Türk Psikiyatri Dergisi 2007; 18(4)
Turkish Journal of Psychiatry

Development of a Questionnaire to Assess Inter-Episode Functioning in Bipolar Disorder: Bipolar Disorder Functioning Questionnaire

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Abstract

Objective: *Even though quality of life and functioning are topics that are point of interest, they are not assessed adequately in mood disorders. In this study, it is aimed to develop a functioning assessment scale in bipolar disorder.*

Method: *Bipolar Disorder Functioning Questionnaire (BDFQ) is developed by the Scientific Section for Mood Disorders of the Psychiatric Association of Turkey. The questionnaire contains 58 items, and consists of eleven subscales: emotional functioning, intellectual functioning, sexual functioning, feelings of stigmatization, social withdrawal, household relations, relations with friends, participation to social activities, daily activities and hobbies, taking initiative and self sufficiency, and occupation.*

Results: *In this study, 252 remitted bipolar patients from 15 centers were included. In addition, thirty subjects without any lifetime psychiatric, neurological or physical disease were recruited.The mean age of the patients was 38.6±12.1 and 56% (n=141) were female. The mean duration of the bipolar disorder was 11.9±9.2 years, and 91.3% of the patients were diagnosed to have bipolar I disorder. In the reliability analyses, after the exclusion of six items with low reliability coefficients, The Cronbach alpha coefficient was calculated to be 0.91. The item-total scale correlations were between 0.22-0.86. In test-retest reliability, the correlation between the two ratings was high (r=0.82, p<0.0001). In validity analyses, 13 factors were obtained representing 65.1% of the total variance in exploratory factor analysis. In confirmatory factor analysis, 11 domains fit the model with a RMSEA of 0.061. BDFQ significantly correlated with GAF (r=0.428, p<.0001). BDFQ also showed significantly negative correlation with HAM-D (r=-0.541, p<0.0001) and YMRS (r=-0.365, p<0.0001). It discriminated the patients (mean score=111.8±15.2) from the healthy subjects (mean score=121.4±10.4) well (t=-2.300, p=0.038).*

Conclusion: *With the six items excluded, it is suggested that the 52-item BDFQ is a reliable and valid instrument in the assessment of functioning in bipolar disorder.*

Key Words: *Bipolar disorder, functioning, questionnaire, reliability, validity*

INTRODUCTION

Traditionally, the outcome measures of bipolar disorder have been objectively determined by clinical information such as rates of relapse, rates of hospitalization, or degree of symptom reduction (Michalak et al. 2006). However, in recent years, functioning and quality of life are becoming a focus of interest since effective regimens and alternatives for the treatment of episodes are available. Global assessment of functioning (GAF) assessed in Axis V in DSM provides an assessment of global functioning only in one dimension. However, especially in bipolar patients, while there is an impairment or problem in one area, the other areas can perfectly be intact. As a matter of fact, the construct and content of global functioning axis should consist of various areas and domains (Mezzich 1997). In the assessment of functioning, social domain containing areas such as familial, occupational, relational functioning, and psychological domain containing areas such as intellectual, sexual, emotional functioning should be included. On the other hand, stigma creates an important problem in the functioning of bipolar patients (Aydemir 2004). It has been emphasized that functioning measures should not contain signs and symptoms used as diagnostic criteria

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(Endicott et al. 1993). Beyond symptoms, inter-episode functioning broadly implies domains such as emotional, sexual, intellectual, occupational functioning. Furthermore, Michalak and colleagues (2005) suggest to taking also into account areas such as independence, spirituality or stigma.

In studies on functioning and quality of life in bipolar disorder, either frequently used but non-specific instruments such as SF-36 or instruments specifically developed for affective disorders such as Q-LES-Q or LFQ are preferred. The Q-LES-Q (Quality of life Enjoyment and Satisfaction Questionnaire) is one of the most common measures in this area (Endicott et al. 1993). The Q-LES-Q consists of 93 items encompassing the following eight subdomains: physical activities, subjective feelings, leisure activities, general activities, social relationships, work, household duties, and school work. There are also single questions measuring satisfaction with medications and overall life satisfaction. Even though the Q-LES-Q provides valid measures in many domains, some domains such as intellectual and sexual functioning or stigmatization are lacking. On the other hand, the LFQ (Life Functioning Questionnaire) is a 14-item, self-rated measure developed for the assessment of functioning in mood disorders (Altshuler et al. 2002). The LFQ first puts forward the description of impairment with 14 items, and then it describes these areas of impairment. In this context, the application of the LFQ is not so simple, even it requires many details.

Taking all these issues into consideration, as the Scientific Section for Mood Disorders of the Psychiatric Association of Turkey, we aimed to first develop, and then perform the reliability and the validity analyses of (a questionnaire to assess functioning in bipolar disorder. In the development of the questionnaire, it was targeted to contain all areas of functioning stated above and not to include the signs and symptoms of bipolar disorder as much as possible.

METHODS

Development of the Bipolar Disorder Functioning Questionnaire

The choice and development of the items for the Bipolar Disorder Functioning Questionnaire (BDFQ) were carried out in three areas. First, one of the authors (OA) carried out focus group interviews with bipolar patients and their family members. For this purpose, 6 patients were interviewed in their remission phase and asked for their subjective perception of impairment of functioning. Also, 8 family members of these 6 patients with the condition of living in the same residence were also interviewed. Secondly, the domains of impairment of functioning are determined by the experts. In the third place, one of the authors (OA) prepared some items inspiring from the Social Functioning Scale (Birchwood et al. 1990). Also, all relevant literature was reviewed and the domains from previous studies were determined.

After the preparation of the domains and items, the questionnaire consisted of eleven subscales and contained 58 items; and the subscales were emotional functioning, intellectual functioning, sexual functioning, sense of stigmatization, social withdrawal, household (familial) relations, relations with friends, participation in social activities, daily activities and hobbies, taking initiative and self sufficiency, and occupation. This questionnaire was sent to the chairmen of 22 centers for mood disorders of the Scientific Section for Mood Disorders of the Psychiatric Association of Turkey and was reviewed, and after the revisions the final version of the BDFQ was formed. Thus, the face validity was obtained. In the preparation of the response scale, Likert type response scale was preferred. In previous studies especially concerning the validation of WHOQOL in Turkey, it was concluded that the scales with a wider range of response scale such as 5- or 7-Likert type scales have low performance when compared with 3-Likert type scales (Fidaner ve ark. 1999). With this in mind, the questionnaire was designed to have 3-Likert type response scale. Also, the questionnaire was designed to contain items both in negative and positive direction (Tezbasaran 1996). In the response scale, 1 point is for no or never, 2 points for partially or sometimes, and 3 points for yes or always. Thus, the score of the questionnaire ranges from 58 to 174 for the 58-item version. In addition, the questionnaire is designed to be self-rated for the assessment the last month.

Subjects

It was targeted to include 20 patients from each center. Since there are 22 centers in the Scientific Section for Mood Disorders of the Psychiatric Association of Turkey, 440 patients were planned to be included in the study. The inclusion criteria were having a diagnosis of bipolar I or bipolar II disorder, being at the age of between 18-65 years, and having a remission for at least six months. The exclusion criteria were having any psychiatric diagnosis other than bipolar disorder, having alcohol or any other substance misuse, having any neurological or physical disease, having problems in under-

Table I. Demographic and clinical features of the patients.

Age	38.6±12.1	
Gender		
Male	111	%43.9
Female	141	%56.1
Education		
Literate	7	%2.8
Primary school	78	%31.0
High school	72	%28.6
University	95	%37.6
Marital status		
Single	85	%34.0
Married	128	%51.2
Widow	8	%3.2
Divorced/separate	29	%11.6
Occupation		
Unemployed	30	%12.0
Housewife	69	%27.5
Paid-employment	79	%31.5
Self-employment	23	%9.2
Retired	35	%13.9
Student	15	%6.0
Diagnosis		
Bipolar I disorder	230	%91.2
Bipolar II disorder	22	%8.8
Duration of illness	11.9±9.2	
Type of the last episode		
Manic	114	%44.8
Major Depressive	91	%36.1
Hypomanic	29	%11.5
Mixed	19	%7.5
Number of episodes	6.5±6.0	

standing the instructions of the study and in completing the study instruments. The remission was described as not having any mood episode during the last six months, and no scale point was used for the confirmation of the asymptomatic remission period. At the end of the study, 252 patients from 15 centers were recruited. In addition, thirty patients were asked to complete BDFQ two weeks later for test-retest reliability.

Also, thirty healthy subjects matched with the bipolar subjects in terms of age, gender, and education level were included in the study for testing discriminating validity. The inclusion criteria for these healthy subjects were being at the age between 18-65 years, and not having any lifetime psychiatric, neurological or physical disease, or using any treatment chronically.

Instruments

Beside BDFQ, Global Assessment of Functioning (GAF), Hamilton Depression Rating Scale (HAM-D), and Young Mania Rating Scale (YMRS) were used in the assessment of the patients.

For assessing depressive symptoms, 17-item HAM-D was used; and the reliability and validity study for the Turkish version was performed by Akdemir et al. (1996). For assessing manic symptoms, YMRS was used; and the reliability and validity study for the Turkish version was performed by Karadag et al. (2002). Global Assessment of Functioning Scale (DSM-IV) is a measure that assesses the individual's overall functioning on a rating scale that ranges from 0 to 100.

Statistical Analysis

In the reliability analyses, Cronbach alpha coefficients for the total scale and for the subscales, Pearson item-scale correlations corrected for overlap for coefficients, and item discriminant validity test were calculated. Besides, in reliability analyses, the floor and ceiling effects of the scale were calculated. For reliability analyses, Multitrait Analysis Program version 2.0 was used. In addition, for reliability analysis, test-retest correlation with Pearson Correlation Test was calculated.

In validity analyses, exploratory factor analysis was performed as principal component analysis with varimax rotation by SPSS for Windows v10.0. Factors with eigenvalue greater than 1 and items with factor loadings greater than 0.4 were taken into consideration.

In addition, confirmatory factor analysis was performed by LISREL. When evaluating the fit of the CFA and stability models to the data, we used several types of goodness-of-fit indexes. We used the standard chi-square index of statistical fit that is routinely provided under the maximum likelihood estimation of parameters. However, a well-known disadvantage of the chi-square statistics is its high sensitivity to sample size and in practice, irrelevant deviations of the empirical data from what is theoretically expected, are detected due to the overwhelming statistical power. It was therefore used also other indexes of practical fit, including the root mean square error of approximation (RMSEA), and the goodness of fit index (GFI). The RMSEA is an absolute index of fit. RMSEA values under 0.05 indicate close fit with the data, values between 0.05 and 0.08 represent reasonable fit, values between 0.08 and 0.10 reflect poor fit, and values greater than 0.10 are unacceptable. The GFI values may range between 0 and 1 and should be greater than 0.90 (Schumacker ve Lomax 2004). Also, in confirmatory factor analysis, conceptual path diagram was drawn.

Table II. Cronbach alpha coefficients of the bipolar disorder functioning questionnaire and its subscales.

	58-item BDFQ	52-item BDFQ
Emotional functioning	.40	.53
Intellectual functioning	.62	.58
Sexual functioning	.88	.87
Feelings of stigmatization	.74	.75
Social withdrawal	.60	.72
Household relations	.82	.83
Relations with friends	.81	.83
Participation in social activities	.70	.75
Daily activities and hobbies	.58	.59
Taking initiative and realizing his/her potential	.63	.63
Occupation	.68	.69
Total	.90	.91

Total scale scores and subscale scores were correlated with GAF for concurrent validity and with HAM-D and YMRS for discriminant validity by Pearson correlation test. For discriminant analysis also, the Student's T Test of BDFQ scores of the bipolar patient group and the healthy control group was calculated.

RESULTS

Table I demonstrates demographic and clinical features of the patients. The mean age of the patients was 38.6±12.1 and 56% (n=141) were female. The mean age of the control group was 35.1±8.5 and 50% (n=15) were female. There was no statistical difference between the bipolar patient group and the control group in terms of age, gender and education level.

Reliability Analyses

When the 58-item BDFQ was taken into account, the Cronbach alpha coefficient was calculated to be 0.90; and the Cronbach alpha coefficients of the subscales were between 0.40-0.88 (Table II). The item-total correlation coefficients were found to be between -0.06-0.86 and the subscale-total correlation coefficients were between 0.38-0.65 (Table III). The item discriminant validity tests were 90.0% for the total questionnaire and between 57.5-100.0% for the subscales (Table IV). After these analyses, six items ("Understanding others' feelings", "Spending most of the day in bed", "Going to night clubs with friends", "Participating in religious activities", "Cooking", "Self-hygiene") were excluded since the reliability coefficients were found to be very low. Then, these same analyses were re-calculated.

When the 52-item BDFQ was subjected to reliability analyses, the Cronbach alpha coefficient of the total questionnaire was found to be 0.91 and the Cronbach alpha coefficients of the subscales were between 0.50-0.88 (Table II). The item-total correlation coefficients were found to be between 0.22-0.86 and the subscale-total correlation coefficients were between 0.50-0.88 (Table III). The item discriminant validity tests were 97.5% for the total questionnaire and between 83.3-100.0% for the subscales (Table IV). Both the floor and the ceiling effects of the scale were calculated to be 0.0%.

In test-retest reliability, the correlation between the two ratings was high ($r=0.82$, $p<0.0001$).

Validity Analyses

The validity analyses were calculated with the 52-item BDFQ. First, exploratory factor analysis was performed as principal component analysis with varimax rotation. In exploratory factor analysis, 13 factors with eigenvalues greater than 1 were obtained and they represented 65.1% of the total variance (Table V). All items were included in a factor with a factor loading of greater than 0.4. These factors can be named as follows: 1 relations with friends, 2 sexual functioning, 3 outdoor activities, 4 occupation, 5 household relations, 6 household duties, 7 social withdrawal, 8 feelings of stigmatization, 9 intellectual functioning, 10 household contribution, 11 leisure time activities for males, 12 daily activities and hobbies, and 13 emotional functioning.

Confirmatory factor analysis was performed with 52-item BDFQ as the total model. In the total model, root mean square error of approximation (RMSEA) was found to be 0.061, comparative fit index (CFI) as 0.91, and goodness of fit index (GFI) as 0.73.

The total mean score of the scale ($r=0.428$, $p<0.0001$) significantly correlated to GAF scores. Also, HAM-D (-0.541, $p<0.0001$) and YMRS (-0.365, $p<0.0001$) negatively correlated with the total score of the BDFQ. The BDFQ discriminated the patients (mean score=111.8±15.2) from the healthy subjects (mean score=121.4±10.4) well ($t=-2.300$, $p=0.038$).

Table III. Item-total score and subscale-total score correlation coefficients of the bipolar disorder functioning questionnaire.

	58-item BDFQ	52-item BDFQ
#1	.30	.35
#2	.22	.32
#3	.34	.38
Emotional functioning	.58	.56
#4	.39	.38
#5	.35	.30
#6	.49	.44
#7	.40	.35
Intellectual functioning	.38	.40
#8	.70	.69
#9	.59	.60
#10	.86	.82
#11	.82	.80
Sexual functioning	.48	.47
#12	.49	.51
#13	.48	.43
#14	.60	.61
#15	.58	.61
Feelings of stigmatization	.38	.40
#16	.46	.50
#17	.50	.59
#18	.48	.54
Social withdrawal	.65	.62
#19	.48	.50
#20	.69	.67
#21	.56	.58
#22	.63	.68
#23	.54	.53
#24	.62	.65
Household relations	.56	.53
#25	.53	.57
#26	.65	.63
#27	.67	.68
#28	.60	.63
#29	.53	.60
Relations with friends	.55	.58
#30	.55	.59
#31	.59	.63
#32	.39	.35
#33	.34	.30
#34	.49	.50
#35	.37	.44
#36	.42	.43
#37	.28	.27
Participation in social activities	.43	.51
#38	.33	.36
#39	.27	.31
#40	.20	.21
#41	.37	.32
#42	.43	.30
#43	.22	.25
#44	.21	.30
#45	.28	.31
Daily activities and hobbies	.47	.55
#46	.48	.44
#47	.49	.42
#48	.49	.46
Taking initiative and realizing his/her potential	.51	.45
#49	.42	.41
#50	.61	.63
#51	.55	.56
#52	.30	.32
Occupation	.42	.44

DISCUSSION

In bipolar disorder, improving functioning is gaining importance as much as symptom reduction, especially in the inter-episodes. For the assessment of functioning, there is a need of a measure with a broad content in the evaluation. Thus, the analyses summarized in this report indicate that the 52-item Bipolar Disorder Functioning Questionnaire (BDFQ) is a strong alternative for this purpose.

Reliability Analyses

BDFQ has a fairly high reliability and the subscales also have moderate to high reliability indicating good internal consistency. Initially, it was a 58-item questionnaire; however the reliability analyses indicate that the six items with low reliability have to be excluded. One of the items ("Are you able to understand others' feelings") correlated with other structures such as emotional

Table IV. Item discriminant validity test of the bipolar disorder functioning questionnaire.

	58-item BDFQ	52-item BDFQ
Emotional functioning	57.5%	90.0%
Intellectual functioning	100.0%	97.5%
Sexual functioning	100.0%	100.0%
Feelings of stigmatization	100.0%	100.0%
Social withdrawal	80.0%	100.0%
Household relations	100.0%	100.0%
Relations with friends	100.0%	98.8%
Participation in social activities	89.0%	96.3%
Daily activities and hobbies	81.1%	100.0%
Taking initiative and realizing his/her potential	87.5%	100.0%
Occupation	100.0%	100.0%
Total	90.0%	98.5%

symptoms and did not reliably assess the "emotional functioning" dimension. Two of the items ("How much of a day do you spend in bed") and ("Do you go to night clubs with your friends") were not rated as 1 or 2 points by most of the patients, so they both showed low reliability. Another one of the items ("How much do you participate in religious activities") correlated with the disease symptomatology instead of inter-episode functioning. Two of the items ("Cooking") and ("Self-hygiene") showed low reliability since they are accepted as routine activities by most of the patients instead of an evidence of functioning. When the number of items was reduced to 52, it is demonstrated that the item sets are assessing the dimensions reliably with good coherence.

Validity Analyses

All validity analyses were performed with the 52-item BDFQ. The BDFQ also has a good factor structure containing all items and all domains in the exploratory factors. All domains were represented in the factors. Household (familial) relations are in fact represented in two dimensions in the factor structure; one is household duties and contribution, and the other is household relations. This is an expected result since most patients living with their family have two types of roles at home one within the other. Furthermore, for leisure time activities, beside general activities, factor #11 represented leisure time activities for male patients such as going to a pub or a coffee shop, going to sport games or attending club activities which are typical male activities in our culture in Turkey.

The findings from the confirmatory factor analysis provide additional support for the construct validity of the BDFQ. In the CFA, the model fit for 11 dimensions was fairly good with reasonable RMSEA and high goodness of fit. Only item #40 ("Playing music") demonstrated relatively low loading. In fact, to play a musical instrument as a hobby unless one is talented is not very common in Turkey. However, we insisted for this item not to exclude from the scale since it shows an important aspect of leisure time hobbies. Further evaluation of the performance of this item is recommended; if this finding is consistent across studies and across cultures, revision of the item might be desirable. It is encouraging to see that all dimensions fit the model very well. Thus, both the exploratory and confirmatory factor analyses indicate a good structural validity for the BDFQ.

When the correlations were taken into consideration, the BDFQ showed moderate but statistically significant correlation with GAF which is a one-dimensional tool for global functioning. The GAF detects only symptomatology and symptom level; however, the BDFQ provides a wide range of functioning assessment which may certainly be missed by the GAF. Furthermore, the BDFQ has a moderate and significantly negative correlation with the HAM-D, but the correlation between the BDFQ and the YMRS is relatively low. Since functioning is more affected by the depressive symptomatology in the inter-episode when compared to the manic

Table V. Exploratory factor structure of the 52-item bipolar disorder functioning questionnaire.

		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
#1	EF													,739
#2	EF													,702
#3	EF	,542												
#4	IF									,761				
#5	IF									,510				,451
#6	IF									,715				
#7	IF	,469												
#8	SF		,766											
#9	SF		,702											
#10	SF		,773											
#11	SF		,770											
#12	FS							,411	,568					
#13	FS								,615					
#14	FS								,810					
#15	FS								,782					
#16	SW							,589						
#17	SW							,545						
#18	SW							,624						
#19	HR					,771								
#20	HR					,661								
#21	HR										,744			
#22	HR										,602			
#23	HR					,526					,406			
#24	HE					,483								
#25	RF	,609												

symtpomatology (Özer ve ark. 2002), the difference of the correlations between depressive and manic scales is understandable. BDFQ demonstrates good performance especially in remission periods and it is affected moderately to poorly by the subsyndromal residual symptoms. As a definition of this present study, since patients in remission were included in the study, the degree of the effect of mood symptoms on BDFQ would be possible with the assessment of the patients during the mood episodes.

The BDFQ is also applied to normal healthy subjects to see the discriminative power of the questionnaire. The BDFQ significantly discriminated normal healthy subjects from bipolar patients. Furthermore, the item discriminant validity test of the BDFQ revealed fairly high percentages ranging between 90-100% for the subscales and 98.5% for the total questionnaire. These data point out that the discriminative power of the BDFQ is very good.

Matching with WHO-ICF Criteria

When the domains of BDFQ are matched with WHO-ICF Criteria (WHO 2001), taking two-step classification into consideration, and all domains are represented in the ICF Codes. For each domain of BDFQ, the ICF Codes are as follows: emotional functioning

Table V Continued.

#26	RF	,801											
#27	RF	,628											
#28	RF	,633				,469							
#29	RF	,491											
#30	PSA	,518											
#31	PSA							,526					
#32	PSA										,682		
#33	PSA										,740		
#34	PSA			,773									
#35	PSA			,827									
#36	PSA	,609											
#37	PSA										,735		
#38	DAH						,660						
#39	DAH						,781						
#40	DAH											.822	
#41	DAH											,789	
#42	DAH											,692	
#43	DAH											,740	
#44	DAH												
#45	DAH			,536									
#46	TIRP			,486									
#47	TIRP												,406
#48	TIRP						,657						
#49	O				,638								
#50	O				,844								
#51	O				,749								
#52	O				,436								
Eigenvalue		9,937	3,288	3,117	2,630	2,268	2,086	1,806	1,694	1,606	1,520	1,415	1,288	1,214
Variance (%)		19,11	6,32	5,99	5,05	4,36	4,01	3,47	3,25	3,08	2,92	2,72	2,47	2,33

EF: Emotional functioning, IF: Intellectual functioning, SF: Sexual functioning, FS: Feelings of stigmatization, SW: Social withdrawal, HR: Household relations, RF: Relations with friends, PSA: Participation in social activities, DAH: Daily activities and hobbies, TIRP: Taking initiative and realizing his/her potential, O: Occupation.

(b152), intellectual functioning (b117), sexual functioning (b640), sense of stigmatization (e460), social withdrawal (d910), household (familial) relations (e310, d760), relations with friends (e320), participation to social activities (d920), daily activities and hobbies (d920), taking initiative and self sufficiency (d860, d865), and occupation (d845, d850). Both participation to social activities, and daily activities and hobbies are represented in the same ICF Code since, in ICF Criteria, there is no difference between routine daily activities and leisure time activities and hobbies. Also, some domains such as taking initiative and self sufficiency, and occupation are each represented by two ICF Codes since they deal with different aspects of the same function.

Limitations

There are some limitations of the study. First, even though the number of the bipolar patients included in the study is fivefold of the number of items of the BDFQ, it would be better to have more bipolar subjects to perform the statistical analyses such as exploratory or confirmatory factor analyses. The reproducibility of the BDFQ and the sensitivity to change are not performed in this study, which should be tested in future studies. Therefore, the prognostic value and predicting response to treatment will be determined. Besides, it would be better to apply another instrument with the BDFQ to provide concurrent validity. The absence of such an instrument widely used in Turkey is a problem. In future studies, taking this issue into consideration, the correlation of BDFQ with other instruments of quality of life or functioning (such as WHOQOL) can be examined. Even though all statistical evaluations were made, because of the reduction of the number of items of BDFQ from 58 to 52 at the end of reliability analyses, the reliability and validity analyses of BDFQ performed in this present study await to be verified in other groups. On the other hand, our effort to cover all dimensions representing functioning in bipolar disorder can be an advantage of the study; and this procedure is done with universal items which can be perfectly administered across cultures.

CONCLUSION

As a conclusion, based on these data of this study, the Bipolar Disorder Functioning Questionnaire is a reliable and valid instrument in the assessment of inter-episode functioning in bipolar patients. It will be helpful and useful in a variety of studies as well as in routine daily practice.

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