ are acceptable. As we anticipated, correlations between scores from the OSQ-SS and the CGI-SSD scales, item 3 in MES and item 5 in MAS were moderate. This moderate correlation may be due to the fact that both CGI-SSD and the MES and MAS items are very simple, single-component

measurements of a phenomenon as complex as the sleep-wake cycle. Specifically, the MES and MAS components only focus on sleeping time, without counting or assessing repercussions during waking hours. Nevertheless, on the other hand, we must consider that results obtained for convergent validity may have been exaggerated by the fact that the same evaluator provided the score for the OSQ, the CGI-SSD and the MES and MAS items.

OSQ-SS was able to distinguish between patients and healthy control group subjects, and between the patients themselves according to general severity of the mental illness (CGI-S) and by severity of the sleep disorder (CGI-SSD). Control group subjects received OSQ-SS scores indicating less severity than those received by schizophrenic or bipolar patients. Likewise, patients with a higher mental disorder and sleep disorder score received a less favourable OSQ-SS result.

Lastly, the OSQ-SS scale was shown to be sensitive to changes throughout time; the score decreased parallel to the decrease in severity related to CGI-SSD.

We believe that the patient population included in this study is a fairly faithful representation of Spanish patients receiving outpatient treatment for a severe mental disorder. On the one hand, since this is a validation study, inclusion criteria were not very restrictive, and the only exclusion criterion was patient's refusal to participate in the study. On the other hand, it was a multi-centre study that included centres from all parts of Spain. However, we understand that the sample size may be a weak point in the study.

The OSQ is a sleep-wake evaluation instrument which had already demonstrated its psychometric usefulness in patients with depressive disorders.<sup>21</sup> In this study, it returns to confirm its good psychometric assessment of patients with schizophrenia and bipolar disorder. Its simplicity and shortness make it easy to use, whether in daily clinical practice or for research purposes.

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## Conflict of interest

The authors affirm that they have no conflicts of interest.

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**Appendix** Oviedo Sleep Questionnaire (OSQ)

During the past month

OSQ1. How satisfied are you with your sleep patterns?

- |                    |                     |                  |               |
|--------------------|---------------------|------------------|---------------|
| 1 Very unsatisfied | 2 Quite unsatisfied | 3 Unsatisfied    | 4 Indifferent |
| 5 Satisfied        | 6 Quite satisfied   | 7 Very satisfied |               |

OSQ2. How many days per week do you have trouble...

	None	1-2 days	3 days	4-5 days	6-7 days
OSQ21. Initiating sleep?	1	2	3	4	5
OSQ22. Remaining asleep?	1	2	3	4	5
OSQ23. Achieving restorative sleep?	1	2	3	4	5
OSQ24. Waking at the usual time?	1	2	3	4	5
OSQ25. With excessive somnolence?	1	2	3	4	5

OSQ3. How long does it take you to fall asleep once you start trying?

- |                 |                        |                 |
|-----------------|------------------------|-----------------|
| 1 0-15 minutes  | 2 16-30 minutes        | 3 31-45 minutes |
| 4 46-60 minutes | 5 More than 60 minutes |                 |

OSQ4. How often do you wake up at night?

- |         |        |           |           |                         |
|---------|--------|-----------|-----------|-------------------------|
| 1 Never | 2 Once | 3 2 times | 4 3 times | 5 More than three times |
|---------|--------|-----------|-----------|-------------------------|

OSQ5. Have you found yourself waking up earlier than usual? If yes, how much earlier?

- |                                |                              |                   |
|--------------------------------|------------------------------|-------------------|
| 1 I wake up at the same time   | 2 Half an hour before        | 3 One hour before |
| 4 Between 1 and 2 hours before | 5 More than two hours before |                   |

OSQ6. Sleep efficiency (hours asleep/hours in bed)

On average, how many hours have you been sleeping every night?

How many hours have you normally been in bed?

- |           |          |          |          |               |
|-----------|----------|----------|----------|---------------|
| 1 91-100% | 2 81-90% | 3 71-80% | 4 61-70% | 5 60% or less |
|-----------|----------|----------|----------|---------------|

OSQ7. How many days a week have you been worried or have you noticed tiredness or a decrease in social/ working function due to not having slept well the previous night?

- |            |            |          |            |                  |
|------------|------------|----------|------------|------------------|
| 1 Not once | 2 1-2 days | 3 3 days | 4 4-5 days | 5 6-7 seven days |
|------------|------------|----------|------------|------------------|

OSQ8. How many days a week have you felt sleepy, fallen asleep during the day or slept more than the usual amount at night?

- |            |            |          |            |            |
|------------|------------|----------|------------|------------|
| 1 Not once | 2 1-2 days | 3 3 days | 4 4-5 days | 5 6-7 days |
|------------|------------|----------|------------|------------|

OSQ9. If you have been feeling sleepy or falling asleep during the day, how many days a week has this been a concern or led to a decrease in your social or working function?

- |            |            |          |            |            |
|------------|------------|----------|------------|------------|
| 1 Not once | 2 1-2 days | 3 3 days | 4 4-5 days | 5 6-7 days |
|------------|------------|----------|------------|------------|

OSQ10. How many days a week do you have (or were told that you have)...

	Not once	1-2 days	3 days	4-5 days	6-7 days
OSQ101. Snoring?	1	2	3	4	5
OSQ102. Snoring with suffocation?	1	2	3	4	5
OSQ103. Leg movements?	1	2	3	4	5
OSQ104. Nightmares?	1	2	3	4	5
OSQ105. Other?	1	2	3	4	5

OSQ11. How many days a week have you taken drugs or used other remedies (infusions, devices, etc., with or without a prescription) as sleep aids?

- |            |            |          |            |            |
|------------|------------|----------|------------|------------|
| 1 Not once | 2 1-2 days | 3 3 days | 4 4-5 days | 5 6-7 days |
|------------|------------|----------|------------|------------|

If you have used a sleep aid (pills, herbs, devices, etc.), please describe:



**Appendix 2** Correction syntax for the Oviedo Sleep Questionnaire (OSQ)

```

IF ((OSQ21 >= 3 | OSQ22 >= 3 | OSQ23 >= 3 | OSQ24 >= 3) & (OSQ7 >= 3))
  Dsis_INS_ICD = 1 .
EXECUTE .
IF ((OSQ21 < 3 & OSQ22 < 3 & OSQ23 < 3 & OSQ24 < 3) | (OSQ7 < 3))
  Dsis_INS_ICD = 0 .
EXECUTE .
IF ((OSQ21 = 5 | OSQ22 = 5 | OSQ23 = 5 | OSQ24 = 5) & (OSQ7 = 5))
  Dsis_INS_DSM = 1 .
EXECUTE .
IF ((OSQ21 < 5 & OSQ22 < 5 & OSQ23 < 5 & OSQ24 < 5) | (OSQ7 < 5))
  Dsis_INS_DSM = 0 .
EXECUTE .
IF ((OSQ21 = 1 & OSQ22 = 1 & OSQ23 = 1 & OSQ24 = 1) & (OSQ25 = 5) & (OSQ8 = 5) & (OSQ9 = 5))
  Dsis_HIPERS = 1 .
EXECUTE .
IF ((OSQ21 > 1 | OSQ22 > 1 | OSQ23 > 1 | OSQ24 > 1) | (OSQ25 < 5) | (OSQ8 < 5) | (OSQ9 < 5))
  Dsis_HIPERS = 0 .
EXECUTE .
COMPUTE OSQ_SS = OSQ21 + OSQ22 + OSQ23 + OSQ24 + OSQ3 + OSQ4 + OSQ5 + OSQ6 +
  OSQ7 .
EXECUTE .

```

Dsis\_INS\_ICD: Insomnia diagnosis according to ICD-10 criteria.

Possible values: 0 = without insomnia; 1 = with insomnia.

Dsis\_INS\_DSM: Insomnia diagnosis according to DSM IV criteria.

Possible values: 0 = without insomnia; 1 = with insomnia.

Dsis\_HIPERS: Hypersomnia diagnosis according to ICD-10 and DSM IV criteria.

Possible values: 0 = without hypersomnia; 1 = with hypersomnia.

OSQ-SS: score on the OSQ Scale for insomnia severity.

Possible values: 9 to 45.