King's Research Portal

DOI:

[10.1016/j.eurpsy.2017.08.005](https://doi.org/10.1016/j.eurpsy.2017.08.005)

Document Version

Peer reviewed version

[Link to publication record in King's Research Portal](#)

Citation for published version (APA):

Hofer, A., Mizuno, Y., Wartelsteiner, F., Wolfgang Fleischhacker, W., Frajo-Apor, B., Kemmler, G., Mimura, M., Pardeller, S., Sondermann, C., Suzuki, T., Welte, A-S., & Uchida, H. (2017). Quality of life in schizophrenia and bipolar disorder: The impact of symptomatic remission and resilience. *European Psychiatry*.
<https://doi.org/10.1016/j.eurpsy.2017.08.005>

Citing this paper

Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

General rights

Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the Research Portal

Take down policy

If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

**QUALITY OF LIFE IN SCHIZOPHRENIA AND BIPOLAR DISORDER:
THE IMPACT OF SYMPTOMATIC REMISSION AND RESILIENCE**

Alex Hofer, MD,¹ Yuya Mizuno, MD, PhD,^{2,3} Fabienne Wartelsteiner, MD,¹

W. Wolfgang Fleischhacker, MD,¹ Beatrice Frajo-Apor, MD, PhD,¹ Georg Kemmler, PhD,¹

Masaru Mimura, MD, PhD,² Silvia Pardeller, PhD,¹ Catherine Sondermann, MD,¹

Takefumi Suzuki, MD, PhD,² Anna-Sophia Welte, MD,¹ Hiroyuki Uchida, MD, PhD,²

¹ Medical University Innsbruck, Department of Psychiatry, Psychotherapy and Psychosomatics, Division of Psychiatry I, Innsbruck, Austria

² Keio University School of Medicine, Department of Neuropsychiatry, Tokyo, Japan

³ Institute of Psychiatry, Psychology & Neuroscience, King's College London, Department of Psychosis Studies, London, UK

Running title: Quality of life in serious mental illness

Corresponding author:

Alex Hofer, MD

Medical University Innsbruck

Department of Psychiatry, Psychotherapy, and Psychosomatics

Division of Psychiatry I

Anichstr. 35

6020 Innsbruck, Austria

Tel.: +43/512/504/23669

Fax.: +43/512/504/25267

Email: a.hofer@i-med.ac.at

ABSTRACT

Background: Health-related quality of life (HRQOL) is significantly affected in individuals with schizophrenia or bipolar I disorder (BD-I). The current study investigated whether symptomatic remission and resilience might differently impact HRQOL in these patients.

Methods: 52 patients with schizophrenia and 60 patients suffering from BD-I from outpatient mental health services as well as 77 healthy control subjects from the general community were included into a cross-sectional study. HRQOL and resilience were assessed using the WHOQOL-BREF and the Resilience Scale. In patients, psychopathology was quantified by the Positive and Negative Syndrome Scale or the Montgomery Asberg Depression Rating Scale and the Young Mania Rating Scale, respectively.

Results: Notably, both patient groups showed lower HRQOL and resilience compared to control subjects, non-remitted patients indicated lower HRQOL than remitted ones. The effect of remission on HRQOL was significantly larger in patients with BD-I than in those with schizophrenia but did not explain the difference in HRQOL between groups. Resilience predicted HRQOL in all three groups. When accounting for the effect of resilience among remitted patients, only the difference in HRQOL between schizophrenia patients and control subjects was significant.

Conclusion: These findings demonstrate the impact of symptomatic remission and resilience on HRQOL of both patients suffering from schizophrenia and BD-I and indicate that these factors are especially relevant for HRQOL of patients with BD-I.

Key words: Quality of life, schizophrenia, bipolar disorder, remission, resilience.

1. INTRODUCTION

The World Health Organization (WHO) defines quality of life as “individuals’ perception of their position in life in the context of the culture and value system in which they live and in relation to their goals, expectations, standards, and concerns” [1]. More specifically, the term *health-related quality of life* (HRQOL) describes a multidimensional and subjective concept comprising physical, social, well-being, and functional domains. As such, HRQOL may be seen as a reliable indicator of disease burden [2] and has therefore been recognized as an important outcome of serious mental illnesses (SMI) like schizophrenia and bipolar I disorder (BD-I).

A number of studies have shown that despite symptom improvement HRQOL is significantly affected in individuals suffering from SMI [3, 4]. When directly comparing patients with schizophrenia and BD-I, most studies report on better or smaller losses of HRQOL in people with BD-I [5, 6]. Notably and irrespective of the type of psychotic disorder, current depressive symptoms, medical and psychiatric comorbidities as well as treatment adverse effects have consistently been shown to be negative predictors of HRQOL [3, 6, 7-9]. However, still other factors can be expected to be of major relevance in this context, e.g., a patient’s remission status and the degree of resilience.

Resilience has been defined as “the capacity of a dynamic system to withstand or recover from significant challenges that threaten its stability, viability, or development” [10]. It has been associated with both subjective (e.g., self-esteem, hopelessness) and objective (symptom severity) domains of recovery [11, 12] and with quality of life of patients with schizophrenia [13-16], however, the interrelations between these variables, especially in individuals suffering from BD-I, remain unclear.

The primary objective of the current study was to investigate HRQOL in patients suffering from different types of SMI and healthy control subjects and to examine whether symptomatic remission and resilience are influential in this context. We hypothesized that HRQOL would be lower in patients compared to healthy control subjects and that schizophrenia patients would indicate lower HRQOL

compared to patients with BD-I. Moreover, we hypothesized that both being in symptomatic remission and showing a higher degree of resilience would be associated with better HRQOL.

2. MATERIAL AND METHODS

Patients meeting diagnostic criteria for schizophrenia or BD-I and healthy control subjects from the general community aged 18 or older were included into a cross-sectional study. The Mini International Neuropsychiatric Interview (M.I.N.I.) [17] was used to confirm both diagnoses in patients and the absence of any axis I disorder according to DSM-IV in control subjects. Patients were recruited from outpatient mental health services in Innsbruck, Austria. They had to be clinically stable without hospitalization for at least six months and without any change in psychopharmacological treatment within six months before study inclusion. Exclusion criteria for all participants included insufficient language abilities, neurological and developmental disorders, and physical illnesses that might interfere with cognitive performance. All subjects signed informed consent in accordance with the local ethics committee.

The WHO Quality of Life assessment (WHOQOL-100) has previously been shown to quantify domains of quality of life in different cultural groups around the world [18]. In the current study, HRQOL was assessed with the short version of this instrument (WHOQOL-BREF) [19], which consists of 26 questions scored in the following domains: global quality of life, physical health, psychological health, social relationships, and environment. Each question is rated on a 5-point scale, domain scores are transformed to lie between 0 and 100.

Resilience was assessed using the 25-item Resilience Scale (RS-25) [20], which is the only resilience scale validated in German language [21] and covers five factors: purpose, perseverance, self-reliance, equanimity, and existential aloneness. This self-report scale measures the degree of individual resilience, which is conceptualized as a positive personality characteristic that enhances adaptation in the context of significant adversity. Since the 2-factor structure of the RS-25 (“acceptance of self and life” and “personal competence”) could not be identified in the German version, we considered

only the total score in our study (Cronbach's $\alpha=0.95$) [21]. Items are scored on a 7-point scale ranging from 1 = strongly disagree to 7 = strongly agree, with possible scores ranging from 25 to 175. Higher scores indicate higher resilience levels.

In patients, psychopathology was assessed by means of the Positive and Negative Syndrome Scale (PANSS) [22] (schizophrenia patients) or the Montgomery-Asberg Depression Rating Scale (MADRS) [23] and the Young Mania Rating Scale (YMRS) [24] (BD-I patients), respectively. Similar to previous studies, symptomatic remission was defined as meeting the severity, but not the time component of the remission criteria as proposed by The Remission in Schizophrenia Working Group [25] (schizophrenia patients) and a score of 7 or less on both the MADRS and the YMRS in patients suffering from BD-I [26]. Ratings were completed by psychiatrists belonging to a trained research team.

2.1 Statistical Methods

Prior to the analysis, deviations from normality were investigated by means of the skewness of the respective variables, considering values > 0.5 or < -0.5 as deviations from a symmetric distribution requiring non-parametric testing [27]. Differences between the three groups with respect to sociodemographic variables and quality of life (WHOQOL-BREF) were tested by one-way analysis of variance, Kruskal-Wallis test, or Chi-square test, depending on the variable type (normally distributed, non-normally distributed, or categorical, respectively). Post-hoc pairwise group comparisons were performed by means of t-test, Mann-Whitney U-test, and Chi-square test, respectively, provided that the overall comparison of the three groups had yielded significance ($p<0.05$). In the case of three groups, this sequential testing procedure yields valid p-values, i.e., no correction for multiple testing is required [28]. In addition, the two patient groups were compared with regard to clinical variables by means of the same tests as above.

To investigate the joint effect of group, symptomatic remission and resilience on HRQOL as measured by the WHOQOL-BREF total score, a series of linear models was fitted. In Model 1, only the factor group (schizophrenia, BD-I, healthy control) was considered. In Model 2, the additional effect of

symptomatic remission on HRQOL was taken into account. For healthy control subjects, the remission status was set to “remitted” (“free of mental illness”), since they are similar to remitted patients in terms of the absence of symptoms (vs. relief from symptoms) of mental illness. In Model 3, we investigated the role of resilience (RS-25 total score) in this context. In particular, we were interested if resilience can account for the observed differences in HRQOL between groups. Finally, the sample was split by remission status, fitting separate linear models to remitted and non-remitted subjects in order to ease interpretation of results.

3. RESULTS

3.1 Sample characteristics

52 patients with schizophrenia, 60 patients suffering from BD-I, and 77 healthy control subjects were included into the study. Sociodemographic and clinical characteristics are summarized in Table 1. The three groups were comparable with regard to age and sex, but schizophrenia patients presented with lower levels of education than the other groups. As expected, patients and control subjects differed with respect to employment status.

Compared to individuals suffering from BD-I schizophrenia patients had a longer duration of illness and were more frequently unemployed. Furthermore, a larger proportion of symptomatically remitted patients was found in the BD-I compared to the schizophrenia sample.

The two patient groups were comparable with respect to resilience, however, they achieved significantly lower mean RS-25 scores than control subjects.

3.2 Health-related quality of life

An overview of participants' HRQOL as assessed by the WHOQOL-BREF is given in Table 2. The two patient samples were comparable in this regard, demonstrating a significant difference only in the WHOQOL-BREF subscale environment (lower scores in schizophrenia patients). However, both

patient groups achieved significantly lower scores in the majority of WHOQOL-BREF scales (subscales and total score) compared to control subjects.

3.3 Models for the prediction of health-related quality of life – the role of remission and resilience

For a more detailed investigation of the role of potential predictors on participants' HRQOL several models were fitted to the WHOQOL-BREF total score.

In *Model 1*, only the factor group was considered (see Table 3.1). Both patient groups showed significantly lower overall HRQOL than control subjects (mean reduction of HRQOL by 15.56 and 13.43 points in schizophrenia and BD-I patients, respectively, $p < 0.001$ for both groups), while no significant difference was observed between the two patient groups ($t = 0.91$, $p = 0.366$).

In *Model 2*, the additional effect of symptomatic remission on HRQOL was investigated (Table 3.2). By definition, healthy control subjects (being free of mental illness) were treated in the same way as remitted patients in this analysis. A significant effect of symptomatic remission and its interaction with diagnostic group was observed. Remitted subjects achieved significantly higher WHOQOL-BREF total scores than non-remitted ones. The effect of remission on HRQOL, though present in both patient groups, was significantly larger in patients suffering from BD-I (mean increase in HRQOL: 19.68 points) than in those with schizophrenia (mean increase in HRQOL: 10.67 points, i.e., 9.01 points smaller than in BD-I patients, $p = 0.037$). Note that the significance of the factor group was retained, i.e., symptomatic remission did not account for the observed difference in HRQOL between groups. The corresponding figures in Table 3.2 indicate that compared to healthy control subjects HRQOL was reduced by 8.8 points ($p = 0.002$) in remitted schizophrenia patients and by 6.09 points ($p = 0.006$) in remitted BD-I patients.

If this analysis is performed without the control group, the relevant findings regarding the two patient groups are retained, namely a highly significant main effect of remission on HRQOL and a significant interaction between patient group and remission, as described above.

In *Model 3*, we investigated the role of resilience (RS-25 total score) in this context. Resilience was found to be a highly significant predictor of higher WHOQOL-BREF total scores in all three groups

(0.324 points increase in WHOQOL total score per unit increase in the RS-25 score, $p < 0.001$). This effect was similar in size across groups as there was no significant interaction between resilience and group. Moreover, the significance of the effect of symptomatic remission on HRQOL was retained, whereas the effect of the factor group and its interaction with remission both lost statistical significance. However, as the significance level of 0.05 was only missed by a narrow margin, especially for the group-by-remission interaction ($p = 0.065$), we split the data by remission status and performed separate analyses for healthy/remitted and non-remitted subjects for a more detailed investigation of the group effect (see Table 4).

The analysis of the subgroup of healthy/remitted subjects (Table 4.1) revealed not only a highly significant effect of resilience on HRQOL but also a significant group effect. On closer inspection, the difference between remitted schizophrenia patients and control subjects was found to be significant ($p = 0.007$); however, neither the difference in HRQOL between the two patient groups nor the difference between remitted BD-I patients and controls reached significance, once the effect of resilience had been accounted for.

In non-remitted subjects (Table 4.2) only the significance of resilience was retained whereas no significant difference in HRQOL between the two patient groups was observed.

These results (Table 3, Table 4) remain unchanged in terms of statistical significance when adjustments are made for education by means of analysis of covariance.

4. DISCUSSION

This study compared HRQOL of patients suffering from schizophrenia or BD-I and healthy control subjects and investigated whether symptomatic remission and resilience might differently impact HRQOL in these patients. In order to target the group of patients one is interested in when evaluating the long term management of individuals suffering from SMI we chose to study clinically stable outpatients. Accordingly, symptom levels were low, irrespective of diagnostic group. It has to be considered, however, that the mean PANSS and MADRS/YMRS scores, respectively indicated that

even those patients who did not fulfil the remission criteria were merely mildly ill at the time of study inclusion.

HRQOL was largely comparable between the two patient groups. However, similar to earlier studies [29] BD patients achieved higher scores in the WHOQOL-BREF subscale environment. Next to issues like “physical safety and security” or “physical environment” (traffic, climate, etc.) which can be expected to generally apply to a single-centre study sample, this domain includes other facets like “financial resources” or “home environment”. We can speculate that these areas may have led to the observed difference between patients suffering from schizophrenia and BD-I, however, this issue cannot be addressed by our data.

As expected and similar to previous studies [11, 15, 16, 30, 31], both patient samples indicated lower HRQOL and resilience compared to healthy control subjects. This demonstrates that even during periods of clinical stability HRQOL is significantly affected in individuals suffering from SMI and underscores the necessity to provide them with continuous psychosocial support. Notably, non-remitted patients indicated lower HRQOL than those who were symptomatically remitted, which also corroborates previous observations [32-36]. The effect of symptomatic remission on HRQOL was significantly stronger in patients suffering from BD-I than in those with schizophrenia. Since residual symptoms of depression have previously been shown to negatively predict quality of life [6], we hypothesize that despite low mean MADRS scores residual depressive symptoms might have led to difficulties to adjust to the state of health and to available resources in patients suffering from BD-I investigated in the current study. In future studies, it will be critical to use a specific instrument for the assessment of depressive symptoms in schizophrenia as the PANSS is not the ideal rating scale to investigate the association between depression and HRQOL in this patient group. Therefore and due to the cross-sectional study design, our data do not allow for causal conclusions regarding the influence of residual depressive symptoms on HRQOL in patients suffering from SMI in general.

Our data provide evidence that interventions focusing on the improvement of resilience may promote an individual’s quality of life, as resilience was found to be a highly significant predictor of HRQOL in all three groups, i.e., the higher the degree of resilience, the higher the degree of HRQOL.

Notably, once the effect of resilience had been accounted for, symptomatically remitted patients suffering from BD-I and healthy control subjects indicated comparable HRQOL, while the difference in HRQOL between remitted schizophrenia patients and control subjects was still significant. Accordingly, individuals suffering from schizophrenia and BD-I obviously differ with regard to the factors affecting HRQOL. It has previously been suggested, that interventions in resilience could be relevant to activate progressive effects and improve multiple indicators of adjustment [37, 38]. For instance, self-management and self-care features have been associated with better quality of life in patients suffering from BD [39]. It remains to be seen, however, whether diagnostic groups and remitted/non-remitted patients differ in this regard. Similarly, it will be critical to investigate whether the promotion of other issues not considered in the current study and likely to have an influence on mental wellbeing, e.g. neuro- and sociocognitive functioning and social support, are of relevance in this context. Finally, when interpreting our data one has to consider that we applied a cross-sectional design and included a sample of clinically stable patients to investigate a number of dynamic issues (HRQOL, symptomatic remission, resilience). We therefore cannot exclude that our patients had developed strategies to cope with the illness and that all study participants had promoted resilience over the course of time which, in turn, may have had a positive impact on HRQOL and vice versa. Longitudinal studies are needed to investigate the interaction between HRQOL, switching to symptomatic remission, and resilience over time. Notwithstanding, our findings on the relationships between symptomatic remission, resilience, and diagnosis emphasize the complex nature of HRQOL and underline the importance of accounting for these background variables when considering treatment options in patients suffering from SMI.

5. FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

6. REFERENCES

- [1] The WHOQOL Group. The World Health Organization Quality of Life Assessment (WHOQOL): position paper from The World Health Organization. *Soc Sci Med* 1995;41(10):1403-1409.
- [2] Cook EL, Harman JS. A comparison of health-related quality of life for individuals with mental health disorders and common chronic medical conditions. *Public Health Rep* 2008;123(1):45-51.
- [3] Eack SM, Newhill CE. Psychiatric symptoms and quality of life in schizophrenia: a meta-analysis. *Schizophr Bull* 2007;33(5):1225-1237.
- [4] Ishak WW, Brown K, Aye SS, Kahloon M, Mobaraki S, Hanna R. Health-related quality of life in bipolar disorder. *Bipolar Disord* 2012;14(1):6-18.
- [5] Michalak EE, Yatham LN, Lam RW. Quality of life in bipolar disorder: a review of the literature. *Health Qual Life Outcomes* 2005;3: 72.
- [6] Saarni SI, Viertiö S, Perälä J, Koskinen S, Lönnqvist J, Suvisaari J. Quality of life of people with schizophrenia, bipolar disorder and other psychotic disorders. *Br J Psychiatry* 2010;197(5):386-394.
- [7] Alessandrini M, Lançon C, Fond G, Faget-Agius C, Richieri R, Faugere M, et al. A structural equation modelling approach to explore the determinants of quality of life in schizophrenia. *Schizophr Res* 2016;171(1-3):27-34.
- [8] Casey DA, Rodriguez M, Northcott C, Vickar G, Shihabuddin L. Schizophrenia: medical illness, mortality, and aging. *Int J Psychiatry Med* 2011;41(3):245-251.
- [9] Fleischhacker WW, Rabinowitz J, Kemmler G, Eerdeken M, Mehnert A. Perceived functioning, well-being and psychiatric symptoms in patients with stable schizophrenia treated with long-acting risperidone for 1 year. *Br J Psychiatry* 2005;187(2):131-136.
- [10] Masten AS. Resilience in children threatened by extreme adversity: frameworks for research, practice, and translational synergy. *Dev Psychopathol* 2011;23(2):493-506.
- [11] Hofer A, Mizuno Y, Frajo-Apor B, Kemmler G, Suzuki T, Pardeller S, et al. Resilience, internalized stigma, self-esteem, and hopelessness among people with schizophrenia: Cultural comparison in

- Austria and Japan. *Schizophr Res* 2016;171(1-3):86-91.
- [12] Torgalsboen AK, Fu S, Czajkowski N. Does resilience contribute to full recovery in first-episode schizophrenia? Poster presented at the 5th Biennial Schizophrenia International Research Society Conference, 2016;2-6 April, Florence, Italy.
- [13] Chiu MY, Ho WW, Lo WT, Yiu MG. Operationalization of the SAMHSA model of recovery: a quality of life perspective. *Qual Life Res* 2010;19(1):1-13.
- [14] Ho WW, Chiu MY, Lo WT, Yiu MG. Recovery components as determinants of the health-related quality of life among patients with schizophrenia: structural equation modelling analysis. *Aust N Z J Psychiatry* 2010; 44(1):71-84.
- [15] Mizuno Y, Hofer A, Suzuki T, Frajo-Apor B, Wartelsteiner F, Kemmler G, et al. Clinical and biological correlates of resilience in patients with schizophrenia and bipolar disorder: A cross-sectional study. *Schizophr Res* 2016;175(1-3):148-153.
- [16] Wartelsteiner F, Mizuno Y, Frajo-Apor B, Kemmler G, Pardeller S, Sondermann C, et al. Quality of life in stabilized schizophrenia patients is mainly associated with resilience and self-esteem. *Acta Pyschiatr Scand* 2016;134(4):360-367.
- [17] Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, et al. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry* 1998;59(Suppl 20):22-33.
- [18] Power M, Harper A, Bullinger M. The World Health Organization WHOQOL-100: tests of the universality of Quality of Life in 15 different cultural groups worldwide. *Health Psychol* 1999;18(5):495-505.
- [19] The WHOQOL Group. Development of the World Health Organization WHOQOL-BREF quality of life assessment. *Psychol Med* 1998;28(3):551-558.
- [20] Wagnild GM, Young HM. Development and psychometric evaluation of the Resilience Scale. *J Nurs Meas* 1993;1(2):165-178.
- [21] Schumacher J, Leppert K, Gunzelmann T, Strauß B, Brähler E. Die Resilienzskala - Ein Fragebogen zur Erfassung der psychischen Widerstandsfähigkeit als Personenmerkmal. *Z f Klinische*

- Psychologie, Psychiatrie und Psychotherapie 2005;53(1):16-39.
- [22] Kay SR, Fiszbein A, Opler LA. The Positive and Negative Syndrome Scale (PANSS) for schizophrenia. *Schizophr Bull* 1987;13(2):261-276.
- [23] Montgomery SA, Asberg M. A new depression scale designed to be sensitive to change. *Br J Psychiatry* 1979;134(4):382-389.
- [24] Young RC, Biggs JT, Ziegler VE, Meyer DA. A rating scale for mania: reliability, validity and sensitivity. *Br J Psychiatry* 1978;133(5):429-435.
- [25] Andreasen NC, Carpenter WT Jr, Kane JM, Lasser RA, Marder SR, Weinberger DR. Remission in schizophrenia: proposed criteria and rationale for consensus. *Am J Psychiatry* 2005;162(3):441-449.
- [26] Yalcin-Siedentopf N, Hoertnagl CM, Biedermann F, Baumgartner S, Deisenhammer EA, Hausmann A, Kaufmann A, Kemmler G, Mühlbacher M, Rauch AS, Fleischhacker WW, Hofer A. Facial affect recognition in symptomatically remitted patients with schizophrenia and bipolar disorder. *Schizophr Res* 2014;152(2-3):440-445.
- [27] Brown S. <http://BrownMath.com/stat/shape.htm>; 2015 [accessed 06.04.17].
- [28] Levin JR, Serlin RC, Seaman MA. A controlled, powerful multiple-comparison strategy for several situations. *Psychol Bull* 1994;115(1):153-159.
- [29] Sum MY, Ho NF, Sim K. Cross diagnostic comparisons of quality of life deficits in remitted and unremitted patients with schizophrenia and bipolar disorder. *Schizophr Res* 2015;168(1-2):191-196.
- [30] Chino B, Nemoto T, Fujii C, Mizuno M. Subjective assessments of the quality of life, well-being and self-efficacy in patients with schizophrenia. *Psychiatry Clin Neurosci* 2009;63(4):521-528.
- [31] Hoertnagl CM, Biedermann F, Yalcin-Siedentopf N, Muehlbacher M, Rauch A, Baumgartner S, et al. Prosodic and semantic affect perception in remitted patients with bipolar I disorder. *J Clin Psychiatry* 2015;76(6)e779-786.
- [32] Brissos S, Dias VV, Balanzá-Martinez V, Carita AI, Figueira ML. Symptomatic remission in schizophrenia patients: relationship with social functioning, quality of life, and neurocognitive

- performance. *Schizophr Res* 2011;129(2-3):133-136.
- [33] Goossens PJ, Hartong EG, Knoppert-van der Klein EA, van Achterberg T. Self-reported psychopathological symptoms and quality of life in outpatients with bipolar disorder. *Perspect Psychiatr Care* 2008;44(4):275-284.
- [34] Jaracz K, Górna K, Kiejda J, Grabowska-Fudala B, Jaracz J, Suwalska A, et al. Psychosocial functioning in relation to symptomatic remission: A longitudinal study of first episode schizophrenia. *Eur Psychiatry* 2015;30(8):907-913.
- [35] Karadayi G, Emiroğlu B, Uçok A. Relationship of symptomatic remission with quality of life and functionality in patients with schizophrenia. *Compr Psychiatry* 2011;52(6):701-707.
- [36] Sum MY, Ho NF, Sim K. Cross diagnostic comparisons of quality of life deficits in remitted and unremitted patients with schizophrenia and bipolar disorder. *Schizophr Res* 2015;168(1-2):191-196.
- [37] Wright MOD, Masten AS, Nayaran AJ. Resilience process in development: Four waves of research on positive adaptation in the context of adversity. In: Goldstein S, Brooks RB, editors. *Handbook of resilience in children*, 2nd ed., New York, NY: Springer; 2013, p. 15–37.
- [38] Echezarraga A, Calvete E, González-Pinto AM, Las Hayas C. Resilience dimensions and mental health outcomes in bipolar disorder in a follow-up study. *Stress Health* doi: 10.1002/smi.2767.
- [39] Murray G, Suto M, Hole R, Hale S, Amari E, Michalak EE. Self-management strategies used by 'high functioning' individuals with bipolar disorder: from research to clinical practice. *Clin Psychol Psychother* 2011;18(2):95-109.

Table 1: Sociodemographic and clinical variables

Variable	Group			Comparison (Overall)	
	Schizophrenia (N=52)	BD-I (N=60)	Controls (N=77)	Statistic ^a	p-value
Age	44.1 ± 10.6	43.2 ± 11.0	42.8 ± 12.1	F = 0.24	0.791
Sex					
Male	52% (27)	42% (25)	38% (29)	$\chi^2=2.63$	0.269
Female	48% (25)	58% (35)	62% (48)		
Education (years)	12.3 ± 2.9	13.8 ± 3.2	13.8 ± 3.4	$\chi^2 = 9.25$	<0.010 ^b
Employment (full- or part-time)	22% (11)	50% (30)	83% (64)	$\chi^2 = 46.3$	<0.001 ^c
Duration of illness (years)	15.4 ± 10.5	11.6 ± 10.2	-	$\chi^2 = 3.99$	0.046 ^e
RS-25 total score	132.1 ± 21.6	129.8 ± 23.1	150.4 ± 14.2	F = 23.3	<0.001 ^d
PANSS total score	57.4 ± 18.0			-	-
PANSS positive symptoms	12.7 ± 5.3			-	-
PANSS negative symptoms	16.1 ± 7.0			-	-
PANSS general symptoms	28.6 ± 8.8			-	-
MADRS		7.4 ± 8.2		-	-
YMRS		1.4 ± 2.8		-	-
Symptomatically remitted	36.6% (19)	62.7% (37)		$\chi^2 = 7.04$	0.008 ^f
Psychotropic medication					
FGA	0% (0)	2% (1)			
NGA	96% (50)	57% (34)			
FGA + NGA	4% (2)	2% (1)			
Mood stabilizer*	16% (8)	67% (40)			
Antidepressant	27% (14)	40% (24)			

Abbreviations: BD-I = bipolar I disorder; RS-25 = Resilience Scale; PANSS = Positive and Negative Syndrome Scale; MADRS = Montgomery-Asberg Depression Rating Scale; YMRS = Young Mania Rating Scale; FGA = first generation antipsychotic; NGA = new generation antipsychotic. Values are shown as mean ± SD or % (n).

* Category “mood stabilizer” includes lithium, valproate, and carbamazepine.

^a Analysis of variance or Kruskal-Wallis test or Chi-square test, depending on the variable type. Post-hoc comparisons were performed with the respective two-group tests.

^b Schizophrenia patients had significantly lower education levels than the other groups.

^c Significantly lower percentage of employed subjects in the two patient groups than in the control group;

significantly lower percentage of employed subjects in the schizophrenia than in the BD-I group.

^d Significantly lower RS-25 scores in patients than in control subjects.

^e Significantly longer duration of illness in schizophrenia than in BD-I patients.

^f Significantly larger proportion of symptomatically remitted subjects in BD-I than in schizophrenia group.

Table 2: Quality of Life (WHOQOL-BREF) by group

Domains of quality of life	Group									Statistics		
	(1) Schizophrenia			(2) BD-I			(3) Control			Overall ^a		Pairwise comparisons
	Mean	SD	N	Mean	SD	N				χ^2	p-value	
Global	62.0 ↓	21.9	52	63.1 ↓	21.5	60	77.8	15.0	77	24.0	<0.001	(1), (2) < (3) ^c
Physical	67.3 ↓	15.5	52	66.6 ↓	17.8	59	86.4	11.3	77	66.4	<0.001	(1), (2) < (3) ^c
Psychological	61.3 ↓	17.8	52	62.1 ↓	20.4	59	80.3	11.0	77	50.3	<0.001	(1), (2) < (3) ^c
Social	62.3 ↓	19.6	52	62.9 ↓	22.9	59	77.2	16.2	77	22.1	<0.001	(1), (2) < (3) ^c
Environment	71.7 ↓	14.7	52	78.1	12.4	59	81.8	10.3	77	15.5	<0.001	(1) < (2), (3) ^d
Total score	66.3 ↓	13.4	52	68.4 ↓	14.7	59	81.8	9.4	77	52.8	<0.001	(1), (2) < (3) ^c

Abbreviations: BD-I = bipolar I disorder; SD = standard deviation; N = sample size.

↓ significantly lower quality of life scores in patients compared to control subjects.

^a Kruskal-Wallis test.

^b Mann-Whitney U-test.

^c significantly lower scores in schizophrenia and BD-I patients than in control subjects.

^d significantly lower scores in schizophrenia patients than in BD-I patients or control subjects.

Table 3: Models for the prediction of health-related quality life (HRQOL) (WHOQOL-BREF total score)

3.1 Effect of diagnostic group on HRQOL (Model 1: Group)

Model information: $F=31.2$, d.f. = 2, $p<0.001$, adjusted $R^2 = 0.244$

Parameter	Beta	s.e.	Test statistic		d.f.	p-value
			F	t		
Group			31.20		2	<0.001
Schizophrenia	-15.56	2.23		-6.99	1	<0.001
BD-I	-13.43	2.15		-6.26	1	<0.001
Controls (reference)	0	.	.			.
Constant	81.84	1.41		57.92	1	<0.001

3.2 Additional effect of remission (Model 2 = Model 1 + Remission + Group*Remission)

Model information: $F=34.3$, d.f. = 4, $p<0.001$, adjusted $R^2 = 0.416$

Parameter	Beta	s.e.	Test statistic		d.f.	p-value
			F	t		
Group			8.28		2	<0.001
Schizophrenia	-8.80	2.79		-3.15	1	0.002
BD-I	-6.09	2.18		-2.79	1	0.006
Controls (reference)	0	.	.			.
Remission (yes vs. no)	19.68	2.93	49.92		1	<0.001
Group * Remission			4.41		1	0.037
Schizophrenia * Remission	-9.01	4.29		-2.10	1	0.037
BD-I (reference) * Remission	0					
Constant	81.84	1.24		65.92	1	<0.001

3.3 Additional effect of resilience (Model 3 = Model 2 + Resilience^a)

Model information: $F=50.1$, d.f. = 5, adjusted $R^2 = 0.567$

Parameter	Beta	s.e.	Test statistic		d.f.	p-value
			F	t		
Group			0.54		2	0.079
Schizophrenia	-5.64	2.43		-2.32	1	0.022
BD-I	-2.24	1.94		1.16	1	0.249
Control (reference)	0	.	.			.
Remission (yes vs no)	13.71	2.63	27.86		1	<0.001
Group * Remission			3.44		1	0.065
Schizophrenia * Remission	-6.88	3.71		-1.86	1	0.065
BD-I (reference) * Remission	0					
Resilience (RS-25 total)	0.324	0.028		11.78	1	<0.001
Constant	75.46	1.33		56.73	1	<0.001

Abbreviations: BD-I = bipolar I disorder; RS-25 = Resilience Scale, s.e. = standard error, d.f. = degrees of freedom

^a Non-significant interaction Group*Resilience removed ($F=0.31$; $df=2.180$; $p=0.737$)

Table 4: Separate models for the prediction of WHOQOL-BREF total score in remitted and non-remitted subjects

4.1 Remitted subjects

Model information: $F=21.4$, d.f. = 3, $p<0.001$, adjusted $R^2 = 0.317$

Parameter	Beta	s.e.	Test statistic		d.f.	p-value
			F	t		
Group			4.01		2	0.020
Schizophrenia	-5.93	2.16		-2.74	1	0.007
BD-I	-2.60	1.74		-1.49	1	0.138
Control (reference)	0	.	.			.
Resilience	0.277	0.044		6.29	1	<0.001
Constant	76.1	1.31		57.8	1	<0.001

4.2 Non-remitted subjects

Model information: $F=13.2$, d.f.=2, $p<0.001$, adjusted $R^2 = 0.310$

Parameter	Beta	s.e.	Test statistic		d.f.	p-value
			F	t		
Group			0.90		1	0.348
Schizophrenia	3.13	3.30				
BD-I (reference)	0					
Resilience	0.344	0.073		4.73	1	<0.001
Constant	59.9	2.63		22.8	1	<0.001

No significant difference between schizophrenia and BD-I patients in non-remitted subjects.